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Investigating the Relationship Between Children's Experiences During a Museum Health Promotion Program and Their Motivation to Learn and Adopt a Healthy Diet

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INVESTIGATING THE RELATIONSHIP BETWEEN CHILDREN'S EXPERIENCES DURING A MUSEUM HEALTH PROMOTION PROGRAM AND THEIR MOTIVATION TO LEARN AND ADOPT A HEALTHY DIET

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ABSTRACT

The purpose of this convergent parallel mixed methods study was to investigate children's learning experiences during the Eat a Georgia Rainbow program and to understand their motivation to learn about healthy eating and healthy cooking in relevance to the development of their intentions to adopt a healthy diet. The experiential learning theory was used as a lens during this study to emphasize the importance of participants learning experience through hands-on, task-oriented activities, and reflecting on the experiences. Recording camera-glasses, the Intrinsic Motivation Inventory (IMI) survey, Motivation for Diet survey, and follow-up individual interviews were used to collect data. In Phase I, data were collected from 50 child participants. During Phase II of the follow-up data collection, data were collected from 31 child participants and 20 parent participants. Pearson's Product-Moment Correlation and simple linear regression analyses were conducted. The interview data were transcribed and coded, and a thematic search was conducted. There was not a relationship between child's level of engagement, IMI survey scores, and Motivation for Diet survey scores. The child's level of engagement and IMI survey score did not influence the child's Motivation for Diet survey score. A joint display table was used to illustrate the integration of quantitative and qualitative data to compare and contrast the results. The interview data revealed that family conversations and participation in meal preparation did occur after the program. Exposing children to the topic of healthy eating and meal preparation is imperative, especially in an informal setting. Reinforcing what children were learning is imperative in sustaining long-term healthy behaviors; therefore, this model may be used in informal and higher education settings.

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CHAPTER I

INTRODUCTION

Background of the Problem

The U.S. Centers for Disease Control and Prevention (CDC, 2016) stated childhood obesity affects youth and adolescents between 6 to 19 years of age in the U.S. Childhood obesity is more prevalent among Hispanics (25.8%) and non-Hispanic Blacks (22.0%) than non-Hispanic Whites (14.1%; CDC, 2016). Several contributing factors relate to childhood obesity, such as poor eating habits, lack of physical activity, and social and environmental factors (CDC, 2016; Ebbeling, Pawlak, & Ludwig, 2002; Must & Strauss, 1999; Wang & Lobstein, 2006). Youth and adolescents with obesity are at high risk for chronic diseases, other life-threatening health issues, and social issues both in childhood and adulthood (Ebbeling et al., 2002; Must & Strauss, 1999; Wang & Lobstein, 2006).

Researchers have reported various prevention programs focusing on nutrition education and physical activity successfully controlled high rates of childhood obesity (Ammerman et al., 2007; Dehghan, Akhtar-Danesh, & Merchant, 2005). Additionally, programs increased nutrition knowledge, attitudes, and beliefs about eating practices (Acheampong & Haldeman, 2013; Klohe-Lehman et al., 2006; Packman & Kirk, 2000). Freedman (2010) noted that successful nutrition education programs, which influence behavior, families, and community members, must include creative approaches. Many studies support Freedman's claims. James, Thomas, Cavan, and Kerr (2004) conducted a study reducing the consumption of carbonated drinks among children ages 7 to 11 (*N* =

644). The researchers incorporated creative interactive strategies in the curriculum to educate students about the deleterious health effects of consuming soda. The results indicated that students reduced the amount of soda intake.

Traditionally, health fairs and health promotion events are based in schools and community health clinics (Glanz, Rimer, & Viswanath, 2008). However, recently, museums became a community source with the capability of offering health promotion programs to families that address specific health concerns (Chatterjee & Camic, 2015). Programs like the Eat a Georgia Rainbow offered at the Children's Museum of Atlanta, focuses on healthy meal preparation and healthy eating. Studies conducted in informal learning environments illustrated family learning does occur in informal settings, such as museums, arboretums, and walking trails through conversation, interaction, and engagement (Falk & Dierking, 2016; Uzick & Patrick, 2018; Zimmerman, McClain, & Crowl, 2013). Similarly, researchers used the family-based approach to conduct childhood obesity prevention programs to encourage family learning for behavioral change (Wilson et al., 2015). The family-based approach is defined as the engagement of all family members that reside in the same household in specific learning activity efforts to work toward positive changes (Schaeffer, 2014).

Falk and Dierking (2016) describe family interactions in informal settings as influencing the process and quality of children's learning. Additionally, researchers discussed incorporating intrinsic motivation to improve children's attitudes for health behavior. Knowing how children see things and what motivates them to learn is imperative. Ultimately, identifying children's intrinsic motivation can help teachers and parents to develop strategies and conversations to support children's motivation (Ryan &

Deci 2000). Even though much is known about learning in informal environments, little is known about children's intrinsic motivation while participating in a museum nutrition education program. There were gaps in literature that exists with nutrition education program utilizing the experiential learning theory and determining if there is a relationship among children's level of engagement during a children's nutrition education program, children's learning experiences measured by interest and enjoyment, their motivation for adopting a healthful diet, and family conversations that were occurring after the Eat a Georgia Rainbow program.

Problem Statement

The problem for this study is that little is known about the influence of children's engagement in a nutrition education program on children's learning experiences measured by interest and enjoyment (intrinsic motivation) and their motivation to adopt a healthy diet. According to the CDC (2016), childhood obesity is a major health concern in the U.S. derived from poor eating habits, lack of physical exercise, and environmental factors. Childhood obesity can lead to chronic diseases, poor academic performance, and other life-threatening health issues in adulthood (CDC, 2016). Based on previous research, there are multiple childhood obesity intervention and prevention programs that have been conducted, but high rates of childhood obesity are still prevalent (Dehghan et al., 2005). Adopting healthy eating habits is essential to weight loss and maintaining a healthy weight and can lead to reducing obesity (CDC, 2016). Data were collected from a minimum of 36 children (ages 4 to 13) who attended the Eat a Georgia Rainbow program at the Children's Museum of Atlanta located in Georgia. The study results identified the relationship among child's level of engagement, learning experiences measured by

interest and enjoyment, and motivation to adopt a healthful diet. Additionally, the results identified children's recollection of experiences during the Eat a Georgia Rainbow program 2 weeks after their attendance and family conversations that occurred after the Eat a Georgia Rainbow program.

Theoretical Framework

Experiential learning theory guided the current study, because the experiential learning theory emphasizes the importance of participants learning through hands-on, task-oriented activities (Wenger, 2009) and reflecting on their experiences (Cornell, Johnson, & Schwartz Jr., 2013; Kolb, 2014). The children learned about healthy meal preparations by participating in a hands-on cooking class during the Eat a Georgia Rainbow program and reported their learning experiences through the Intrinsic Motivation Inventory (IMI) survey as seen in Appendix A. Ryan and Deci (2000) created the IMI survey to measure participant interest and enjoyment. The current study results identified the components of family conversations that occur after the Eat a Georgia Rainbow program regarding meal preparation and healthy eating. Furthermore, Kolb (2014) described a learning cycle that includes concrete experience, reflective observation, abstract conceptualization, and active experimentation. Children experienced concrete experiences that support and encourage them to process the experiences after the visit (Ballantyne & Packer, 2010). Therefore, the resulting experiences can influence children's thoughts about healthy eating.

Additionally, Dudley, Cotton, and Peralta (2015) conducted a meta-analysis review of school-based teaching interventions that utilized the experiential learning approaches and focused on improving the eating habits of school-aged children. As a

result, authors identified that the experiential learning approaches showed the strongest effects on reducing the food consumption and energy intake. Additionally, the results indicated that experiential learning approach is a strong evidence-based strategy to increase nutritional knowledge among school-aged children. A study conducted by Jose, Patrick, and Moseley (2017) utilized the experiential learning theory to determine student's knowledge gained from a field trip. Researchers instructed students who attended the local delta environment as a field trip to draw configuration of land and water features before and after the field trip to measure the change in student's knowledge of the local delta environment. As a result, the scores from pre- and post-drawings indicated a significant difference in student's knowledge of the local delta environment gained from the field trip.

In the current study, the experiential learning theory was used as a lens to identify family conversations and determining the relationship among children's level of engagement, children's learning experiences during the Eat a Georgia Rainbow program, and their motivation for adopting a healthful diet.

Purpose of the Study

According to the CDC (2016), childhood obesity is prevalent among children ages 6 to 19, and, to prevent childhood obesity, children must participate in physical activity and adopt healthful diets. However, little is known about the influences of children's engagement in a nutrition education program on children's learning experiences measured by interest and enjoyment during a nutrition education program and intrinsic motivation to adopt a healthful diet. Therefore, the goal of this convergent parallel mixed methods study was to investigate children's learning experiences during the Eat a

Georgia Rainbow program and to understand their motivation to learn about healthy eating and healthy cooking in relevance to the development of their intentions to adopt a healthy diet.

The study took place at the Children's Museum of Atlanta, a nonprofit organization, which offered educational programs, community outreach initiatives, and exhibits located in Georgia promoting overall health. The Children's Museum of Atlanta offered a nutrition education program called Eat a Georgia Rainbow, which focused on fruits and vegetables harvested throughout the year in Georgia. In this nutrition education program, the families participated in a hands-on cold cooking activity in the art lab facilitated by museum chef. The researcher provided service to the Children's Museum of Atlanta by evaluating the Eat a Georgia Rainbow program. The results aided the museum with defining the effectiveness of their nutrition education program and advocate for childhood obesity prevention. Additionally, the results provide a better understanding of the influences of children's level of engagement during the Eat a Georgia Rainbow program on their learning experiences and their intentions for adopting a healthful diet.

Definitions of Terms

1. *Autonomy support*- the approach to encourage individuals to be autonomously motivated (Deci & Ryan, 1987).
2. *Body Mass Index (BMI)*- is a measure used to determine childhood overweight and obesity. BMI does not measure body fat directly, but BMI is correlated with more direct measures of body fat (CDC, 2016).
3. *Childhood obesity*- is defined as a child with a BMI at or above the 95th percentile for children and teens of the same age and sex (CDC, 2016).

4. *Children's level of engagement*- is measured by the amount times a child raises their hand to respond to questions (Micheletto, 2011).
5. *Children's Museum*- "an institution committed to serving the needs and interests of children by providing exhibits and programs that stimulate curiosity and motivate learning" (Association of Children's Museum, 2019, p.1).
6. Health- a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (World Health Organization, 2019).
7. *Healthy diet*- focuses on foods and beverages that help achieve and maintain a healthy weight, promote health, and prevent chronic disease (CDC, 2016).
8. *Health promotion*- "enables people to increase control over, and to improve, their health" (WHO, 2019, para. 1).
9. *Health education*- any combination of learning experiences designed to help individuals and communities improve their health, by increasing their knowledge or influencing their attitudes (WHO, 2019).
10. *Informal learning*- refers to learning activities that occur outside of school settings. ~~This~~ Informal learning can take place in many environments, such as science museums, natural history parks, geological zoos, etc. (Hofstein & Rosenfeld, 1996).
11. *Interest and Enjoyment*- is a subscale that is self-report measure of intrinsic motivation (Ryan & Deci, 2000).
12. *Intrinsic Motivation Inventory (IMI) survey*- is a multidimensional measurement tool intended to assess participants' subjective experience related to a specific learning activity. The instrument assesses participants' interests, enjoyment,

perceived competence, effort, value, and perceived choice while performing a particular activity through autonomy (Ryan & Deci, 2000).

13. *Motivation for diet*- occurs when the individual is willing to adopt a healthy eating habit without external rewards, but through autonomous motivation (Kitzman-Ulrich, 2010).
14. *Museum*- an institute that presents collections of artifacts to the public for educational and enjoyment purposes (Falk, Moussouri, & Coulson, 1998).
15. *Nutrition*- the intake of food, considered in relation to the body's dietary needs (WHO, 2019).
16. *Nutrition education*- is the set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviors conducive to health and well-being (Washington State Department of Social and Health Sciences, 2018).
17. Overweight- is defined as an individual with a BMI between the 85th percentile to less than or equal to 94th percentile (CDC, 2016).

Significance of the Study

This study was beneficial because the results could help the museum staff to develop effective strategies to deliver nutrition education programs to families that motivate children to learn about healthy eating and healthy meal preparation. The researcher applied a convergent parallel mixed methods approach to determine the effectiveness of a museum nutrition education program, which focused on nutrition education among children. The researcher determined if there was a relationship among children's level engagement, learning experiences measured by the IMI survey, and

motivation for adopting a healthful diet. The current study was significant to participants and their families, museum educators, researchers, and school educators because the findings indicated the children had high scores of interest and enjoyment during the Eat a Georgia Rainbow program. The overall results could help the museum educators, school educators, and parents understand what engages and motivates children to learn and adopt a healthful diet. Moreover, the results could aid teachers and parents as they develop learning strategies and support learning conversations for children. Research indicates that determining the effectiveness of intervention programs offered in a museum setting is difficult because the museum visit is time sensitive and following up with participants to identify the long-term effect can be ~~is~~ challenging. Data determined the effects of the Eat a Georgia Rainbow program on children's level of engagement, learning experiences, motivation to adopt a healthful diet, and the identification of components of family conversations relating to healthy eating and meal preparation.

Ultimately, this study could be beneficial to program planners developing health curricula because the results may be used to develop and adopt new strategies for museum and school-based nutrition education programs. This study was significant to the researcher because the researcher is interested in children's health research and the contribution of this work could help improve nutrition education programs for children offered in informal learning settings and schools. In order to determine the influence of the Children's Museum of Atlanta's Eat a Georgia Rainbow program on children, the researcher focused on the following questions:

Research Questions

1. What is the relationship between child level of engagement during the Eat a Georgia Rainbow program and their IMI survey scores? (Quantitative Research Question)

   Null Hypothesis: There is no statistically significant relationship between child's level of engagement and IMI survey scores.

   Alternate Hypothesis: There is a statistically significant relationship between child's level of engagement and IMI survey scores.

2. What is the relationship between child level of engagement during the Eat a Georgia Rainbow program and their Motivation for Diet survey score? (Quantitative Research Question)

   Null Hypothesis: There is no statistically significant relationship between child's level of engagement and IMI survey scores.

   Alternate Hypothesis: There is a statistically significant relationship between child's level of engagement and IMI survey scores.

3. Does the child's level of engagement influence their motivation for diet survey score to a statistically significant degree? (Quantitative Research Question)

   Null Hypothesis: The child's level of engagement does not influence their motivation for Diet survey score to a statistically significant degree.

   Alternate Hypothesis: The child's level of engagement does influence their motivation for Diet survey score to a statistically significant degree.

4. Does the child's IMI score influence their motivation for diet survey score to a statistically significant degree? (Quantitative Research Question)

Null Hypothesis: The child's IMI score does not influence their motivation for diet survey score to a statistically significant degree.

Alternate Hypothesis: The child's IMI score does influence their level of engagement to a statistically significant degree.

5. What conversations and interactions regarding healthy eating and meal preparation are occurring within families after the Eat a Georgia Rainbow program? (Qualitative Research Question)
6. What are parent's perceptions of their children's knowledge 2 weeks after the Eat a Georgia Rainbow program? (Qualitative Research Question)
7. What are children's perceptions of the Eat a Georgia Rainbow program 2 weeks after attending? (Qualitative Research Question)
8. How do the interviews of parents and children support the relationship between child's level of engagement, IMI survey score, and Motivation for Diet survey score? (Mixed Methods Research Question)

Methodology Overview

To answer the research questions, the researcher used a convergent parallel mixed methods approach to investigate children's learning experiences during the Eat a Georgia Rainbow program and to understand their motivation to learn about healthy eating and healthy cooking in relevance to the development of their intentions to adopt a healthy diet. The convergent parallel design allowed the researcher to collect data concurrently, analyze the quantitative and qualitative data separately, and merged the data to interpret findings (Fetters, Curry, & Creswell, 2013).

Quantitative

Quantitative data were collected through recording camera-glasses worn by children, IMI survey and Motivation for Diet survey. The camera-glasses were self-worn glasses and record visual and audible data (Burbank, McGregor, & Wild, 2018; Zhou, Xu, David, & Chalon, 2014). On the day of the Eat a Georgia Rainbow program, the children, who completed the cooking class and wore the camera-glasses, were asked to complete the IMI survey. The survey measured the children's interest and enjoyment of the Eat a Georgia Rainbow program (Ryan & Deci, 2000). The IMI survey also included three demographic questions, age, gender, and ethnic background. Additionally, the Motivation for Diet survey was used as a follow-up instrument and was used 2 weeks after the children attended the Eat a Georgia Rainbow program. The Motivation for Diet survey measured the child's willingness to adopt a healthy diet (Kitzman-Ulrich et al., 2011; Wilson et al., 2002).

Qualitative

Follow-up interviews were conducted with the child(ren) and the parent 2 weeks after their attendance of the Eat a Georgia Rainbow program. However, the parent interview was conducted without the child present. The parent questions pertained to what parents thought their children learned during Eat a Georgia Rainbow, whether or not family conversation regarding healthy eating and or meal preparation occurred after Eat a Georgia Rainbow, and whether or not the child participated in meal preparation after Eat a Georgia Rainbow. The researcher asked the child questions pertaining to their recollection of what food item was prepared the day of Eat a Georgia Rainbow, recollection of ingredients used that day, their perceptions of healthy ingredients, and

their experiences during Eat a Georgia Rainbow. If data were previously collected from more than one child per family, the follow-up interviews were conducted separately.

Design

A convergent parallel mixed methods design was appropriate for the current study because the goal of the study was to determine the existence of the relationship among the observed variables (i.e., child's level of engagement, IMI survey score, and Motivation for Diet survey score). As seen in Figure 1, the researcher collected data through two phases. Phase I: During the Eat a Georgia Rainbow program, quantitative data were collected using camera-glasses worn by children. The camera-glasses were an appropriate data collection tool to record environmental conditions, in which behaviors and conversations occur during the nutrition education program (Burbank et al., 2018; Zhou et al., 2014). Quantitative data were also collected in Phase I through the completion of the IMI surveys from the children. The IMI survey determined the children's perceived interest and the enjoyment of the learning experience during the Eat a Georgia Rainbow program. The camera-glasses were used to collect children's level of engagement that is measured by the number of times the child raised their hand and attempted to respond to a question during the cooking class whether or not the child was called on and whether or not the child's response was correct. Phase II: Qualitative and quantitative data were collected during follow-up, ~~two~~ 2 weeks after the Eat a Georgia Rainbow program from the same participants. The qualitative data were collected from both the parent and the child separately through interview questions. If follow-up data were collected from more than one child per family, each child was interviewed separately. The Motivation for Diet survey collected in Phase II assessed the children's

motivation for healthy eating and a high score on the survey indicated a positive self-concept and greater motivation with the intent to adopt a healthful diet.

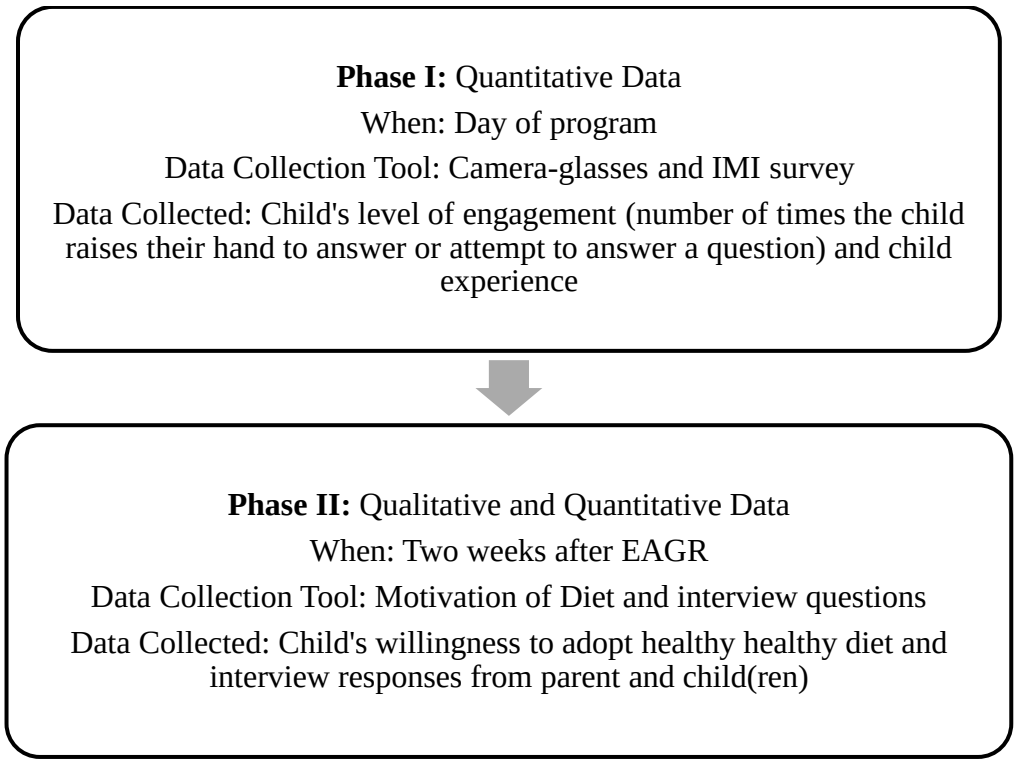

Figure 1. Demonstration of Two Phases of Data Collection.

Setting and Participants

Convenience sampling was be used to select prospective participants for this study. Children were selected based on the age range from 4 to 14 years. According the G*Power analysis, 36 was the recommended sample size. Therefore, at least 36 children were recruited from the Eat a Georgia Rainbow program at the Children's Museum of Atlanta with their families. The participants represented various demographic groups. The target participants were children, but qualitative data were collected from families to identify family conversations and interactions after the Eat a Georgia Rainbow program. In Phases I of the data collection, data were collected from the children data, and, in Phase II, data were collected from both child participants and parent participants.

Procedure

Prior to collecting data, the legal guardian signed an informed consent form (Appendix E) and children signed a child assent form (Appendix F). Explanations and instructions on how and when to wear the camera-glasses were given, and contact information (email or phone numbers) were collected for the follow-up survey. Families were assigned an identifying code to link the recordings, IMI survey, follow-up interviews, and Motivation for Diet survey for the data analysis and interpretation phase. Children were provided codes based on their family code. For example, a female child from family was assigned the code FAFC (Family A Female Child). Camera-glasses, surveys, and follow-up interviews were used to collect data. The data determined whether or not the conversations relate to healthy eating and meal preparation and the relationship among children's level of engagement, children's interest, enjoyment of the nutrition education program, and self-reported motivation for a healthy diet.

The self-worn camera-glasses visually and audibly captured the number of times the child raised their hands during the nutrition education program and allowed researchers to access personal and public data at anytime and anywhere (Burbank et al., 2018; Zhou et al., 2014). The children wore the camera-glasses for the complete duration of the nutrition education program. If the child left the nutrition education program, the child was asked to remove the camera-glasses. The IMI survey assessed the children's interest and enjoyment they experience during the Eat a Georgia Rainbow program. The interest and enjoyment subscale measured the learner's intrinsic motivation, and therefore, using this survey measured the participant's subjective experience (Ryan & Deci, 2000). McAuley, Duncan, and Tammen (1989) examined validity and reliability of

the IMI subscales and found strong support for the reliability and validity. The IMI survey was facilitated face-to-face at the museum the same day the participants participated in the Eat a Georgia Rainbow program. The survey measured children's perspectives of their experience from the Eat a Georgia Rainbow program. Subsequently, the Motivation for Diet survey was used for follow-up and was conducted with the same participants ~~that~~ who attended the nutrition education program, participated in wearing the camera-glasses, and completed the IMI surveys. The follow-up survey is reliable and valid measurement tool that assessed regulatory motivation around healthy eating and a high score indicated the participant's intent for a healthy diet (Kitzman-Ulrich et al., 2011; Wilson et al., 2002). The follow-up survey and interviews were conducted through video conferencing, such as FaceTime, and/or by phone to ensure the parents were present and to validate the identity of the child.

Analysis

The camera-glass data were downloaded to a password protected hard drive for transcribing and data analysis purposes. The researcher counted the number of times the child raised their hands during the Eat a Georgia Rainbow program. The recordings were not transcribed because the number of times a child raised their hand was the only visual data needed to measure the child's level of engagement. The camera-glasses recordings visibly showed the number of times children raised their hand during the learning activity during Eat a Georgia Rainbow. The IMI survey item scores were aggregated within each subscale for each participant, and a high score measured participant interest and enjoyment they experience during the program. The Motivation for Diet survey responses were aggregated within each subscale for each participant. A high score on the

Motivation for Diet survey measured the participant's self-concept and motivation with an intent for adopting a healthful diet. The IMI survey scores and the Motivation for Diet survey scores were inputted into SPSS. A Pearson's Correlation analysis and a simple linear regression analysis were conducted. The analyses results determined children who engaged during the Eat a Georgia Rainbow program, found the nutrition education program interesting and enjoyable, and if the Eat a Georgia Rainbow program influenced participant's intentions to adopt a healthy diet. Participants' identifying codes were linked to the recording, IMI survey, follow-up interviews, and Motivation for Diet survey results to interpret the findings. The follow-up interviews were transcribed, and open-coding and a thematic analysis were conducted to determine family interactions with meal preparations~~,~~ and topics of conversation that occur after the Eat a Georgia Rainbow program. A joint display table was used to compare and contrast the results from the quantitative and qualitative results (Creswell & Clark, 2017).

Limitations

The results from the reliability testing in SPSS yielded a low Cronbach's alpha value of .521 for the Motivation for Diet survey. One possible reason for the low reliability was ~~is~~ low inter-item correlation and missing values. However, the researcher relied on the exception of the skewness (0.070) and kurtosis (-1.137) values being below 2.1 and 7.1 to compute the parametric analyses. Furthermore, the items on the Motivation for Diet survey features the phrases, such as "everyday" and "most days", would be difficult for participants to conceptualize and report because attending a cooking class for 30 minutes only once may not translate to children wanting to adopt a healthy diet on a long-term daily basis. Therefore, if the researcher assessed a recurring

nutrition education program rather than a short-term cooking class, then the results may be generalized beyond the given environment.

Only 31 participants were interviewed during Phase II of the study out of the 50 participants who participated in the Eat a Georgia Rainbow program in Phase I. However, incentives were used as an effort to collect follow-up data from participants. The target population included school-aged children, and the study was conducted during the school year. Therefore, collecting follow-up data was challenging due to conflicting schedules with parent availability because parents were required to be present on the virtual call during follow-up. Failure to secure all 50 participants for the follow-up data collection may have impacted the generalizability.

The number of camera-glasses available determined the number of participants who were able to participate in the study. Over the course of seven visits, there were 96 program attendees, but the researcher was only able to collect intake data from 50 participants. The camera-glasses data were difficult to analyze, and the researcher had to rely on other participant camera-glasses data to determine the level of engagement due to the constant movement of the child. Parent interviews can reflect response bias because the questions were related to their child's behavior and there is not substantial evidence to validate that the events parents reported did or did not occur.

There was a trend noticed in the joint display table of high IMI and Motivation for Diet survey scores but low level of engagement. Due to the survey data being self-reported, the results can yield to social desirability bias. Social desirability occurs when survey respondents amplify in reporting positive behaviors to devalue the negative behaviors (Andersen & Mayerl, 2017).

Both the quantitative and qualitative data were not analyzed by age range. Due to the wide age range of the participants of 4 to 14 years of age, the data did not capture all age groups in the general population. As a result, the wide age range may impact the external validity of the study results.

Summary

Childhood obesity is a major issue in the United States that affects children and can lead to chronic diseases, poor academic performance, and other potential life-threatening health issues. This issue brings attention to the need for developing intervention strategies to improve the increasing rates of childhood obesity. There is a need for effective nutrition education programs to promote healthy eating, healthy cooking, and overall health. Museums possess the ability to reach a diverse population and the capacity to offer nutrition education program to the community and their positioning to develop programs addressing various health concerns. However, the effectiveness of museum nutrition education program must be evaluated, and evaluation must take into consideration that museum visits are short and difficult for follow-up measures. Moreover, researchers state that identifying the motivation of an individual can lead to the prediction of behavior quality. Recognizing how children see things and what motivates them to learn can allow teachers and parents to implement strategies and conversation, which support children's learning. However, little is known about the motivation and engagement level of children during a museum nutrition education program.

Through the experiential learning theory, the researcher utilized a convergent parallel mixed methods approach to determine the relationship among children's level of

engagement during the Eat a Georgia Rainbow program by identifying their learning experiences and intentions to adopt a healthy diet that contributed to the continuing efforts of childhood obesity prevention. In doing so, the researcher collected data from the same participants utilizing camera-glasses and conducting a face-to-face survey and follow-up survey, and individual interviews by FaceTime or phone. The camera-glasses captured the participant's level of engagement, the IMI surveys recorded interest and enjoyment during the nutrition education program, the follow-up interviews measured the family's interaction with meal preparation, conversations regarding healthy eating, child's recollection of their experiences during the Eat a Georgia Rainbow program, and the follow-up Motivation for Diet survey measured the participant's regulatory motivation with the intent for healthy eating. The quantitative data collected through the camera-glasses were not transcribed because the number of times a child raised their hand was the only visual data needed to measure the child's level of engagement. The qualitative data collected through the interviews identified family conversations that occurred after the Eat a Georgia Rainbow program. The follow-up recordings were transcribed and coded, and a thematic analysis was computed. The scores from the IMI survey, Motivation for Diet survey, and child's level of engagement were entered into SPSS. A Pearson's correlation was used to determine the degree of the relationship between children's level of engagement, children's interest and enjoyment, and motivation for healthy eating. A simple linear regression analysis was computed to measure the influence of child's level of engagement and IMI survey score on the Motivation for Diet survey score.

CHAPTER II

REVIEW OF LITERATURE

Introduction

Childhood obesity is a pressing issue in the United States that has negatively impacted children's physical and psychosocial health (CDC, 2016). Because of this health issue, many efforts focus on combatting the high childhood obesity rates (Dudley et al., 2015; Must & Strauss, 1999). Strategies included nutrition education program promoting healthy eating and physical exercise to prevent childhood obesity in a child care setting, schools, and learning institutes (Ammerman et al., 2007). Researchers discussed incorporating intrinsic motivation to improve individual's attitudes for health behavior (Ryan & Deci, 2000). Historically, museums collected artifacts to present to the general public for the purpose of education and enjoyment and are now known to serve as educational providers to the local community (Falk & Dierking, 2016). Researchers found family informal learning does occur in museums and family interaction can influence how much children learn (Falk & Dierking, 2000). Results show that family interaction and family learning positively affect improved outcomes (Järvelä & Renninger, 2014). Moreover, researchers noted that learning in informal environments are linked to motivation, prior knowledge, and experience (Falk & Storksdieck, 2005). Recently, museums play a significant role in addressing health issues and implemented programs to promote overall health. In fact, collaboration with professionals from public health, adult and social care, and health institutes can help museums to be equipped to support the health and wellbeing of their community members, and contribute to

improving health and wellbeing (Dodd & Jones, 2014). Additionally, Freedman (2010) suggested that researchers must employ creative approaches to achieve effective nutrition programs to influence behavior, families, and community members. To help guide museum educators to design and implement effective and creative programs, researchers must understand what keeps children interested (motivated) and engaged during nutrition education program (Ryan & Deci, 2000). However, Friedman (2007) suggested the evaluation of intervention programs implemented in a museum setting is problematic because visits are typically short and following up with participants is difficult. The difficulty with following up with participants make evaluation challenging for researchers to determine the long-term health effects (as cited in Christensen, Bønnelycke, Mygind, & Bentsen, 2016, p. 26).

