FAMILY INVOLVEMENT IN PRESCHOOL CHILDREN'S HEALTH:

A PILOT STUDY OF FAMILY BACKPACKS

by

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(Under the Direction of Diane Bales)

ABSTRACT

Childhood obesity is recognized as a national and international health problem. Childhood obesity rates have substantially increased over the past several decades in the United States. Unhealthy eating habits are directly related to childhood obesity, and most children develop eating habits in preschool years. About 75% of preschool-aged children consume fewer fruits and vegetables than recommended for health. The purpose of this study was to create a family backpack and to assess its effectiveness in increasing fruit and vegetable consumption in preschool-aged children and their parents. Forty-two families participated in this family backpack pilot study. (Twenty-two families were in the experimental group and twenty families were in the control group.) Children's and parents' fruit and vegetable consumption and fruit and vegetable availability at home were evaluated with the use of pre-and post-surveys. The results indicated increases in preschoolers' and parents' fruit and vegetable consumption in the experimental group but not the control group after they used the family backpacks. A family backpack focused on fruits and vegetables can be a useful tool to reinforce preschoolers' healthy eating habits at home and increase their fruit and vegetable consumption.

INDEX WORDS: Family backpacks, family involvement, nutrition education, childhood obesity, preschool children, fruit and vegetable consumption

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# TABLE OF CONTENTS

# LIST OF FIGURES

# LIST OF TABLES

# CHAPTER 1

## INTRODUCTION

### Background

Childhood obesity is recognized as a global public health issue, and the prevalence of obesity in children has dramatically increased over the last decade in the United States and other countries (Moss & Yeaton, 2011; Spurrier, Magarey, Golley, Curnow, & Sawyer, 2008). More recently, data from the Centers for Disease Control and Prevention (CDC) show that 16.9% of young children and adolescents in the United States are obese (Ogden, Carroll, Kit, & Flegal, 2012). According to Georgia Department of Public Health (2011), 15% of 2- to 4-year-old children enrolled in the Women Infants and Children Program in Georgia are obese. Consequently, childhood obesity is regarded as the most prevalent nutritional disorder among children and adolescents in the United States (Davis et al., 2007). Obese children are at higher risk of being overweight or obese when they become adults (Moss & Yeaton, 2011; Must & Anderson, 2003).

Childhood obesity is associated with increased risk for adverse health outcomes. Children who are obese are more likely to exhibit psychological problems, such as depressive symptoms, low self-esteem, and social anxiety (Dietz, 1999; Hassink, Sheslow, & Wallace, 1993; Must & Anderson, 2003; Strauss & Pollack, 2003). They are also more likely to have chronic health issues, such as atherosclerosis, cardiovascular disease, hypertension, heart attack, stroke, sleep apnea, type 2 diabetes, insulin resistance, metabolic syndrome, and nonalcoholic fatty liver

disease (Fagot-Campagna, Narayan, & Imperatore, 2001; Finkelstein, Fiebelkorn, & Guijing, 2003; Maruthur, Bolen, Brancati, & Clark, 2009).

Although there are some genetic causes of childhood obesity (Gable & Lutz, 2000), children's unhealthy eating behaviors and insufficient physical activity are strong contributors to becoming overweight or obese (Kilcoyne, 2006). When the number of calories children consume exceeds the number of calories they burn, childhood obesity is likely to develop over time (Ritchie, Welk, Styne, Gerstein, & Crawford, 2005). Moreover, risk factors may increase children's risk of becoming overweight and obese, and the risk factors may act in combination. For example, low-income backgrounds (Cecil et al., 2005), parents' eating habits and physical activity (Fisher & Birch, 1995; Gable, Chang, & Krull, 2007; Levy & Petty, 2008), food environment such as large portion sizes and increased consumption of fast food and soft drinks (French, Lin, & Guthrie, 2003), a decline in physical education in schools (Gable, et al., 2007), and increased time spent using computers and watching television (Brown, Broom, Nicholson, & Bittman, 2010) have all been shown to contribute to childhood obesity. One of the most important of these factors may be the direct family influence, because parents have primary control over young children's food choices and physical activity (Dietz, 1999; Gable & Lutz, 2000; Stenhammar et al., 2010). Families can help prevent childhood obesity by promoting children's healthy eating behaviors and physical activity (Dalton & Kitzmann, 2008; Gable, et al., 2007; Levy & Petty, 2008; McLean, Griffin, Toney, & Hardeman, 2003).

Family involvement in children's eating habits is more important and effective for younger children than for older age groups (Dietz, 1999). Three to five-year-old children are at optimal ages for the development of healthy eating habits, because children develop attitudes towards food and nutrition during the preschool years (Gable & Lutz, 2001; O'Connor et al.,

2010). Young children may benefit from nutrition and physical activity programs before eating habits become more ingrained in later childhood. It is important to educate preschool-aged children about healthy eating habits, such as increasing fruit and vegetable intake (Nicklas et al., 2001; O'Connor, et al., 2010).

