PRESCHOOLER’S UNDERSTANDING OF FOOD ALLERGIES

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PRESCHOOLER’S UNDERSTANDING OF FOOD ALLERGIES

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ABSTRACT

This study examined preschool children’s understanding of the concept of food allergies and the effectiveness of using a storybook versus interactive activities as learning tools to increase their food allergy comprehension. The preschool children were administered interviews and educational interventions throughout a three week period. The control group was read the book Cody the Allergic Cow by Nicole Smith then asked contextualized questions, while the experimental group participated in educational activities. During the first activity, the children prepared a safe meal for Cody to eat and during the second activity they prepared a soy milk banana bread recipe. The results indicated that most children knew something about food allergies prior to any interventions. Both groups displayed learning after educational interventions were administered. Although, children from the control group displayed increased learning about the health aspect of food allergies, the experimental group displayed increased learning about appropriate diet behaviors for individuals with a milk allergy. With the findings from this study, parents and day care providers have a better understanding of what a preschooer can understand about food allergies and educational tools for this developmental level.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>II. REVIEW OF LITERATURE</td>
<td>4</td>
</tr>
<tr>
<td>III. RESEARCH DESIGN AND METHODS</td>
<td>10</td>
</tr>
<tr>
<td>Participants</td>
<td>10</td>
</tr>
<tr>
<td>Child Pre-Assessment Interview</td>
<td>12</td>
</tr>
<tr>
<td>Book- <em>Cody the Allergic Cow</em> by Nicole Smith</td>
<td>12</td>
</tr>
<tr>
<td>Baseline Activity</td>
<td>12</td>
</tr>
<tr>
<td>Post- Baseline Activity Interview</td>
<td>13</td>
</tr>
<tr>
<td>Control Group Activity</td>
<td>13</td>
</tr>
<tr>
<td>Experimental Group Activity</td>
<td>13</td>
</tr>
<tr>
<td>Post- Week 3 Interviews</td>
<td>14</td>
</tr>
<tr>
<td>Coding Categories</td>
<td>15</td>
</tr>
<tr>
<td>Parent/Guardian Questionnaire</td>
<td>16</td>
</tr>
<tr>
<td>IV. RESULTS</td>
<td>17</td>
</tr>
<tr>
<td>Question 1- What is a food allergy?</td>
<td>17</td>
</tr>
<tr>
<td>Question 2- Do you have a food allergy?</td>
<td>19</td>
</tr>
<tr>
<td>Sub Question- If yes, what are you allergic to?</td>
<td>19</td>
</tr>
</tbody>
</table>
Question 3- Do you know someone who has a food allergy?...............................21

Sub Question- If yes, who?.................................................................................21

Question 4- What do you think happens if someone eats a food they’re allergic to?.........................................................................................................................22

Question 5- What can people be allergic to?.....................................................23

Question 6- If a person is allergic to milk, what is safe to drink? Cow’s milk or soy milk?.....................................................................................................................23

Parent/Guardian Questionnaire.........................................................................25

V. DISCUSSION...........................................................................................................26

Interview Analysis..................................................................................................27

Parent/Guardian Questionnaire Analysis...............................................................30

Limitations and Directions for Future Research.................................................31

Conclusion...............................................................................................................32

REFERENCES..........................................................................................................34

APPENDICES.........................................................................................................37

APPENDIX A. INFORMED CONSENT...................................................................38

APPENDIX B. PARENT LETTER...............................................................................41

APPENDIX C. CHILD INTERVIEW SCRIPT..............................................................45

APPENDIX D. FOOD AND BEVERAGE PICTURES USED FOR EXPERIMENTAL GROUP ACTIVITY...........................................................................................................47

vi
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Study Timeline for Interviews and Interventions</td>
</tr>
<tr>
<td>2</td>
<td>Post-Baseline Activity Interview Responses</td>
</tr>
<tr>
<td>3</td>
<td>Post- Week Three Interview Responses</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

Food allergy, or food hypersensitivity, can be defined as an immune-mediated adverse reaction to food. Children with food allergies may have mild reactions, such as a skin rash, but are also at risk for anaphylaxis, which is a severe allergic reaction with, but not limited to, respiratory and cardiovascular involvement. Food allergies are on the rise among children in the United States. In 2000, Sicherer, Furlong, DeSimone, & Sampson (2000) reported that the prevalence of food allergy is among 6-8% of children under 4 years of age. In the United States, from 1997 to 2007, there was an 18% increase in prevalence of food allergies among children under the age of 18 years (Branum & Lucas, 2008).

The diagnosis can be very challenging, which leaves many parents unaware of their child’s allergies before they begin child care or school outside of the home. In 2000, 4,586 parents in the US Peanut and Tree Nut Allergy Registry (Sicherer, Furlong, DeSimone, & Sampson, 2001) were contacted to answer questions about their child’s food allergic reactions in the school setting. Of these participants, 750 children (16%) had a reaction in school or day care and 64 percent of the reactions occurred in day care or preschool (Sicherer, et al, 2001). Most of these reactions are accidental and
unexpected (Yu, Kagan, Verreault, Nicolas, Joseph, St Pierre, & Clark, 2006). These numbers, along with the majority of cases being accidental exposures, indicates the significance of this issue in the school setting for parents, teachers, day-care providers, nurses, physicians, and children with and without food allergies.