The review of literature focuses on defining childhood obesity, identifying where childhood obesity is most likely to occur, who is most likely to be affected by childhood obesity, the causation and consequences of the health issue, and the strategies that work toward efforts to prevent and treat the childhood obesity. The literature also overviews the different types of learning, defining museums, family interaction and engagement, children learning through intrinsic motivation, and the integration of nutrition education programs and museums.

Defining Childhood Obesity

According to the CDC (2016), childhood obesity is determined by the child's BMI calculated by dividing an individual's weight in kilograms by the square of height in meters. To determine a child's BMI percentage, the child's age, sex, and height are considered. Children with normal or healthy weight have a BMI between the 5th and 84th

percentile, children who are overweight have a BMI between 85th and 95th percentile, and children who are obese have a BMI that is greater than or equal to the 95th percentile (CDC, 2016). Childhood obesity affects school-aged children and adolescents between the ages of 6 and 19 years (CDC, 2016; Must & Strauss, 1999). Factors contributing to childhood obesity are behaviors, such as poor dietary intake and lack of physical activity (Ebbeling et al., 2002; Must & Strauss, 1999; Ogden, Carroll, Kit, & Flegal, 2012; Reilly et al., 2005; Wang & Lobstein, 2006). Interestingly, multiple studies show childhood obesity is more prevalent among individuals who are in a lower socioeconomic status compare to individuals who are in a higher socioeconomic status (Hollar et al., 2010; Must & Strauss, 1999; Nepper & Chai 2016; Sallis & Glanz, 2006).

Childhood Obesity and Socioeconomic Status

Additional factors contributed to childhood obesity include environmental factors. For instance, lower socioeconomic status increases risks for childhood obesity due to the environmental factors (Hollar et al., 2010; Must & Strauss, 1999; Nepper & Chai 2016; Sallis & Glanz, 2006). Children who live in lower socioeconomic neighborhoods with limited access to walkable sidewalks, food markets with fresh fruits and vegetables, and recreational facilities have a higher likelihood of developing obesity. Authors suggested that even when lower income neighborhoods with access to markets with healthful food options, purchasing healthful foods is difficult due to high cost (Hollar et al., 2010; Sallis & Glanz, 2006). Researchers pointed out the lack of accessibility to preventative factors of childhood obesity can affect lifestyle changing decisions and eating patterns among low-income youth (Hollar et al., 2010; Sallis & Glanz, 2006). The implementation of prevention programs should reach all racial, ethnic, and socioeconomic groups to address

health disparities. Considering museums are community venues reaching a diverse population across rural and urban settings, these informal settings can be an ideal community source to develop and implement nutrition education programs to address the health disparities (Camic & Chatterjee, 2013).

Short-term and long-term effects. Childhood obesity is derived from behaviors, such as consuming unhealthy foods and not participating in the recommended amount of physical activity (CDC, 2016). Addressing this health issue is imperative because children with obesity are at high risk for developing immediate health risks. Obese children are at high risk for immediate issues, such as Type 2 diabetes, high blood pressure, high cholesterol, respiratory issues, sleep apnea, poor academic performance, and psychosocial issues (CDC, 2016; Must & Strauss, 1999). According to Ebbeling et al. (2002), childhood obesity, which if not immediately addressed, can result in short-term and long-term health effects. For example, children, who are obese, are more susceptible to life threatening health issues, such as adult obesity, cardiovascular disease, cancer, and Type 2 diabetes. Ultimately, childhood obesity can lead to further health complications and poor quality of life in both childhood and adulthood (Ebbeling et al., 2002; Must & Strauss, 1999; Wang & Lobstein, 2006). Although health risks affect the quality of life of youth and adolescents, the effect childhood obesity has on academic performance is impactful (Datar, Sturm, & Magnabosco, 2004; Hollar et al., 2010; Mo-suwan, Lebel, Puetoaiboon, & Junjana, 1999).

Childhood obesity affects academic performance. Researchers noted there is a relationship between student's overweight status and poor academic performance (Datar et al., 2004; Hollar et al., 2010; Mo-suwan et al., 1999). Hollar et al. (2010) assessed a

school-based prevention program that targeted low-income elementary school children to determine the relationship between student's weight status and academic performance. The program focused on dietary, curricula, and physical exercise components on BMI percentiles and academic performance. Hollar et al. (2010) conducted a quasi-experimental study over a two-year period that consisted of four intervention schools and one control school with 4,588 school children. The results indicated children who were obese had lower IQ scores and lower test scores compared to children who were not overweight or obese (Hollar et al., 2010). The lower IQ scores and lower test scores resulted from the children's poor academic performance.

Similarly, in Datar et al.'s (2004) study, the researchers conducted a longitudinal study to analyze the relationship between overweight students and academic performance in kindergarten and first grade. To determine the relationship, the authors compared the overweight students' academic performance to the non-overweight students' academic performance. As a result, the students who were overweight demonstrated lower test scores in math and reading in kindergarten. Subsequently, the students who were overweight in kindergarten continued to indicate lower math and reading test scores at the end of first grade. The authors also reported that there was a relationship between poor academic performance and the stigma of being overweight during the first years of elementary school (Datar et al., 2004).

In contrast, Mo-suwan et al. (1999) reported the association between students being overweight and academic achievement during adolescence (Grades 7 through 9). The authors also focused on determining the association between the students who were overweight (BMI between the 84th and 94th percentile) and their academic performance

through a cross-sectional and longitudinal study utilizing the students' grade records in math and Thai language. However, the authors compared the overweight status and academic performance of children in third through sixth grade with the overweight status and academic performance of young adolescents in seventh to ninth grade. As a result, overweight subjects (BMI value > 85th percentile of the first National Health and Nutrition Examination Survey data for age and gender) in Grades 7 to 9 had a mean GPA of 0.20 (95% *CI* = 0.04, 0.37), which indicated that students in Grades 7 to 9 who were initially overweight, remained overweight during adolescence, were associated with poor academic performance. The association between overweight students and poor academic performance with children in third through sixth grade was not found (Mo-suwan et al., 1999).

Preventing childhood obesity. According to the CDC (2016), there is not a simple solution to reducing the high rates of childhood obesity. Although, childhood obesity has been a significant health issue in the United States and has gained attention from policy makers, researchers, educators, and health providers to develop and implement various intervention and prevention programs to address childhood obesity (Ebbeling et al., 2002). In fact, researchers agreed on prevention programs contributing to controlling the high rates of obesity in the United States (Dehghan et al., 2005).

James, Thomas, Cavan, and Kerr (2004) stated programs focusing on consuming less foods that are high in fat and sugars and increasing physical exercise can prevent excess weight gain. In turn, children would be less susceptible to becoming obese. Many investigations and study results report short-term behavioral changes preventing and treating childhood obesity, but there are challenges to encouraging youth and adolescents

to sustain those health behaviors (James et al., 2004). Educators, parents, and health care providers should focus on the factors to motivate youth and adolescent for learning. As a result, through autonomous motivation, youth and adolescent are more likely to sustain their healthy behaviors (Deci & Ryan, 2008; Dwyer et al., 2017; Johnson & Scal, 2015).

Pandita et al.'s (2016) work focused on preventing childhood obesity rather than treatment because the researchers believed that developing effective strategies and programs to prevent childhood obesity will be successful in obesity control. In this article, the researchers emphasized obese adults have more of a challenge when it comes to losing weight and treatment procedures can become costly (Pandita et al., 2016). The authors have also suggested in their work of the different prevention strategies that will help achieve success in preventing childhood obesity. Researchers recommended that preschool-aged children and parents should be exposed to nutrition education to develop health eating practices, offer healthy food preferences, and track the rate of weight gain to prevent being overweight. Children should be monitored for both weight and height, prevented excess body fat gain, provided nutritional education counseling, and encouraged to participate in physical activity. Adolescences should prevent weight gain after growth spurt, maintain healthy eating habits, and reinforce participation in physical activity (Pandita et al., 2016).

A quasi-experimental study conducted by Jarpe-Ratner, Folkens, Sharma, Daro, and Edens (2016) evaluated a nutrition cooking class education program that was focused on the consumption of fruits and vegetables. The program targeted underserved 17 elementary and middle schools with 271 students (n = 271), located in Chicago. The purpose of this program was to encourage and increase children's desire to choose fruits

and vegetables, cooking at home, and family conversations in regard to healthy eating (Jarpe-Ratner et al., 2016). The 10-week after-school program was held in the kitchen cafeterias. The lessons included a 30-minute lecture and discussion of nutrition principles and cultural awareness, a 75-minute hands-on cooking and instruction, and 15 minutes of conversation and meal sharing (Jarpe-Ratner et al., 2016). Both parents and students completed a pre and post-survey to assess the effectiveness of the after-school program. The children survey results reported an increase of vegetable consumption by approximately 0.2 ($p < .05$), increased fruit consumption by 0.23 ($p < .001$) and showed an increase in nutrition knowledge from 0.6 to 0.8 ($p < .05$). However, the results indicated that the program did not significantly affect student's desire for fruits and vegetables (Jarpe-Ratner et al., 2016). Parents reported their child's participation in the cooking class significantly increased the score for family conversations in regard to healthy food by 0.3 ($p < .01$), the score for how often their child participated in meal preparation by 0.2 ($p < .05$), and the score for parents' perception of their ability to prepare a healthy meal by 0.2 ($p < .001$). The researchers suggested that implementing a nutrition education program that incorporated experiential learning hands-on cooking class to underserved communities can be ~~is~~ successful in achieving increased nutrition knowledge, family conversations about healthy eating, and children participation in meal preparation at home (Jarpe-Ratner et al., 2016). Additionally, the researchers did suggest including components, such as a community garden and physical activity, in the program, which focus more on preventing childhood obesity (Jarpe-Ratner et al., 2016).

Defining Health Promotion Programs

The purposes of health promotion programs are to address significant health problems to a target population and to implement strategies to successfully achieve behavior change (Glanz et al., 2008). A family-based or school-based approach is most likely to be used in successful treatment of childhood obesity (Ebbeling et al., 2002). Kitzman-Ulrich et al. (2010) noted studies incorporated a training for authoritative parenting styles, parenting skills or child management, and family functioning to treatment programs resulted in positive outcomes for the intended behavior change. Moreover, researchers noted schools are best fit to address childhood obesity and implement programs, but the programs must be able to reduce incidence and prevalence of overweight and obesity across gender without initiating an inappropriate weight controlling behaviors (Dehghan et al., 2005; Mahmood, Perveen, Dino, Ibrahim, & Mehraj, 2014). Effective nutrition education programs are essential because they address health issues in the local communities and advocate for schools to adopt and implement health practices to improve children's health (Glanz et al., 2008).

School-based programs. Schools are great avenues to address and implement childhood obesity prevention programs because schools have the capabilities to incorporate nutrition and physical activity education to curriculums to reach all students. One of the immediate effects of childhood obesity is lower academic performance compared to non-obese children (Datar et al., 2004; Hollar et al., 2010; Mo-suwan et al., 1999). Educators can potentially prevent the decline of children's academic performance through the implementation of childhood obesity prevention programs at their school. Ebbeling et al.'s (2002) reviewed a school-based program called the Pathways program.

The program was designed to decrease high fat consumption and increase physical activity for American-Indian children, who are at high risk for cardiovascular disease and Type 2 diabetes. The results indicated that there was significant decrease in consumption of foods high in fat and increase in physical activity, but there was not a difference in BMI between children in the intervention and control group.

Kropski, Keckley, and Jensen (2008) conducted a systematic review to observe the effectiveness of school-based programs focusing on reducing childhood obesity. The observed studies utilized an experimental or quasi-experimental design, reported primary or secondary outcomes in terms of BMI, provided a measure of body fat prevalence, reported outcomes at least six months post-baseline, applied curricular and/or environmental in the study design, and applied preventive interventions involving both overweight and normal-weight children. As a result, the review indicated that one study showed evidence of reducing the odds ratio for overweight among fourth-grade females. Meanwhile, four studies reported significant improvements in BMI or at-risk-for overweight or overweight prevalence among second-grade males and females. Twelve studies reported significant improvement in dietary intake, physical activity, and sedentary behavior.

Veugelers and Fitzgerald (2005) conducted a multilevel comparison of school-based obesity prevention programs to determine the effectiveness of the programs implemented in schools. The researchers surveyed 5,200 fifth-grade students, parents, and school principals and compared excess body weight, diet, and physical activity across schools that include with and without nutrition programs using simple linear regression methods. The researchers indicated that students, who participated in school-based

programs, illustrated lower rates of obesity and overweight, healthier diets, and reported more physical activity compared to those students who did not participate in a nutrition program. Ultimately, the researchers concluded through their review that school-based nutrition and physical activity programs show great promise because the programs can potentially reach almost all students and improve the future health of children (Veugelers & Fitzgerald, 2005).

In an intervention program, James et al. (2004) focused on nutrition with children (N = 644) between the ages of 7 to 11 years. The researchers aimed to reduce the consumption of carbonated drinks to prevent excessive weight gain. Teachers were involved in the one-hour facilitated class and were instructed to reiterate the content outside of the facilitated classes. During this school-based program, researchers developed creative strategies for students to learn about carbonated drinks and the potential health effects from carbonated drinks. For example, one of the lessons required students to participate in a music competition. Students were given a copy of a song (i.e., Ditch the Fizz) and facilitators challenged students to produce a song or a rap with a healthy message. The final session included students participating in a presentation of art and a quiz related to a popular television game show. The researcher utilized a cluster randomized controlled trial to analyze the data. As a result, students in the intervention group decreased their carbonated drinks consumption by 0.6 glasses compared to the controlled group, who increased their consumption by 0.2 glasses. At the end of the 12-month program, there was an increase of 7.5% of overweight and obese children in the control group and a decrease in the intervention group of 0.2%. James et al. (2004)

suggested that reduction of consuming carbonated drinks in children can prevent excessive weight gain and in turn, prevent obesity.

Family-based programs. Dehghan et al. (2005) implied most approaches exclusively focusing on behavior change showed little impact on the high rates of childhood obesity. Additionally, the authors went on to discuss implementing programs addressing built environment factors, home environment factors, physical activity, and dietary intake can potentially achieve prevention. Dehghan et al. (2005) suggested using the family-based approach during the implementation of childhood obesity programs to achieve positive outcomes because family is relevant in children's health behaviors.

A family-based intervention study conducted by Epstein, Paluch, Consalvi, Riordan, and Scholl's (2002), used behavioral strategies with families and their children who are obese, to reduce the consumption of high calorie foods and increase in physical exercise. As a result, children showed significant ($p < .001$) increases of 50% and decreases of 53% in targeted sedentary behaviors from baseline during the increase and decreases phases. During the 10-year follow-up, there was a 7.5% decrease among participants who were overweight in the experimental group. There was a 14.3% increase of being overweight among participants within the control group. However, less than half of the participants in the intervention group maintained a 20% decrease in overweight.

Thomas (2006) reviewed 57 controlled trials that focused on improving dietary intake and increasing physical activity among youth. The purpose of the review was to gain a better understanding of the effectiveness of childhood obesity prevention programs that focuses on the level of parental involvement. Out of 57 studies, only 25 studies were related to improving dietary intake and increasing physical activity. Only one study

showed significant differences in both dietary intake and physical activity outcomes. Additionally, among the 25 studies that related to both intended outcomes, 13 showed significant differences in only dietary intake. The results indicated that family involvement showed some positive effects on the outcomes. However, the direct impact of family involvement on both outcomes was difficult to conclude because the researcher was not able to compare across all studies due to the variety in intensity, duration, and activities that the parents were involved in. To address the issue of comparison, Thomas (2006) suggested future studies should thoroughly monitor parental activities to help researchers exclusively conclude the effectiveness of parental involvement within nutrition education programs.

Defining Intrinsic Motivation and Flow

Intrinsic motivation. Through Deci and Ryan's (1985) extensive work, the researchers determined that being able to identify individual's motivation can lead to the prediction of the individual's quality of behavior. Deci and Ryan (2008) also described that children who were autonomously motivated showed interest and found enjoyment in the learning activity they were engaged, and therefore, the motivation was internally moving the individual to action. Students who were autonomously motivated experienced willingness when engaging in conceptual learning (Deci & Ryan, 2008). Therefore, the IMI survey scale that measures interest and enjoyment was used in the current study to obtain data from child participants to measure the child's subjective motivational experience during the Eat a Georgia Rainbow program. Obtaining the IMI data allowed the researcher to investigate the relationship between the child's level of engagement and his or her IMI survey score. The Motivation for Diet survey measures the willingness of

the participant to adopt a healthy diet without external reward, but rather through autonomous motivation (Kitzman-Ulrich et al., 2011; Wilson et al., 2002). Therefore, the researcher utilized the Motivation for Diet survey to measure whether factors, such as engagement or interest and enjoyment experienced during Eat a Georgia Rainbow, influenced the child's motivation to adopt a healthy diet.

Additionally, Deci and Ryan (1987) suggested that autonomy support is an approach to encourage individuals to be autonomously motivated. The autonomy support led the educator to supporting the learner's motivation to learn or engage in a learning activity (Ryan & Deci, 2000). Although, Deci and Ryan (2000) determined that interest and enjoyment directly measured intrinsic motivation, but a learner's perceived competence also led to engaging in a learning activity.

Johnson and Scal's (2015) study results demonstrated that when participants have a sense of control in their interactions in a given environment and a sense of freedom of health-related choice, the sense of control, freedom, and choice facilitate their motivation to learn about a specific behavior. Similarly, a study conducted by Dwyer et al. (2017) examined how autonomous motivation was correlated among adolescents and parents and whether parents and adolescents reported autonomous motivation predicted the parent-adolescent correlation in fruit and vegetable intake frequency. The researchers utilized the data from the Family Life, Activity, Sun, Health, and Eating program, a cross-sectional U.S. survey of parent–adolescent (N = 1,945). As a result, Dwyer et al. (2017) reported that there was a positive correlation with parent and adolescent fruit and vegetable intake frequency (r = .51, p < .001). Parent and adolescent autonomous motivation were also positively correlated (r = .29, p < .001). Autonomous motivation

explained 6.4% of the parent–adolescent interdependence in fruit and vegetable intake, while partner effects of autonomous motivation explained 0.7% of this interdependence. Also, 10.4% of the interdependence was driven by adolescent autonomous motivation, while 5.1% was driven by parent autonomous motivation.

Flow. Csikszentmihalyi (1990) developed the theory of flow that is described as a state of deep concentration in an activity that is intrinsically enjoyable. This experience occurs when the learner perceives their performance to be enjoyable and successful, and the activity is perceived as worth doing for its own sake, even if a goal is not reached (Nakamura & Csikszentmihalyi, 2002). The state of flow is considered to be intrinsically rewarding; therefore, learners are more likely to continue to participate in a particular activity repeatedly (Nakamura & Csikszentmihalyi, 2002). In order for flow to occur, Csikszentmihalyi (1990) determined that concentration, interest, and enjoyment during an activity must be experienced simultaneously. Additionally, Csikszentmihalyi (1990) described interest as a factor providing the learner with the basis for becoming engaged with an activity for the learner's sake.

Bridging intrinsic motivation and flow. Essentially, the links between flow and intrinsic motivation have been reported in various psychological research (Wang, Liu, Chye, & Chatzisarantis, 2011). The link occurs from perceived competence. For instance, Ryan (1982) suggested learners with high perceived competence are likely to report higher intrinsic motivation to engage in an activity than individuals who have low competence because learners with low competence experience boredom and are disinterested. Csikszentmihalyi (2000) suggested that perceived competence is linked with the occurrence of flow because flow occurs when the learner perceives their

performance to be enjoyable and successful and when concentration, interest, and enjoyment are experienced simultaneously. Understanding the linkage between intrinsic motivation and flow is essential in developing effective autonomy supportive environments for learners to engage in learning. This concept is applicable to the current study because when a child shows interest and enjoyment during Eat a Georgia Rainbow, the child may experience a moment of flow, which may inform learning about healthy eating.

Utilizing the IMI survey subscale, interest and enjoyment, determined the child's learning experience during a learning activity (Ryan & Deci, 2000). As a result, understanding the occurrence of intrinsic motivation and flow are essential to develop effective strategies that motivate children to learn during the program activities. Identifying intrinsic motivation may be applied to both formal and informal settings.

Defining Museums

Traditionally, health fairs and health promotion events were typically based in schools and provided through community health clinics (Glanz et al., 2008). Furthermore, museums begun to offer programs that focuses on the overall health and well-being of members of the community (Chatterjee & Camic, 2015). Historically, museums are known to present collections of artifacts to the public for educational and enjoyment purposes (Falk et al., 1998). The role of museums has evolved into becoming educators to the local community. Museums have the capability to reach diverse populations across rural and urban settings (Camic & Chatterjee, 2013). Museum audiences are composed of families from different age groups, genders, ethnic background with various shared experiences, beliefs, motivation, communication skills,

learning skills, and participation roles. Falk and Dierking (2000) noted museums put forth efforts to better understand how museum audiences learn in museums and the factors that contribute to learning in these informal settings.

Researchers established the existence of family learning in informal settings (Falk & Dierking, 2016; Uzick & Patrick, 2018). Further investigations were conducted to identify that family interactions and engagement influence how much children learn (Falk & Dierking 2016). Moreover, Falk and Dierking (2016) reported that informal learning institutions, such as children's museums, science centers, and libraries, are continuously working to incorporate their associated exhibits and programs as a way to engage new and existing audiences. In turn, their purpose is to provide disciplinary learning opportunities in science, technology, engineering, art, and math to meet the various needs of the audience (Honey & Kanter, 2013). Research evidence show there are existing partnerships between museums, and learning centers with higher education institutes (Bonacchi & Willcocks, 2016; Winstanley, 2015). Winstanley (2015) emphasized the importance of utilizing museums and art galleries as a place for learning and for social and emotional engagement. The researcher noted that the outcome presents student impactful reflective responses to tasks and experiences.

Family learning in museums. Families learn together through museum visits by applying related and reinforced past experiences and family history and shared understanding (Falk, Moussouri, & Coulson, 1998). Wenger (1998) noted that learning during a museum visit results from visitors' past experiences, pre-existed knowledge, family history, and understandings (cited in Ellenbogen, Luke, & Dierking, 2004). Families are able to expand their conversations and adopt new knowledge. For example,

in a study conducted by Uzick and Patrick (2018), the researchers wanted to gain a better understanding of the roles that family members play during a hike. In doing so, the researchers utilized Bloom's taxonomy question levels, Zimmerman, McClain, and Crowl's (2013) Learning Levels framework and commonly cited trail features to help identify the family member roles. Uzick and Patrick (2018) noted that when families conversed about the trail features, families relied on what they had seen or experienced prior to the walking trail. The exploration was an opportunity for families to have a conversation that would lead to interpreting new information without an informal educator present.

Falk and Storksdieck (2005) pointed out that families learning in informal environments are linked to motivation, prior knowledge, and experience. For example, in Uzick and Patrick's (2018) study, the families relied on past experiences, knowledge, and each other to learn new knowledge without an informal educator. Additionally, Falk and Dierking (2000) suggested families use informal settings, such as museum institutions, as resources for shared leisure and learning. Studies on group learning has shown that learners' interpretations can be positive and lead to increased motivation and engagement for group activities, but group learning can also lead to learners' perceptions being negative and result in de-motivation and withdrawal (Van den Bossche, Gijselaers, Segers, & Kirchner, 2006). Researchers indicated that students who enjoyed visits to museums resulted in an increased interest and enjoyment of science activities that establishes impactful learning outcomes that continues to develop over time (Anderson, Thomas, & Ellenbogen, 2003).

In a study conducted by Falk and Storksdieck (2005), the researchers sought to answer two questions: How do specific independent variables individually contribute to learning outcomes when not studied in isolation? and does the Contextual Model of Learning provide a useful framework for understanding learning from museums? Falk and Storksdieck (2005) utilized a repeated measure design and conducted interviews and applied observational and behavioral measures with a random sample of 217 adult visitors to a life science exhibition at a major science center. The data indicated that "variables such as prior knowledge, interest, motivation, choice and control, within and between group social interaction, orientation, advance organizers, architecture, and exhibition design affect visitor learning" (p. 746). The study utilized the Contextual Model of Learning framework to understand the complexity of factors that influenced visitor learning. Therefore, the authors concluded that informal environments, such as museums, prompted for the exchange of knowledge through conversation and interaction (Falk & Storksdieck, 2005).

Family interaction and engagement. Understanding how families learn and how they interact with exhibits in an informal setting is imperative because ~~this~~ museum educators are able to design and tailor exhibits to encourage family interaction, engagement, and learning. Järvelä and Renninger (2014) mentioned that conversation and interpretations can lead to increased motivation and engagement in an informal setting. In Uzick and Patrick's (2018) study, the researchers identified the *Explorer* family member role, which allowed other family members to have experiences and the opportunity to develop a relationship with nature. Thus, Thomas and Anderson (2013)

noted that parents tailor family involvement as a method to maximize the overall experience (cited in Uzick & Patrick, 2018, p. 13).

In Patrick and Moorman's (2017) study, the researchers wanted to understand and identify the object that moved family groups from one exhibit to the next. Thus, the researchers utilized the Actor Network Theory (ANT) to examine how families mobilized through a museum based on objects or exhibit. ANT helps identify the interaction and the engagement that the audience has with an object that facilitates this act, and ~~this~~ the movement should occur simultaneously. In this study, the object or exhibit was classified as a boundary object, and the boundary object played a vital role in mobilizing people from one exhibit to the next. The researchers observed 159 families who moved through exhibits within the museum. As a result, Patrick and Moorman (2017) identified that the intressment stage occurs due to the boundary object. Identifying the intressment stage is essential to ANT because the intressment stage leads to the enrollment and mobilization stages of conversion. Utilizing ANT is essential because researchers and museum educators are able to identify family engagement with the exhibits and, more importantly, the conversations with one another that causes the audience to move within the museum. In addition, utilizing ANT encouraged families to engage in conversation at particular exhibits or in any informal settings.

In Zimmerman and McClain's (2014) study, the researchers observed families' interactions while using outdoors and exploration tools, such as field guides, at a nature center. The researchers followed a conceptual framework based on informal learning and sociocultural theory for this study. Families were randomly assigned into two different phases that received two different conditions. In the first phase of the study, 28 families

completed a survey on exploration tools and ethnographically visual recording followed the families as they interacted with each other on a walking trail. In the second phase, the researchers conducted an in-depth video-based analysis of learning processes of 16 families of their recorded conversations from the nature walks. This method allowed researchers to examine whether the families used the given exploration tools or if the families used the tools for other purposes other than what the tools were intended for. Zimmerman and McMlain (2014) noted that exploration tools that families thought would be useful on the trail differed from the tools families actually used to explore nature. Social collaboration and exploration were essential tools to identify plants and animal species on the trail, and families found the use of the exploration tools, such as field guides, hand lenses, compasses, butterfly nets, binoculars, and bug boxes, challenging. Lastly, the results indicated that families used the exploration tool after discovering an object instead of using the exploration tool to discover new objects on the walking trail. Therefore, this study prompted for localized trail field guides and training for families or groups on how to utilize the exploration tools. This study focused on the learning process rather than gaining knowledge.

A study conducted by Callanan, Castañeda, Luce, and Martin (2017) focused on types of parents' science talk that predicted children's engagement with exhibits. Callanan et al.'s (2017) identified the types of parents' talk as parents' critical thinking questions:

> parents' explanations about the mammoth, the fossils, and the practices of paleontology, as well as requests for children to create such explanations; parents' expressions or requests about how to use evidence to answer questions; parents'

> talk about meaningful personal connections to exhibits for their child; and parents' use of simple comparisons between exhibit content and other information. (Callanan et al., 2017, p. 1499)

The researchers collected data from 83 parent-child groups and conducted an analysis of variance (ANOVA) to analyze the means of each type of talks in two types of ANOVAs. The results from the ANOVA test indicated that parents used more explanations as a type of talk, $F(2, 78) = 11.36$, $p < .001$, $g2p = .13$, explanatory requests, $F(2, 78) = 4.60$, $p = .025$, $g2p = .06$, and critical thinking questions, $F(2, 78) = 3.53$, $p = .04$, $g2p = .043$, in the dig pits than at the other two exhibit types. Additionally, Callanan et al.'s (2017) study utilized regression models to investigate the associations between parents' talk and children's conceptual engagement. As a result, there were statistically significant interactions ($p < .05$) between order and other variables, such as parents' critical thinking questions, parents' explanation statements, and parents' evidence talk. Ultimately, the researchers concluded that the integration of hands-on activities exceed the expectations of traditional exhibits becoming a catalyst for family conversations within the exhibits.

Learning in a children's museum. Braham, Libertus, and McCrink (2018) pointed out in their study that little is known about the process of how parents can encourage their children's spontaneous focus on number that helped children's math achievement. In this study, researchers asked 54 preschool-aged children and their parents to work together in an exhibit using either a numerical prompt or a non-numerical prompt. The researchers asked children to complete an assessment before and after interacting with their parents to measure individual differences in their activity related to spontaneously focus on

number. Children who interacted with their parents and received the numerical prompt showed more spontaneous focus on number compared to children whose parents did not receive the numerical prompt. This study promotes parental involvement and family engagement in hopes to keep children engaged and interested in the learning activity (Braham et al., 2018). Interestingly, the findings suggest that when parents interact in an informal setting with their children that involve numerical content, the interaction helps increase the children's spontaneous attention to numerical information. Ultimately, children who focused more on numbers in their environment were more likely to receive more practice with numerical information, and as a result, these children were able to improve their mathematical skills. Braham et al. (2018) also reported that the study findings emphasize the importance of creating and providing learning situations for children that include numbers into play. Museums should encourage caregivers to notice the learning value in play.

Furthermore, in Haden et al.'s (2014) study, the researchers examined the effectiveness of an educational program in a children's museum that focused on encouraging family conversations about science, technology, engineering, and math (STEM). This study promoted motivating sustained family engagement through science-related learning activities. The study included families with children (N = 130) approximately six years old, and researchers observed families in a building construction exhibit. Families were randomly assigned into two groups. The conditioned group received instructions about a key engineering principle and elaborative question-asking. Conversations throughout the building activity was audibly recorded, and data were coded in the analysis. The researchers coded photographs incorporating the STEM

content, such as scientific method, technology, engineering- triangles, engineering-other, and math (Haden et al. 2014). As a result, conversation instruction resulted in adults' asking double the number of who, what, where, why, and how, also known as the *wh*-questions, compared to families who did not receive the instruction. Haden et al. (2014) also pointed out that the building instruction was important because the activity increased adults' STEM-related conversations during the building activity and during the children's STEM conversations when asked what they learned from the building activity. The results demonstrated that adult family members have the capability to support STEM conversations and understandings with children in informal settings. This study was significant because a low number of professionals pursue careers in the STEM fields (Sanders, 2009). Therefore, Haden et al. (2014) noted that there was a need for families to engage in STEM conversation in an informal setting as well as sustaining the family's interest to continuing the STEM conversations outside of formal settings.