Unfortunately, about 75% of preschool children consume fewer fruits and vegetables than recommended for health (Essery, DiMarco, Rich, & Nichols, 2008). Increasing fruit and vegetable intake may help reduce the risk of developing chronic diseases related to childhood obesity, including heart attack and type 2 diabetes (Flynn et al., 2006; N. Williams et al., 2010). Children who have sufficient consumption of fruits and vegetables also tend to consume less high-fat and high-sugar food; therefore, increasing intake of fruits and vegetables may be a useful approach to preventing childhood obesity (L. Epstein et al., 2001).

Nutrition education and health interventions for preschool children can be more effective when families get involved (Jouret et al., 2009; Pearson, Atkin, Biddle, & Gorely, 2010). Connection between home and preschool is important for promoting preschoolers' healthy eating and nutrition knowledge (Blom-Hoffman, Wilcox, Dunn, Leff, & Power, 2008). For example, preschools can help involve families in children's nutrition education by offering family involvement activities, which parents and children can use at home (Epstein & Sheldon, 2002). Family involvement activities may help parents to gain insight into what their children know about nutrition and how to support children's healthy eating and physical activity. Because family involvement helps teachers and parents provide children with consistent messages about healthy eating at home and at preschool, children are more likely to improve their eating behaviors and physical activity.

Effective nutrition education programs for families can help families promote healthy eating, and therefore contribute to preventing childhood obesity. However, to the author's knowledge, few programs have been developed to support and encourage family involvement in preschool children's nutrition education, and the effects of family involvement have not been evaluated in the few programs that do exist.

## The Purpose of the Study

The purpose of this study is to assess the effectiveness of family backpacks in increasing fruit and vegetable consumption in preschool-aged children and parents before and after participation in this pilot study. The family backpacks are a self-contained educational packet about fruits and vegetables that were developed for preschool-aged children and their parents.

# CHAPTER 2

## REVIEW OF LITERATURE

The following is a review of the literature, and it is divided into five sections. The first section presents an overview of the ecological systems theory developed by Urie Bronfenbrenner (Bronfenbrenner, 1986), which helps identify significant components of the complex childhood obesity problem. The second section examines previous literature on childhood obesity prevention programs focusing on nutrition education. The third section reviews research showing the need for greater consumption of fruits and vegetables by children and the role parents play in influencing children's consumption of these foods. The fourth section presents an overview of family involvement in children's education, and the fifth section examines the literature on family backpacks used in educational areas other than nutrition.

### Theoretical Framework

Bronfenbrenner (1986) categorized diverse environmental factors into four systems: microsystem, mesosystem, exosystem, and macrosystem. Experts emphasize the importance of ecological approaches to examining these diverse factors affecting childhood obesity and effective preventive methods (Dietz & Gortmaker, 2001; Ebbeling, Pawlak, & Ludwig, 2002). Based on ecological systems theory(Bronfenbrenner, 1986), problems of obesity cannot be effectively explained without considering the many ecological contexts that make up a child's developmental environment. In case of preschool-aged children, the most important ecological systems include the family and the early childhood education program. Therefore, prevention of

childhood obesity should focus on these two environmental contexts in which children spend the most time, the home and the preschool. In this study, the child is in the circle of the ecological model (Figure 1). Although the ecological theory is based on a model that includes four ecological systems, this study did not include the other two systems, exo- and macro-system, but it only focused on micro- and meso-systems of family, preschool, and home-school connection. The following sections explain four different ecological systems.