The purpose of this research is to increase the knowledge of what preschool children know about food allergies and to determine age-appropriate educational interventions that exhibit learning about food allergies with this developmental level. With the increasing prevalence of food allergies in children, educational interventions should be introduced when children enter preschool. Children should be knowledgeable of what a food allergy is, the symptoms, and how they are managed. It is important for a child with a food allergy to be educated, and also their peers. Past research on food allergy management has focused the attention on the parent and educators as the primary subjects involved, and has failed to present literature that demonstrates evidence-based educational interventions for food allergies. Of course, the parents and educators should be included when writing up emergency action plans for the day care or school setting, but it is also important to implement developmentally appropriate educational materials in order for children to understand food allergies. This can help the child with a food allergy become more aware of their diagnosis, know what foods to avoid, and learn about the symptoms of a reaction so that, if necessary, they can alert a teacher or peer. On the other hand, children without food allergies may be able to gain an understanding of an allergy to be sensitive to peers and may be able
to alert a teacher if needed. With the increase in prevalence of food allergies, and the lack of diagnosis until a later age, the implementation of an intervention could be beneficial to all participants involved.
Currently, management of childhood food allergies and anaphylaxis consists of guidelines that outline the roles and responsibilities for parents, schools, and medical practitioners. Emphasis is placed on extensive parental involvement with the school to ensure proper management of the food allergy (Hu & Kemp, 2005; Leo & Clark, 2007; Munez-Furlong, & Sicherer, 2009; Santos & Lack, 2012; Sicherer & Mahr, 2010). From the study conducted by Sicherer et al. (2001), only 12 percent of students were educated about food allergies, and this was after a reaction had already occurred in the school setting. This is an extremely low percentage of children who were aware of the severity of food allergies.

Management of food allergies has been documented as having a significant effect on the quality of life for both children and parents. Gupta, Springston, Smith, Kim, Pongracic, Wang, & Holl (2010) reported that parents have a solid baseline of knowledge of food allergies, but most feel that the general public would be unable to recognize the symptoms of a food allergy which had an impact on their quality of life scores. When comparing parents, mothers report having greater anxiety and stress along with significantly poorer psychological and physical quality of life than the fathers.
King, Knibb, & Hourihane, 2008). The impact of the child’s food allergy could also influence the child’s attitude towards their allergy. Dunn Galvin, de BlokFlokstra, Burks, Dubois, and Hourihane (2008) found that children from three to six years old had increased food anxiety in comparison to the six to twelve year olds in their study. These results suggest that the anxiety associated with the child’s understanding of the risk of a fatal reaction has detrimental effects on their everyday lives. Research specific to children with a peanut allergy, has found that their quality of life scores are less than healthy children’s scores (King, Knibb, & Hourihane, 2008). The mean age for this participant population was ten years old. More broadly, a study was also conducted to assess the impact of food allergies on the daily activities of children and their families, in which the food allergy included: peanut, tree nut, shellfish, eggs, scaled fish, milk, other, fruit, soy, wheat, vegetables, and other grain. Among this sample, food allergy significantly affected their family social activities, parents stress levels due to their child’s food allergy, the child’s play time at other friends’ houses, school field trips, and school parties (Bollinger, Dahlquist, Mudd, Sonntag, Dillinger, & McKenna, 2006). These findings display the increased risk of social-emotional development for children with food allergies due to the activities that are affected. Children are in need of opportunities for proper growth and development and activities that include interaction with their surroundings.

Health educational interventions have been implemented with preschool children to identify what they can understand about health concepts, as well as what methods of instruction work most effectively with this population. After an extensive
study on germs, Kalish (1996) identified that three-year olds recognized that the cause of illness may be invisible, and that you cannot always tell by visual cues what will make a person sick. These findings indicated that preschool children have the cognitive capacity to think about invisible mechanisms (Kalish, 1996). Thus, contamination by germs is seen as a physical process by preschool-aged children. Kalish (1997) then furthered his study of preschoolers’ understanding of germs and illness and found that children also recognized that physical contact with contaminated food is required to produce an illness. Although their cognitive capacity to understand what happens inside the body after contamination is limited, they still grasped the concept of food allergy contamination that leads to illness of the body if you were allergic to that specific food.

Studies observing preschool children’s ability to understand nutrition have also been implemented and proven successful. Gorelick and Clark (1985) studied 187 children ages 3-5 years old, implemented a nutritional education program to assist children in identifying foods, classifying foods as fruit or vegetables, pairing food images, and understanding what tasks occur before and after eating. After the intervention, the children’s nutrition knowledge scores increased, suggesting that the use of developmentally appropriate material can facilitate development of an understanding of the concepts of nutrition and food. The intervention presented in this study used Piaget’s Cognitive Development Theory, which provided children with educational tools that were consistent with their current cognitive capacities. A more current example of the implementation of Piaget’s Theory to teach nutrition education was also found to be
successful. Başkale and Bahar (2011) prepared educational content from Piaget’s pre-operational stage of development where the content of the messages were simple, positive, behavior-oriented, and abstract concepts were avoided. They were also successful in increasing nutrition education scores for children and increasing healthy food consumption. Thus, the children were able to understand the concept of nutrition and apply it to their lives. Other studies have shown the success of educational and self-management interventions among a variety of concepts for preschoolers, such as: healthy lifestyle, asthma, and hand-washing (Davis, Gordon, & Burns, 2011; McWayne, Fantuzzo, & McDermott, 2004; Rosen et al., 2005). Preschool children are able to understand and demonstrate sustained behavior changes after participating in educational interventions. This thesis will seek to determine if providing interventions to preschool children will produce similar results in increasing preschool children’s understanding of food allergies.

Specific instructional educational methods have posited success in preschoolers increasing their understanding of nutritional knowledge. As noted earlier, Piaget’s Cognitive theory has been used as a theoretical framework to increase children’s nutritional knowledge scores. Başkale and Bahar (2011) designed age appropriate nutritional interventions based on Piaget’s theory, and after six weeks of twenty to thirty minute sessions, children’s knowledge scores and healthy food consumption increased. Due to the children’s age, active participation was encouraged during the game-based methods of playing, painting, coloring, and interactive stories. Overall, not
only did scores improve on a standardized questionnaire, but the children also integrated the newly acquired nutrition knowledge into their daily lives. Other studies have found similar results using Piaget’s theory (Auld, Romaniello, Heimendinger, Hambidge, & Hambidge, 1998; Gorelick & Clark, 1985).