Moreover, museum educators and researchers continue the efforts to understand how children learn to develop strategies or exhibits to support children learning in an informal setting, such as in Andre, Durksen, and Volman's (2017) study. Researchers noted that understanding how children learn in a museum setting is essential because researchers and museum educators want to contribute to the continuous efforts of encouraging children to learn in an informal setting. Researchers noted that interactivity has become more prevalent in children's learning experiences in a museum setting. Thus, the researchers identified interactivity types of learning for children are child–adults/peers, child–technology, and child–environment.

Fender and Crowley (2007) examined two studies that illustrated how parent explanation impacted what children learn from everyday shared scientific thinking. In the first study, children between ages of 3 and 8 years old explored during a task by themselves or with parents. Analyses of children's performance on a posttest compared three groups who consisted of 64 families exploring with their children who explained to them, children exploring with parents who did not explain, and children exploring without parents. The children participated in the posttest that consisted of a series of questions that pertained to the assessment of the children's knowledge of the exhibit. The second part of the posttest consisted of a test to obtain their understanding of animation. As a result, children whose parents explained were most likely to have a theoretical as than a technical understanding of the task. Researchers explained that parents who explained to their children were aiding their children's cognitive development.

In the second study, Fender and Crowley (2007) examined the causal effect of parent explanations on children's understanding. The researchers randomly assigned children to conditions where they were or were not provided explanation while exploring a task with an adult. Researchers examined 24 of 41 parents gave at least one explanation, and the families were thus assigned to the conditioned group where parents explained to their children. As a result, of 41 parents, 12 parents gave causal explanations, which were considered simple and short explanations. Conversely, five parents gave connection explanations in which were considered to be complex explanations, and seven parents provided causal and connection explanations. Fender and Crowley (2007) pointed out children, who heard explanations, were more likely to switch from procedural to conceptual understanding.

In Ash's (2004) paper, the researcher focused on the change from every day to scientific ways of reasoning, and on the roles of meaning-making conversations and science content as they contribute to scientific literacy. The author argued that family collaborative conversations in an informal setting can be the foundations for scientific ways of thinking. Ash (2003) utilized the significant event construct for analysis. The significant event contained recognizable beginnings and endings on one particular exhibit, sustained conversational segments that differed in short, un-sustained interactions, which can precede and follow significant events, various sources of knowledge, such as distributed expertise, and various inquiry strategies that pertained to questioning, inferring, or predicting. In the first phase, six Spanish-speaking families were recruited for in-depth visits to the Splash Zone exhibit. The family visit time ranged from approximately 25 to over 80 minutes long. The researcher collected audio and visual recorded data during the exhibit visits and in interviews before, and after the museum visits. In the second phase, two families were invited back for a second visit to the museum approximately six months after the original visit. Ash (2004) conducted a semi-structured interview, and families viewed previous recording in which the family was probed to reflect on their actions and thought at the time of the previous visit. In the third phase, the families returned for a second visit to the Splash Zone exhibit. Families chose their own path through the exhibits at the Splash Zone exhibit and were visually and audibly recorded. Ash (2004) discussed that the results indicated complex biological understandings, such as conservation, can be achieved in aquarium settings. Family conversation can be extended to being more scientific over time, but they required a repetition of proceedings of scientific conversation. The family used many different

resources to make sense of the scientific conversations, such as prior experiences, dependency on each other, pictures, live and preserved objects, and the facilitator guide that was provided both in Spanish and English languages. Ash (2004) explained that knowledge was distributed across the family, the exhibit, and the interpreter. Thus, in stimulated follow-up interviews, families collectively remembered previous knowledge.

In a study conducted by Zimmerman, Reeve, and Bell (2010), the authors focused on families identifying specific exhibits utilizing their knowledge and past experiences. Essentially, focusing on the learning interaction between families and the exhibits. In doing so, Zimmerman et al. (2010) examined the interactional ways that families identified biological exhibits during a visit to an interactive science center. The researchers wanted to understand the perceptions of families who attended the museum. Therefore, the researchers used ethnographic and discourse analytic methods that included pre- and post-visit interviews, videotaped observations of the museum visits, and coding and analysis of words from naturally occurring conversations. In this study, the Everyday Expertise framework was used to understand how families use ideas and materials to interpret the scientific content presented in exhibits. Zimmerman et al. (2010) argued that "individual and cognitive aspects of learning are fundamentally connected to the social and cultural aspects of learning" (p. 478). Therefore, the researchers analyzed the linkage between individual cognitive resources, situated activities, and cultural toolkit resources that support learning interactions and processes. The results indicated that families used a variety of knowledge types to identify exhibit content. This process helped assisted families to identify biological content by applying their past experiences, and families used biological facts and perceptual descriptions to

identify biological exhibits. Overall, researchers were able establish that family learning did occur in museum settings through the examination of various studies that focused on family conversation, engagement, parent-child collaboration, parental involvement.

Borun, Chambers, Dritsas, and Johnson (1997) conducted a study called the Philadelphia-Camden Informal Science Education Collaborative Family learning project that aimed at increasing the understanding of family learning in a museum setting and identified characteristics of successful family learning exhibits. There were three phases in study, a study to determine the behavioral indicators for family science learning, the development and evaluation of four exhibit enhancements that focused on achieving family science learning goals, and a study comparing the frequency of learning behaviors for families that used test exhibits to families that only used the test exhibits. In Phase I of the study, researchers observed family behaviors at a test exhibit at each of the four museums. The researchers measured family learning by the frequency of learning-related behaviors and analyzing family conversations and interviews. As a result, the behaviors that were found to be statistically related to learning levels were classified as performance indicators. In Phase II, researchers classified the seven exhibit characteristics were related to family learning were identified and provided in the review of literature on family visitors and observations from Phase I of the study.

In Phase III of the research, the purpose of the study was to test the effectiveness of the four exhibits located in the Franklin Institute Science Museum, the Academy of Natural Sciences, the New Jersey State Aquarium at Camden, and the Philadelphia Zoo as measured in control to treatment from the seven performance indicators from Phase I of the study. The control group consisted of families (N = 200) and were observed to

measure the impact of the exhibits. As a result, the results showed that all four modified exhibits illustrated significant increases in performance indicators. The seven characteristics of successful family exhibits were multi-sided, multi-user, accessible, multi-outcome, multi-modal, readable, and relevant. These indicators were used as a guide for the development of exhibits. The frequency performance indicators showed highly significant increase from control to treatment for five indicators. The researchers noted that not every indicator significantly increased at all four museums. However, the differences among four museums were related to the test exhibit and family learning.

Integrating health and museums. Museums are known as sites for expositions and displays and facilitate many of society's basic values. However, museums advanced to becoming a place for cultural politics (Crooke, 2008). For example, Crooke (2008) discussed that museums are able to connect parts of the community to build trust and engage in issues that influence or shape the community's health or wellbeing. In recent years, many museums, including art galleries, have included programs that focused more on health issues within the community (Chatterjee & Camic, 2015). For example, Chatterjee and Camic (2015) noted that the Museum of Modern Art was the first art gallery-based program that was meant for patients with dementia and their family caregivers in the United States. Also, in Europe, the London's Dulwich Picture Gallery has a comprehensive program for elders (Chatterjee & Camic, 2015).

Further evidence shows that people who engage with museum exhibits are more likely to experience positive social experiences that can lead to reduced social isolation (Chatterjee, Vreeland, & Noble, 2009). Museums can provide opportunities for learning and acquiring news skills; increased positive emotions, such as enjoyment; increased self-

esteem, and increased communication among families, caregivers, and health professionals (Chatterjee et al., 2009). As of recent, museums have addressed health concerns and the well-being of older adults, people with dementia, and mental health service users (Chatterjee et al., 2009). Museums are not only meeting the educational needs of their audience but are also aiming to meet the health needs of local community members.

Health Promotion Programs in Museum Settings

Museums collaborating with professionals from public health, adult and social care, and health institutes can aid informal institutes as they become equipped to support the health and wellbeing of their communities, and contribute to health and wellbeing agendas (Dodd & Jones, 2014). Kitzman-Ulrich et al. (2010) conducted a review of childhood obesity intervention programs that utilized the family systems approach and recommended that future studies utilizing parental-involvement can contribute to obesity treatment programs by evaluating approaches outside of clinical or university settings, such as community centers, schools, and primary care offices. In fact, Camic and Chatterjee (2013) noted that public health intervention programs can be delivered in alternative venues and therefore, museums are community venues that have the ability to develop and offer health programs.

Christensen et al. (2016) conducted a review of several health promotion programs and exhibits implemented in a children's museum. From this review, the researchers were able to produce discussions regarding challenges and opportunities that arise during these health promotion activities considering the evaluation of health-related outcomes, exhibit environment, and learning experiences. Most programs focused on

whether the participants intended to use the health-related messages in their daily life and if participants developed and intentioned to change their current lifestyle. Learning outcomes were mainly related to previous knowledge. Christensen et al. (2016) wanted to determine if these programs influenced any health behavior changes among participants who participated in the programs or exhibits. In the review, various programs aimed to improve or change children's attitudes towards physical activity and healthy eating. For instance, the Hands-on Health exhibit increased awareness of healthy behaviors in student visitors and their families, and Healthyville exhibit and Power play exhibit stimulated health-related discussions at home. Furthermore, Christensen et al. (2016) noted that museum experiences did motivate people to adopt healthful behavior changes, which can lead the participants with the intent to change or act on.

Christensen et al. (2016) investigated whether health programs in museums were able to achieve their goal of changing participant's health behaviors. Researchers conducted an evaluation on the EatSleepPlay program to determine if participants implemented healthy changes to their dietary and physical activity based on the curriculums that were facilitated to participants. Results indicated that 78% of parents rated the exhibit's ability to teach their children about healthy habits as *good or excellent* while 94% of participants rated the exhibit's ability to teach the parents themselves as *good or excellent*. Furthermore, the Healthyville exhibit surveys provided information on how the exhibit influenced their behaviors. Christensen et al. (2016) noted that almost half of the visitors reported that they were "making healthier food choices and washing hands regularly" (p. 24). Also, about 15% of participants stated that visiting the exhibit did not affect their behaviors. However, in Christensen et al.'s (2016) review, the authors

noted that vital information in regard to the methods was missing and therefore, a complete evaluation of the effectiveness of the programs was difficult to determine.

On the other hand, Christensen et al. (2016) discussed that the Powerplay program provided thorough information of health-related outcomes from observations, interviews, and follow-up interviews. Participants who reported having a low physical activity level prior to the exhibit visit reported showed health behavior change in their follow-up results. The results showed that physical activity levels positively influenced in 27% of children and slightly influenced in 45% of parents. The program's and exhibit's evaluation results from Christensen et al.'s (2016) review showed an increase of children's confidence and self-belief of their abilities, in addition to increasing knowledge and self-awareness of their body. From this review of programs and exhibits located in a various children's museums, Christensen et al. (2016) identified challenges within the programs, exhibits, and museums. The authors stated that museum staff experienced difficulty with recruiting participants because of the informality of the setting and environment as well as following up with participants to determine the program's long-term effects. As a result, evaluating the long-term effects of an intervention implemented in a museum is a challenge that programs face. Therefore, authors suggest instead of making health behaviors a goal of a program, making non-behavioral outcomes as goals may be more effective. Given that most of the data collected were self-report data, this limitation can cause bias towards the results. The bias was related to over-reporting due to the possibility of social desirability because participants are having to recall their own behaviors that were influenced by the program or exhibit. A major limitation from the health programs and exhibits was the lack of

information provided for the methods because the results cannot be exclusively concluded due to the non-existent linkage between the methods and the results.

Freedman (2010) evaluated the effectiveness of a nutrition program that targeted students who attended a cooking class on a field trip to a museum. In doing so, the researcher conducted a pretest survey 2 weeks prior and a posttest survey 2 weeks after the class to measure the amount of nutrition knowledge the students gained from the nutrition program. The nutrition class provided students with a presentation and a hands-on experience at a *Healthy Pizza Kitchen* exhibit. The students learned about various healthy ingredient options that can be used to prepare pizzas. Freedman's (2010) results supported the claim that hands-on cooking activities helped increase children's nutrition education knowledge and improved children's food choices.

Summary

Childhood obesity is a major health issue in the United States that affects youth and adolescents, especially individuals in the lower socioeconomic status. If this health issue is left untreated and not addressed early, overweight youth and adolescents are at high risk for further health complications that can affect them physically and mentally both in their childhood and adulthood. Researchers have made continuous efforts to reduce childhood obesity rates. However, the continuing high rates of childhood obesity indicates that the strategies are not effective enough. Historically, museums are known to present the collections of artifacts for the purpose of education and enjoyment. However, recently museums adopted new programs that focused on the health and well-being of the members of the community. Research evidence also emphasized family interaction, engagement, and motivation influences family learning in museums, and on the other

hand, nutrition education program that utilize the family-based approach also yields family learning as well. Additionally, various psychological research has linked intrinsic motivation with the theory of flow. The occurrence of both intrinsic motivation and flow is essential because the occurrence prompted the development of effective strategies to motivate children to learn about healthy eating. Children who are motivated to learn about healthy eating are more likely to adopt a healthy diet. As a result, children adopting healthy diets will reduce their risk of developing obesity in adulthood.

Furthermore, the integration of nutrition education programs offered in museums show positive influences in youth and adolescent's self-efficacy, attitudes, and motivation to learn about health. In turn, youth and adolescents have the intent for health behavior change. Research evidence shows intrinsic motivation can be assessed to understand what facilitates children's motivation to engage and learn in a learning activity. Furthermore, researchers emphasized that because nutrition programs positively influenced children's motivation to learn about health, the motivation to learn about health does not predict that the health behavior change took place. However, the literature did not provide sufficient information to conclude nutrition education programs in museums are effective and can change children's health behavior. Because museum visits are short and time sensitive, determining the effectiveness of an intervention is difficult. Additionally, recruitment was limited when following up with participants to determine the long-term effects; therefore, researchers suggest setting goals, which began with non-behavioral changes. In response to the findings of the literature review, the researcher investigated the relationship between children's experiences during the museum nutrition education program, the

children's motivation to learn about healthy eating and healthy cooking, and the children's intentions to adopt a healthful diet.

CHAPTER III

METHODOLOGY

Introduction

According to the CDC (2016), childhood obesity is a major health concern that affects children ages 6 to 19 and can lead to further chronic health issues. This issue brings attention to the need for developing effective nutrition education programs to promote healthy eating, healthy cooking, and overall health (Glanz et al., 2008). Museums possess the ability to reach a diverse population and capacity to offer health promotion programs to the community. Museums are positioned to develop programs addressing various health concerns (Camic & Chatterjee, 2013). However, little is known about the influence of children's engagement in a nutrition education program on children's learning experiences measured by interest and enjoyment (intrinsic motivation) and their motivation to adopt a healthy diet. Experiential learning theory was used as a lens during this study to emphasize the importance of participants learning experience through hands-on, task-oriented activities (Wenger, 2009) and reflecting on the experiences (Cornell et al., 2013; Kolb, 2014). The goal of this convergent parallel mixed method study was to investigate children's learning experiences during the Eat a Georgia Rainbow program and to understand their motivation to learn about healthy eating and healthy cooking in relevance to the development of their intentions to adopt a healthy diet. Refer to Chapter I for Figure 1 that displays data were collected in two phases. In Phase I, quantitative data were collected through camera-glasses and IMI surveys from

the child. In Phase II of the data collection, follow-up quantitative and qualitative data were collected through the Motivation for Diet survey and individual interviews from the child. In Phase II of the follow-up data collection phases, the researcher conducted structured interviews with the parent participants as well. The camera-glass recordings recorded the number of times a child raised their hand to attempt to respond to the cooking class facilitator (level of engagement). To determine the influence of the Eat a Georgia Rainbow program on children, the recorded level of engagement, IMI survey scores, and Motivation for Diet scores were uploaded into SPSS to quantitatively analyze the data. Qualitative data were collected from the parent and child(ren) through follow-up interviews to determine the component of family conversations that occurred after the Eat a Georgia Rainbow program regarding healthy eating and meal preparation, interaction with meal preparation, and child's description of the Eat a Georgia Rainbow program. The interviews were recorded, transcribed, and coded, and a thematic search was conducted.

Research Questions

1. What is the relationship between child level of engagement during the Eat a Georgia Rainbow program and their IMI survey scores? (Quantitative Research Question)

   Null Hypothesis: There is no statistically significant relationship between child's level of engagement and IMI survey scores.

   Alternate Hypothesis: There is a statistically significant relationship between child's level of engagement and IMI survey scores.

2. What is the relationship between child level of engagement during the Eat a Georgia Rainbow program and their Motivation for Diet survey score? (Quantitative Research Question)

   Null Hypothesis: There is no statistically significant relationship between child's level of engagement and IMI survey scores.

   Alternate Hypothesis: There is a statistically significant relationship between child's level of engagement and IMI survey scores.

3. Does the child's level of engagement influence their motivation for diet survey score to a statistically significant degree? (Quantitative Research Question)

   Null Hypothesis: The child's level of engagement does not influence their motivation for Diet survey score to a statistically significant degree.

   Alternate Hypothesis: The child's level of engagement does influence their motivation for Diet survey score to a statistically significant degree.

4. Does the child's IMI score influence their motivation for diet survey score to a statistically significant degree? (Quantitative Research Question)

   Null Hypothesis: The child's IMI score does not influence their motivation for diet survey score to a statistically significant degree.

   Alternate Hypothesis: The child's IMI score does influence their level of engagement to a statistically significant degree.

5. What conversations and interactions regarding healthy eating and meal preparation are occurring within families after the Eat a Georgia Rainbow program? (Qualitative Research Question)

6. What are parent's perceptions of their children's knowledge 2 weeks after the Eat a Georgia Rainbow program? (Qualitative Research Question)
7. What are children's perceptions of the Eat a Georgia Rainbow program 2 weeks after attending? (Qualitative Research Question)
8. How do the interviews of parents and children support the relationship between child's level of engagement, IMI survey score, and Motivation for Diet survey score? (Mixed Methods Research Question)

Research Design

This study utilized a convergent parallel mixed method approach to collect qualitative and quantitative data that determined the existence of the relationship among the observed variables. Although, in a multiphase study, the subsequent phase is dependent on the data collection and results of the previous phase and utilizes two or more phases to collect data (Creswell & Clark, 2017), but a convergent design better suits the needs of the current study. In the present study, the phases were predetermined and did not require the data collection and analysis of the previous phase to move forward. A mixed methods study had not yet been conducted to investigate the influence of Eat a Georgia Rainbow program on participant's level of engagement and his or her motivation to adopt healthy dietary practices. Thus, utilizing a mixed methods design was an important methodological contribution to current literature. Utilizing the convergent parallel design, quantitative data were collected in Phase I and in Phase II. Qualitative and quantitative data were collected approximately the same time during the follow-up in Phase I and II. Then, data were analyzed separately and integrated to compare and contrast the results for interpretation (Creswell & Clark, 2017).

Quantitative

In the quantitative part of the study, the independent variables that were measured were children's level of engagement (time) and IMI survey scores. The dependent variable measured was Motivation for Diet survey scores. The quantitative data collected were used to test the influence of children's level of engagement during the Eat a Georgia Rainbow program on their learning experiences measured by interest and enjoyment and their intentions for adopting a healthful diet.

Qualitative

The individual follow-up interviews were used to collect qualitative data from the child(ren) and their parent. The coding and thematic analysis method was applied to ascertain qualitative data that illustrated family conversations that occurred after the Eat a Georgia Rainbow program, interaction with meal preparation, and children's description of the Eat a Georgia Rainbow program. The results from both the qualitative and quantitative data established the children's experiences. Utilizing a mixed method was essential because the qualitative data provided supportive evidence for the quantitative data.

Eat a Georgia Rainbow Nutrition Education Program

Eat a Georgia Rainbow was a nutrition education program that promotes healthy eating and meal preparation to families. The program is offered at the Children's Museum of Atlanta, located in Georgia. Annually, the Children's Museum of Atlanta has roughly 200,000 visitors, and in 2018, 1,207 attendees participated in the Eat a Georgia Rainbow program, including 673 children and 534 adults. The program is held on Sunday afternoons, and the duration of the program is approximately 45 minutes. The museum

attendees voluntarily participate in the program. The museum staff invite the families into the cooking lab to participate in a hands-on cold cooking class that is led by the museum chef. The chef discusses various healthy ingredients and demonstrates a healthy meal preparation. Each week, a different meal is prepared, and the museum chef provides a recipe card for families to recreate the meals at home.

Participants

Population and Setting

Childhood obesity affects children ages 6 to 19 (CDC, 2016) and collecting data from families with children is fundamental to the development of effective nutrition education programs. Therefore, the researcher chose to collect data from children between the ages of 4 to 14 years during the Eat a Georgia Rainbow program at the Children's Museum of Atlanta in Georgia as well as follow-up data with the same child participants who attended the program along with the parent. The researcher and museum staff did not have prior knowledge on the program attendees, and therefore, a convenience sampling was used to recruit participants (Etikan & Alkassim, 2016).

Sample

Participants were included based on their willingness to participate in the study, and the researcher included all participants who represented various demographic groups. However, child participants were required to be between the age of 4 to 14 years due to the multiple phases of data collection that were required to answer the research questions. When the families entered into the cooking lab for the Eat a Georgia Rainbow program, the researcher explained the purpose of the study and the procedures of the data collection process to all attendees and allowed participants to volunteer under specific

conditions. A legal guardian was required to be present to sign the informed consent form and the child was required to sign a child assent form. The informed consent form was obtained at the day of the Eat a Georgia Rainbow program from the legal guardians (parent participants) to participate in the follow-up individual interviews. Bonett and Wright (2000) suggested to have a minimum of 25 participants to achieve a 95% confidence interval when conducting a Pearson's correlation test. However, to achieve an 80% probability that the test will reject a false null hypothesis correctly, the researcher conducted G-Power analysis (G*Power). The G*Power analysis was used to determine the minimum number of participants required to conduct analysis and detect effect size between the variables (Bosco et al., 2015; Faul, Erdfelder, Buchner, & Lang, 2009). According to the G*Power analysis, the minimum sample size recommended was 36 child participants (Faul et al., 2009).

Over the course of seven visits to the museum, the program had 96 children and 79 adults who attended the Eat a Georgia Rainbow program. Table 1 presents the demographic information and food items prepared by the participant families during their visit to the Atlanta museum in Phase I of the study. Additionally, data were not collected from the parent (legal guardian) during Phase I. Data were collected on the number of participants based on the number of available camera-glasses.

Table 1

Number of Families that Participated in Phase I of Data Collection

	# Families	Gender [a]	# Children	Race	Food Item [b]
Visit 1	2	1F 1M	2	White	Strawberry Shortcake
		3 F	3	AA[c]	Bites
Visit 2	4	4F	4	AA	

	# Families	Gender [a]	# Children	Race	Food Item [b]
		1F	2	AA	Coconut
		1M			Dates
		1F	1	Caucasian	
		1M	1	Caucasian	
Visit 3	6	1F	1	Other	Cucumber
		2F	2	Asian	Hummus
		1F	2	Caucasian	
		1M			
		1F	1	Asian	
		1F	1	Asian	
		1F	1	Other	
Visit 4	5	1F	1	Asian	Cucumber
		1F	1	Caucasian	Hummus
		1F	1	AA	
		1F	1	Asian	
		1F	1	Asian	
Visit 5	6	1F	1	AA	Mexican
		1F	1	AA	Sweet Corn
		1M	1	Asian	
		1F	1	AM or NA[d]	
		1M	1	AA	
		1F	1	Caucasian	
Visit 6	7	1F	1	AA	Cucumber
		1F	2	Caucasian	Hummus
		2M			
		1F	1	Caucasian	
		1F	1	Caucasian	
		1M	1	Asian	
		1F	1	Caucasian	
		1M	1	Asian	
Visit 7	6	1M	1	AA	Cucumber
		1M	1	AA	Hummus
		1M	2	AA	
		1F			
		1M	2	AA	
		1F			
		1M	2	Other	
		1F			
		1M	1	AA	

Note. [a] F is abbreviated for female, and M is abbreviated for Male.
[b] The name of the food item that was prepared varied within the seven visits during data collection.
[c] AA is abbreviated for African American.
[d] AI or NA is abbreviated for American Indian or Alaskan Native.

During Phase I of the data collection, 50 child participants wore the camera-glasses and completed the IMI survey the day of the Eat a Georgia Rainbow program. Only children who wore the camera-glasses were eligible to complete the IMI surveys and, subsequently, participated in Phase II of the follow-up data collection. Table 2 provides demographic information of the child participants (n = 50). The participants consisted of 34 (68%) females and 16 (32%) males between the ages of 4 and 14 years (M = 7.22, SD = 2.41). Of the 50 child participants, 13 (26%) were Caucasian, 22 (44%) were African American, 1 (2%) was American Indian, 10 (20%) were Asian, and 4 (8%) self-reported as Other.

Table 2

Demographic Frequencies Statistics of Child Participant (N = 50)

Age	*n*	%
4	6	12
5	8	16
6	7	14
7	9	18
8	7	14
9	6	12
10	3	6
11	1	2
13	2	4
14	1	2

Ethnicity	*n*	%
Caucasian	13	26
African-American	22	44
American Indian or Alaskan Native	1	2
Asian	10	20
Other	4	8

Gender	*n*	%
Male	16	32
Female	34	68

Note. The *n* represents the frequency of the child's age, ethnicity, and gender.

Out of the 50 child participants who completed Phase I of data collection, 31 child participants completed the Motivation for Diet survey through FaceTime and/or phone call in Phase II. A modification was made to the IRB protocol after the first follow-up data collection, and therefore, only 26 out of 31 child participants completed the follow-up interviews (see Appendix K). Thus, 19 child participants were lost in Phase II follow-up. In Phase II, out of 31 participants who completed the diet survey, only 26 participants with an average age of 7.12 (*SD* = 2.38) completed the structured individual interviews. Table 3 displays demographic information of 26 children and their parents who completed the structured interviews. The 20 parent participants who completed the follow-up individual interview consisted 18 females (90%) and 2 males (10%).

Table 3

Number of Children and their Families that Completed Phase II Follow-up Interviews

	Family (*n*=20)	Children (*n*=26)	Parent (*n*=20)	Parental Gender [a]	Race
Follow-up 2	1	2	1	F	African American
Follow-up 3	5	1	1	F	Other
		2	1	F	Asian
		2	1	F	Caucasian
		1	1	F	Asian
		1	1	F	Asian
Follow-up 4	4	1	1	F	Asian
		1	1	F	Caucasian
		1	1	F	African American
		1	1	F	Asian
Follow-up 5	3	1	1	F	African American
		1	1	F	African American
		1	1	F	Caucasian
Follow-up 6	5	1	1	M	African American
		3	1	F	Caucasian

		1	1	F	Caucasian
		1	1	F	Caucasian
		1	1	F	Asian
Follow-up 7	2	1	1	M	African American
		2	1	F	African American

Note. [a] F is abbreviated for female and M is abbreviated for male within parent participants.

Data Collection

The researcher used a convergent parallel mixed methods research design to answer eight (four quantitative, three qualitative, and one mixed methods research questions) research questions through recording camera-glasses, IMI survey, Motivation for Diet survey, and individual interviews. Camera-glasses were used to record the number of times a child raised their hand to respond to the Eat a Georgia Rainbow class facilitator in the cooking class to measure the child's level of engagement. The child participant also completed the IMI survey that measured their interest and enjoyment they experienced during the Eat a Georgia Rainbow program. Two weeks after attending the Eat a Georgia Rainbow program, the child participants completed the Motivation for Diet survey that measured the child's intention to adopt a healthy dietary lifestyle. Additionally, data were collected through interviews of children and their parents 2 weeks after the participating families attended the Eat a Georgia Rainbow program at the Children's Museum of Atlanta to identify conversations that occurred after the Eat a Georgia Rainbow program regarding healthy eating and meal preparation and the children's interaction with meal preparation at home.

Quantitative. The camera-glasses were self-worn glasses that can record visually and audibly (Wettstein & Jakob, 2010; Zhou et al., 2014). The visual recording measured

the level of engagement by the number of times the child raised their hand in attempt to respond to the Eat a Georgia Rainbow cooking class facilitator. Additionally, the number of times a child raised their hand was the only visual data needed to measure the child's level of engagement, and therefore, audio data were not needed for this current study. The camera-glasses were an appropriate data collection tool to record environmental conditions, in which behaviors and conversations occur during the nutrition education program (Burbank et al., 2018; Zhou et al., 2014).

The Intrinsic Motivation Inventory (IMI) survey assessed the child's interest and enjoyment they experienced during the Eat a Georgia Rainbow program (Ryan & Deci, 2000). The IMI survey consists of seven subscales: interest/enjoyment, perceived competence, effort/importance, pressure/tension, perceived choice, value/usefulness, and relatedness (Ryan & Deci, 2000). The interest and enjoyment subscale-measured the learner's intrinsic motivation and was applicable to this study (Ryan &Deci, 2000). Therefore, only the interest/enjoyment subscale was used to measure the child's learning experience during Eat a Georgia Rainbow program. The IMI survey that was completed by child participants is provided in Appendix B. Additionally, three demographic questions were included in the IMI survey to collect data on age, gender, and ethnic background. In McAuley, Duncan, and Tammen's (1989) work, the authors tested the validity and reliability of the interest/enjoyment subscale. Cronbach's alpha was used to evaluate the internal consistency of the interest/enjoyment subscale. The alpha coefficient value was .78, which was considered acceptable (Nunnally, 1978).

Additionally, in a quantitative study conducted by Esparragoza et al. (2016), the authors utilized the interest and enjoyment subscale from the IMI survey to measure the

level of interest and perception of value in engineering students participating in a multinational collaborative project. As a result, students showed a high level of interest and enjoyment towards their participation in the multinational collaborative project. Thus, the authors suggested that understanding the student's process of learning was imperative, new experiences that students participated in outside classroom projects produces interest, and the experiences became exciting to students (Esparragoza et al., 2016). Augustyniak et al. (2016) also utilized the interest and enjoyment subscale of the IMI survey to assess the level of intrinsic motivation of medical students following their participation in a renal physiology course. The results indicated that 28.1% of students scored low on the survey. The authors found that students with low intrinsic motivation also had lower class performance (Augustyniak et al., 2016). Therefore, utilizing the IMI survey was imperative in the current study to determine whether or not the child's learning experiences during Eat a Georgia Rainbow motivated the child to engage in family conversations regarding healthy eating and meal preparation, participate in meal preparation at home, and have the intentions to adopt a healthy diet.

The Motivation for Diet survey was used as a follow-up instrument and includes 10 questions pertaining to the participant's motivation to participate in healthy eating. Details of Motivation for Diet Survey that was completed by the child participants is provided in Appendix A. The Motivation for Diet survey measures the willingness of the participant to adopt a healthy diet without external reward, but through autonomous motivation (Kitzman-Ulrich et al., 2011; Wilson et al., 2002). A study conducted by Wilson et al. (2002) tested the reliability of the Motivation for Physical Activity survey. Cronbach's alpha coefficient value was .90, which was acceptable (Nunnally, 1978).

Additionally, a pilot study conducted by Kitzman-Ulrich et al. (2011) used the same scale but modified the wording of the scale to assess adolescent's motivation around healthy eating rather than physical activity. The author also conducted a reliability test resulting in a Cronbach's alpha coefficient of .91. Significant increases in dietary intake was observed in response to the 6-week interventions where participants level of motivation and self-concept increased (Kitzman-Ulrich et al., 2011). Therefore, the scale was both reliable and valid. In both studies, the scale was used to measure the participant's motivation to adopt a healthy diet (Kitzman-Ulrich et al., 2011; Wilson et al., 2002). Both studies indicated that participants showed positive improvements in adopting healthy behaviors and their autonomous motivation for diet. Therefore, utilizing the Motivation for Diet survey in this current study indicated whether or not the child participant would adopt a healthy diet as a result from participating in the Eat a Georgia Rainbow program in the Atlanta museum. Permission was obtained from the authors who constructed the IMI survey (Appendix C) and Motivation for Diet (Appendix D) survey instruments.

Qualitative. Six structured interview questions were used to collect follow-up data from both the child participants and parent participants. The child was asked questions pertaining to their recollection of the food item and ingredients used during the cooking activity and their perceptions of what the child liked and disliked about Eat a Georgia Rainbow. The parent participant was asked to describe what the parent participant perceived his or her child learned during Eat a Georgia Rainbow and whether or not if his or her child participated in family conversations and meal preparation at home after Eat a Georgia Rainbow. The researcher created the questions to support the quantitative

methods (Creswell & Clark, 2017). As seen in Appendix G and Appendix H, the interview questions are listed for the child participant and parent participant.

Procedures

To answer the research questions of this convergent parallel mixed method study, the researcher relied on both qualitative and quantitative methods for using camera-glasses, surveys, and follow-up. The Eat a Georgia Rainbow program was offered on Sunday afternoons, and the duration of the program is approximately 45 minutes. Prior to collecting data, the researcher explained the purpose of the study, and the data collection process. The researcher obtained an informed consent from the legal guardians and a child assent form from the child participants. The researcher collected data on those days over the course of seven visits, which is shown in Table 1. Follow-up data were collected every 2 weeks after participants had attended the Eat a Georgia Rainbow program. The researcher previously requested the families to be at home to complete the follow-up data collection and to protect the confidentiality of participants' responses and their participation in the study. The researcher facilitated the Motivation for Diet survey to children virtually through FaceTime to ensure the presence of the parent. However, there were occurrences when the connection was weak, and the researcher had to call the participants back on the phone for the remainder of the data collection phase. The parent did not remain on the phone during the facilitation of the follow-up data collection. The following section describes the instruments used to collect quantitative and qualitative data in the current study.

Quantitative

A child or children from each family were asked to place the recording camera-glasses on their faces and wear the glasses throughout the complete duration of the Eat a Georgia Rainbow program. The recordings visually recorded the level of engagement, which measured the number of times the child raised their hand in attempt to respond to a question or request to participate in a cooking task during the Eat a Georgia Rainbow program. Additionally, the number of times a child raised their hand was the only visual data needed to measure the child's level of engagement, and therefore, audio data were not needed for this current study. Children who wore the camera-glasses were eligible to complete the IMI survey and subsequently, participated in the follow-up data collection.

At the conclusion of the Eat a Georgia Rainbow cooking class, the class facilitator directed all Eat a Georgia Rainbow attendees to assist in cleaning the area in which the attendee participated in the cold cooking. The researcher distributed the IMI surveys to the child participants who wore the camera-glasses once they completed cleaning the cooking area. The researcher explained to the participants that there were no correct or incorrect answers, the responses should represent their own perception of their experiences during the Eat a Georgia Rainbow program. The researcher also stated that the parent may assist the child with the survey if needed. The child participant took an average of 10 minutes to complete the IMI survey with the assistance from the child's parent. Before the participants left the Eat a Georgia Rainbow program, the researcher also obtained phone numbers from the child participant's parent to coordinate the follow-up data collection in Phase II. The researcher obtained an email address from the child

participant's parent and explained to the families that the child participants will receive a $10.00 e-gift card from Target as an incentive for participating in the current study.

Two weeks following the Eat a Georgia Rainbow program, the researcher contacted the parent of the child participants through text messaging to schedule a time for the child and parent to complete the follow-up data collection through FaceTime and/or by phone. If the parent did not respond to the first message, a subsequent message was sent. If the parent did not respond to the second message, the participants were considered to be lost to follow-up. Follow-up data were collected from 31 child participants. The researcher asked the child each question listed on the survey along with the response choices. Appendix A provides the Motivation for Diet survey that includes 10 questions on the participant's motivation to participate in healthy eating. The facilitation of the Motivation for Diet survey was recorded to validate the child's responses, but the recording was not transcribed. The survey administration through both phone and video conference took on average 5 minutes to complete. Once the child completed the Motivation for Diet survey, the researcher proceeded to ask the child structured interview questions.

Qualitative

The parent participants were asked to leave the room if the parent participants were utilizing FaceTime or not be placed on speakerphone to complete the individual interview without the child's presence. The researcher disclosed to the parent participants that the interview was being recorded and later transcribed. The researcher asked the parent participants three questions utilizing the questions listed in Appendix G that pertained to family conversations and interactions regarding healthy eating and meal

preparation that occurred after the Eat a Georgia Rainbow program and parent's perceptions of their children's knowledge 2 weeks after the Eat a Georgia Rainbow program. The parent interviews took on average 5 minutes to complete. Once the parent interviews were completed, the researcher emailed the $10.00 e-gift card incentive to the parent's email that was addressed to the child for participating in the study. However, the parent participants were not given an incentive for completing the interview. Of the 31 child participants who completed the Motivation for Diet survey, 26 child participants completed the individual interviews due to a modification to the IRB protocol (see Appendix K). The qualitative questions were added to the protocol to understand the child participant's perspective on the Eat a Georgia Rainbow. Interview questions were also added to the IRB protocol to collect data on children's participation in family conversations and interaction with meal preparation at home after Eat a Georgia Rainbow. The child was told that the interview questions were also being recorded and later transcribed. The child was also told that there were no correct or incorrect responses and the responses should represent their description of the Eat a Georgia Rainbow program in his or her own words. The researcher asked the child six interview questions along with four follow-up questions (Appendix H). The structured interview took on average 7 minutes to complete.

Data Analysis

In the following section, Figure 2 displays the different phases of data analysis. In Chapter I, Figure 1 displays the data collection methods, the setting in which the data were collected, tools used for data collection, and the type of data collected in the two

phases. The description of the data analysis for quantitative, qualitative, and mixed methods analysis is described below.

Quantitative

The camera-glass recordings were uploaded through a USB cord to a password protected laptop. The camera-glass recordings visually captured the number of times a child raised their hand to respond to the cooking class facilitator but were not ~~be~~ transcribed. The number of times a child raised their hand was the only visual data needed to measure the child's level of engagement, and therefore, the audio data were not transcribed and interpreted for the study. The mean of child's level of engagement was 12.9, and therefore, values greater than 12.9 were considered high, and values lower than 12.9 were considered low.

The IMI survey item scores were aggregated within each subscale for each participant. The aggregate score was used in correlation and regression analyses. The researcher hypothesized that a child with higher level of engagement during the Eat a Georgia Rainbow program will score significantly ($p < .05$) higher scores on the IMI survey, which was measured by enjoyment and interest. An aggregate IMI score of greater than 22.5, between 11 and 22.5, and less than 11 was considered to be high, medium, and low scores respectively.

The researcher aggregated all item scores within each subscale for each participant for the Motivation for Diet survey, and the total score was used in the correlation and regression analyses (Appendix B). A high score on the Motivation for Diet survey indicated that participants had a higher intention to adopt a healthy diet (Kitzman-Ulrich et al., 2011; Wilson et al., 2002). Therefore, an aggregate Motivation for

Diet survey score of greater than 21, between 11 and 21, and less than 11 was considered to be high, medium, and low scores respectively. The researcher hypothesized that a child who is engaged more frequently during the Eat a Georgia Rainbow program will score significantly ($p < .05$) higher on the Motivation for Diet survey. The child's level of engagement, the IMI survey score, and Motivation for Diet survey score were uploaded into SPSS (version 25) and a two-tailed significance test was used for the correlation and regression analyses (Mourouga & Sethuraman, 2017).

A reliability analysis was used to test the internal consistency of the subscales. The Kolmogorov-Smirnov test and Shapiro Wilk's test of normality in SPSS were used to test whether the data from student engagement, IMI, and diet survey was following a normal distribution. A statistically non-significant test indicates that the normality assumption was met. The variance inflation factor was used to detect multicollinearity in a regression model. Variance inflation factor values approaching 10 or more than 10 indicates severe multicollinearity in the regression model where the independent variables are highly correlated, which biases the results and leads to increased probability of Type II error (Tabachnick & Fidell, 2007). Durbin-Watson test was used to test the independence of observations. A test statistic value between 1.5 and 2.5 was considered to meet the independence of observations assumption (Fields, 2009). Correlation and regression analyses were conducted after checking the assumptions.

A Pearson product-moment correlation was utilized to determine the strength (i.e., low, medium, high) and direction (i.e., positive, negative, or straight line) of relationship between the child's level of engagement and the child's IMI survey score. A scatterplot

was used to visually determine the direction as well as the strength of the relationship (Tabachnick & Fidell, 2007).

A simple linear regression model was used to determine the influence or predict the value of a dependent variable (i.e., Motivation for Diet survey aggregate scores) based on one independent variable at a time (i.e., student engagement scores and IMI survey aggregate scores) in the model. A quadratic term was calculated separately for motivation for diet variable and IMI variable. This calculation was computed by multiplying each individual score of each variable with itself. The quadratic term enabled to simultaneously model the non-linear effects along with the linear effects of the independent variable (IMI score) on the dependent variable (diet score) in the linear regression model. The new quadratic term was then mean-centered for two reasons. First, to minimize the correlation between the quadratic term, which was derived from the original IMI variable, and the original independent IMI variable thereby reducing the biasing effect of multicollinearity (as measured by the variance inflation factor) in the regression model. Second, to improve the adjusted R^2 value of the regression model. A quadratic term for level of engagement was not created because the scores were not measured on a Likert scale unlike IMI and diet scores. The model allows to estimate the contribution of each independent variable to explain the variance in the dependent variable scores. (Rawlings, Pantula, & Dickey, 2001). Hence, the researcher used a simple linear regression to determine whether the child's level of engagement and IMI survey score individually influenced the child's Motivation for Diet survey score. Understanding the occurrence of intrinsic motivation and flow were essential to developing effective strategies, which will motivate children to engage in learning during

nutrition education program activities. This model may be transferrable from informal to higher education settings.

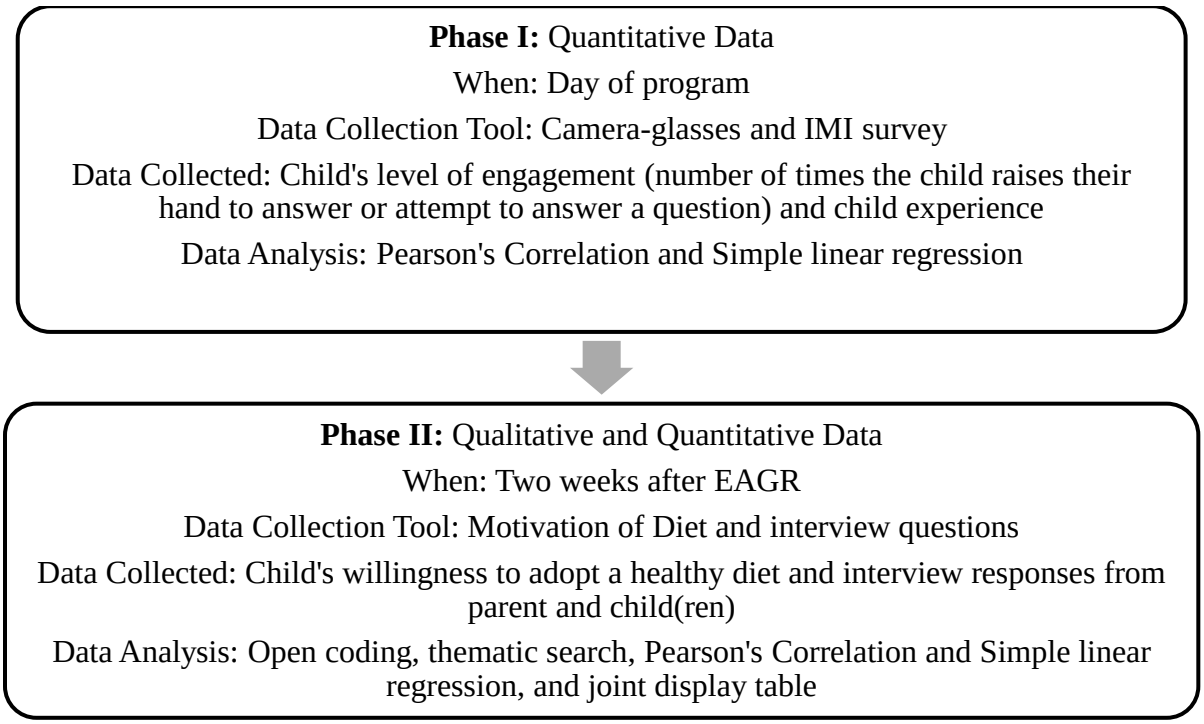

Figure 2. Demonstration of the Data Analysis Methods.

Qualitative. The follow-up interviews were recorded and were transcribed by using open coding to assign labels to the patterns of emerging themes from the child's interview responses and parent's interview responses (Charmaz, 2014). The process of open coding consists of creating categories of codes through notes and headings and reading transcripts multiple times (Elo & Kyngäs, 2008). In Lowenstein et al.'s (2013) study, the researcher utilized open coding to categorize and organize the codes extracted from the transcripts and created a codebook. Using the codebook, the researchers coded the transcripts and met to merge the differences. For example, the theme was *provider-parent interaction*, the code was *barrier*, sub-code was *verbal*, and the note made was "feel that doctors were not addressing the fathers. Instead they just address the wives"

(Lowenstein et al., 2013, p. 138). Triangulation was applied to achieve validation and reliability within the data (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014) as well as to analyze the data from multiple perspectives to uncover a deeper meaning within the data (Jick, 1979). Specifically, the interview transcripts were analyzed three different ways; the researcher reviewed the transcripts prior to coding, utilized open-coding to code each transcript manually, and another researcher reviewed and coded four parent participant and four child participant transcripts. Table 4 illustrates the example of the grouped codes, properties, and example quotes from participants.

Table 4

Example of Categorized Codes Based on Properties and Example Parental Quotes

Theme: Enjoyment and Interest • Meal preparation process		
Open Codes	Properties	Example Quotes
Program enjoyment Collaboration Group learning Reported child's enjoyment	Parents mentioning kids reported enjoyment from cooking class and meal preparation process.	They told me it was very fun […] they wanted to go back to museum to do cooking class (ID:09P) I think she enjoyed the cooking class and being involved (ID:18P) [Being in a] group setting and that other kids were eating and enjoying it (ID:26P) In cooking class she's very happy she got to use the knife and she feel very happy to enjoy the process (ID: 13P) They have a better understanding. Like measurements and like they enjoy the measuring process of it (ID:33P)

The researcher coded 20 parent transcripts and 26 child transcripts twice. There were 115 codes found in the parent transcripts and 169 codes found in the child

transcripts. To meet the validity of the codes found, a second researcher coded 20% (n=4) parent interview transcripts and 15% (n = 4) child interview transcripts utilizing the parent and child codebooks. The researcher then compared and contrasted the differences in codes within the same four parent transcripts and four child transcripts. The method used was based on a study conducted by Patrick and Caplow (2018). The first researcher utilized open-coding to code 15% of the 136 mission statements to identify conservation and education within the mission statements to assess how the collective goals of the community have changed. To verify the validity of the categories found previously in the coding process, a second researcher coded 15% of the 136 mission statements. Additionally, the researchers used the overlap to verify whether or not the coding was sufficient in code distribution.

In the current study, the second researcher found 15 codes within the four parent transcripts. As a result, there was a 94% overlap in the distribution of codes. The final six percent of the remaining codes were discussed and negotiated. New codes were not developed as the first researcher found one more code that the second researcher did not find. The codes were grouped together as categories and based on similar events and incidents (Elo & Kyngäs, 2008). The researcher utilized descriptive coding to assign codes that summarized meanings of phrases or words being used in a specific context (Ngulube, 2015). The second researcher coded the transcripts as an external individual who had no knowledge of the participants or their identity, was not affiliated with neither Columbus State University, Atlanta museum, or study participants, and/or had no financial gain of the current study. The second researcher had a background in science research and had the ability to thoroughly conduct the coding process independently.

From the parent's transcripts, codes were grouped into four major themes, which included: *enjoyment and interest, participation in meal preparation, learning during EAGR,* and *family conversations*. Phrases or words that pertained to enjoyment during the program, such as *they told me it was very fun, interested in the process, she was happy, excited,* and *enjoyed* were categorized as *program enjoyment and interest*. Phrases or words that pertained to learning, such as *she learned, how to make, better understanding, motor skills, observations, how to take turns, she was open to trying it, trying new foods,* and *motivating to cook* were categorized as *learning from EAGR.* When asked whether or not the child had initiated any conversation regarding healthy eating and or meal preparation, responses that related to types of conversations, such as *talked about the class, cutting down soda and sugar, she's talked about eating more healthy, asking if he can cook, ingredients and what is good,* and *we talk about healthy foods all the time,* were categorized as *family conversations.* References to *process of making the food, helped me cook, interested in making food, we teach them how to make salads and how to cook, wants to help me cook everything, prepare dinner, and breakfast* were categorized as *participation in meal preparation.* Table 5 illustrates examples of codes, themes/subthemes, and example quotes from the parent's interview transcripts analysis.

Table 5

Parental Codes, Themes/Subthemes, and Participant Example Quotes

Theme/Subtheme	Example Quotes
Program Enjoyment and Interest 1a. enjoyment during program 1b. enjoyment meal preparation during EAGR 1c. food item	1a. well, they told me it was very fun and they wanted to go back to the museum to do more of the cooking classes 1b. she was so excited to make herself you know, not just for her, but for me

Theme/Subtheme	Example Quotes
1d. process of meal preparation during EAGR	1c. they did say they enjoyed the snack 1d. she's very happy she got to use the knife and she feel very happy to enjoy the process
Learning during EAGR 2a. knowledge on healthy foods 2b. knowledge on process of meal preparation 2c. knowledge about healthy eating 2d. knowledge about ingredients 2e. skill development (social) 2f. new Experience	2a. She likes cucumber and chickpeas and she knows that these things are healthy now 2b. How to make a nutritious snack 2c. I think she learned about healthy eating 2d. they learned about ingredients and word recipe 2e. umm some motor skills and observation follow the instructions and patience 2f. I think she learned how to use one of those little knife things
Family Conversations 3a. EAGR program 3b. healthy eating 3c. meal preparation 3d. ingredients 3e. prior conversations 3f. ongoing	3a. they talked about the class 3b. talked about cutting down soda and sugar 3c. he has been asking if he can cook 3d. we talk about ingredients and what is good 3e. we talk about healthy foods all the time 3f. that's more just like ongoing conversations [about] eating more vegetables and protein
Participation in meal preparation 4a. participation in meal preparation at home-after 4b. meal preparation at home-prior 4c. unhealthy items 4d. discourages cooking 4e. encouraging cooking	4a. like when she's home, she cooks the carrots and cucumbers and mixes the salad 4b. we have like pizza night on Fridays, something that we kind of did before the cooking class 4c. Our favorite of brownies. So we make brownies and muffins 4d. at home she always wants to do some cooking, but I just gave her the cooking toys but I don't let her you try a lot real food 4e. we did you like those kids knives and we liked them so much we bought her a set to use them to be able to use with us at home while cooking

During the initial coding, the researcher coded four out of 26 child interview transcripts twice, and there were 11 codes found. The 11 codes were inputted into the child's transcript codebook. For validity purposes, the second researcher coded the same four transcripts twice utilizing the child's codebook. The second researcher found 12 codes and within the four child transcripts. There was a 92% overlap in the distribution of codes. The remaining eight percent of the codes were discussed and negotiated. One new code was found from the second researcher's coding process, *favorite component-knowledge on health outcome.* This code was added to the child's transcript codebook. The codes from the child participant transcripts were grouped into five major themes that included: *recollection of food, understanding components of healthy ingredients, enjoyment, favorite component of EAGR,* and *disliked component of EAGR.*

References to *food item prepared in EAGR* and *ingredients used in EAGR* were categorized as *recollection of EAGR.* Words or phrases relevant to *ingredients, eating healthy, vitamins are good,* and *they can make you strong* were categorized as *understanding the components of healthy ingredients.* Words or phrases relevant to *enjoyed working together, enjoyed cutting the cucumbers, class was useful,* and *I enjoyed the taste of the snack* were categorized as *enjoyment*. Phrases that included *my favorite part was tasting, favorite part was making, favorite part was making it with my sister*, and *favorite part was learning* were categorized as *favorite component of EAGR.* References to *I didn't like the taste, I didn't like the smell,* and *I didn't like the camera-glasses* were categorized as *disliked component of EAGR*. Table 6 illustrates examples of codes, themes/subthemes, and example quotes from the child's interview transcripts analysis.

Table 6

Examples of Codes, Themes/Subthemes, and Example Quotes from Child Participants

Theme/Subthemes	Example Quotes
Recollection of EAGR 1a. recollection of food item 1.b recollection of ingredients	1a. cucumber hummus 1b. It was uh chick peas, cucumber, and minced Garlic with olive oil
Understanding components of healthy ingredients 2a. health outcome 2b. healthy ingredients 2c. healthy eating-perceived as important 2d. Intent of healthy diet	2a. it's important for nutrients to like go to your body for you work 2b. cumbers are very healthy for you. You can eat them as a snack 2c. If I eat healthy I can be healthy and strong when I get older now 2d. I should try to eat healthy everyday
Enjoyment 3a. enjoyed collaboration 3b. enjoyed tasting 3c. enjoyed meal preparation 3d. perceived usefulness	3a. I really like how, like we all got to take turns and not one person or something to do all the work 3b. I like eating it, it was so good. 3c. cooking was fun 3d. [the class] was very useful
Favorite component of EAGR 4a. favorite-tasting 4b. favorite- meal preparation process 4c. favorite collaboration 4d. favorite-knowledge	4a. my favorite part was eating the hummus 4b. my favorite part was chopping the cucumbers 4c. my favorite part was putting in the ingredients in with my little sister 4d. my favorite part was getting to learn about the importance of eating healthy and learning like what ingredients and like, what you need for stuff to make it
Disliked component of EAGR 5a. disliked taste of food item 5b. disliked food item 5c. disliked camera-glasses	5a.eating the corn 5b. I don't like the cucumbers 5c. the glasses because they felt warm on my face

Quantitative and Qualitative Data Integration

The integration of qualitative and quantitative results during the data collection and interpretation phase exemplified support of those results to answer the mixed methods research question "How do the interviews of parents and children support the relationship between child's level of engagement, IMI survey score, and Motivation for

Diet survey score?" For example, the camera-glass recordings provided participant's remarks that related to the interest and enjoyment of the program. Therefore, the results aligned with the quantitative IMI survey scores that indicated a high interest and enjoyment score. The purpose was to determine the relationship between the child's level of engagement and the interest/enjoyment in Eat a Georgia Rainbow program. Additionally, the child's willingness to adopt a healthy diet was based on the interest and enjoyment of the Eat a Georgia Rainbow program and the child's level of engagement during Eat a Georgia Rainbow. The joint display table demonstrates a cross-over mixed analysis where a theme was produced from the qualitative data analysis and was used to integrate the quantitative data (Poth, 2014). The purpose of the joint display table was to show the integration data analysis by organizing the quantitative and qualitative data to compare the results (Creswell & Clark, 2006). Table 7 illustrates a joint display table of an example of participant's quotes, child's level of engagement, IMI survey score, and Motivation for Diet survey score.

Table 7

Example of the Integration of Qualitative and Quantitative Data Analysis

Theme	Qualitative		Quantitative		
	Parent's Response	Child's response	Level of Engagement	IMI survey score	Motivation for Diet survey score
Enjoyment and Interest • Engagement • Cooking was fun • Working with others was fun					

	"[they are] more interested in making food by themselves. Like, like to help in the kitchen when I'm making food and cooking". (ID: 08P)	"I like how we all got to take turns and not one person do all the work[…]My favorite part was getting to learn about the importance of eating healthy and learning what ingredients and like what you need for stuff to make it" (ID: 081_F)	17	30	25

Summary

A convergent parallel mixed methods research design was used for the present study, and data were collected from 50 child participants through two phases of data collection at the Children's Museum of Atlanta. In Phase I, during the Eat a Georgia Rainbow program, quantitative data were collected using camera-glasses and the IMI survey. The recordings recorded the level of engagement that was measured by the number of times a child raised his or her hand during the Eat a Georgia Rainbow program. The interest and enjoyment subscale from the IMI survey was used to measure learner's motivation to learn and perform during specific learning activities. Therefore, the IMI survey measured the child's perceived interest and enjoyment of his or her learning experiences during the Eat a Georgia Rainbow program. In Phase II, quantitative

follow-up data were collected through the Motivation for Diet survey, and qualitative follow-up data were collected through structured interviews. The follow-up data in Phase II were collected 2 weeks after the participants attended the museum Eat a Georgia Rainbow program. The Motivation for Diet survey was used in past studies to assess the participant's motivation to adopt a healthy diet that could result in positive improvements in adopting healthy behaviors and their autonomous motivation for diet. Thus, the Motivation for Diet survey was used in this current study to measure the child's motivation for healthy eating. A high score on the survey indicated a positive self-concept and greater motivation with the intent to adopt a healthful diet. The recorded level of engagement, IMI survey scores, and Motivation for Diet survey scores were inputted into SPSS (version 25) to analyze the quantitative results. A Pearson's Correlation was utilized to determine the relationship between the child's level of engagement and their IMI survey score. Pearson Correlation was used to determine the relationship between the child's level of engagement and their Motivation for Diet survey score. A simple linear regression was used to assess impact on the Motivation for Diet survey scores by the child's level of engagement and IMI survey scores.

The structured interviews conducted with parent participants in Phase II identified family conversations and interactions with meal preparation that occurred after the Eat a Georgia Rainbow program. The structured interviews conducted with child participants in Phase II identified the child's description of Eat a Georgia Rainbow 2 weeks after attending the Eat a Georgia Rainbow program at the Children's Museum of Atlanta. The data from the child(ren) and parent interview responses were recorded using a recording device, transcribed, and manually coded, and themes were coded, selected, and analyzed.

The researcher assigned codes to phrases and words using descriptive coding. The researcher assigned codes that summarized meanings of phrases or words being used in a specific context. During the coding process, a second researcher coded four of the parent interview transcripts and four of the child interview transcripts to validate the codes that were found. The researcher then compared and contrasted the same four parent and child interview that were previously transcribed and found a 94% overlap in the parent transcripts and a 92% overlap in the child transcripts. No new codes were developed in the parent transcripts, but one new code was developed in the child transcript, *favorite component-knowledge on health outcome.* The researcher found 115 codes in the parent transcripts and 169 codes in the child transcripts. The codes were grouped together as categories and based on similar events and incidents. A cross-over mixed analysis was used to integrate the findings. The quantitative and qualitative data were analyzed independently, and results were then integrated in a joint display table. This approach illustrated the integration data analysis by organizing the quantitative and qualitative data to compare the results (Creswell & Clark, 2017). The qualitative data results from the structured interviews supported the quantitative results from the camera-glasses, IMI survey, and Motivation for Diet survey.

CHAPTER IV

RESULTS

Introduction

Limited research exists that investigates the influence of children's level of engagement in a nutrition education program on children's learning experiences measured by interest and enjoyment and their intention to adopt a healthy diet. The experiential learning theory was used as a lens in the current study to emphasize the importance of participants learning through hands-on, task-oriented activities (Wenger, 2009) and reflecting on the experiences (Cornell et al., 2013; Kolb, 2014). A convergent parallel mixed methods research design was used in this study to investigate children's learning experiences during the Eat a Georgia Rainbow program and to understand their motivation to learn about healthy eating and healthy meal preparation in relevance to the development of their intentions to adopt a healthy diet. There were two phases of data collection for the present study. In Phase I of data collection, camera-glasses and the IMI survey were used to collect data. The camera-glasses were used to record the number of times a child raised their hand to attempt to respond to the cooking class facilitator or volunteered to perform a cooking task. The IMI survey measured the child's enjoyment and interest they experienced during the Eat a Georgia Rainbow program. In Phase II of the follow-up data collection, the researcher facilitated the Motivation for Diet survey and interviews through Facetime and/or phone call. The parent was asked three questions that pertained to conversations regarding healthy eating, child's interaction with

participation in meal preparation, the parent participant's perception of what his or her child learned during the Eat a Georgia Rainbow program (see Appendix G). Afterwards, the child was also asked questions pertaining to their recollection of their experiences during Eat a Georgia Rainbow as well as questions from the Motivation for Diet survey that measured their intent of adopting a healthful diet. The parent and child interviews were conducted separately.

Child's level of engagement, IMI survey score, and Motivation for Diet survey score were inputted into SPSS to analyze the relationship between the variables as well as to investigate the influence of the child's level of engagement and IMI survey score on the Motivation for Diet survey score. The researcher transcribed the qualitative data obtained from FaceTime and/or phone interview, manually coded the transcripts using open-coding, and conducted a thematic analysis. This chapter describes the integration of quantitative and qualitative results and provides an illustration of how the results from the data analysis relate to problem statement, purpose of study, and the research questions.

Findings

In this section, the researcher will be discussing the findings from the quantitative statistical analyses, qualitative analysis, and findings from the integration of both the quantitative and qualitative results using joint display tables. The following were the research questions and hypotheses that guided this study:

1. What is the relationship between child level of engagement during the Eat a Georgia Rainbow program and their IMI survey scores? (Quantitative Research Question)

Null Hypothesis: There is no statistically significant relationship between child's level of engagement and IMI survey scores.

Alternate Hypothesis: There is a statistically significant relationship between child's level of engagement and IMI survey scores.

2. What is the relationship between child level of engagement during the Eat a Georgia Rainbow program and their Motivation for Diet survey score? (Quantitative Research Question)

   Null Hypothesis: There is no statistically significant relationship between child's level of engagement and IMI survey scores.

   Alternate Hypothesis: There is a statistically significant relationship between child's level of engagement and IMI survey scores.

3. Does the child's level of engagement influence their motivation for diet survey score to a statistically significant degree? (Quantitative Research Question)

   Null Hypothesis: The child's level of engagement does not influence their motivation for Diet survey score to a statistically significant degree.

   Alternate Hypothesis: The child's level of engagement does influence their motivation for Diet survey score to a statistically significant degree.

4. Does the child's IMI score influence their motivation for diet survey score to a statistically significant degree? (Quantitative Research Question)

   Null Hypothesis: The child's IMI score does not influence their motivation for diet survey score to a statistically significant degree.

   Alternate Hypothesis: The child's IMI score does influence their level of engagement to a statistically significant degree.