Research by Holzheimer, Mohay, and Masters (1998) compared the efficacy of using video tapes and pictures books as interventions to teach preschoolers about asthma. Their specific aim was to increase children’s knowledge and self-management of asthma. Findings showed that the book was a more effective tool for asthma education and the use of two instructional methods were more effective than one and produced sustained behavior change (Holzheimer et al., 1998).

More specifically, book reading has determined to have long-term effects on pre-school children’s developmental skills. Reese and Cox (1999) found that the describer book reading technique provides overall benefits for a child’s receptive vocabulary. This suggests that reading interventions that are carefully tailored to a child’s current developmental level will increase their cognitive performance. Interactive shared-book reading interventions have showed an increase in children’s vocabulary development and literacy outcomes (Bus, Van IJzendoorn, & Pelligrini, 1995; Wells, 1985). Sénéchal and Cornell (1993) found that young children can increase their receptive vocabulary after one single reading of a book. In addition, Sénéchal (1997) and Sénéchal, Thomas, and Monker (1995) found that children who answered questions about target words during the book-reading were able to comprehend the story better.
than the children who solely listened to the story while the reader emphasized the
target words. Thus, active engagement during book reading for this age population
strengthens their learning capacity.

The research previously stated signifies the importance of teacher-student
verbal interactions during book-reading educational interventions. The way in which
vocabulary is presented and reinforced to children is a critical factor in learning
development (Penno, Wilkinson, & Moore, 2002). As cited in Gest, Holland-Coviello,
Welsh, Eicher-Catt, & Gill’s (2006) article, Dickson (2001) stated that contextualized and
decontextualized questions and commentary have been examined, in which instances of
decontextualized talk was noted to play a key role in language development. Although
both are important, decontextualized talk allows the child’s thoughts go beyond the
book and involves connecting events in the story to a child’s own life and drawing
inferences (Wasik, 2010). This enables the child to gain a deeper understanding of the
subject material, in which they are encouraged to use higher mental functions to
associate contextual information to their world.
CHAPTER III
RESEARCH DESIGN AND METHODS

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week One</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pre-assessment Interviews for all subjects</td>
</tr>
<tr>
<td>Week Two</td>
<td>All subjects read <em>Cody the Allergic Cow</em></td>
<td>All subjects read <em>Cody the Allergic Cow</em></td>
<td></td>
<td></td>
<td>Post- baseline Interviews for subjects</td>
</tr>
<tr>
<td>Week Three- Experimental Group</td>
<td>Read <em>Cody the Allergic Cow</em> and asked contextualized questions</td>
<td>Read <em>Cody the Allergic Cow</em> and asked contextualized questions</td>
<td></td>
<td></td>
<td>Post- week 3 interviews for subjects in the control group</td>
</tr>
<tr>
<td>Week Three- Control Group</td>
<td>Engaged in activity using pictures of food to plan a safe meal for Cody</td>
<td></td>
<td>Prepare banana bread with soy milk</td>
<td></td>
<td>Post- week 3 interviews for subjects in the experimental group</td>
</tr>
</tbody>
</table>

Figure 1 Study Timeline for Interviews and Interventions

*Participants*

The study was conducted at a Midwestern child care center. Participants included 28 three- to five-year-old children and 27 parents. Twenty-two mothers and five fathers completed the questionnaire. Sixteen of the children were female and twelve were male. Fourteen of the children were African-American, eight were Caucasian, three were Asian-American, and three were of other origin. All were English speaking. Two children did not use English as their primary language.
The convenience sample was selected from two classrooms within a university preschool center. The center serves a diverse population, including families of differing ethnicities and socioeconomic levels. All materials and interventions used in this study were approved by the university’s Institutional Review Board and staff at the child care center.

The study was conducted within a three week period. Parents interested in participating in the study gave consent and completed a family questionnaire. The questionnaire provided demographic data and food-allergy information about the child and family. Each child who participated was administered three individual interviews throughout the three week period by the primary investigator: 1) a pre-assessment interview, 2) post- baseline activity interview, and 3) post- second intervention interview (script in Appendix C). Each interview lasted less than five minutes and was performed in a quiet room at the child care center. The purpose of the interview was to determine the child’s knowledge of food allergies. It was developed through the collaboration of a child life specialist, child counselor, the child care center head administrator, and a nutrition and dietetics clinical counselor who utilized their knowledge of child development and clinical experiences to determine age-appropriate food allergy questions for the preschool population. The first and second interview consisted of five questions, while the third interview consisted of six questions. All questions were related to food allergies.
Child Pre Assessment Interview

Within the child care center, two pre-school classrooms participated in the study. Thirteen children were in attendance from classroom three and fifteen children from classroom five. During week one, each child was administered a pre-intervention interview that consisted of five questions about the topic of food allergies (Appendix L). This interview would serve as a baseline to determine what they understood about food allergies before interventions were implemented.

Book - Cody the Allergic Cow by Nicole Smith

This story is about Cody, a young cow, with a milk allergy. The author outlines allergic reactions, sources of milk allergies, food and beverage alternatives, allergy remedy, including possible emotions and behaviors a person with an allergy may encounter. After reviewing the book with a Child Life Specialist, some terms were not used or slightly altered due to developmental appropriateness: on page 12, ‘rice milk’, was not read to the children to avoid confusion, page 18 was covered by a white piece of paper, and ‘epinephrine kit’ was read as ‘allergy medicine’ on page 23.

Baseline Activity

On Monday and Wednesday of week two, both classrooms were read the book Cody the Allergic Cow by Nicole Smith during center time. Children were arranged in a Circle while read a story; commentary and questions did not occur during the book readings.
**Post- Baseline Activity Interview**

On Friday of week two, children from both classrooms were administered the same questions from the pre-assessment interview, in addition to a sixth question targeting their understanding of a milk allergy. Children were administered the interview in a private room individually.

**Control Group Activity**

On Monday and Wednesday of week three, children from the control group continued to be read *Cody the Allergic Cow* by Nicole Smith, and participated in a group discussion where they were asked five contextualized questions about the character’s milk allergy. The questions were designed to target important concepts that would aid in the development of understanding food allergies: 1) “what is Cody allergic to?”, 2) “because Cody is allergic to milk, 3) “what can he not do?”, 4) “what happened when Cody drank the milk?”, 5) ”what else may happen if someone is allergic to something they eat?”, 6) “how did Cody get better?” All children were encouraged to participate; correct answers were verbalized by majority of the children before moving to the following question.

**Experimental Group Activity**

On Monday of week three, children from the experimental group participated in an experimental activity during morning center time. Each child was asked to prepare a safe meal for Cody, the cow character with an allergy to cow’s milk, from the book *Cody*
the Allergic Cow. The children were provided pictures of beverages (cow’s milk, apple juice, water), vegetables (green beans, corn, broccoli), fruit (apples, oranges, banana), and a main dish (chicken fingers, chicken sandwich, spaghetti). These food items were chosen from their meal plan at the child care center to minimize possible confusion during the meal preparation activity. Children in groups of three or four participated in a short discussion about Cody’s milk allergy. They were encouraged to select beverages and food that would be safe for Cody to have for lunch. No corrections were made if the children chose cow’s milk.

On Wednesday of week three, children from the experimental room participated in a second interactional activity of preparing banana bread with soy milk. The baking activity took place in a separate classroom with groups of four to five children. The intervention included a discussion about the book, Cody the Allergic Cow, and then each child helped prepare banana bread using a soy milk substitution (recipe- Appendix M). Reinforcement of the soy milk alternative and the ability for foods to be hidden in other foods were reiterated during the activity. The banana bread was sent to the kitchen to be prepared for their snack. Due to miscommunication with the kitchen staff, they were not able to eat the bread for snack.

Post- Week 3 Interviews

Following the interventions performed in week three, children from both classrooms were administered a third interview consisting of the same questions from the post- baseline activity interview in a private room individually.
Coding Categories

After the third interview, data was collected from the family questionnaires and child interviews. The family questionnaire and children’s responses were coded according to major topics that were expressed for each question. Due to the uniqueness of this study, coding categories were developed by the primary investigator and cross referenced with a co-investigator to establish inter-rater reliability. The categories are representative of children’s responses.

The categories for questions:

1. ‘What is a food allergy?’, include: I don’t know, unintelligible, silent, other, food, food consumption, health, body part, milk, and family.

2. ‘What are you allergic to?’, include: no, I don’t know, unintelligible, other, food, food consumption, health, family, milk, pet, and silent.

3. ‘Do you know anyone who has a food allergy?’, include: no, silent, unintelligible, I don’t know, other, friend, family, classmate, people, and Cody the Cow.

4. ‘What do you think happens if someone eats a food they are allergic to?’, include: no, I don’t know, unintelligible, other, food, food consumption, health, physical, assistance, milk consumption, physical action, silent, and family.

5. ‘What can people be allergic to?’, include: milk, I don’t know, food, people, insect, self, other, no, silent, and unintelligible.

6. ‘What is safe to drink when you have an allergy?’, include: cow, soy, and other.
**Parent/Guardian Questionnaire**

In addition, the parent/guardian questionnaires were coded based off of the major themes presented in the parent’s responses. The primary investigator and co-investigator cross-referenced themes to ensure inter-rater reliability for each question.
CHAPTER IV
RESULTS

The computer program, SPSS, was used to perform statistical analyses with the data collected from the children’s interviews and parent/guardian questionnaires. Comparison of frequency measurements between the child’s pre-assessment, post-baseline activity, and post-week 2 interviews yielded differences in children’s answers from the control and experimental groups throughout the two week intervention. Due to the nature of this mixed methods study, the main statistical analysis used was frequency analysis of each variable over time to examine changing trends. Each question was analyzed by comparing frequencies of the children’s answers to assess who understood food allergies and the efficacy of the interventions presented.

Question 1- What is a food allergy?

Pre-assessment interviews from both control and the experimental groups were obtained. Almost half (13/28) children showed evidence of knowing that food allergies had some relation to food or food consumption. Within these categories, a majority of children responded that a food allergy was a specific food, while some responded with a food they like to eat. Some responses included: ‘I like chicken patties’, ‘apples and oranges’, and ‘hot dogs’. The next largest categories consisted of children displaying
unintelligible answers and confusion when asked this question (12/28). Their responses included: “I don’t know”, silence, unintelligible communication, and other stories unrelated to the question. These responses reflect their lack of understanding about food allergies. This may be due to a lack of knowledge about this topic.

After children from both groups listened to the story, **Cody the Allergic Cow**, twice in one week, there was a decrease in unintelligible answers, unrelated stories, and overall responses that displayed confusion regarding the concept of a food allergy as compared to the pre-assessment interviews. Children had retained some information about food allergies after solely being read a book two times about a milk allergy; their answers increased by 21 % in the categories of food, health, and milk. Although full comprehension of the term food allergy could not be determined, it seems some learning took place during the book reading.

Types of food remained the most common answer for both the control and experimental group during the post week- three interviews when asked, “What is a food allergy?” It was found that children from the experimental group displayed more “milk” responses (3/21) while the control group did not use the term “milk” to answer the target question. In addition, the control group yielded 5 responses that were considered unintelligible, silent, and unrelated stories categories in comparison to one child responding similarly from the experimental group.
Overall, children from both groups appeared to have difficulty answering this question. Most were able to connect this term food allergy with food, health, and milk, but were not able to express full comprehension.

**Question 2- Do you have a food allergy?**

When asked the question, “Do you have a food allergy?”, in the pre-assessment interview, twenty-one of twenty-eight children replied that they had a food allergy, while only six children had been diagnosed by a physician as having a food allergy as indicated by the parent/guardian questionnaire.