5. What conversations and interactions regarding healthy eating and meal preparation are occurring within families after the Eat a Georgia Rainbow program? (Qualitative Research Question)
6. What are parent's perceptions of their children's knowledge 2 weeks after the Eat a Georgia Rainbow program? (Qualitative Research Question)
7. What are children's perceptions of the Eat a Georgia Rainbow program 2 weeks after attending? (Qualitative Research Question)
8. How do the interviews of parents and children support the relationship between child's level of engagement, IMI survey score, and Motivation for Diet survey score? (Mixed Methods Research Question)

Quantitative

Prior to testing the reliability, the normality, and computing the data analyses to answer the research questions, the survey scores were inputted into SPSS (version 25), aggregated, and reversed item scores were removed from the IMI survey and Diet survey. The scores for each participant in the IMI survey was aggerated before using the scores for analysis. Similarly, scores for the Motivation for Diet survey was aggerated as well. Although the results were statistically non-significant, the Adjusted R^2 increased compared to when the reverse scores were included in the correlation model. Additionally, item Diet_2 was removed because the variable was not correlated with other variables. As a result, the Adjusted R^2 was much higher. Furthermore, two cases with an IMI aggerate score of 15 and 17 and one case Diet aggregate score of 18 was removed as these scores were outliers.

A reliability analysis was conducted to determine the estimated internal consistency of the survey items. This analysis assisted in determining if the scores for the IMI survey that have been aggregated were reliable. The reliability analysis was computed without the inclusion of the reversed IMI survey_score_3 and IMI_survey_score_4. As seen in Table 8, the reliability results for IMI survey scores indicated a high level of internal consistency of .929. Subsequently, two cases with IMI total score of 15 and 17 were removed. As a result, the removal of outlier cases caused a decrease in reliability of .774 (Table 9). However, the IMI survey was deemed to be reliable as the reliability score was above .70 cut off (Nunnally, 1978). Table 10 displays the percentages of responses for the IMI survey.

Table 8

Reliability Analysis for IMI Survey with Outlier Cases

Cronbach's Alpha	*N* of Items	*n*
.929	5	50

Note. Cronbach's alpha measures the internal consistency of the survey scale. *n* represents the subsample size.

Table 9

Reliability Analysis for IMI Survey with Removal of Outlier Cases

Cronbach's Alpha	*N* of Items	*n*
.774	5	47[a]

Note. Cronbach's alpha measures the internal consistency of the survey scale. The *n* represents the subsample size.

[a] The subsample size has decreased from Table 3 as a result of the removal of three cases.

Table 10

Frequency Analysis of Participant's Responses for the IMI Survey

IMI	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I enjoyed doing this activity very much	76.6%	21.3%	0%	2.1%	0%
This activity was fun to do	78.7%	21.3%	0%	0%	0%
I thought this was a boring activity	2.1%	0%	4.3%	8.5%	85.1%
This activity did not hold my attention at all	8.5%	2.1%	0%	10.6%	78.7%
I would describe this activity as very interesting	72.3%	27.7%	0%	0%	0%
I thought this activity was quite enjoyable	68.1%	31.9%	0%	0%	0%
While I was doing this activity, I was thinking about how much I enjoyed it	66.0%	19.1%	10.6%	4.3%	0%

The reliability analysis was conducted without the inclusion of the reversed Diet survey_score_5 and Diet_survey_score_9, but the analysis included the case having Diet aggregate score of 18. As seen in Table 11, the reliability indicated a lower level of internal consistency of .684. However, the removal of the two reverse-coded survey items and the case with Diet aggregate score of 18 caused a decrease in reliability of .517. As a result, the Motivation for Diet Survey was not reliable as seen from Table 12. The reason for removing the Diet aggregate score of 18 was that the case resulted in a negative adjusted R^2 value in the regression model making the interpretation of the influence of

independent variables (i.e., level of engagement and IMI survey score) on the dependent variable (i.e., Motivation for Diet survey score) difficult. In addition, the case was an outlier and lead to severe non-normal distribution. Table 13 show the percentage of responses for the IMI survey and Motivation for Diet survey.

Table 11

Reliability Analysis for Motivation for Diet Survey with Outlier Cases

Cronbach's Alpha	*N* of Items	*n*
.684	7	50

Note. Cronbach's alpha measures the internal consistency of the survey scale. *n* represents the subsample size.

Table 12

Reliability Analysis for Motivation for Diet Survey without Outlier Cases

Cronbach's Alpha	*N* of Items	*n*
.521	7	47[a]

Note. Cronbach's alpha measures the internal consistency of the survey scale. The *n* represents the subsample size.
[a] The subsample size has decreased from Table 5 as a result of the removal of three cases.

Table 13

Frequency Analysis of Participant's Responses for the Motivation for Diet Survey

Motivation for Diet	Very true	Somewhat true	Not true at all
I am excited about eating healthy on most days	38.3%	23.4%	0%
I get into eating healthy on most days	46.8%	12.8%	2.1%
I make sure I get plenty of healthy food on each day	48.9%	12.8%	0%

Motivation for Diet	Very true	Somewhat true	Not true at all
I do not care about eating healthy on most days	4.3%	57.4%	0%
I plan on how I can eat healthy every day	61.7%	23.4%	4.3%
Eating healthy is very important to me	57.4%	2.1%	2.1%
I get excited about eating healthy every day	61.7%	31.9%	2.1%
I am not interested in eating healthy	2.1%	2.1%	61.7%
I get into it when I eat healthy very day	31.9%	29.8%	0%
Missing	18 (38.3%)		
Valid	29 (61.7%)		

The normality analysis assessed whether or not the data within the variables were normally distributed. The normality analysis was used in SPSS (version 25) prior to running the correlation and regression analyses. The normality analysis was conducted without the inclusion of the reversed Diet survey_score_5 and Diet_survey_score_9, but the analysis included one case having Diet total score of 18. As a result, the normality test indicated a skewness of 0.008 and kurtosis -0.0812 (Table 14). Thirty-one children completed the Motivation for Diet survey. However, two cases from the IMI survey with an aggregated score of 15 and 17 and one case with from the Motivation for Diet survey with an aggregated score of 18 were removed from the dataset to increase the normality values. Hence, there were only 29 valid cases for the final correlation and regression analyses. As a result, there was an increase in skewness to 0.070 and kurtosis to -1.137 (Table 16). As seen in Table 15, the Shapiro-Wilk's test results indicated $p = .002$ and was determined to be a statistically significant. Therefore, the researcher failed to reject the null hypothesis that stated the data were normally distributed and normality was not met. However, according to West, Finch, and Curran (1995), the absolute value of

skewness greater than 2.1 and kurtosis value greater than 7.1 indicates true departure from normality. The skewness values and kurtosis values were below 2.1 and 7.1. When the outlier cases were removed, the scores were approximately normally distributed. The normal Q-Q plot and detrended Q-Q plot in Figure 3 and Figure 4 show a slight normal distribution for the Motivation for Diet survey because not all the points were aligned on the straight line. Figure 5 displays the distribution of Motivation for Diet survey scores through a box plot. The median score was 18 (or middle quartile) and was indicated by the horizontal line inside the boxplot. The horizontal line at the bottom of box plot was the lower quartile for the diet survey aggregate score and was approximately 17. The horizontal line at the top of box plot was the upper quartile for the Motivation for Diet survey aggregate score and was approximately 20. The minimum and maximum values for the aggregate Motivation for Diet survey scores were 15 and 21 respectively.

Table 14

Descriptive Statistics of Normality Analysis for Motivation for Diet Survey with Outlier Case Item

			Statistic	*SE*
Diet_survey_total_score	*M*		27.17	.362
	95% Confidence Interval for Mean	LL	26.43	
		UL	27.91	
	5% Trimmed Mean		27.22	
	Median		27.00	
	Variance		3.937	
	Std. Deviation		1.984	
	Minimum		23	
	Maximum		30	
	Range		7	
	Interquartile Range		3	
	Skewness		.008	.427
	Kurtosis		-.812	.833

Note. *SE* is an abbreviation for Standard Error and *M* is an abbreviation for Mean.

Table 15

Normality Analysis for Motivation for Diet Survey without Outlier Case Item

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	*df*	*p*	Statistic	*df*	*p*
Diet_Survey_NoReverse_Total_new	.183	29	.014	.914	29	.022

Note. The *p* represents the significance level, and significance level for Shapiro-Wilk's test was $p > .05$.

Table 16

Descriptive Statistics of Normality Analysis for Motivation for Diet Survey without Outlier Case Item

			Statistic	*SE*
Diet_Survey_NoReverse_Total_new	*M*		18.45	.339
	95% Confidence Interval for Mean	Lower Bound	17.75	
		Upper Bound	19.14	
	5% Trimmed Mean		18.48	
	Median		18.00	
	Variance		3.328	
	Std. Deviation		1.824	
	Minimum		15	
	Maximum		21	
	Range		6	
	Interquartile Range		3	
	Skewness		.070	.434
	Kurtosis		-1.137	.845

Note. SE is an abbreviation for Standard Error, and *M* is an abbreviation for Mean.

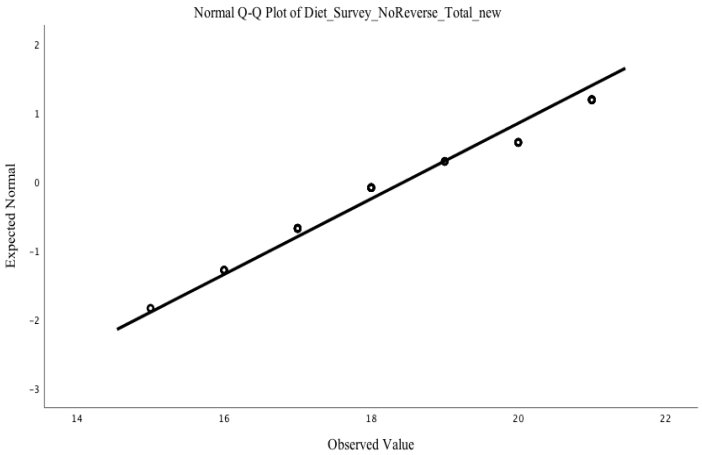

Figure 3. Normal Q-Q Plot for the Motivation for Diet Survey Scores without outlier cases.

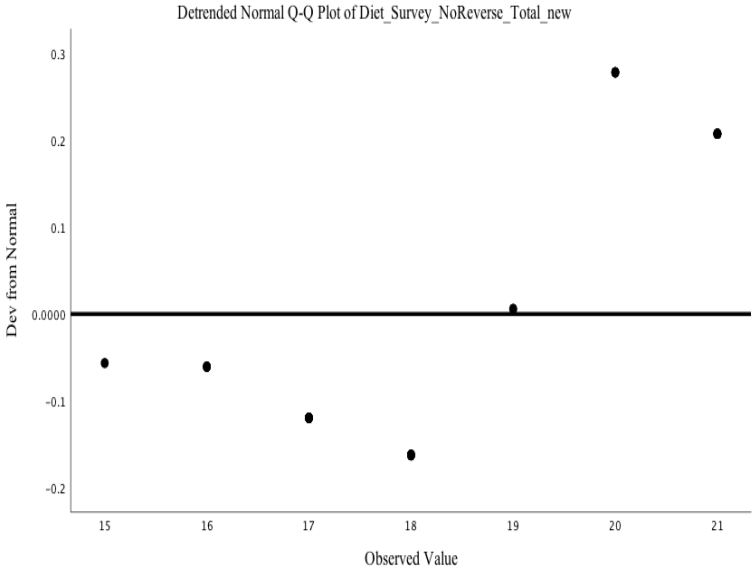

Figure 4. Detrended Q-Q Plot for the Motivation for Diet Survey Scores without outlier cases.

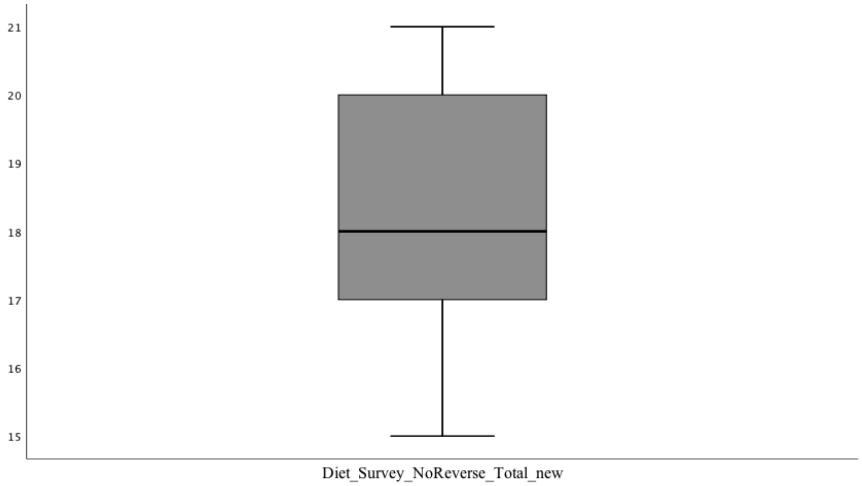

Figure 5. Box Plot for Motivation for Diet survey.

The normality analysis was computed without the inclusion of the reversed IMI survey_score_3 and IMI_survey_score_4, but the analysis included the two cases having IMI aggregate score of 15 and 17. Skewness was -2.867, and kurtosis was 10.628 (Table 17). Normality test was statistically significant indicating that the normality assumption was not met after removing the outliers (Table 18). Table 19 displays the results after the removal of the reversed survey items and two cases with IMI total score of 15 and 17, which led to a decrease in skewness from -2.876 to -1.132, and a large decrease in kurtosis from 10.628 to -0.023. However, the skewness and kurtosis values were below 2.1 and 7.1 respectively indicating that the IMI aggregate scores were not severely departing from a normal distribution (West et al., 1995). Hence, the scores were approximately normally distributed and parametric analyses (correlation and regression) could be utilized. Figure 6 and Figure 7 demonstrate the Normal Q-Q plot and the Normal Detrended Q-Q plots that does not illustrate a normal distribution. However, the focus was on the skewness and kurtosis values that were below 2.1 and 7.1 and respectively, Hence, the IMI aggregate scores were considered to be approximately normally distributed (West et al., 1995). Figure 8 displays the distribution of IMI survey

scores through a box plot. The median score was 24 (or middle quartile) and was indicated by the horizontal line inside the boxplot. The horizontal line at the bottom of box plot was the lower quartile for the IMI survey aggregate score and was approximately 22. The horizontal line at the top of box plot was the upper quartile for the IMI survey aggregate score and was approximately 25. The minimum and maximum values for the aggregate IMI survey scores were 19 and 25, respectively.

Table 17

Descriptive Statistics for IMI Survey with Outlier Case Item

			Statistic	*SE*
IMI_NoReverse	*M*		22.6800	.52407
	95% Confidence Interval for Mean	LL	21.6269	
		UL	23.7331	
	5% Trimmed Mean		23.2333	
	Median		24.0000	
	Variance		13.732	
	Std. Deviation		3.70570	
	Minimum		5.00	
	Maximum		25.00	
	Range		20.00	
	Interquartile Range		4.00	
	Skewness		-2.867	.337
	Kurtosis		10.628	.662

Note. SE is an abbreviation for Standard Error, and *M* is an abbreviation for Mean.

Table 18

Normality Analysis for IMI Survey without Outliers

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	*df*	*p*	Statistic	*df*	*p*
IMI_Survey_NoReverse_Total_new	.254	47	.000	.771	47	.000

Note. df is an abbreviation for degrees of freedom, and *p* is an abbreviation for the significance value.

Table 19

Descriptive Statistics of Normality Analysis for IMI Survey without Outliers

			Statistic	*SE*
IMI_Survey_NoReverse_Total_new	*M*		23.38	.305
	95% Confidence Interval for Mean	LL	22.77	
		UL	24.00	
	5% Trimmed Mean		23.56	
	Median		24.00	
	Variance		4.372	
	Std. Deviation		2.091	
	Minimum		18	
	Maximum		25	
	Range		7	
	Interquartile Range		3	
	Skewness		-1.132	.347
	Kurtosis		-.023	.681

Note. SE is an abbreviation for Standard Error, and *M* is an abbreviation for Mean.

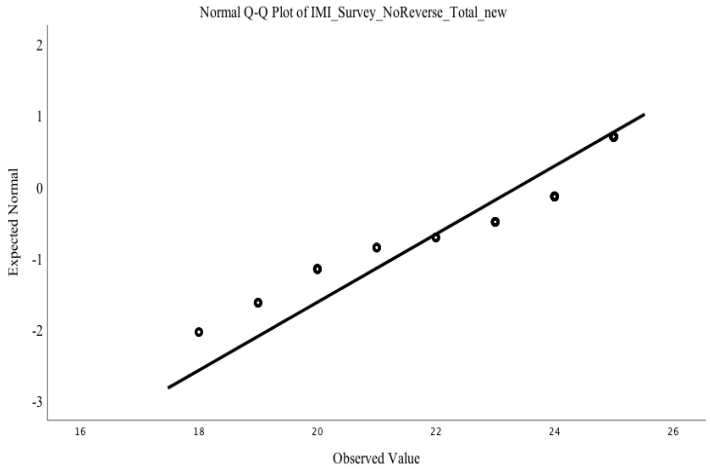

Figure 6. Normal Q-Q Plot for IMI Survey Scores without outliers.

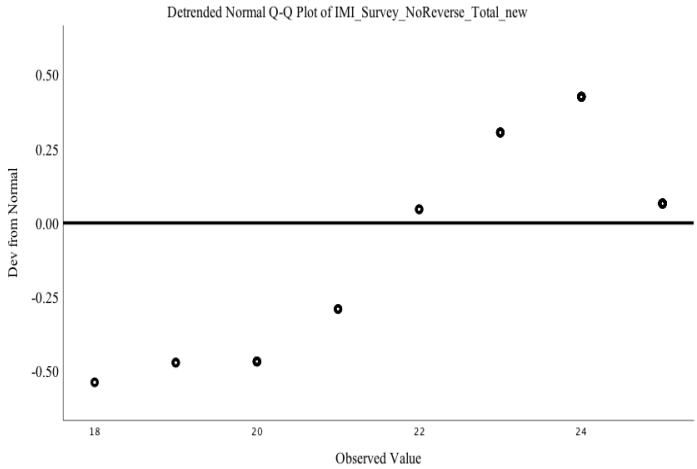

Figure 7. Detrended Normal Q-Q Plot for IMI Survey Scores without outliers.

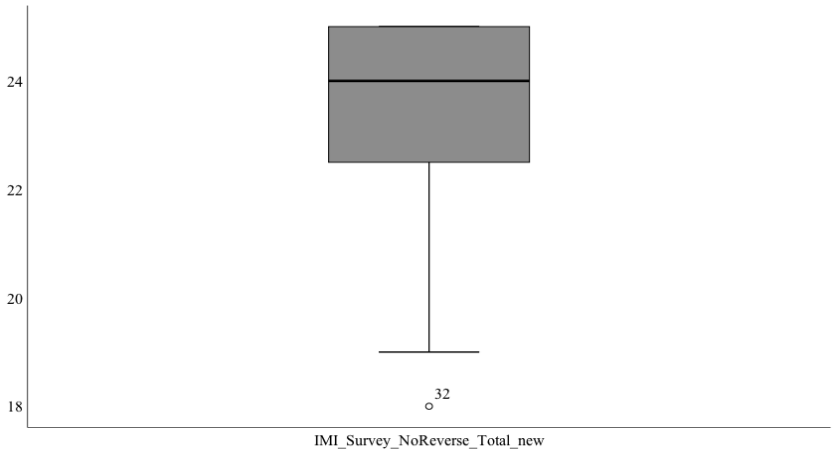

Figure 8. Box Plot for IMI Survey Score without outliers.

Table 20 displays the normality test for engagement scores. The result was statistically non-significant indicating that normality assumption was met. Hence, normality was met. Table 21 illustrates the skewness to be approximately 0.40 and kurtosis to be -0.433. The kurtosis and skewness for level of engagement scores were still below 2.1 and 7.1 and thus, indicating that normality has been met and parametric analyses can be utilized. Figure 9 and Figure 10 show the Q-Q plots that demonstrates the points closely aligned with the straight line, and thus, the data were normally distributed. Figure 11 displays the distribution of level of engagement scores through a box plot. The

median score was12 (middle quartile) and was indicated by the horizontal line inside the boxplot. The horizontal line at the bottom of box plot was the lower quartile for the diet survey aggregate score and was approximately 10. The horizontal line at the top of box plot was the upper quartile for the level of engagement score, and was approximately 14. The minimum and maximum values for the level of engagement scores were 8 and 17 respectively.

Table 20

Test of Normality for Level of Engagement

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	*df*	*p*	Statistic	*df*	*p*
Level of Engagement	.108	47	.200*	.957	47	.084

Note. **$p > .05$

Table 21

Descriptive for the Normality Analysis for Level of Engagement

			Statistic	*SE*
Level of Engagement	*M*		12.19	0.333
	95% Confidence Interval for Mean	*LL*	11.52	
		UL	12.86	
	5% Trimmed Mean		12.13	
	Median		12	
	Variance		5.202	
	Std. Deviation		2.281	
	Minimum		8	
	Maximum		17	
	Range		9	
	Interquartile Range		4	
	Skewness		0.397	0.347
	Kurtosis		-0.433	0.681

Note. SE is an abbreviation for Standard Error, and *M* is an abbreviation for Mean. *LL* is abbreviated for lower limit of the confidence Interval. *UL* is abbreviated for upper limit of the confidence interval.

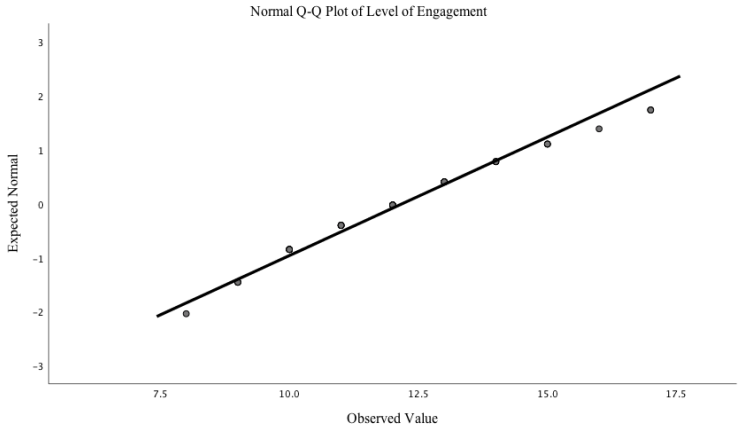

Figure 9. Normal Q-Q Plot of Level of Engagement.

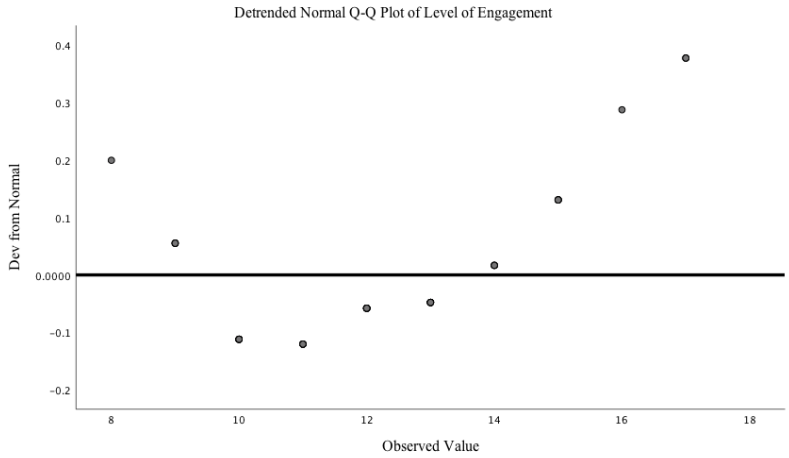

Figure 10. Detrended Q-Q Plot of Level of Engagement.

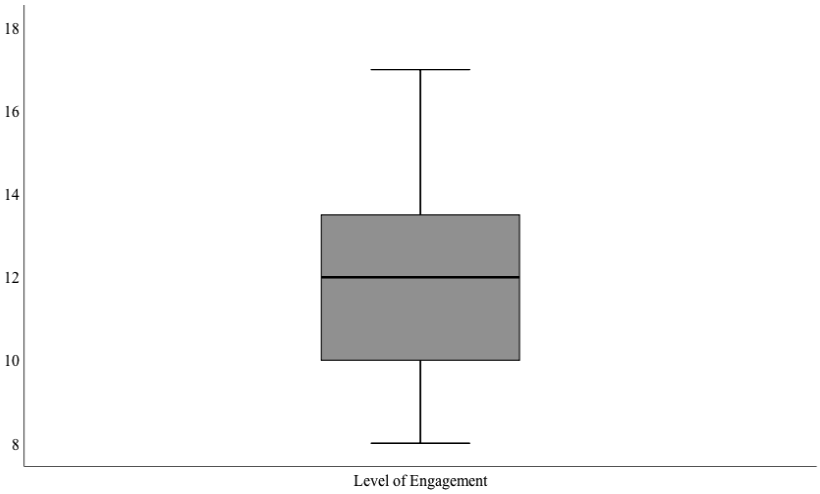

Figure 11. Box Plot for Level of Engagement.

Correlation Analysis

A Pearson's correlation analysis was conducted to answer Research Questions 1 and 2. Utilizing the Pearson's correlation, the researcher examined the relationship between child's level of engagement, IMI survey score, and Motivation for Diet survey score. Prior to removing the two cases from the IMI survey aggregate score of 15 and 17 and one case from the Diet survey aggregate score of 18, there was a positive correlation of .283 between IMI survey score and Motivation for Diet survey score. Table 22 illustrates the descriptive statistics. There were 47 valid cases for the IMI survey, and only 29 valid cases for the Motivation for Diet survey. Table 23 indicates that there was a weak relationship between IMI survey scores, and level of engagement. The correlation coefficient was statistically non-significant $r = .235$, $R^2 = .052$, $p > .05$ (Table 23). There was also a negative correlation between the child's level of engagement and Motivation for Diet survey score. The correlation coefficient was statistically non-significant (Table 23). There was not sufficient evidence to reject the null hypothesis for both research question one (level of engagement and IMI survey score) and two (level of engagement and Motivation for Diet survey score).

Table 22

Descriptive Statistics for Correlations Analysis for Level of Engagement, IMI Survey, and Motivation for Diet Survey

	M	*SD*	*n*
Level of Engagement	12.19	2.281	47
IMI_Survey_NoReverse_Total_new	23.38	2.091	47
Diet_Survey_NoReverse_Total_new	18.45	1.824	29

Note. *M* is abbreviated for mean; *SD* is abbreviated for standard deviation, and *n* is abbreviated for number of cases.

Table 23

Correlations Analysis for Level of Engagement, IMI Survey, and Motivation for Diet Survey

	Level of Engagement	IMI_Noreverse_CenterSq	Diet_Survey_CenterSq
Level of Engagement	--		
IMI_Noreverse_CenterSq	-.016	--	
Diet_Survey_CenterSq	.196	.256	--

Simple Linear Regression Analysis

The influence of child's level of engagement on predicting the Motivation for Diet survey score. A simple linear regression was conducted to answer Research Question 3. The independent variables were the child's level of engagement and IMI survey score, and the dependent variable was the child's Motivation for Diet survey score. A quadratic term was calculated separately for the Motivation for Diet variable and IMI variable. The calculation was computed by multiplying each individual score of each variable with itself. The quadratic term enabled to simultaneously model the non-linear effects along with the linear effects of the independent variable (i.e. IMI score) on the dependent variable (i.e., diet score) in the linear regression model. The new quadratic term was then mean-centered for two reasons. First, to minimize the correlation between the quadratic term, which was derived from the original IMI variable, and the original independent IMI variable, thereby reducing the biasing effect of multicollinearity (i.e., as measured by the variance inflation factor) in the regression model. Second, to improve the adjusted R^2 value of the regression model. A quadratic term for level of engagement was not created because the scores were not measured on a Likert scale unlike IMI and

diet scores. Table 24 displays the ANOVA statistics of regression analysis for level of engagement variable. The assumptions of multicollinearity were met through examination of variance inflation factor (1.000). The normality was met through the examination of the Q-Q plots as seen in Figure 12. The skewness and kurtosis values for the Motivation for Diet survey (0.070, -1.137) score and level of engagement (0.397, -0.433) were below 2.1 and 7.1 and respectively, the data were considered to be normally distributed (West et al., 1995). Independence of observation of the Durbin-Watson statistic indicated that the value of 2.021 that was within the absolute range of 1.5 and 2.5. In Figure 13 and Figure 14, the scatterplots indicated that the scores of the standardized predicted values and residuals were independent from each other and, thus, the independence of observations was not met. A non-significant regression equation was found ($F(1, 27) = 1.078$, $p > .05$), with an R^2 of .003 (See Table 25). When the Sum of Squares (*SS*) between or the *SS* of regression was very low, the independent variables (i.e., IMI survey scores and level of engagement) were not sufficiently explaining the variation in the dependent variable (i.e., Motivation for Diet survey score), which will result in the regression model being statistically non-significant. When the *SS* between is much lower than the *SS* of residual, the unexplained variation in the dependent variable scores (i.e., Motivation for Diet survey score) was high compared to explained variation. Hence, the values can be seen in Table 25 that the SS residual was closer to *SS* total leading to a lower adjusted R^2 value (Tabchinick & Fidell, 2006). The *SS* between or *SS* regression value should be considerably higher than SS residual value for the regression model to achieve statistical significance and to demonstrate that the independent variables were explaining the variance in DV scores. Table 26 indicates the participant's

predicted weight on Motivation for Diet survey score was equal to -0.006 + 0.252 (child's level of engagement) score when independent variables were measured in scale points. For every 1 scale point increase in level of engagement, the Motivation for Diet survey score decreased by 0.196 units. The level of engagement variable was a non-significant predictor of Motivation for Diet scores. The statistical power of this simple linear regression model was .46 for the level of engagement variable. Therefore, the researcher failed to reject the null hypothesis. Table 23 displays the correlations statistics of between level of engagement and motivation for diet center squared variable.

Table 24

ANOVA Statistics of Regression Analysis for Level of Engagement

Model		*SS*	*df*	*MS*	*F*	*p*
1	Regression	9.755	1	9.755	1.078	.308
	Residual	244.432	27	9.053		
	Total	254.187	28			

Note. SE estimate is abbreviated for standard error of estimate, *F* is abbreviated for F distribution change, and *df* is abbreviated for degrees of freedom.

Table 25

Model Summary of Regression Analysis for Level of Engagement

					Change Statistics				
Model	*r*	R^2	Adj R^2	*SE* estimate	R^2 Change	*F*	*df1*	*df2*	Durbin-Watson
1	.196	.038	.003	3.00883	.038	1.078	1	27	2.188

Note. SE estimate is abbreviated for standard error of estimate, *F* is abbreviated for *F* change, and *df* is abbreviated for degrees of freedom.

Table 26

Coefficient Statistics of Regression Analysis for Level of Engagement (N=29)

Model		*B*	*SE* ß	ß	*t*	*p*	Collinearity Statistics	
							Tolerance	VIF
1	(Constant)	-.006	3.150		-.002	.999		
	Level of Engagement	.252	.243	.196	1.038	.308	1.00	1.00

Note. The standard error for the unstandardized beta ($\overline{SE\ B}$), the standardized beta (β), the *t* test statistic (*t*), and the probability value (*p*).