The post-baseline activity interviews during week two resulted in fewer child responses of having a food allergy (15/24). Although four children were absent during the second interview, some children understood that they did not have a food allergy after becoming familiar with the concept of a milk allergy in the book, *Cody the Allergic Cow*. It is possible that by the children hearing the term “food allergy” and provided contextual information, they may have learned whether they have one or not. This may show potential learning through reading the book *Cody the Allergic Cow*.

The post-week three interviews posed little change in both experimental and control group answers in comparison to the previous interview when asked “Do you have a food allergy?” Overall, 2/3 of children responded that they had a food allergy when only 1/3 actually did. This may indicate that both interventions did not help the children to clearly understand the question of “Do you have a food allergy?”
Sub-Question 2: If yes, what are you allergic to?

If students responded “yes” to having an allergy, they were asked the follow-up question “What are you allergic to?” Fifteen out of twenty-eight children answered they were allergic to “food”, “health”, and “milk”. The next largest categories consisted of “no”, unintelligible, silent, other, or “I don’t know” (11/28). Without interventions most children understood types of foods were related to the topic of food allergies, due to the high prevalence answers in that category.

After being read the book Cody the Allergic Cow over two days, 8/24 children in either group answered they were allergic to food in the post-baseline activity interviews. These numbers reflect the child’s cognitive development; some children were able to discriminate themselves from the character in the book who has a milk allergy. A higher number of children (14/24) appeared to respond to this question with confusion. Although they had verbalized that they had a food allergy, during the post-baseline activity interview questions when asked if they had a food allergy, some children may have realized they were actually did not have an allergy. The book may still have sparked cognitive interest in this subject matter, but a complete cognitive construct had not been formed which would aid in their ability to answer the question correctly.

The post-week three interview displayed great discrepancy in children’s responses from the baseline interview. Only 3/21 children stated that they were allergic
to a food. More children from both the control and experimental groups identified themselves as not having an allergy. From the activity group, 3 children verbalized they were allergic to milk, while only one child’s parent identified their child as having a milk allergy. This was the first time that “milk” was given as a response when asked the question “what are you allergic to?” It is evident that some learning took place during the activity interventions. A 7% decrease in the “I don’t know”, unintelligible, and other categories for both groups suggests some cognitive growth in understanding food allergies.

Question 3- Do you know someone who has a food allergy?

When the students were asked “do you know someone who has a food allergy?” during the pre-assessment interviews, results showed that 23/27 children knew someone with a food allergy. After week three interventions, 21/24 children continued to respond they knew someone with a food allergy, and 17/19 children responded they knew someone with a food allergy during the post week-three interview. The children’s answers remained constant throughout the interviews. Although there was a decrease in attendance, change did not occur with this question.

Sub Question 3- If yes, who?

If children responded “yes” to knowing someone who had a food allergy, they were asked the follow-up question “who?” The majority of children (17/28) identified a friend, family member, classmate at the Center for Child Development, or themselves as
having an allergy in the pre-assessment interview. After being read the book Cody the Allergic Cow two times, the majority of the children (14/24) had answers displaying more confusion in their response, while 10/24 children continued to identify a friend, family member, or classmate at the Center. The shift in answers from the pre-assessment interview to post-baseline interviews may indicate this question was less confusing before being read the book because they answered without any prior food allergy education.

During the post-week three interview, 11/21 children continued to answer that they knew someone with a food allergy. The responses for this question remained consistent for all but one child when compared to the post-baseline activity interviews. One child from the experimental group stated that Cody, the cow character from the book, had a food allergy. The reading group had higher responses in the no, silent, and unintelligible categories. Among all the children, there were zero ‘I don’t know’ responses. The development of understanding food allergies appeared to have occurred for children in the control and experimental groups when asked this question.

**Question 4- What do you think happens if someone eats a food they are allergic to?**

Children were asked “What do you think happens if someone eats a food they are allergic to?” In the pre-assessment interview, the majority of the children from both groups replied with a health related response (8/28) or fell in the other category (8/28). During the post-baseline activity interview, 14/24 of the answers included health, milk consumption, or a physical action as a consequence of eating a food one is allergic to:
such as, “they get sick” or “a doctor”. As indicated in the post- week three interviews, children in the control group had more responses in relation to the physical aspects of health, while the experimental group had more responses about milk.

Question 5- What can people be allergic to?

During the pre-assessment interview, 11/28 children replied that people can be allergic to food. Only one child responded that a person could be allergic to milk, which was the child with a milk allergy. Two children stated “spiders” and “bugs”, which were coded as insects. During the post- baseline activity interview, three more children had identified milk as being an allergy. The other larger category responses were food and other (8/24, 8/24).

The largest response difference occurred in the post- week three interview sessions. Milk became the highest response for both control and experimental groups (21.4%). With both interventions, children learned that people can be allergic to milk. A response in the food category was the second highest category for the experimental group, while person category was the second highest category for the control group. Milk and food were the highest overall categories when both groups were combined.

Question 6- If a person is allergic to milk, what is safe to drink? Cow’s milk or soy milk?

When the question, “If a person is allergic to milk, what is safe to drink?” was asked during the post- baseline activity and post- week three interviews, differences were observed between the control and experimental groups. In the control and
experimental group, after being read the book *Cody the Allergic Cow* two times in a week, 13/23 children responded that soy milk would be a safe milk while 9/23 replied cow’s milk.

During the post-week three interviews, the control group’s responses were the same for the soy milk and cow’s milk categories. Most children were straightforward with their answer, in which they replied “cow’s milk” or “soy milk”. On the other hand, all but one child in the experimental group responded that soy was safe milk for Cody.

![Figure 2 Post-Baseline Activity Interview Responses](image_url)

*Figure 2 Post-Baseline Activity Interview Responses*
CHAPTER V
DISCUSSION

The results of the present study revealed that preschool children are able to develop some understanding of food allergies. Children’s responses during the interviews indicated learning with book reading and interactional activities; both styles are developmentally appropriate educational materials for preschoolers.

The ability for children to learn about food allergies is consistent with past research examining children’s ability to learn health concepts by using developmentally appropriate education (Baskale & Bahar, 2011; Davis, Gordon, & Burns, 2011; Gorelick & Clark, 1985; Kalish 1996; Kalish 1997; Rosen et al., 2005; McWayne, Fantuzzo, & McDermott, 2004). The majority of these articles suggest that for education of health concepts to be effective with preschool children, it must be developmentally appropriate. This present study integrated a book reading intervention and activity-based intervention to determine learning of food allergies for preschoolers. The results from the book reading and activity-based groups’ interview responses suggest the development of some understanding of food allergies. With the increase of prevalence of food allergies amongst children, child care programs should incorporate food allergy education into their curriculum.
Past research identified day care and preschool settings as locations of childhood allergic reactions (Sicherer et al., 2001). Food allergy forms have been designed and implemented to ensure optimum safety for the child with a food allergy in these settings, but allergic reactions have still transpired. Food allergy forms presented in food allergy research have yet to include the child’s education of their food allergy diagnosis as a preventive measure. As indicated from this study, of the children who were diagnosed as having a food allergy by a physician, only two knew they were allergic to certain foods and had full comprehension of the concept. As shown by the child’s responses during interviews, preschoolers have the cognitive ability to learn about food allergies when provided developmentally appropriate educational interventions. Therefore, food allergies should be discussed with all children at the beginning of the school year to increase safety during meals and snack time which can help reduce accidental allergic reactions while the parents are not present to monitor their child’s food in-take, and the child who has an allergy has an understanding of their specific allergen, health consequences, and what to do if they believe they are having an allergic reaction.

Interview Analysis

It is interesting that children who participated in the interactive activity intervention displayed increased comprehension of some food allergy concepts, while the children who participated in the book reading and contextualized questions intervention displayed an increased comprehension of different food allergy concepts.
The children in the book reading group had more health category answers, while children in the activity group had more responses about milk. As indicated from the children’s responses, those who continued to participate in the book readings and discussion with contextualized questions about the story during week 2, retained a deeper understanding regarding the health of an allergic reaction. After further investigation of this result, children in the book reading group were shown pictures in the story book of what allergic reactions look like. They were shown the book two more times than the activity group which is consistent with research on the use of effective tools for this developmental age (Arnold, Lonigan, Whitehurst, & Epstein, 1994; Holzheimer, Mohay, & Masters, 1998; Rosen et al, 2005; Valdez-Menchaca & Whitehurst, 1992; Salmon, 2010;v. Visual representation of concepts can enhance children’s cognition of the material, which may have contributed to their ability to better recall the information about food allergies when interviewed.

The second question, “Do you have a food allergy?”, yielded surprising statistics from children’s responses. After reviewing the parent/guardian questionnaires, six children had food allergies and half (3/6) were knowledgeable of the specific foods they could not eat, but did not necessarily know they had a food allergy. When children were asked if they had a food allergy during the pre-assessment interview, twenty-one of twenty-eight believed they had a food allergy. It appears that children were responding “yes” without understanding the question. After they had been read Cody the Allergic Cow, about food allergies, some children then responded in the post-
baseline activity interview that they did not have a food allergy, while majority of children who responded “yes” were unable to name the specific food they were allergic to. It seems as if some learning occurred during the book readings. Children may have begun to understand that they did not have any food restrictions.

The children who were able to correctly identify themselves as having a food allergy remained the same throughout the study. In addition, they were able to verbalize their specific food allergy. This finding demonstrates a preschoolers’ cognitive ability to learn and retain information about their diet to keep them safe. Past studies have not discussed the developmentally appropriate age for children to become aware of their food allergies; thus, from these results, it’s evident that children can begin to understand their food allergy between the ages three to five years old.

During the post- baseline activity interviews, almost half of the children were able to verbalize an understanding of the relationship of a food allergy and food consumption. Although the preschoolers were not able to produce a definition when asked, “What is a food allergy”’, their responses related to the term food allergy should not be discredited. This displays the development of some understanding of the term. Food consumption is an important aspect of food allergies; the children’s ability to verbalize the relationship of those two concepts signifies their increased knowledge of food allergies after an educational intervention.
Parent/Guardian Questionnaire Analysis

Of the twenty-seven parent/guardian questionnaires completed, nineteen parent/guardians thought their child did not understand the concept of food allergies. Most had indicated that they had not spoken to their child about food allergies, thus leading them to believe their child did not have knowledge of this concept. However, the baseline interview responses suggest that they were more aware of food allergies than their parent/guardians had believed. Some children verbalized a classmates’ name that had a food allergy when asked the interview question “Do you know someone who has a food allergy?” Also, the head teachers within the classrooms stated that food allergies were not integrated into their curriculum, but children who had a food allergy would receive different foods and beverages than their classmates during mealtimes. It appears that children observed the differences among their classmate’s food and beverages and were aware of the food allergy concept, but didn’t have the knowledge of the correct terminology due to the lack of educational instruction in the classroom or at home.

The parent/guardian questionnaire also revealed that most parent/guardians who provided food allergy instruction to their child primarily chose verbal instruction (6/7), which as indicated from this study, is not the most effective educational intervention for a preschooler. The concepts retained by the book reading and activity groups differed due to the difference in visual information provided during interventions. Although verbal instruction most likely helped, it’s evident that visual
aids had a greater impact on learning. It’s crucial that parents and teachers are aware of this finding in order to increase their food allergy instruction effectiveness. Without developmentally appropriate material, preschoolers will not be able to retain or comprehend information that is potentially life-saving when they enter a setting away from home.

Contrary to other research on health concepts, this study showed the efficacy of a two week intervention period as opposed to a six month or year learning program (Baskale & Bahar, 2011; Kalish, 1996; Kalish 1997; Holzheimer, Mohay, & Masters, 1997). As indicated from baseline interviews, most preschoolers could not verbalize their understanding of a food allergy. But, after the use of developmentally appropriate educational interventions, more children were able to verbalize some understanding during the later interviews. It seems that the use of developmentally appropriate material with preschoolers can result in learning at a faster pace than past research has indicated.