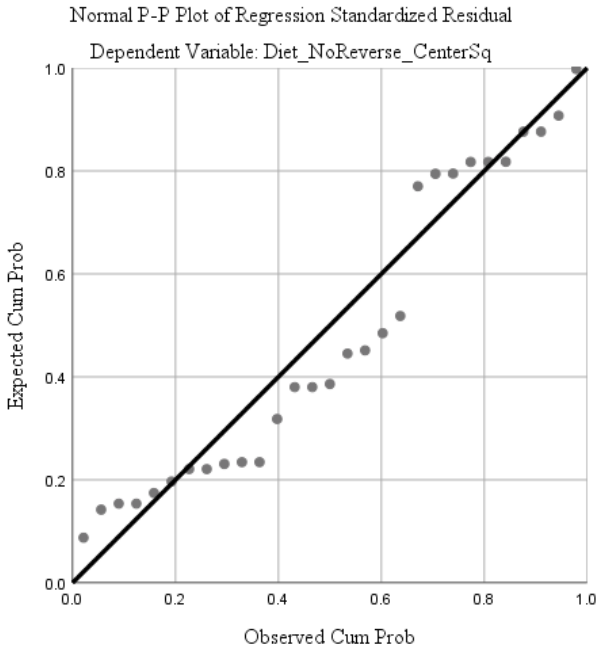

Figure 12. Normal Q-Q Plot of Regression Standardize Residual for Motivation for Diet survey and Level of Engagement.

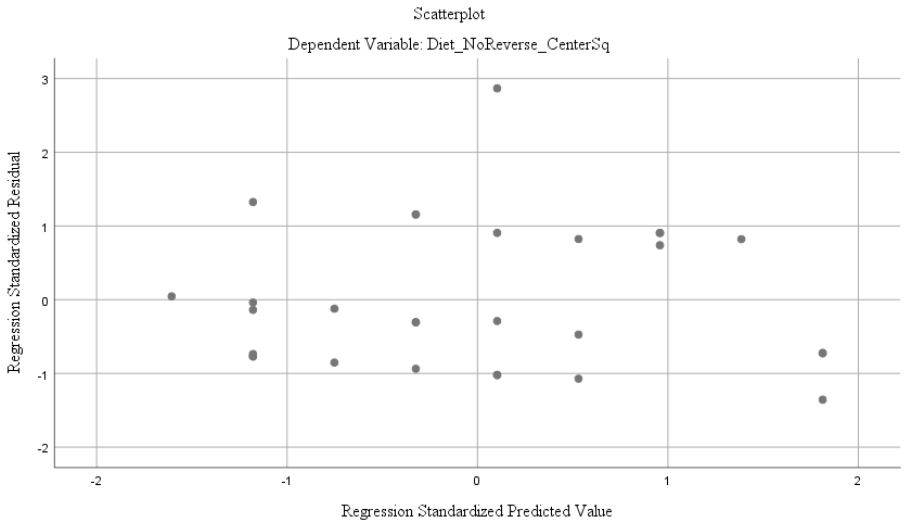

Figure 13. Scatterplot of Regression Standardize Residual for Motivation for Diet survey and Level of Engagement.

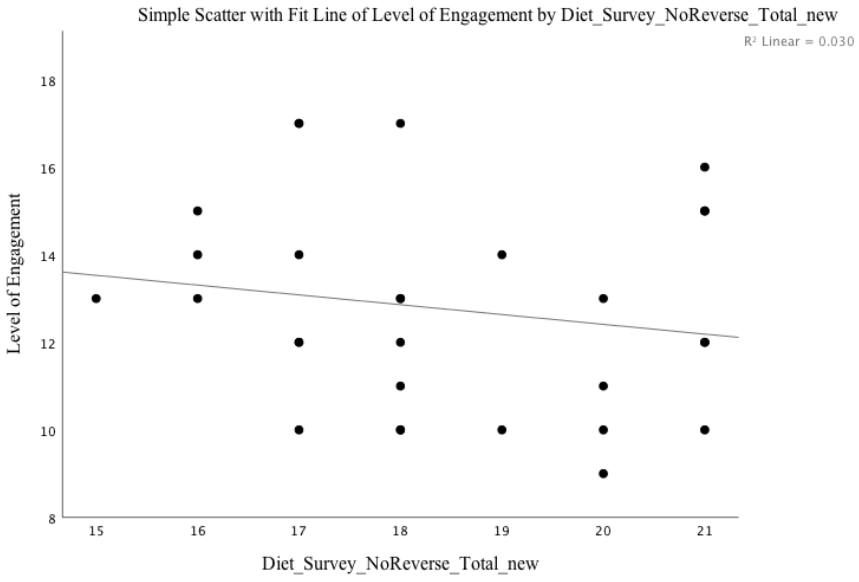

Figure 14. Simple Scatter Plot of Level of Engagement and Motivation for Diet survey score.

Simple Linear Regression

The influence of the IMI survey score on the Motivation for Diet survey score. A simple linear regression was conducted to answer Research Question 4. The normality was met through the examination of the Q-Q plots in Figure 15. Figure 16 and Figure 17 are scatterplots that indicated the scores of the standardized predicted values and residuals were independent from each other, and thus, the independence of observations was not met.

The skewness and kurtosis for the IMI survey score variable was below 2.1 and 7.1, which was considered to be normally distributed (West et al., 1995). Independence of observation of the Durbin-Watson statistic indicated that the value of 2.042 was within the absolute range of 1.5 and 2.5, and therefore, the independence of observation assumption was met (Table 27). Table 28 displays the descriptive statistics for the IMI survey score and Motivation for Diet survey score variables. Table 23 displays the correlations statistics of between IMI center squared and Motivation for Diet center squared variable. A statistically non-significant negative correlation (r = -.016) exists between both variables. As seen on Table 27, a non-significant regression equation was found ($F(1, 27) = 3.225$, $p > .05$), with an R^2 of .137.

When the Sum of Squares (*SS*) of in between and the *SS* of regression was very low, the independent variables (i.e., IMI survey scores and level of engagement) were not sufficiently explaining the variation in the dependent variable (i.e., Motivation for Diet survey score), which will result in the regression model being statistically non-significant. When the *SS* between was much lower than the *SS* of residual, the unexplained variation in the dependent variable scores (i.e., Motivation for Diet survey

score) was high compared to explained variation. Hence, the values can be seen in Table 29 that the *SS* residual was closer to *SS* total leading to a lower adjusted R^2 value (Tabchinick & Fidell, 2006). The *SS* between or *SS* regression value should be considerably higher than *SS* residual value for the regression model to achieve statistical significance and to demonstrate that the independent variables were explaining the variance in dependent variable scores. Table 30 displays that the standardized regression coefficients that provides participant's predicted weight on Motivation for Diet survey score is equal to be -21.949 + 0.773 (IMI_survey_noreversecentersq) + 0.632 (IMI_Survey_NoReverse_Total_new) score when the independent variable was measured in scale points. For every one scale point increase in IMI centersq (quadratic non-linear variable derived from the original IMI variable) scores, the Motivation for Diet survey scores increased by 0.773 units. For every one scale point increase in IMI total new scores (original variable), the Motivation for Diet survey scores increased by 0.632 units. Both the predictors significantly predicted the motivation for diet survey score but the results should be cautiously interpreted because the quadratic term (IMI survey no reverse centersq) in the model was a derivative of the original IMI_Survey_NoReverse_Total_new variable. Although mean centering the quadratic IMI survey score reduces multicollinearity, but the high value of sum of square residuals and low value of sum of square regression coupled with low correlation between the variables is an indicator for interpreting the significant standardized regression coefficients with caution. The statistical power of this simple linear regression model is .76 for the level of engagement variable. The researcher failed to reject the null hypothesis for Research Question 4.

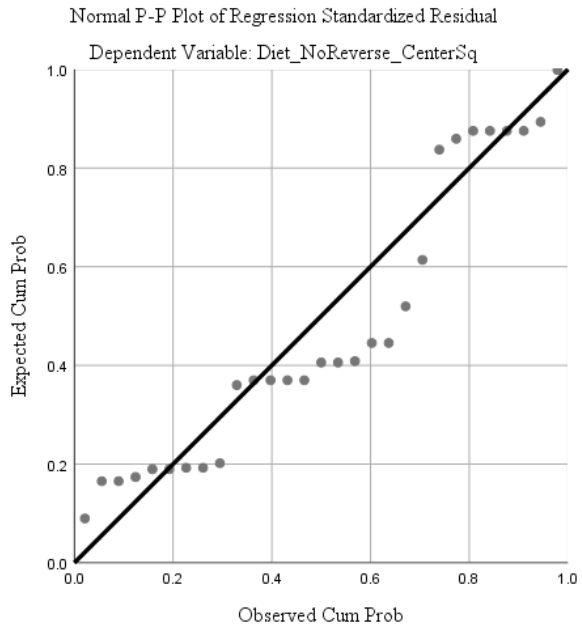

Figure 15. Normal Q-Q Plot of IMI survey scores and Motivation for Diet survey score.

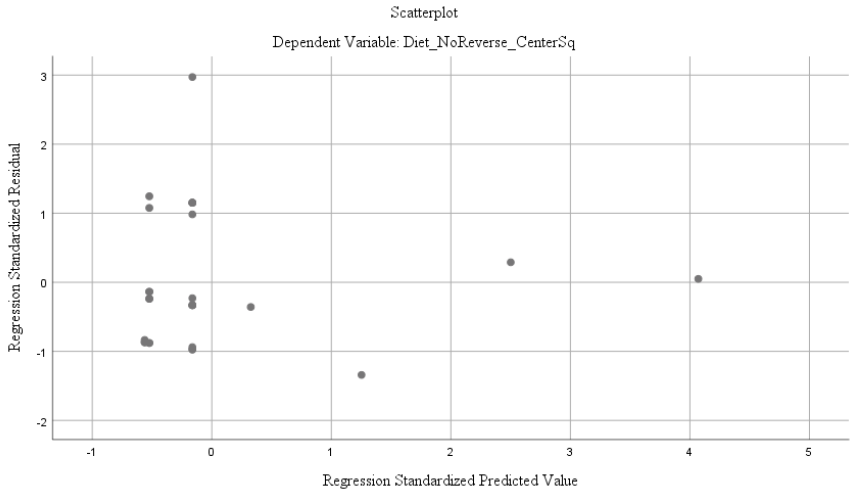

Figure 16. Scatter Plot of IMI survey scores and Motivation for Diet survey score.

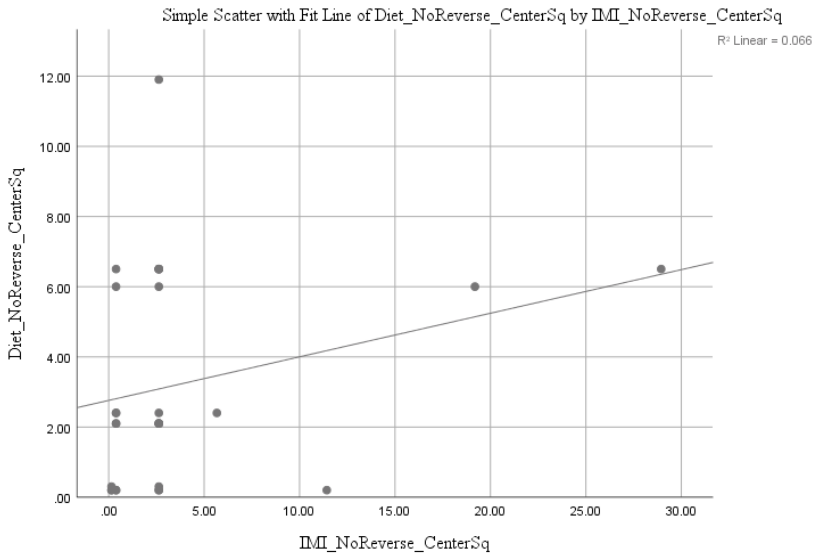

Figure 17. Simple Scatter Plot of IMI survey scores and Motivation for Diet survey score.

Table 27

Model Summary of Regression Analysis for IMI Survey

					Change Statistics				
Model	*r*	R^2	adj R^2	*SE* estimate	R^2 Change	*F*	*df1*	*df2*	Durbin-Watson
1	.446	.199	.137	2.79877	.199	3.225	2	26	2.347

Table 28

Descriptive Statistics of Regression Analysis for IMI Survey

	M	*SD*	*N*
Diet_Survey_NoReverse_CenterSq	3.2128	1.824	29
IMI_NoReverse_CenterSq	3.6368	6.21785	29
IMI_Survey_NoReverse_Total_new	23.76	1.902	29
	M	*SD*	*N*
Diet_Survey_NoReverse_CenterSq	3.2128	1.824	29

	M	*SD*	*N*
IMI_NoReverse_CenterSq	3.6368	6.21785	29
IMI_Survey_NoReverse_Total_new	23.76	1.902	29

Table 29

ANOVA Statistics of Regression Analysis for IMI Survey

Model		*SS*	*df*	*MS*	*F*	*p*
1	Regression	50.526	2	25.263	3.225	.056
	Residual	203.660	26	7.833		
	Total	254.187	28			

Note. Degrees of Freedom is abbreviated as *df*, Sum of Squares is abbreviated as *SS*.

Table 30

Coefficient Statistics of Regression Analysis for IMI Survey (N=29)

Model		*B*	*SE* ß	ß	*t*	*p*	Collinearity Statistics
1	(Constant)	-21.949	11.906		-1.844	.077	
	IMI_Survey_NoReverse_Total_new	1.002	.482	.632	2.078	.048	3.005
	IMI_NoReverse_CenterSq	.375	.147	.773	2.540	.017	3.005

Qualitative

Data were collected from the parent (n = 20) and children (n = 26) through follow-up interviews to determine the component of family conversations that occurred after the Eat a Georgia Rainbow program regarding healthy eating and meal preparation, interaction with meal preparation, and child's description of the Eat a Georgia Rainbow program. Although 31 child participants completed the Motivation for Diet survey, only 26 child participants completed the follow-up interviews due to a modification to the IRB

protocol (see Appendix K). The qualitative questions were added to the protocol to understand the child participant's perspective on the Eat a Georgia Rainbow. Interview questions were also added to the IRB protocol to collect data on children's participation in family conversations and interaction with meal preparation at home after Eat a Georgia Rainbow. Individual interviews were scheduled after 2 weeks of attending the Eat a Georgia Rainbow program, and the interviews were conducted through FaceTime or phone call. The participants completed the follow-up interviews virtually and through phone calls from while the participants were located at home. The participants were asked to be at home in order to complete the interviews to protect their responses during the data collection. The interviews were recorded, transcribed, and coded, and a thematic search was conducted.

Components of family conversations and interactions. After analyzing the data, 115 codes were found, and four major themes emerged from the parental transcripts. The four major themes included: *enjoyment and interest, participation in meal preparation, learning during EAGR,* and *family conversations.* However, the following three themes including *family conversations, program enjoyment and interest*, and *participation in meal preparation* answered Research Question 5. The follow-up interviews measured the family's interaction with meal preparation and conversations regarding healthy eating and meal preparation after the Eat a Georgia Rainbow program. The parents were asked three questions pertaining to what the parent participants perceived his or her child learned from the cooking class, whether their child has had any conversations regarding healthy eating or cooking since Eat a Georgia Rainbow, and if their child has participated in meal preparation at home since the cooking class. All interviews were coded manually during

open-coding, and the interviews were analyzed in batches of four for organization purposes. The codes were categorized based on the shared properties (Elo & Kyngäs, 2008; Ngulube, 2015). For example, the codes were reported child's enjoyment after program, collaboration, group setting, and cooking was fun were grouped together based on the properties being parents mentioning kids reported enjoyment from cooking class and meal preparation process.

Family conversations. When asked whether their child has had any conversations regarding healthy eating or cooking since Eat a Georgia Rainbow, 13 parent participants (68%) indicated that their child had some sort of conversations or made remarks pertaining to healthy cooking, healthy eating, and/or in regard to the Eat a Georgia Rainbow program. Of the 13 parent participants who indicated conversations did occur, five participants mentioned that conversations occurred before the Eat a Georgia Rainbow program. One parent participant mentioned that since the cooking class, his or her child has mentioned about the child's interest in eating healthy, "she talked about how we need to eat more fruits and vegetables" (ID: 13P). Table 31 displays the number of times participants mentioned the theme *family conversations* and additional example quotes of the theme and subthemes. One participant indicated that his or her child had previous conversations prior to the Eat a Georgia Rainbow program, and therefore, the frequency of conversations had not increased since the program.

> She kind of did with me before we even did the program. Since [she] came home she wants to help me make supper more. It hasn't really been a topic lately because she always wants to eat her fruits and vegetables anyway. (ID:26P)

One participant mentioned his or her child had not had conversations regarding healthy eating or meal preparation, but he or she has participated in meal preparation at home since the Eat a Georgia Rainbow program. For instance, the parent participant stated “no, she hasn’t [had conversations] she puts the dishes in the oven and has made ground turkey at home” (ID:24P).

Program enjoyment and interest. Parent participants mentioned phrases pertaining to *enjoyment during program, enjoyment meal preparation during EAGR, food item,* and *process of meal preparation during EAGR* 27 times (23.5%). In the following example quote, the parent participant reported that the child participant enjoyed the Eat a Georgia Rainbow program and was interested in returning to the cooking class. The parent participant stated, “Well, they told me it was very fun and they wanted to go back to the museum to do more of the cooking classes" (ID:09P). Table 31 displays the additional example quotes of the theme and subthemes for *enjoyment and interest* and the number of times participants mentioned the theme. The following parent participant mentioned that his or her child enjoyed the process of meal preparation during the Eat a Georgia Rainbow program, “Yeah she's very happy she got to use the knife and she feel very happy to enjoy the process” (ID:13P).

Participation in meal preparation at home. When asked if their child has participated in meal preparation at home since the cooking class, 17 parents (89%) indicated that their child participated in meal preparation at home since the cooking class. However, when asked what the parent participant thought her child learned from Eat a Georgia Rainbow, she responded “she always wants to do some cooking, but I just gave her the cooking toys but I don't let her you try a lot […] the real food though” (ID:13P).

When the same parent participant was asked if her child participated at home with meal preparation, the participant said "yeah, she has. Like when she helps me at home" (ID:13P). Table 31 displays the number of times participants mentioned the theme *participation in meal preparation at home* and additional example quotes of the theme and subthemes.

Of the 17 participants that indicated their child's participation in meal preparation at home, three participants indicated that their child participated in baking items that were categorized as unhealthy item when asked what kind of items does their child assisted with in meal preparation.

Our favorite are brownies. So we make brownies and muffins (ID:14P).

Cookie and making cookies and cake (ID: 16P).

They do, they like [making] cookies and other little snacks (ID:4P).

Parent's perception of child's knowledge gained from EAGR. Codes pertaining to parent participants reporting their perception of knowledge and skills their child learned from Eat a Georgia Rainbow were categorized as *learning during EAGR* theme. This theme assisted in answering Research Question 6. When asked about the parent's perception of what the child learned from Eat a Georgia Rainbow, 15 (75%) participants mentioned their child learned about *ingredients, healthy eating, cooking,* and *social or cognitive skill development*. These subthemes were mentioned by parent participants 26 times (22.6%). The following example participant quote, the participant mentions their perception of how the child learned how to share with the other program attendees and mentioned new experiences with the food item.

I think they learned how to learn how to share with other kids like the activity, you know […] it wasn't just one person doing everything to share with each other. I also think that when they were talking and explaining each of the ingredients that gave me that made the kids or my kid in particular, she's such a picky eater, when they broke it down and explained what everything was, she was more open to trying it versus than just putting it in front of her, you know. (ID:15P)

Table 31

Parental Participant Themes and Example Quotes

Theme/Subtheme	Total/Percentage (*N*=115)	Example Quotes
Program Enjoyment and Interest 1a. enjoyment during program 1b. enjoyment meal preparation during EAGR 1c. food item 1d. process of meal preparation during EAGR	27 23.5%	1a. well, they told me it was very fun and they wanted to go back to the museum to do more of the cooking classes 1b. she was so excited to make herself you know, not just for her, but for me 1c. they did say they enjoyed the snack 1d. she's very happy she got to use the knife and she feel very happy to enjoy the process
Learning during EAGR 2a. healthy foods 2b. process of meal preparation 2c. healthy eating 2d. about ingredients 2e. skill development (social) 2f. new experiences	26 22.6%	2a. She likes cucumber and chickpeas and she knows that these things are healthy now 2b. How to make a nutritious snack 2c. I think she learned about healthy eating 2d. they learned about ingredients and word recipe

Theme/Subtheme	Total/Percentage (*N*=115)	Example Quotes
		2e. umm some motor skills and observation follow the instructions and patience 2f. I think she learned how to use one of those little knife things
Family Conversations 3a. EAGR program 3b. healthy eating 3c. meal preparation 3d. ingredients 3e. prior conversations 3f. ongoing	24 20.9%	3a. they talk about the class 3b. talked about cutting down soda and sugar 3c. he has been asking if he can cook 3d. we talk about ingredients and what is good 3e. we talk about healthy foods all the time 3f. that's more just like ongoing conversations [about] eating more vegetables and protein
Participation in meal preparation 4a. participation in meal preparation at home-after 4b. meal preparation at home-prior 4c. unhealthy items 4d. discourages cooking 4e. encouraging cooking	38 33%	4a. like when she's home, she cooks the carrots and cucumbers and mixes the salad 4b. we have like pizza night on Fridays, something that we kind of did before the cooking class 4c. Our favorite of brownies. So we make brownies and muffins 4d. at home she always wants to do some cooking, but I just gave her the cooking toys but I don't let her you try a lot real food 4e. we did you like those kids knives and we liked them so much we bought her a set to use them to be able to use with us at home while cooking

Child's description of EAGR 2 weeks after attending. After analyzing the 26 child interview transcripts, 169 codes were found, and five themes emerged from those codes that answered Research Question 7. The five major themes included: *recollection of EAGR, understanding components of healthy ingredients, enjoyment, favorite component of EAGR,* and *disliked component of EAGR*. Table 32 displays the number of times child participants mentioned the theme/subtheme and additional example quotes that aligned with the theme/subtheme.

Recollection of EAGR. During the follow-up interview, 2 weeks after the Eat a Georgia Rainbow program, the child was asked whether or not they could recall the food item and food ingredients used the day of the Eat a Georgia Rainbow program. Of the 26 child participants, 15 child participants (58%) were able to recall the name of the food item, 21 child participants (81%) were able to recall the ingredients, and 13 (50%) were able to recall both the name of the food item and ingredients. The following child participant was not able to recall the food item prepared during Eat a Georgia Rainbow but was able to recall the ingredients.

> I forgot what it was called but it was made with cucumber. And we ate it with chips (ID:110_F).
>
> We used cumbers and we used umm these Types of beans and we used garlic or something. We used lemons (ID:110_F).

Understanding components of healthy ingredients. Child participants mentioned words and phrases relevant to *health outcome, healthy ingredients, healthy eating,* and *intent of healthy diet* 38 times (22.3%) throughout the follow-up interviews. Of the 26 child participants, 18 (69%) participants mentioned the theme and subtheme of

understanding components of healthy ingredients. In the following example quotes, two participants mentioned their intentions of healthy behaviors as a result of understanding the components of healthy ingredients.

> It helped me understand Because they said like all this junk and stuff every day, like you can get sick, or like something could happen to you so it helped me know me know that I need to be careful of what I eating and make sure that I'm allowed to eat it. (ID:081_F)

> Peas has a lot of protein and I think the cucumber has some vitamins and I don't think she said anything specific about the garlic […] well, I should try to eat healthy every day. (ID:250_F)

Enjoyment. During the follow-up interview, the theme and subtheme of enjoyment was mentioned 46 times (27.1%) by child participants. The child participants described positive experiences during Eat a Georgia Rainbow through collaboration, tasting the food items, and the meal preparation process, and one participant also perceived Eat a Georgia Rainbow to be useful. When asked how the child felt about the Eat a Georgia Rainbow program, all 26 (100%) participants expressed that they liked the program. The following example quotes show the participants' perceptions of how they felt about the Eat a Georgia Rainbow program 2 weeks after attending. One child participant stated, "it was awesome, I liked it" (ID:240_F) and another child participant stated, "it was super fun" (ID:300_M).

Two participants also mentioned that they enjoyed collaborating with others in the class. In the following example quote, a participant expressed their perceptions of enjoyment was based on taking turns during the meal preparation process. For instance,

one child participant stated, “I really like how, like we all got to take turns and not one person to do all the work” (ID:081_F).

Favorite component of EAGR. The child participants were asked to describe their favorite component, and as a result, eight participants (31%) reported that their favorite component was tasting the food item prepared. Of the 26 child participants, 14 (54%) participants reported that preparing the food item was their favorite component. Two participants (8%) reported that learning about the ingredients was their favorite component, and two child participants (8%) reported working with others was their favorite component. The example quote shows the participant who was not able to recall the food item prepared that day, but the participant was able to recall the ingredients. For instance, the child participant stated, “I forgot what it was called but it was made with cucumber. And we ate it with chips” (ID:110_F). When the same child participant was asked what her favorite component was, she responded “when I figured out that cucumber isn’t a vegetable, but it was a fruit” (ID:110_F).

Disliked component of EAGR. When asked what the child participant disliked about the Eat a Georgia Rainbow program, one participant reported that they did not like wearing the camera-glasses. Six participants (23%) stated that he or she did not like the taste of the food item or an ingredient that was used in the food item. However, these six participants, who reported that they did not like the taste of the food item or the ingredients used in the food item, reported that they enjoyed preparing the food item as well as expressed enjoyment from Eat a Georgia Rainbow. The researcher asked the child participant what was her favorite component of the cooking class and she responded, “mixing it up the ingredients” (ID:180_F). The researcher then asked the same child

participant what she disliked about Eat a Georgia Rainbow, and she responded, “the taste of it” (ID:180_F).

Table 32

Number of Times Themes and Subthemes were mentioned and Child Example Quotes

Theme/Subthemes	Total/Percentage (*N*= 169)	Example Quotes
Recollection of EAGR 1a. recollection of food item 1.b recollection of ingredients	55 32.3%	1a. cucumber hummus 1b. It was uh chick peas, cucumber, and minced Garlic with olive oil
Enjoyment 2a. enjoyed collaboration 2b. enjoyed tasting 2c. enjoyed meal preparation 2d. perceived usefulness	46 27.1%	2a. I really like how, like we all got to take turns and not one person to do all the work 2b. I like eating it, it was so good. 2c. cooking was fun 2d. [the class] was very useful
Understanding components of healthy ingredients 3a. health outcome 3b. healthy ingredients 3c. healthy eating-perceived as important 3d. Intent of healthy diet	38 22.3%	3a. it's important for nutrients to like go to your body for you work 3b. cumbers are very healthy for you. You can eat them as a snack 3c. If I eat healthy I can be healthy and strong when I get older now 3d. I should try to eat healthy everyday
Favorite component of EAGR 4a. favorite-tasting 4b. favorite- meal preparation process 4c. favorite collaboration 4d. favorite-knowledge	23 13.5%	4a. my favorite part was eating the hummus 4b. my favorite part was chopping the cucumbers 4c. my favorite part was putting in the ingredients in with my little sister 4d. my favorite part was getting to learn about the importance of eating

Theme/Subthemes	Total/Percentage (*N*= 169)	Example Quotes
		healthy and learning like what ingredients and like, what you need for stuff to make it
Disliked component of EAGR 5a. disliked taste of food item 5b. disliked food item 5c. disliked camera-glasses	7 4.14%	5a. eating the corn 5b. I don't like the cucumbers 5c. the glasses because they felt warm on my face

Mixed Methods Analysis

The quantitative results from the SPSS analyses and themes from the individual interviews were merged and presented in a joint display on Table 33 to answer Research Question 8. The joint table illustrates the themes and example quotes that emerged within the child and parent interviews, child's level of engagement, and the aggregated scores from the IMI survey and Motivation for Diet survey scores (Creswell & Clark, 2017).

The parent and child interview themes reported in the joint display table were chosen based on their comparability to the child's level of engagement, IMI survey, and Motivation for Diet survey. Thus, the themes were *enjoyment and interest*, *learning during EAGR,* and *recollection of food items*. The joint display table presents interview responses from both the parent and child, which also compared and contrasted the child's level of engagement, IMI survey score, and Motivation for Diet survey score. Previously, the four major themes from the parent interviews included: *enjoyment and interest, participation in meal preparation, learning during EAGR,* and *family conversations*. The five major themes found within the child interviews included: *recollection of food, understanding components of healthy ingredients, enjoyment, favorite component of*

EAGR, and *disliked component of EAGR.* Even though, the results from the analyses did not establish relationships among the variables and predictions could not be made, the themes from the parent and child interviews supported the quantitative results.

From the Pearson's Correlation analysis, there was a statistically non-significant relationship between level of engagement and IMI survey scores, but the results did indicate a positive correlation of .235. Participant (ID:081_F) did indicate that he or she enjoyed learning in the program under the theme of *enjoyment and interest* and also had a high score for level of engagement of 17(M = 12.19), high aggregate score of IMI survey of 30, and a high aggregate score on the Motivation for Diet survey of 25. The Pearson's Correlation analysis also indicated a negative correlation between IMI survey score and Motivation for Diet survey score with r= -.06. However, participant (ID:110_F) indicated a low score of 12 on level of engagement, a high aggregate score of a 33 on the IMI survey, and a high aggregate score of 27 on the Motivation for Diet survey. The child also mentioned that he or she learned from the Eat a Georgia Rainbow program and was also able to recall the new information. The parent (ID:11P) also stated that the child learned a lot from the program and had the intentions of wanting to participate in meal preparation at home.

> It helped me to eat more healthy stuff and do more exercise and learned something new that a cucumber isn't a vegetable, it's actually a fruit (ID:110_F).
>
> She learned a lot and She was really interested in cooking and she told me that 'oh can I cook at home?' (ID:11P).

The mean statistic for the child's level of engagement was reported to be 12.9 (M = 12.9), and hence, values greater than 12.9 were considered as a high value and values

lower than 12.9 were considered as a low value. Table 33 displays the selection of two cases of the highest level of engagement and two cases of the lowest level of engagement from each of the four themes. An aggregate IMI survey score of greater than 22.5, between 11 and 22.5, and less than 11 was considered to be high, medium, and low scores respectively. An aggregate Motivation for Diet survey score of greater than 21, between 11 and 21, and less than 11 was considered to be high, medium, and low scores respectively. The joint display table also presents the three themes, 12 cases, and the integration of the child's level of engagement, IMI, and Diet survey scores.

Table 33

Joint Display Table of the Integration of Qualitative and Quantitative Results

	Qualitative		Quantitative		
Theme/Subtheme	Parent's Response	Child's response	Level of Engagement	IMI survey score	Diet survey score
Enjoyment and Interest • Engagement • Cooking was fun • Working with others was fun • Dislike in taste and smell • Favorite component - tasting the food item					

	Qualitative		Quantitative		
Theme/Subtheme	Parent's Response	Child's response	Level of Engagement	IMI survey score	Diet survey score
	[they are] more interested in making food by themselves. Like, like to help in the kitchen when I'm making food and cooking (ID: 08P)	I like how we all got to take turns and not one person do all the work[…]My favorite part was getting to learn about the importance of eating healthy and learning what ingredients and like what you need for stuff to make it (ID: 081_F)	17 (high)	30 (high)	25 (high)
	After the class she always talk about a cooking class and at home she always wants to do some cooking, but I just gave her the cooking toys but I don't let her you try a lot to kind of the real food though […] in cooking class she's very happy she got to use the knife and she feel very happy to enjoy the process (ID: 13P)	[Favorite part] cutting the cucumbers and making the sauce (ID:130_F)	10 (low)	33 (high)	28 (high)

	Qualitative		Quantitative		
Theme/Subtheme	Parent's Response	Child's response	Level of Engagement	IMI survey score	Diet survey score
	They have a better understanding. Like measurements and like they enjoy the measuring process of it (ID:33P)	Cutting the cucumber (ID: 330_M)	11 (low)	30 (high)	26 (high)
	And then also just like they get to take turns to do thing (ID:25P)	[favorite part] making the food […] I didn't like the cucumber taste (ID: 251_M)	15 (high)	27 (high)	30 (high)
Learning during EAGR • Understanding components of ingredients • Health outcomes • Interested in cooking					
	She learned a lot and She was really interested in cooking and she told me that 'oh can I cook at home?' (ID:11P)	It helped me to eat more healthy stuff and do more exercise and learned something new that a cucumber isn't a vegetable, it's actually a fruit" (ID:110_F)	12 (low)	33 (high)	27 (high)
	She likes cucumber and she likes chickpeas also and so she was like, she knows that these things	umm, fun [favorite part] chopping the cucumbers (ID:070_F)	14 (high)	27 (high)	18 (high)

	Qualitative		Quantitative		
Theme/Subtheme	Parent's Response	Child's response	Level of Engagement	IMI survey score	Diet survey score
	are healthy (ID:070P)				
	I think she learned how to use one of those little knife things venturing out into food that she's never had before because we've never had hummus (ID:14P)	[the class] teaches me a lot (ID:140_F)	9 (low)	34 (high)	29 (high)
	Like eating the healthy stuff things from the class and like, you know? (ID:08P)[a]	They said […] cucumber is either good for your skin or hair. I think beans, they said that they are sort of like vitamins are good for your skin. All this junk and stuff […] like you can get sick […] I need to be careful of what I am eating and make sure that I'm allowed to eat it" (ID: 081_F) Cucumbers are healthy for you, you can eat them as a snack	17 (high) 16 (high)	30 (high) 35 (high)	25 (high) 30 (high)

	Qualitative		Quantitative		
Theme/Subtheme	Parent's Response	Child's response	Level of Engagement	IMI survey score	Diet survey score
		Lemon is very good for you, you can put it in […] water You can make so many healthy [foods] you can mix up carrots and any kinds of vegetables and you just can make it healthy (ID:080_F)			
Recollection food items • Item prepared • Ingredients used					
	From the class? Like eating the healthy stuff things from the class and like, you know, um more interested in making food by themselves. Like, like to help in the kitchen (ID:08P)	We prepared on our cutting board [with] all the ingredients [used] the blender Hummus, beans, cucumber, lemon, and minced garlic (ID:80_F)	16 (high)	35 (high)	30 (high)
	She learned a lot and She was really interested in cooking and she told me that 'oh can I cook at home?' (ID:11P)	It was made with cucumber and we ate it with chips We used cucumbers and some type of beans, and garlic, lemon [and] peas (ID:110_F)	12 (low)	33 (high)	27 (high)

	Qualitative		Quantitative		
Theme/Subtheme	Parent's Response	Child's response	Level of Engagement	IMI survey score	Diet survey score
	They have a better understanding. Like measurements and like the Like they enjoy the measuring process of it. (ID:33P)	Yes, chickpeas, lemon, oil, and we did um cucumbers and we did kinda like beans. (ID:330_M)	11 (low)	30 (high)	27 (high)
	like how to make a healthy snack (ID: 24P)	We made like uh sauce. […] Garbanzo beans, cucumbers and lemons and the peas." (ID:240_F)	14 (high)	34 (high)	25 (high)

Note. An aggregate IMI survey score of greater than 22.5, between 11 and 22.5, and less than 11 was considered to be high, medium, and low scores respectively. An aggregate Motivation for Diet survey score of greater than 21, between 11 and 21, and less than 11 was considered to be high, medium, and low scores respectively.
[a] Participant 08P is the same parent for participants 080_F and 081_F.

Summary

Quantitative

The reliability analysis, Cronbach's Alpha, resulted in a value of .774 for the IMI survey and a .52 for Motivation for Diet survey. According to West et al. (1995), the absolute value of skewness and kurtosis should be less than 2.1 and 7.1, respectively to indicate significant departure from normality. The skewness and kurtosis were 0.07 and -1.13 respectively. Normality tests for both IMI survey score and Motivation for Diet survey score were statistically significant even after the removal of outlier cases, indicating that normality assumption was not met. However, the skewness and kurtosis value for both survey scores were less than 2.1 and 7.1, respectively, indicating that the

scores did not severely depart from a normal distribution. Similarly, the level of engagement was statistically non-significant for level of engagement scores, indicating that the scores were following a normal distribution. Hence, overall results suggest that parametric statistical procedures could be conducted. The Pearson's Correlation was conducted, and there was a negative relationship between the IMI survey scores and child's level of engagement score. The correlation coefficient was statistically non-significant $r = -.016$, $p > .05$. There was also a weak relationship between the child's level of engagement and Motivation for Diet survey score. The correlation coefficient was statistically non-significant $r = .196$, $p > .05$.

A simple linear regression was used to test the influence of child's level of engagement (independent variable) on the Motivation for Diet survey score (dependent variable) and a non-significant regression equation was found ($F(1, 27) = 1.078$, $p > .05$), with an R^2 of .003. Participant's predicted weight on Motivation for Diet survey score was equal to -0.006 + 0.252 (child's level of engagement) score when independent variable was measured in scale points. For every 1 scale point increase in level of engagement, the Motivation for Diet survey scores decreased by 0.196 units. The level of engagement variable was a non-significant predictor of Motivation for Diet scores and thus, the researcher failed to reject the null hypothesis.

A simple linear regression was used to test the influence of the child's IMI survey score (independent variable) on the Motivation for Diet survey score (dependent variable). A non-significant regression equation was found ($F(1, 27) = 3.225$, $p > .05$), with an R^2 of .137. The correlation coefficient participant's predicted weight on Motivation for Diet survey score was equal to -21.949 + 0.773 (IMI survey no reverse

centersq) + 0.632 (IMI_Survey_NoReverse_Total_new) score when the independent variable was measured in scale points. For every 1 scale point increase in IMI centersq (quadratic non-linear variable derived from the original IMI variable) scores, the Motivation for Diet survey scores increased by 0.773 units. For every 1 scale point increase in IMI total new scores (original variable), the Motivation for Diet survey scores increased by 0.632 units. The IMI survey score variable was a non-significant predictors of Motivation for Diet scores. The researcher failed to reject the null hypothesis.

Qualitative

The four themes that emerged from the parent interviews were *enjoyment and interest, participation in meal preparation at home, learning during EAGR,* and *family conversations.* These themes aligned with answering Research Questions 5 and 6 that pertained to the components of conversations and interactions regarding healthy eating and meal preparation that occurred within families after the Eat a Georgia Rainbow program. Of the 20 parent interviews, 13 parents (65%) indicated that family conversations did occur after the Eat a Georgia Rainbow program. Within the conversations, children have mentioned about healthy eating, healthy meal preparation, and components about their experiences from Eat a Georgia Rainbow. However, five parent participants mentioned that family conversations regarding healthy eating and/or healthy meal preparations occurred before the Eat a Georgia Rainbow program. One participant in particular said the frequency of those conversations did not increase since the cooking class. Additionally, one participant mentioned that his or her child did not initiate conversations about healthy eating or cooking but participated in meal preparation since the cooking class. Seventeen parents (89%) indicated that their child participated in

meal preparation at home after the cooking class. However, one participant mentioned that he or she did not let their child assist with real food, but rather toy foods. When asked what parents thought their child learned from Eat a Georgia Rainbow, 15 parent participants (79%) mentioned their perceptions of what their child learned during Eat a Georgia Rainbow. Parent participants indicated their child learned about *ingredients, healthy eating, cooking,* and *social or cognitive skill development* during Eat a Georgia Rainbow.

After analyzing the child participant data, five major themes emerged. *Recollection of EAGR, understanding components of healthy ingredients, enjoyment, favorite component of EAGR,* and *disliked component of EAGR* are themes that answered Research Question 7. Of the 26 child participants, 17 child participants (65%) were able to recall the name of the food item, but 18 child participants (69%) were able to recall the ingredients. The child participant data also demonstrated that 18 (*n*=18, 69%) participants were able to recall the information mentioned during the Eat a Georgia Rainbow program about the components of healthy ingredients. The participants were able to recall the potential health outcomes from the healthy ingredients used the day of the Eat a Georgia Rainbow program. During the interviews, the child participants described positive experiences during Eat a Georgia Rainbow through collaboration, tasting the food items, and the meal preparation process, and one participant also perceived Eat a Georgia Rainbow to be useful. When asked how the child felt about the Eat a Georgia Rainbow program, all 26 (100%) participants expressed that they liked the program. Subsequently, the child participants were also asked to describe their favorite component of Eat a Georgia Rainbow, and as a result, eight participants (31%) reported that their favorite

component was tasting the food item prepared. Fourteen (54%) participants reported that preparing the food item was their favorite component. Two participants (8%) reported that learning about the ingredients was their favorite component, and two child participants (8%) reported working with others was their favorite component. Furthermore, six participants (23%) reported that they did not like the taste of the food item or an ingredient that was used in the food item. However, these same six participants, who reported that they did not like the taste of the food item or the ingredients used, reported that they enjoyed preparing the food item as well as expressed enjoyment from Eat a Georgia Rainbow.

Mixed Methods

A joint display table was provided to show the alignment of the results from both the quantitative and qualitative results and to answer Research Question 8. The joint display table provided comprehensive and organized summary table to compare and contrast the results from the quantitative and qualitative results. There was a statistically non-significant relationship between level of engagement and IMI survey score. Participant ID:081_F did indicate that she enjoyed learning in the program under the theme of *enjoyment and interest* and also had a high score for level of engagement of 17 (M=12.12), high score for IMI survey of 30, and a high score on the Motivation for Diet survey of 25. There was a statistically non-significant correlation between IMI survey score and Motivation for Diet survey score with r = -.06. However, the child participant scored high score on the level of engagement, IMI survey, and Motivation for Diet survey and mentioned in their interview that she learned from the Eat a Georgia Rainbow program and was also able to recall the new information. The parent participant stated

that the child learned a lot from the program and had the intentions of wanting to participate in meal preparation at home.

CHAPTER V

DISCUSSION

Summary of the Study

Little is known about the influence of children's engagement in a nutrition education program on children's learning experiences as measured by interest and enjoyment and their intention to adopt a healthy diet. Based on previous research, there were multiple childhood obesity intervention and prevention programs that been conducted, but high rates of childhood obesity were still prevalent (Dehghan et al., 2005). According to the CDC (2016), childhood obesity is a major health concern in the United States and is still prevalent despite the multiple efforts that have been made to control the rising rates. Therefore, providing children and their families nutrition education programs is essential (Christensen et al., 2016).

Furthermore, there are gaps in literature that exists with nutrition education programs, which utilized the experiential learning theory. Specifically, there are gaps in the literature regarding the existence of a relationship among children's level of engagement during a children's nutrition education program, children's learning experiences (measured by interest and enjoyment), children's motivation to adopt a healthful diet, and the existence of family conversations occurring after a museum nutrition education program. Researchers suggested that the integration of hands-on activities exceed the expectations of traditional exhibits becoming a catalyst for family conversations within the exhibits (Callanan et al., 2017). Deci and Ryan (2008) also described that learners who are autonomously motivated showed interest and enjoyment

in the learning activity they were engaging during the learning activity, and therefore, the motivation was internally moving the individual to action. Students who were autonomously motivated experience willingness when engaging in conceptual learning (Deci & Ryan, 2008). Dehghan et al. (2005) suggested using the family-based approach during the implementation of childhood obesity programs to achieve positive outcomes because family was relevant in children's health behaviors. The findings from a study conducted by Thomas (2006) suggested the results show that family involvement had positive effects on learning outcomes during nutrition education programs. Wenger (1998) noted that a sociocultural perspective frames learning in and from museums as socially and culturally constructed through people's actions within a specific community of practice, such as a family, shares a set of values, vocabulary, understandings, and assumptions (cited in Ellenbogen et al., 2004).

There is limited literature that supports nutrition program evaluations that were conducted in museum settings. However, Falk et al. (1998) suggested that family learning does occur in informal settings. Family learning during museum visits is imperative through applying related and reinforced past experiences, family history, and shared understanding (Falk et al., 1998). Current literature also indicated the limited research on following up with museum attendees due to various challenges (Christensen et al., 2016). There is also limited research that utilized the experiential learning theory as a framework to conduct childhood prevention studies. A convergent parallel mixed methods study had not yet been conducted to investigate the influence of Eat a Georgia Rainbow program on participant's level of engagement and his or her motivation to adopt healthy dietary

practices. Therefore, utilizing the convergent parallel mixed methods research design was an important methodological contribution to current literature through triangulation and integrating the quantitative and qualitative results (Schoonenboom & Johnson, 2017). The goal of this convergent parallel mixed method study was to investigate children's learning experiences during the Eat a Georgia Rainbow program and to understand their motivation to learn about healthy eating and healthy cooking in relevance to the development of their intentions to adopt a healthy diet.

Review of Methods

Quantitative

The researcher utilized camera-glasses to visually record the child's level of engagement that measured number of times a child raised their hand in attempt to respond to questions or volunteer to cooking tasks during the Eat a Georgia Rainbow program from 50 child participants. Subsequently, the researcher also collected data from the same child participants (n = 50) utilizing the IMI survey that measured the child's enjoyment and interest during the Eat a Georgia Rainbow program on the day of the Eat a Georgia Rainbow program. The IMI survey was conducted on the day of the Eat a Georgia Rainbow program located in the cooking lab at the Children's Museum of Atlanta. The participants were between the ages of 4 to 14 years. The IMI survey took the participants on average of 10 minutes to complete. Two weeks following the Eat a Georgia Rainbow program, the researcher contacted the parent participants to conduct the Motivation for Diet survey through FaceTime and or phone call. Of the 50 child participants, the researcher was only able to successfully conduct the Motivation for Diet

survey with 31 child participants. The 10-item survey took child participants on average 5 minutes to complete.

Qualitative

Individual interviews were conducted with parent participants (n = 20) and child participants (n = 26) during the follow-up data collection 2 weeks after attending the Eat a Georgia Rainbow program. Of the 31 child participants who completed the follow-up data collection, only 26 participants completed the interviews as a result of a modification to protocol after the first round of follow-up data collection. The parent interviews determined if family conversations regarding healthy eating and meal preparations as well as participation in meal preparation occurred at home after the Eat a Georgia Rainbow program. The child interviews identified their experiences and description of the Eat a Georgia Rainbow program 2 weeks after attending. The parent interviews and child interviews were conducted separately. If previous data were collected from more than one child per family unit, then the interviews were conducted individually as well. Open-coding and thematic analysis method was applied to analyze qualitative data that illustrated family conversations and participation in meal preparation that occurred after the Eat a Georgia Rainbow program as well as children's description of Eat a Georgia Rainbow (Elo & Kyngäs, 2008; Ngulube, 2015). The researcher utilized a second researcher to validate the 115 codes found in the parent interview transcripts and 170 codes found in the child interview transcripts (Patrick & Caplow, 2018).

Summary of Findings

This chapter includes an interpretation of results previously discussed in Chapter IV to investigate children's learning experiences during the Eat a Georgia Rainbow program and to understand their motivation to learn about healthy eating and healthy cooking in relevance to the development of their intentions to adopt a healthy diet. Quantitative and qualitative data were collected, analyzed, and integrated during interpretation to answer the research questions. In the following section, the researcher describes how each of the findings aligned with the eight research questions.

Quantitative

A Pearson's correlation analysis was used to determine the relationship between the child's level of engagement, IMI survey scores, and Motivation for Diet survey to answer Research Questions 1 and 2. The quantitative data collected was used to test the influence of children's level of engagement during the Eat a Georgia Rainbow program on their learning experiences measured by interest and enjoyment and their intentions for adopting a healthful diet. During the statistical analysis, three outlier cases were removed to conduct the simple linear regression analyses resulting in only 29 valid participant cases. The results confirmed that tracking long-term impact of the Eat a Georgia Rainbow program was challenging due to attrition in the follow-up cases. Also, missing data were an issue. One possible reason for the statistically non-significant correlation coefficient was that there was a low sample size of only 29 valid cases for the Motivation for Diet survey. Additionally, the questions on motivation for diet survey were administered through telephonic conversation or through online chat, which might have influenced the

responses. Furthermore, engaging in short-duration and one-time activities of healthy cooking may not necessarily translate to motivation for adopting a healthy diet. Furthermore, there was a statistically non-significant relationship found between child's level of engagement and IMI survey scores. A low sample size can result in a low correlation between child's level of engagement and IMI survey scores. Additionally, Christensen et al. (2016) mentioned following up with museum participants is challenging, and the results from this study confirmed that claim.

Researchers suggested that being able to identify motivation of an individual can lead to the prediction of the individual's quality of behavior (Deci & Ryan, 2008). A simple linear regression analysis was used to determine if the two independent variables, child's level of engagement and IMI survey scores, influenced the dependent variable, Motivation for Diet survey scores, to answer Research Questions 3 and 4. Furthermore, no predictions between child's level of engagement, IMI survey scores, and Motivation for Diet survey scores could be determined from the simple linear regression. No predictions can be made from the regression analysis due to small sample size during the follow-up, and the removal of three outlier cases resulting in statistically non-significant results.

Additionally, exposing the child participant to a short-term nutrition education program located at a museum cannot result in a long-term impact on the child's healthy behaviors. Therefore, the child's level of engagement and IMI survey measured by interest and enjoyment did not influence the child's intention of adopting a healthy diet. Although the Pearson's correlation indicated there was not a relationship among the

variables and predictions could not be made, 29 child participants scored high on the Motivation for Diet survey, indicating high intentions to adopt a healthy diet. Researchers suggested that the Motivation for Diet survey indicated the participant's high intentions to adopt a healthy diet (Kitzman-Ulrich et al., 2011; Wilson et al., 2002). However, the results from the simple linear regression analysis showed that the child's level of engagement, interest, and enjoyment (IMI survey score) during Eat a Georgia Rainbow did not influence children to adopt long-term healthy behaviors.

Qualitative

Components of family conversations and interactions. The results from the parent interviews indicated 13 parent participants out of 20 (65%) indicated that family conversations did occur at home after the Eat a Georgia Rainbow program. Five of the 13 participants (38%) mentioned that family conversation regarding healthy eating and healthy meal preparations occurred before the program. However, the researcher was unclear whether or not the family conversations were still ongoing even after the Eat a Georgia Rainbow program. Of the 20 parent participants, 17 (85%) parents indicated that their child participated in meal preparation at home. The results from the parent interviews did answer Research Question 5. Parents did indicate that family conversations regarding healthy eating and meal preparation and participation in meal preparation occurred at home after the Eat a Georgia Rainbow program. According to a study conducted by Callanan et al. (2017), the authors suggested that the integration of hands-on activities exceeded the expectations of traditional exhibits becoming, thereby, a catalyst for family conversations within the exhibits. Additionally, Kolb's (2014) learning

cycle can explain why children are interacting in conversations and meal preparation at home after attending Eat a Georgia Rainbow. The child is reflecting on about what he or she learned after having had gone through the concrete experience, which places the child in the reflective observation phase that leads the child into abstract conceptualization. In this phase, the learner could be thinking about new ideas to apply to the next active experimentation (i.e. experience). In turn, the active experimentation can motivate the child to participate in meal preparation at home after attending Eat a Georgia Rainbow. The child's participation in meal preparation at home can be considered as building on new knowledge and experiences or prior knowledge (Kolb, 2014). Deci and Ryan (2008) described that learners who are autonomously motivated showed interest, found enjoyment in the learning activity, were engaged in the learning activity, and therefore, the motivation was internally moving the individual to action to go forward. Researchers suggest that the state of flow is considered to be intrinsically rewarding; therefore, learners are more likely to continue to participate in a particular activity repeatedly (Nakamura & Csikszentmihalyi, 2002). Thus, the current literature supports the reason children are interacting in conversations regarding healthy eating and meal preparation at home.

Parent's perceptions of child's knowledge gained from Eat a Georgia Rainbow. The results from the parent interviews indicated that 15 (75%) of 20 participants mentioned their child learned about ingredients, healthy eating, cooking, and social or cognitive skill development. The results from the parent interviews answered Research Question 6 and indicated that parents believed that their child learned about ingredients,

healthy eating, cooking, and social or cognitive skills through conversations with their child. The results from this study supports that learning does occur in museum as shown in past literature. The parent and child interviews indicated that children were learning from the Eat a Georgia Rainbow program that was offered in a museum setting. Researchers suggest that individual learning experiences are encouraged and molded by members of the family group (Borun, Chambers, & Cleghorn, 1996; Idema & Patrick, 2019; Uzick & Patrick, 2017). Thus, the results from the parent interviews were all self-reported, and there was no sufficient evidence whether or not the events that parents report actually occurred. Although Falk and Storksdieck (2005) pointed out that families learning in informal environments were linked to motivation, prior knowledge, and experience, and current study results indicated that parents who were reporting what they believed their child learned from Eat a Georgia Rainbow may be an actual reflection of what they learned while attending Eat a Georgia Rainbow with their child. The parent and child are experiencing the same experiences but may have entered into the Eat a Georgia Rainbow program at different learning phases (i.e., concrete experience, reflective observation, abstract conceptualization, and active experimentation; Kolb, 2014). The parent and child participants being at different learning phases can be resulted from the parent's past experiences with meal preparation and pre-existing knowledge about healthy eating (Kolb, 1984). For example, the parent participant (ID:33P) reported more content in regard to what the child enjoyed from Eat a Georgia Rainbow than what the child reported when asked what the child enjoyed about Eat a Georgia Rainbow. The parent participant reported his or her child has "a better understanding [of] measurements

and like they enjoy the measuring process of [cooking]" (ID:33P). However, the child participant reported that he only enjoyed "cutting the cucumber" (ID: 330_M). However, the following parent participant (ID: 24P) reported less knowledge compared to what the child reported he or she learned during Eat a Georgia Rainbow.

> [She learned] like how to make a healthy snack (ID: 24P).
>
> Garbanzo beans, cucumbers, lemons, and peas [the chef] said that they can help us grow strong If I eat healthy I can be healthy and strong when I get older (ID:240_F).

Child's description of Eat a Georgia Rainbow 2 weeks after attending. As a result, from the child interviews, 26 (100%) participants expressed that they liked the program in which answered Research Question 7. Subsequently, the child participants were also asked to describe their favorite component of Eat a Georgia Rainbow, and as a result, 14 (54%) children reported that preparing the food item was their favorite component. Six participants (23%) reported that they did not like the taste of the food item or an ingredient that was used to prepare the food item. However, these same six participants, who reported their dislike of the taste of the food item or the ingredients used, reported that they enjoyed preparing the food item as well as expressed enjoyment from Eat a Georgia Rainbow. During the follow-up interview, 17 children out of 26 were able to recall the name of the food item that was prepared during Eat a Georgia Rainbow 2 weeks after the program. Learners who were able to recall information obtained from past events and indicate engagement, which in turn, indicates learning (Deci & Ryan, 2008; Kolb, 1984). Additionally, when learners are in the state of experiencing flow, the

learners are able and engaged in the learning activity that leads to being able to recall previous knowledge (Nakamura & Csikszentmihalyi, 2002). Current study results support the claim that participants who participate in learning activities experience learning through hands-on, task-oriented activities (Wenger, 2009) reflect on the experiences (Cornell et al., 2013; Kolb, 2014). However, results from the current study did show discrepancies in what the parent participant perceived their child learned compared to what the child participant experienced and/or learned. For example, parent participant (ID: 10P) reported that the Eat a Georgia Rainbow program motivated his or her child to cook. However, the child participant (ID: 100_F) did not mention any details regarding their enjoyment of cooking or meal preparation in their follow-up interview. Therefore, the results related to Ideman and Patrick's (2019) study results that indicated parent's descriptions of what children learned do not relate to what children reported they learned and or experienced.

Mixed Methods

Utilizing a mixed methods approach was essential because the qualitative data provided supportive evidence for the quantitative data (Schoonenboom & Johnson, 2017). Specifically, a convergent parallel mixed methods research design was utilized to simultaneously collect quantitative and qualitative data at approximately the same time during the follow-up. Then, data were analyzed separately and integrated to further interpret the results (Creswell & Clark, 2017; Schoonenboom & Johnson, 2017). A joint display table was provided to show the alignment of the results from both the quantitative and qualitative results to compare and contrast those results (Creswell & Clark, 2017).

The support of participant interviews for the relationship between observed variables. The results from the Pearson's correlation and simple linear regression analyses did not establish a relationship among child's level of engagement, IMI survey scores, and Motivation for Diet survey scores, and no predictions could be made for the Motivation for Diet survey scores based on the child's level of engagement and IMI survey scores. Utilizing the IMI survey subscale, interest and enjoyment, determined the child's learning experience during a learning activity (Ryan & Deci, 2000). As a result, understanding the occurrence of intrinsic motivation and flow are essential to develop effective strategies that motivate children to learn during the program activities. Freedman (2010) suggested that hands-on cooking activities helped to improve nutrition education knowledge and improving children's food choices. Thus, providing creative learning experiences during a nutrition education program can influence children's intention of healthy behaviors. Although the statistical results indicated no relationships and predictions within the observed variables, the qualitative results supported the relatedness of the child's level of engagement, IMI survey score, and Motivation for Diet survey score. Results from reported on Table 33 of the joint display table displays that qualitative results (interview responses) supported the survey results (IMI and Motivation for Diet). Participant (ID:081_F) indicated that she enjoyed learning in the program under the theme of *enjoyment and interest* and also had a high score for level of engagement of 17 (M = 12.19), high aggregate score of IMI survey of 30, and a high aggregate score on the Motivation for Diet survey of 25. The results indicated there was a statistically non-significant negative relationship between IMI survey score and Motivation for Diet

survey score with r = -.06. Thus, the child participant scored high on the level of engagement, IMI survey, and Motivation for Diet survey and was able to recall the new information gained from Eat a Georgia Rainbow 2 weeks after attending. The parent participant (ID:08P) stated that the child learned a lot from the program and had the intentions of wanting to participate in meal preparation at home. However, a trend noted in the joint display table was that the child had high IMI and Diet scores but irrespective of the level of engagement. Reasons to explain this trend include: the statistically non-significant correlation results, social desirability bias because the survey data were self-reported, and while children reported that cooking was fun during the Eat a Georgia Rainbow program, enjoyment with cooking during Eat a Georgia Rainbow does not directly translate into actively participating in meal preparation at home.

Alignment with the Experiential Learning Theory

Experiential learning theory is based on the constructivist ideology. The focus of this theory is that learning is created through transformation of experience and learning is developed through hands-on tasks (Kolb, 1984). The author also created the four-stage learning cycle, in which the author believed is a non-ending cycle of learning. The four stages include; concrete experimentation, this phase is described to be the new experience; reflective observation (observing and watching); abstract conceptualization (learner is thinking of new ideas to apply to the next experience); and active experimentation (the learner is applying his or her new ideas).

The participants are not expected to go through the entire learning cycle (Ballantyne & Packer, 2011; Kolb & Kolb, 2005). For example, the child goes through

the reflective observation and abstract conceptualization phase when the child observed the class facilitator while the museum chef explained each ingredient that was being used during the cooking class and provided information regarding the healthy benefits of each ingredient. The child then experiences the active experimentation while cooking the food item in the cooking class. Then, the child was able to experience the reflective observation phase, when completing the IMI survey, the day of the program because the child was able to reflect on their experiences of the Eat a Georgia Rainbow program. The parent's interview results indicated that family conversations were occurring after the program; therefore, the child's participation in family conversation can be assumed that the child was placed in the abstract conceptualization phase of the learning cycle. The parents describing that children participated in meal preparation at home indicated that the child may be experiencing the active experimentation phase of the learning cycle. The resulting experiences with child participants during the Eat a Georgia Rainbow program could influence the child's reflective observations and become a catalyst for family conversations, participation in meal preparation, and recall of past experiences 2 weeks after attending Eat a Georgia Rainbow. The results from this study indicated that the child participants described their experiences during Eat a Georgia Rainbow as enjoyable and interesting, and the Experiential learning theory is focused on learning from experiences. Therefore, the quantitative and qualitative results were able to capture the subjective experience in the learning process.

Limitations of the Study

The results from the reliability testing in SPSS yielded a low Cronbach's alpha value of .521 for the Motivation for Diet survey. The low Cronbach's alpha value could be due to low sample size, missing values, and low-inter item correlation. However, the researcher relied on the exception of the skewness (0.070) and kurtosis (-1.137) values being below 2.1 and 7.1 to compute the parametric analyses. Furthermore, the items on the Motivation for Diet survey features the phrases, such as "everyday" and "most days", would be difficult for participants to conceptualize and report because attending a cooking class for 30 minutes only once may not translate to children wanting to adopt a healthy diet on a long-term daily basis. Therefore, if the researcher assessed a recurring nutrition education program rather than a short-term cooking class, then the results may be generalized beyond the given environment. The reliability scale is based on the responses given by the respondents to the scale items. Thus, in previous studies conducted by Kitzman-Ulrich et al. (2011) and Wilson et al. (2002), the reliability value was high, but in additional studies that consisted of different participants, the scale reliability can be lower.

Only 31 participants could be interviewed during Phase II of the study out of the 50 participants who participated in the Eat a Georgia Rainbow program in Phase I. Incentives were used as an effort to collect follow-up data from participants. The target population included school-aged children, and the study was conducted during the school year. Therefore, collecting follow-up data were challenging to due to conflicting schedules with parent availability because parents were required to be present on the

virtual call during follow-up. Failure to secure all 50 participants for the follow-up data collection may have impacted the generalizability.

The number of camera-glasses available determined the number of participants who were able to participate in the study. Over the course of seven visits, there were 96 program attendees, but the researcher was only able to collect intake data from 50 participants. The camera-glasses data were difficult to analyze, and the researcher had to rely on other participant camera-glasses data to determine the level of engagement due to the constant movement of the child. Parent interviews can reflect response bias because the questions were related to their child's behavior and there was not substantial evidence that the events parents reported did or did not occur.

There was a trend noticed in the joint display table of high IMI and Motivation for Diet survey scores but low level of engagement. The survey data were self-reported and could lead to social desirability bias. Social desirability occurs when survey respondents amplify in reporting positive behaviors to devalue the negative behaviors (Andersen & Mayerl, 2017).

Both the quantitative and qualitative data were not analyzed by age range. Thus, wide age range of participants with 4 to 14 years may impact the external validity of the study results.

Recommendations for Future Research

Previously, the researcher mentioned the potential response bias from the parent interviews. Future studies should conduct individual interviews utilizing the same questions to the child participants before or after separately from the parent interviews to

increase reliability of the data. To address the low reliability values, researchers should consider conducting additional reliability analysis and revising the scale for the Motivation for Diet survey.

Researchers should explore different incentives other than gift cards to increase the number of respondents for the follow-up data collection as the follow-up phase was the most challenging process but a critical phase of the study. Researchers who are working with children and are observing children's behavior should consider utilizing one camera to capture the target participants instead of utilizing individual camera-glasses. Utilizing one camera to capture the target participant's behavior can increase reliability of data collected and will not limit the researcher to collect data based on the number of camera-glasses available.