Limitations and Directions for Future Research

Limitations of the present study should be considered during analysis. The sample size was small due to the quantity of children in each classroom. Due to low number of participants in each group the use of SPSS made it difficult to render substantial results and higher level of statistical analysis. Therefore, in analyzing data, a decision to use frequency of percentage was used in order to examine trends of change rather than anovas or statistical significance testing. Despite having small sample sizes,
this study clearly indicates that preschool children have the potential to receptively learn about allergies from reading activities, and experiential tasks. In addition, some children were absent throughout the two-week period, resulting in missed opportunities for educational interventions and interviews. The small sample size also limited the options for data analysis; significant changes among children’s responses were not observed.

This study was designed to provide information about pre-school children’s baseline understanding of food allergies, and what preschool children are able to learn from developmentally-appropriate food allergy educational interventions. As far as is known, this is the first study to examine pre-school children’s understanding specifically about food allergies and what they are able to learn using developmentally appropriate educational interventions. Many opportunities for further research could be pursued using this study as a point of reference. Different interventions could be utilized to determine the most appropriate educational tool to increase a preschoolers’ understanding of food allergies. Changes could be made to the length of the study. Research can examine the efficacy of increased learning opportunities about specific food allergies. These findings could illustrate how much information a preschool child can fully comprehend at this developmental level.

Conclusion

In conclusion, it’s important to investigate the topic of preschool children’s understanding of food allergies because it is occurring more frequently in young
children. In addition, children are being diagnosed at a later age, leading to an increased amount of allergic reactions occurring away from home and parents. In light of these recent findings, preschoolers’ ability to understand food allergies and the use of developmentally appropriate educational material can be useful in a child care setting with young children.
REFERENCES


APPENDIX A

INFORMED CONSENT

INFORMED CONSENT

Assessing Children’s Understanding of Food Allergies

Principal Investigator:
Katie Riley
Graduate Student, The University of Akron Child Life Program
Phone Number: 515-229-3411

Title of Study: Assessing Children’s Understanding of Food Allergies

Introduction: Your child is being invited to participate in a research study conducted by Katie Riley, a graduate student in the Child Life Program at The University of Akron. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. Please take the time to read the following information carefully. Please ask the researcher if there is anything that isn’t clear or if you need more information.

Purpose: I hope to gain an understanding about what preschool children currently understand about food allergies, and what interventions are successful for them to gain an understanding about this topic. For this study, children from the Rooms of 3, 5, and 6 will be asked to participate.

Study Procedure: Your child’s expected time commitment for this study will be four weeks. The interventions will occur Monday, Wednesday, and Friday during the first week for a maximum of twenty minutes. The interventions the second week will be Monday, Wednesday, and Friday for a maximum of twenty minutes.

The first week your child will be interviewed individually by the researcher about food allergies and what they currently understand about them. The second week your child will be read, Cody the Allergic Cow, by Nicole Smith in their rooms by the researcher on Monday, Wednesday, and Friday. The third week your child will be read, Cody the Allergic Cow and asked questions about the book on Monday, Wednesday, and Friday, or your child will be read, Cody the Allergic Cow and asked questions about the book on Monday and Wednesday, and participating
in an educational activity on Friday about food allergies. The fourth week, your child will be interviewed individually by the researcher about food allergies and what they understand about them after being provided two weeks of educational interventions. Each child’s responses will be tape recorded for the researchers use only. Your child’s responses will remain confidential throughout the entire study.

**Risks and Discomforts:** The risks and discomforts of this study are very minimal. If the questions asked during the interview upset your child, assistance will be available by Cynthia Reynolds from The University of Akron Counseling Department.

**Benefits:** The benefits to your child for participating in this study may be an increased understanding about food allergies. However, there may be no direct benefit from participating in this study.

**Right to Refuse or Withdraw:** Following your consent, participation of your child in this study remains voluntary. Your child will also be asked to provide assent to participate and may refuse even if you consent. Your child can also refuse to answer any questions and may withdraw from the study at any time without penalty.

**Confidential Data Collection:** Any identifying information collected will be kept in a secure location and only the researchers will have access to the data. Participants will not be individually identified in any publication or presentation of the research results. Only aggregate data will be used. Your signed consent form and your child’s assent form will be kept separate from the data, and nobody will be able to link their responses to them.

**Confidentiality of Records:** Data that may contain your child’s name will be destroyed at the end of this study. Audio recordings will also be erased when the study is complete.

**Person to Contact:** If you have any questions about this study, you may call Katie Riley at (515) 229-3411 or Rose Resler at ?????. This project has been reviewed and approved by The University of Akron Instructional Review Board. If you have any questions about your rights as a research participant, you may call the IRB at (330) 972-7666.

**Acceptance and Signature**

I have read the information provided above and all of my questions have been answered. I voluntarily agree to the participation of my child in this study. I will receive a copy of this consent form for my information.

**Parent / Legal Guardian Signature**

**Parent / Legal Guardian Signature**

**Name of Child**
APPENDIX B

PARENT LETTER

Dear Parents,

You and your child are invited to participate in a research study on pre-school children’s understanding of food allergies. I am conducting this study as part of my work toward a Masters degree in the College of Health Professions at The University of Akron. My co-researchers include Rose Resler, from The University of Akron’s College of Health Professions, Sophia Kraus, from the Center for Child Development at The University of Akron, and Cynthia Reynolds, from the Counseling Department at The University of Akron.

The purpose of this study is to gain an understanding of what three to five-year old children currently understand about food allergies, and what interventions are successful for them to gain an understanding about this topic. With the rate of food allergies increasing, management plans in the school setting are being developed to ensure safety for the allergic child. This study will be of great assistance in determining the appropriate level of intervention and method of interventions to provide children regarding the topic of food allergies. Gaining this basic understanding is important because it can give school staff and parents a baseline understanding of what children know at this age, and what educational interventions can be implemented to enhance the child’s knowledge on food allergies.