To successfully evaluate the effectiveness of a health program, researchers should consider implementing a pre and posttest to measure the amount of knowledge the child learned from a nutrition program. The researcher should consider evaluating a long-term cooking class program that is reoccurring weekly with the same participants to measure the long-term health impact of those participants. Researchers who are wanting to conduct nutrition education programs should consider focusing on the parents or caregivers of the children because the parents and or caregivers are more in control of the types of foods that are exposed to children.

Implications of the Study

The results of this study did provide helpful information for the museum to improve or sustain parts of their program. The children and parents mentioned that the

Eat a Georgia Rainbow program was a fun activity for children to participate in and learn about healthy eating and meal preparation. The results also showed that some children were gaining new knowledge and others were building onto pre-existing knowledge. Exposing children to the topic of healthy eating and meal preparation is imperative, especially in an informal setting. Reinforcing what children were learning is imperative in sustaining long-term healthy behaviors; therefore, this model may be used in the field of higher education. This study was an important contributor to the field of higher education because the focus should be on student's process of learning and not just the outcome. In turn, identifying student's process of learning will assist educators to create learning environment for students to sustain the knowledge the students gain in classrooms for future use. Additionally, higher education institutions currently support learning centers (i.e., museums), and therefore, this current study can be applied to higher education.

Dissemination of the Findings

The results of this study will be shared with the Children's Museum of Atlanta, specifically the staff and administrative who worked closely with the Eat a Georgia Rainbow program. The researcher will present a more consolidated report that illustrates the findings from the study to the staff and administration at the Children's Museum of Atlanta. The results from the study and information regarding how children and their parents perceived the Eat a Georgia Rainbow program will help the Eat a Georgia Rainbow program staff and administrative to sustain or better their program.

Conclusion

The goal of this convergent parallel mixed methods research study was to investigate children's learning experiences during the Eat a Georgia Rainbow program and to understand their motivation to learn about healthy eating and healthy cooking in relevance to the development of their intentions to adopt a healthy diet. The current study addressed the limited literature on understanding children's learning process during a nutrition education program and to determine the relationship among children's motivation to learn about healthy eating and meal preparation, and their motivation for participating in healthy behaviors after attending the Eat a Georgia Rainbow program (Callanan et al., 2017; Christensen et al., 2016; Deci & Ryan, 2008; Dehghan et al., 2005; Falk et al., 1998; Thomas, 2006; Wenger, 1998). The findings from this study magnify the importance of offering nutrition education programs in informal settings because results indicated learning was occurring. However, without the reinforcement factor, children were not highly impacted by the long-term benefits. Therefore, family conversations and interaction are essential. This issue is imperative for families, researchers, program planners, and museum staff. In order to combat the high rates childhood obesity, nutrition education programs must be accessible to a diverse audience and be creative to achieve success in delivering highly impactful nutrition programs to families. Thus, programs like Eat a Georgia Rainbow should be seen as valuable to families who attend the museum.

Traditionally, health promotion programs are held at local community venues, but museums have the capacity to reach a diverse population to house and offer health

promotion programs to address various health concerns (Camic & Chatterjee, 2013; Glanz et al., 2008). Therefore, utilizing museums as a venue to provide health promotion programs can be an innovative strategy to reach families and to address health promotion topics. Furthermore, in the current study, the child participants' interview responses indicated that 100% (n = 26) of the child participants described their experiences during Eat a Georgia Rainbow held in a museum setting as being enjoyable. Hence, enjoyment relates to autonomous motivation that leads to the learner's motivation to internally move the individual to action (Ryan & Deci, 2008). Ideally, moving learners and their families to work toward positive changes. Including parent(s) in health promotion programs is essential because incorporating the family-based approach in childhood obesity prevention programs will encourage family learning for behavioral change (Wilson et al., 2015).

Health promotion programs should be seen as enjoyable, interesting, and accessible to the local community. These characteristics are imperative because the results in the current study showed that child participants were interested and were engaging while learning about healthy eating and healthy meal preparations during Eat a Georgia Rainbow. Creating effective health promotion programs, which are enjoyable and addressing health issues, may lead to preventing childhood obesity and improving children's overall health (Glanz et al., 2008).

Quantitative

A very low correlation was found between child's level of engagement and IMI survey scores, and there was not enough sufficient evidence to prove that engagement in

a nutrition program motivated a child to adopt a healthy diet. Thus, a low sample size can result in a low correlation between child's level of engagement and IMI survey scores. A low sample size can occur due to the challenges related to following-up with participants (Christensen et al., 2016). Although the statistical analyses resulted in no relationship or predictions, but 30 child participants out of 31 scored high on the Motivation for Diet survey indicating their intentions to adopt a healthy diet. However, exposing children to a short-term nutrition education programs may not result in a long-term impact on the child's motivation to adopt healthy behaviors.

Qualitative

Parents indicated that family conversations regarding healthy eating and meal preparation and participation in meal preparation occurred at home after the Eat a Georgia Rainbow program. The recurring conversations and participation in meal preparation can result from the child participants engaging in a hands-on experience that may have been a new experience for the children. In turn, the enjoyment and interest from the new experience could have been a catalyst for family conversations and participation in meal preparation at home after attending Eat a Georgia Rainbow (Callanan et al., 2017; Deci & Ryan, 2008). The motivation was internally moving the individual to action going forward (Deci & Ryan, 2008; Nakamura & Csikszentmihalyi, 2002). For example, child participants reported high levels of intrinsic motivation after the Eat a Georgia Rainbow program and may result in engaging in further conversations and experiences with meal preparation at home. Having family conversations and participation in meal preparation with families after attending Eat a Georgia Rainbow

contributes to building onto their existing knowledge and experiences (Kolb, 2014). Furthermore, the parent interviews were all self-reported, and there was no sufficient evidence to prove whether these events that parents reported actually occurred.

Parents who were reporting what they believed their child learned from Eat a Georgia Rainbow may be an actual reflection of what the parents learned while attending Eat a Georgia Rainbow with their child. The parent and child were experiencing the same experiences but may have entered into the Eat a Georgia Rainbow program at different learning phases (i.e., concrete experience, reflective observation, abstract conceptualization, and active experimentation; Kolb, 2014). Therefore, the child's learning experience can be encouraged and molded by members of the family group (Borun et al., 1996; Uzick & Patrick, 2017). The parent's reinforcement can be from the parent's past experiences with meal preparation and pre-existing knowledge about healthy eating (Kolb, 1984).

Results from child interviews indicated that children were able to recall the name of the food item that was prepared during the Eat a Georgia Rainbow program 2 weeks after attending through their learning experiences. The child participants also indicated that they experienced enjoyment during the program as well as being able to recall their favorite component of the program and what they disliked from the program. Learners who were able to recall information obtained from past events and indicate engagement, which in turn, indicates learning (Deci & Ryan, 2008; Kolb, 1984). The parent interview results also supported the child's responses as seen on the joint display table on Table 33.

Mixed Methods

The joint display table illustrates the alignment of the quantitative and qualitative results. The results from this mixed method study indicated that the children experienced enjoyment of cooking during and after the Eat a Georgia Rainbow program through the IMI survey and follow-up interviews with the parent and child participant. However, the child's enjoyment experienced during the Eat a Georgia Rainbow does not translate to enjoyment of healthy meal preparation. For instance, participant (ID:14P) indicated that his or her child enjoyed cooking brownies at home. The child (ID:140_F) had a low level of engagement score and high scores on both the IMI and Motivation for Diet surveys; therefore, the perception of enjoying meal preparation cannot determine that the child enjoys healthy meal preparation. The IMI survey indicated high levels of intrinsic motivation, and the child interview results indicated that the child was able to recall information 2 weeks after attending Eat a Georgia Rainbow. Additionally, when learners are in the state of experiencing flow, the learners are able and engaged in the learning activity that leads to the ability to recall previous knowledge (Nakamura & Csikszentmihalyi, 2002). Current study results support the claim that participants participated in learning activities, experienced learning through hands-on, task-oriented activities (Wenger, 2009), and reflected on the experiences (Cornell et al., 2013; Kolb, 2014). The results from the current study cannot conclude that museum health programs leave a long-term impact because of short-term exposure to the nutrition education program. However, Anderson et al. (2003) suggested learners who enjoyed visits to museums result in an increased interest and enjoyment of activities that establishes

impactful learning outcomes that will continue to develop over time. Furthermore, the current study results did show prior knowledge, interest, motivation, group social interaction, and orientation variables influencing learning outcomes (Falk & Storksdieck, 2005), but without the reinforcement factor, there was no sustained behavior change.

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APPENDICES

APPENDIX A

INTRINSIC MOTIVATION INVENTORY SURVEY

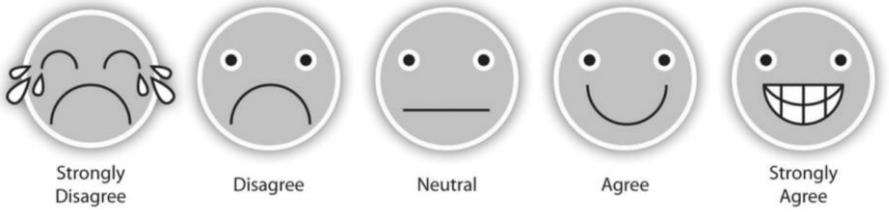
PART 1: Background Information

Directions: Please answer each questions by filling in the blank or circling an answer that best describes you.

1. What is your age? _____
2. What is your gender?
   a. Female
   b. Male
   c. Other (specify)
3. What is your ethnic background?
   a. White
   b. Black or African-American
   c. American Indian or Alaskan Native
   d. Asian
   e. Native Hawaiian or other Pacific Islander
   f. Other (specify)

PART 2: The Post-Experimental Intrinsic Motivation Inventory Survey

Directions: For each of the following statements, please fill in the blank with a number that represents how true it is for you, using the following scale:



1. I enjoyed doing this activity very much _____
2. This activity was fun to do. _____
3. I thought this was a boring activity. (R) _____
4. This activity did not hold my attention at all. (R) _____
5. I would describe this activity as very interesting. _____
6. I thought this activity was quite enjoyable. _____
7. While I was doing this activity, I was thinking about how much I enjoyed it. _____

APPENDIX B

MOTIVATION FOR DIET FOLLOW-UP SURVEY

Summary: This scale assesses regulatory motivation around healthy eating.

See FIT:

- Child Baseline Survey – Page 2

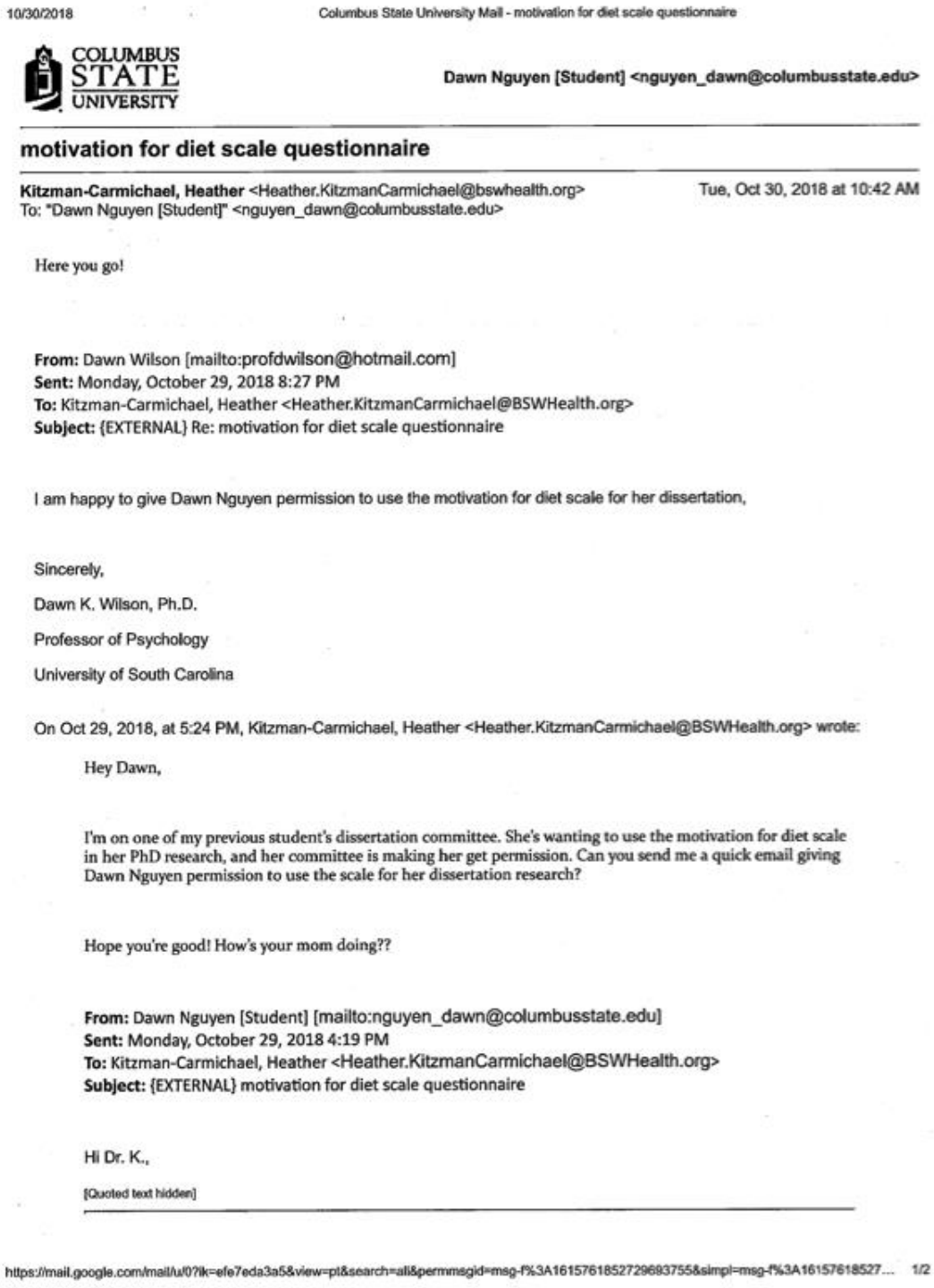
1	2	3
Not true at all	Somewhat true	Very True

Items:

VARIABLE NAME	ITEM
COEH01	**1. I am excited about eating healthy on most days. _____**
COEH02	**2. It is important to eat healthy every day. _____**
COEH03	**3. I get into eating healthy on most days. _____**
COEH04	**4. I make sure I get plenty of healthy foods on each day. _____**
COEH05	**5. I do not care about eating healthy on most days. (R) _____**
COEH06	**6. I plan how I can eat healthy every day. _____**
COEH07	**7. Eating healthy is very important to me. _____**
COEH08	**8. I get excited about eating healthy every day. _____**
COEH09	**9. I am not interested in eating healthy. (R) _____**
COEH10	**10. I get into it when I eat healthy every day. _____**

APPENDIX C

PERMISSION TO USE MOTIVATION FOR DIET SURVEY



10/30/2018 Columbus State University Mail - motivation for diet scale questionnaire

COLUMBUS STATE UNIVERSITY

Dawn Nguyen [Student] <nguyen_dawn@columbusstate.edu>

motivation for diet scale questionnaire

Kitzman-Carmichael, Heather <Heather.KitzmanCarmichael@bswhealth.org> Tue, Oct 30, 2018 at 10:42 AM
To: "Dawn Nguyen [Student]" <nguyen_dawn@columbusstate.edu>

Here you go!

From: Dawn Wilson [mailto:profdwilson@hotmail.com]
Sent: Monday, October 29, 2018 8:27 PM
To: Kitzman-Carmichael, Heather <Heather.KitzmanCarmichael@BSWHealth.org>
Subject: {EXTERNAL} Re: motivation for diet scale questionnaire

I am happy to give Dawn Nguyen permission to use the motivation for diet scale for her dissertation,

Sincerely,

Dawn K. Wilson, Ph.D.

Professor of Psychology

University of South Carolina

On Oct 29, 2018, at 5:24 PM, Kitzman-Carmichael, Heather <Heather.KitzmanCarmichael@BSWHealth.org> wrote:

Hey Dawn,

I'm on one of my previous student's dissertation committee. She's wanting to use the motivation for diet scale in her PhD research, and her committee is making her get permission. Can you send me a quick email giving Dawn Nguyen permission to use the scale for her dissertation research?

Hope you're good! How's your mom doing??

From: Dawn Nguyen [Student] [mailto:nguyen_dawn@columbusstate.edu]
Sent: Monday, October 29, 2018 4:19 PM
To: Kitzman-Carmichael, Heather <Heather.KitzmanCarmichael@BSWHealth.org>
Subject: {EXTERNAL} motivation for diet scale questionnaire

Hi Dr. K.,

[Quoted text hidden]

https://mail.google.com/mail/u/0?ik=efe7eda3a5&view=pt&search=all&permmsgid=msg-f%3A1615761852729693755&simpl=msg-f%3A16157618527... 1/2

APPENDIX D

PERMISSION TO USE IMI SURVEY

In order to access these questionnaires you must first register and log into the website. On the registration page you will be asked to agree terms and conditions stating that you will only use the scales for academic research. Once this is complete you will have access to the scales while logged in to the website.

*** Please note that all questionnaires on this web site, developed for research on self-determination theory, are copyrighted. You are welcome to use the instruments for academic (non-commercial) research projects. However, you may not use any of them for any commercial purposes without written permission to do so from Edward L. Deci and Richard M. Ryan. (To inquire about a commercial request, please email info@selfdeterminationtheory.org)

Click on any questionnaire name below to access the scale or set of questionnaires and other information.

Aspirations Index (AI)
The AI assesses people's intrinsic and extrinsic life goals or aspirations. That is, it measures the degree to which people value seven broad goal contents–wealth, fame, image, personal growth, relationships, community contribution, and health. The instrument is used in research relating the content of people's goals to constructs such as mental health and risk behaviors.

Basic Psychological Needs Scales (BPNS)
Self-determination theory posits three universal psychological needs and suggests that these must be ongoingly satisfied for people to maintain optimal performance and well-being. The BPNS is a set of questionnaires that assess the degree to which people feel satisfaction of these three needs. There is a general form, as well as domain specific forms for work and relationships. More recently, questionnaires assessing not only need satisfaction, but also need frustration have been developed. There is a general form, as well as an adaptation for work domain and an adaptation for daily measurement (diary-studies).

Christian Religious Internalization Scale (CRIS)
This scale is also referred to as the Religion Self-Regulation Questionnaire (SRQ-R). It appears within the Self-Regulation Questionnaires section of this web site. You can visit the CRIS link at the beginning of this paragraph and that will take you to the actual scale. Alternatively, you can go to the Self-Regulation Questionnaires(SRQ) section, which will take you to an overview of the Self-Regulation family of questionnaires, along with scoring information. From there, you can go to the Religion Self-Regulation Questionnaire subsection.

General Causality Orientations Scale
This is an individual difference measure of people relatively enduring motivational orientations. It was developed for use with individuals who are at least 17 years of age. It assesses autonomous, controlled, and impersonal causality (motivational) orientations.

Health Care SDT Packet (HC-SDT)
The HC-SDT is a set of questionnaires related to assessing three SDT constructs as they relate four health-relevant behaviors. The behaviors are smoking cessation, diet improvement, exercising regularly, and drinking responsibly. The SDT constructs for each behavior are self-regulation (SRQ), perceived competence (PCS), and the perceived autonomy supportiveness of the health care climate (HCCQ).

Index of Autonomous Functioning (IAF)
The IAF was developed to assess dispositional/trait autonomy based on three theoretically derived subscales assessing authorship/self-congruence, interest-taking, and low susceptibility to control. Authorship/congruence reflects how much one views oneself as the author of behavior and experiences high consistency among behaviors, attitudes, and traits. Interest-taking concerns an ongoing insight into oneself and one's experience in an open and non-judgmental manner. Lastly, low susceptibility to control refers to the absence of internal and external pressures as motivators for behaviors.

Intrinsic Motivation Inventory (IMI)
The IMI was developed to assess participants' subjective experience related to experimental tasks. Specifically, it is used in intrinsic motivation laboratory experiments in which participants have worked on an interesting activity within some experimental condition, and the IMI assesses their levels of interest/enjoyment; perceived competence; effort; value/usefulness; felt pressure and tension; and perceived choice while they were performing the activity.

APPENDIX E

INFORMED CONSENT FORM

INSTITUTIONAL REVIEW BOARD

Informed Consent Form

You are being asked to participate in a research project conducted by Dawn Nguyen, a student in the Counseling, Foundations, and Leadership Department at Columbus State University. Dr. Patricia Patrick, an Associate Professor will be supervising this project.

I. Purpose:

The purpose of this project is to investigate a child's level of engagement during the Eat a Georgia Rainbow (EAGR) program and how their level of engagement affects their learning expereince and motivation to adopt a healthy diet.

II. Procedures:

While attending the EAGR program, your child will wear a camera-glass that will record audibly and visually to capture conversations during the EAGR program. This also includes when your child is participating in the cooking class. The glasses are to be worn for the whole duration of the EAGR program. Your child is required to remove the glasses when they are not physically standing in the vicinity of the program. The recordings will later be transcribed and the transcripts will only be discussed while interpreting the findings. Your identity will not be revealed and will not be linked to the data.

After the cooking class concludes today, you and your child will remain in the cooking lab. Your child will complete a 10-item survey pertaining to their expereince during the EAGR program in the cooking lab. This survey will take approximately 15 to 30 minutes to complete based on the child's age and the assistance they require.

Two weeks after your attendance of the EAGR program, the PI will contact you through video conferencing to ask your child to complete the Motivation for Diet survey. The survey contains 10-items regarding their intentions to adopt a healthy diet. The PI will also ask your child 6 interview questions regarding the cooking class. The survey and interview questions will take approximately 30 minutes to complete based on the child's age and the assistance they require. A legal guardian is required to be present during the call. The PI will read the questions to the child and record the responses. The PI will use an iPad to record the follow-up survey to ensure the validity of the child's response. Once your child has completed the survey and interview, the PI will ask you a couple of interview questions regarding your child's experience during the program. The interview will be audibly recorded for data analysis purposes.

The responses from the surveys will be inputted into a statistical software for data analysis. During your participation in this study, you and your family will be assigned to identifying codes that will link the recordings and survey responses for data anlaysis and interpretation purposes. This data may be used for future studies

III. Possible Risks or Discomforts:

During your participation in the study, you and your child may experience minimal risk because your idenity will be recorded while wearing the recording camera-glasses, but you will not experience any discomfort. However, your identity will not be revealed and linked to the data collected in this study. Only the PI will have access to the recordings

IV. Potential Benefits:

Your participation in this study will help the museum and researcher define the impact of the health program on children's learning experiences and allow future researchers to develop effective nutrition education programs. Your child will have the opportunity to express their experiences from the EAGR program.

V. Costs and Compensation:

Your child will receive a $10.00 eGiftCard from Target once the child completes the follow-up survey through video conference two weeks after attending the EAGR program. The eGiftCard will be sent to the legal guardian's email address.

VI. Confidentiality:

The survey data will be stored in a locked cabinet in the PI's office and the student researcher will be the only individual who will have access to the surveys. The recordings will be downliaded into the student researcher's password protected computer and the student researcher will be the only individual who willhave access to this data. The participants will be assigned identifying codes and only the PI will have access to this data. The data will be kept for five years and will be discarded.

VII. Withdrawal:

Your participation in this research study is voluntary. You may withdraw from the study at any time, and your withdrawal will not involve penalty or loss of benefits.

For additional information about this research project, you may contact the Principal Investigator, Dawn Nguyen at [redacted] or nguyen_dawn@columbusstate.edu.. If you have questions about your rights as a research participant, you may contact Columbus State University Institutional Review Board at irb@columbusstate.edu.

I have read this informed consent form. If I had any questions, they have been answered. By signing this form, I agree to participate in this research project.

_____ _____

Signature of Participant Date

By signing below, I consent to my child's participation in this research project.

APPENDIX F

CHILD ASSENT FORM

Protocol Number: 19-044

CHILD ASSENT FORM (age 5-12)

Why are we doing this research?

We are doing a study to learn about your experiences during the Eat a Georgia Rainbow Program. We are asking you to help because we don't know very much about kids experiences during the Eat a Georgia Rainbow Program.

What would happen if I join this research?

If you agree to be in our study, we are going to ask you to wear camera-glasses and ask you to fill out a survey after the cooking class. We are going to ask you questions about your experiences during the Eat a Georgia Rainbow Program and we want to know if you enjoyed the program at the Children's Museum of Atlanta.

Then, two weeks from today, we will call you to ask you questions about healthy eating. We want to know if the program has encouraged you want to eat healthy foods.

Could bad things happen if I join this research?

Being recorded on the camera-glasses may make you feel uncomfortable, but we will try to make sure that no bad things will happen.

Could this research help me?

This research will not help you. We do hope to learn something from this research though.

Important things to know:

The questions we will ask are only about what you think. There are no right or wrong answers because this is not a test.

You can ask questions about this study at any time. You can talk to Mrs. Dawn Nguyen. If you decide at any time not to finish, you can ask us to stop.

In two weeks after we ask you questions on the phone, we will give you a $10.00 Target eGiftCard to thank you for being in the study. You should talk with your parents about how you would like to use this.

Protocol Number: 19-044

If you sign this paper, it means that you have read this and that you want to be in the study. If you don't want to be in the study, don't sign this paper. Being in the study is up to you, and no one will be upset if you don't sign this paper or if you change your mind later.

Your printed name: _____

Your signature: _____

Date _____

Signature of person obtaining consent: _____

Printed name of person obtaining consent: _____

Date _____

APPENDIX G

PARENT FOLLOW-UP INTERVIEW QUESTIONS

1. What do you think your child learned from the class?
2. Has your child had conversations with you in regard to healthy eating and or meal preparation?
    a. What has your child talked about the class since the cooking class?
3. Has your child engaged in meal preparation at home?
    a. What was the food item that your child participated in meal preparation?

APPENDIX H

CHILD FOLLOW-UP INTERVIEW QUESTIONS

1. Do you remember what you prepared in the EAGR cooking class?
    a. What was the food item called?
2. Do you remember the ingredients used?
    b. What were they?
3. Do you remember the chef talking about the ingredients being healthy?
    c. How are the ingredients healthy for you?
4. How did the cooking class help you understand about the importance of healthy eating?
5. How did you feel about the cooking class?
6. What was your favorite part about the cooking class?
        a. What did you not like?

APPENDIX I

LETTER OF COOPERATION FROM CHILDREN'S MUSEUM OF ATLANTA

Children's Museum of Atlanta

January 10, 2019

Ms. Dawn Nguyen-Truong
Doctoral Fellow
Counseling, Foundations and Leadership Department
Columbus State University
4225 University Avenue
Columbus, Georgia 31907

Dear Ms. Nguyen-Truong:

This letter serves as formal permission for you to utilize Children's Museum of Atlanta as a site to collect data for your study. I have been informed of the purposes of the study and the nature of the research procedures. As the Director of Education and Exhibits at Children's Museum of Atlanta, I am authorized to grant permission to allow you, Ms. Nguyen-Truong to recruit research participants from our visitors and staff for your study. Sara Hempen and Connor Lynch, who I supervise directly, will serve as the liaison and supervisor while you are onsite in the museum during data collection.

This agreement can be revoked by written request of either Children's Museum of Atlanta or Ms. Nguyen-Truong.

Sincerely,

Karen Kelly
Director of Education and Exhibits
Children's Museum of Atlanta
275 Centennial Olympic Park Dr. NW
Atlanta, GA 30013
kkelly@childrensmuseumatlanta.org
(404) 653 - 8157

APPENDIX J

IRB APPROVAL PROTOCOL 19-044

COLUMBUS STATE UNIVERSITY

Dawn Nguyen [Student] <nguyen_dawn@columbusstate.edu>

Expedited Approval Protocol 19-044

CSU IRB <irb@columbusstate.edu> Mon, Mar 4, 2019 at 5:34 PM
To: Dawn Nguyen <nguyen_dawn@columbusstate.edu>, Patricia Patrick <patrick_patricia1@columbusstate.edu>
Cc: CSU IRB <irb@columbusstate.edu>, Institutional Review Board <instituional_review@columbusstate.edu>

Institutional Review Board
Columbus State University

Date: 3/4/19
Protocol Number: 19-044
Protocol Title: Investigating the Relationship Between Children's Experiences During a Museum Nutrition Program and Their Motivation to Learn and Adopt a Healthy Diet
Principal Investigator: Dawn Nguyen
Co-Principal Investigator: Patricia Patrick

Dear Dawn Nguyen:

Representatives of the Columbus State University Institutional Review Board have reviewed your research proposal identified above. It has been determined that the research project poses minimal risk to subjects and qualifies for expedited review under 45 CFR 46.110. Approval is granted for the research project.

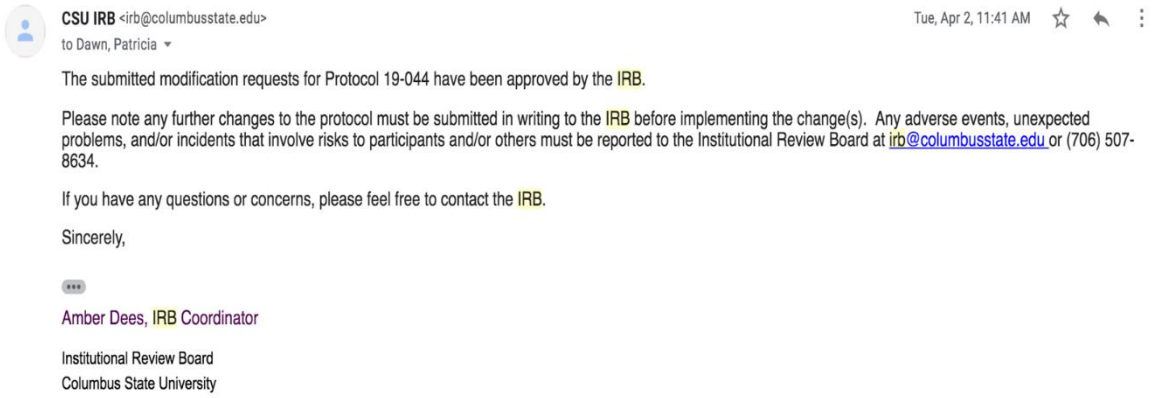
Please note any changes to the protocol must be submitted in writing to the IRB before implementing the change(s). Any adverse events, unexpected problems, and/or incidents that involve risks to participants and/or others must be reported to the Institutional Review Board at irb@columbusstate.edu or (706) 507-8634.

If you have further questions, please feel free to contact the IRB.

Sincerely,
Amber Dees, IRB Coordinator
Institutional Review Board
Columbus State University

APPENDIX K

MODIFICATION APPROVAL LETTER FOR PROTOCOL 19-044



CSU IRB <irb@columbusstate.edu> Tue, Apr 2, 11:41 AM

to Dawn, Patricia

The submitted modification requests for Protocol 19-044 have been approved by the IRB.

Please note any further changes to the protocol must be submitted in writing to the IRB before implementing the change(s). Any adverse events, unexpected problems, and/or incidents that involve risks to participants and/or others must be reported to the Institutional Review Board at irb@columbusstate.edu or (706) 507-8634.

If you have any questions or concerns, please feel free to contact the IRB.

Sincerely,

Amber Dees, IRB Coordinator

Institutional Review Board
Columbus State University