Participation is voluntary. You may revoke your decision to participate and your child’s permission to participate at any time. Your child will be free to withdraw from the interview and educational intervention at any point. The anticipated risks or benefits for this study for you and your child are minimal to none. Each child will be asked six questions in one short interview (lasting about 10 minutes), which will take place in your child’s day care center. I, as primary investigator, will conduct the interviews, and your child will have the option of having a teacher’s aid with whom he/she is familiar to accompany him/her to the interview. The interviews will be tape recorded to insure that we are able to accurately capture your child’s answers. I will also read “Cody the Allergic Cow” by Nicole Smith to your child, and your child may or may not participate in an activity about food allergies. These educational interventions will be audiotaped. Parents will be asked to provide information on your family’s experience with food allergies on a short form entitled “Family Questionnaire.”
I will be asking your child simple and general questions about his/her understanding of food allergies. Some children may have difficult memories associated with food allergies. In the event that you or your child becomes upset by the interview and/or survey, Cynthia Reynolds, a Professional Counselor and Licensed Psychologist, is available at no charge to assist with any negative feelings or reactions that may arise as a result of this study. Your child’s confidentiality will be protected and the information collected will be kept in a secure location and only the researchers will have access to the data. Participants will not be individually identified in any publication or presentation of the research results. Your signed assent will be kept separate from the data, and no one will be able to link responses to you or to your child. All identifying information will be destroyed at the end of the study.

The University of Akron Institutional Review Board for the Protection of Human Subjects has approved this study. For more information about your rights as a human research participant, please contact Ms. Sharon Mc Whorter, Associate Director, Research Services at 330-972-7666. The administration of The University of Akron’s Center for Child Development has also approved this research.

In order to obtain accurate results from our study, it is extremely important that you, as parents, do not do anything to alter your child’s understanding of food allergies between now and the time of your child’s interview. We ask that you do not discuss the subject any more than you normally would, because any additional instruction could reduce our ability to get an accurate idea of what children at this age typically know. You and your child will be in no way judged on your knowledge about the subject of food allergies or on how you have chosen to discuss or not discuss it in your household. Your child will be praised for his/her input regardless of what information is given as a response.

If you have any other questions about the project, please do not hesitate to call Rose Resler, College of Health Professions at The University of Akron: 330-972-8040

If you are willing to participate, please sign the consent form on the next page, fill out the Parent Questionnaire, and return BOTH of these documents to the Center for Child Development front desk by March 15, 2013, using the enclosed envelope. If you decline to participate, please fill out the next page and return. Thank you for your help!

Sincerely,

Katie Riley

Graduate Student, College of Health Professions, The University of Akron
**PLEASE RETURN THIS FORM**

CONSENT AGREEMENT:

I, the undersigned, hereby give permission to have my child participate in the above study on pre-school children’s understanding of food allergies. I also give permission for my responses to the parent questionnaire to be used in the study.

I understand that I have the right to revoke this consent at any time.

_________________________________________       ________________
Signature of Parent/Guardian                                Date

_________________________________________
Name of Child (please print)

Please return this form and the parent questionnaire in the enclosed envelope (seal for your privacy) to the front desk at the Center for Child Development by March 15, 2013.

PLEASE RETURN THIS FORM EVEN IF YOU DECLINE TO PARTICPATE IN THE STUDY:

I DO NOT give permission for my child,________________________________________, to participate in the above study on pre-school children’s understanding of food allergies. Thank you!

4ηη
APPENDIX C

CHILD INTERVIEW SCRIPT

Script for Child Interviews for both groups during Week 1 and Week 4 (text in italics not actually spoken to the participant during the interview)

Hello, my name is Katie. I am a student here at the University and I am going to ask you some questions about food allergies. All I want you to do is answer each question as best you can. If you do not want to answer a question, you don’t have to and may return to your class at any time. Here are your questions:

**Question 1: What is a food allergy?**

a. Child gives answer:
   - If child’s response is “I don’t know,” go on to 1.b
   - If child gives any other response, skip to next question.

b. Have you ever heard of a food allergy?
   ______Yes _______No
   - Regardless of answer, Okay! Thank you for answering!

**Question 2: Do you have a food allergy?**

a. Child gives answer:
   ______Yes _______No
   - If child’s response is “I don’t know” or “no”, go on to 2b
   - If child’s response is “Yes”, go on to 2c

b. Okay!

c. What are you allergic to?

**Question 3: Do you know anyone who has a food allergy?**

a. Child gives answer:
   ______Yes _______No
   - If child’s response is “I don’t know” or “no”, go on to 3c
   - If child’s response is “Yes”, go on to 3d

c. Okay!
d. Can you tell me who has a food allergy?

**Question 4:** What do you think happens if someone eats a food they are allergic to?

a. *Child gives answer:*
   - If child’s response is “I don’t know”, go on to 4c
   - Any other response, go on to 4d

b. Okay!

c. Thank you for answering!

**Question 5:** What can people be allergic to?

a. *Child gives answer*
   - If child’s response “I don’t know”, go on to 5b
   - Any other response, go on to 5b

b. Thank you.

**Question 6 in post-interview only:** If a person was allergic to milk, which milk should they drink?

a. A container of soy milk and regular milk will be displayed in front of the child for them to choose.

b. *Child gives answer*
   i. If child’s response “I don’t know”, go on to 6b
   ii. Any other response, go on to 5b

c. Thank you
APPENDIX D

FOOD AND BEVERAGE PICTURES USED FOR EXPERIMENTAL GROUP ACTIVITY
APPENDIX E

EXPERIMENTAL GROUP ACTIVITY RECIPE

BANANA BREAD RECIPE USED FOR EXPERIMENTAL ACTIVITY

1 Cup Oats

1 banana

¼ Cup soy milk

⅛ Cup egg whites

Directions: Bake at 350 degrees for 20 minutes