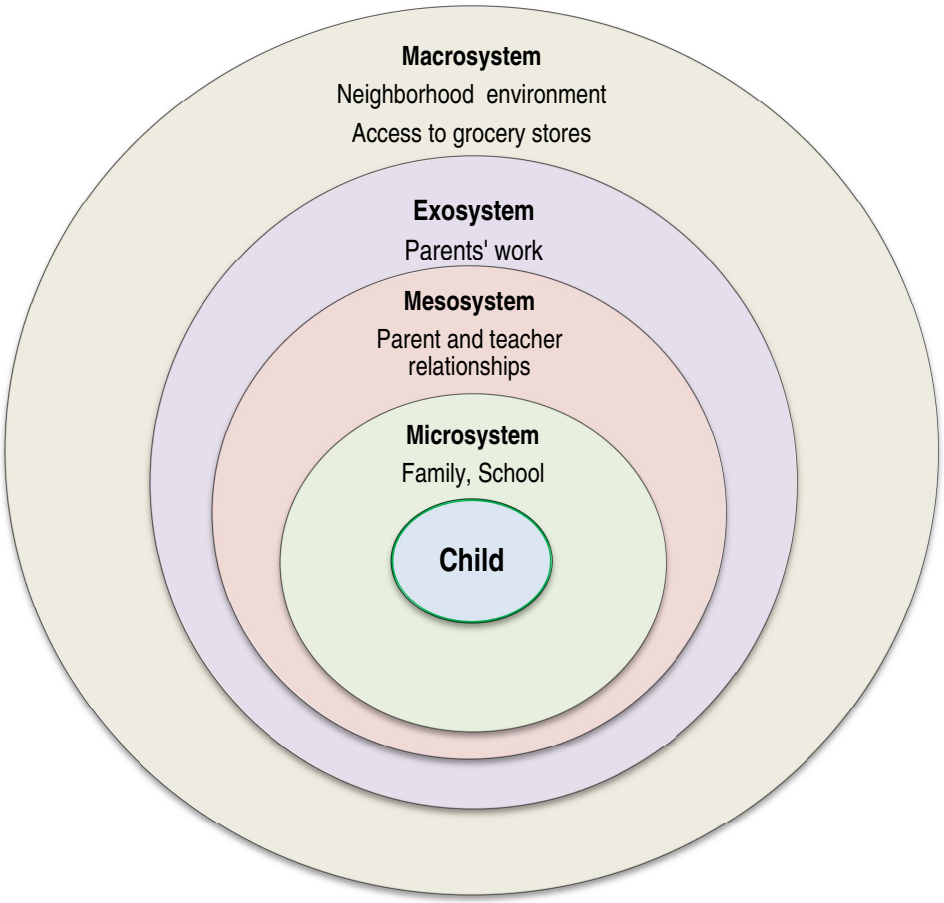


Figure 1: Bronfenbrenner's ecological systems that influence the child's risk of obesity

*Family Factors at the Microsystem Level*

The microsystem consists of children's most immediate environment. Preschool-aged children's microsystem includes immediate relationships with which they interact, such as their family or primary caregivers and their preschool or child care. These immediate environments have a strong influence on how children grow and develop. Both children's family and preschool teachers are significant microsystems for children's development (Bronfenbrenner & Morris, 1998). In particular, home is considered a more important place to learn eating habits than school, especially when children are young and dependent on parents' food choices (Gable & Lutz, 2000). One of the most substantial factors influencing childhood obesity may be the direct parental influence on children's health (Davis, et al., 2007; DeMattia & Denney, 2008; Dietz, 1999).

Families play a primary role in influencing the development of preschoolers' eating behaviors in various ways. First, parents' eating patterns serve as models for children's eating behaviors, and their role models can be positive or negative. Parents affect children's fruit and vegetable consumption through parental modeling, as well as by making fruits and vegetables available and accessible at home (Bante, Elliott, Harrod, & Haire-Joshu, 2008; O'Connor, et al., 2010; Robinson-O'Brien, Neumark-Sztainer, Hannan, Burgess-Champoux, & Haines, 2009). Parents who regularly consume fruits and vegetables are more likely to have children who do the same (Fisher & Birch, 1995). By witnessing their role models' willingness to eat and take pleasure in eating fruits and vegetables, children are more likely to engage in similar behaviors and make this conduct habitual. Parents who consume more prepared foods and high-fat foods tend to be overweight, and may influence their children's poor eating habits and weight gain (Gable & Lutz, 2000).

Second, parents' nutritional knowledge and beliefs about nutrition and obesity-related health problems can also influence children's eating patterns (Birch & Ventura, 2009). In particular, mothers' knowledge of children's nutrition is positively associated with children's fruit and vegetable consumption and negatively associated with children's fat intake (Wardle, Guthrie, Sanderson, Birch, & Plomin, 2001). Parents' poor knowledge about nutrition may also contribute to children's bad eating habits and is associated with greater consumption of junk foods and high energy-dense foods such as fatty foods on both the parents' and the children's parts (Gable & Lutz, 2000).

Third, studies show that parents' active lifestyles are associated with children's healthy eating and high levels of physical activity involvement (Semmler, Ashcroft, Jaarsveld, Carnell, & Wardle, 2009; Wardle, et al., 2001). Children with physically active mothers are twice as likely to be active as children with inactive mothers (Gable, et al., 2007). Lower levels of physical activity are associated with higher BMI and obesity in children and adults (Simpson, Gray, Waldrep, & Gaus, 2009).

In addition, children who watch more than four hours of television a day at home are less likely to engage in physical activity, which puts them at higher risk of being overweight (Gable, et al., 2007). Moreover, children whose families spend a lot of time watching television are more likely to be exposed to food commercials on television, which may promote unhealthy food consumption as well (Halford, Gillespie, Brown, Pontin, & Dovey, 2004). A television in children's bedrooms can be a strong marker of increased risk of being overweight because of extra hours spent watching TV and exposure to fast-food advertisements on television. Preschool-aged children who freely watch TV in their bedrooms tend to spend more time

watching television and may be at higher risk of becoming overweight (Dennison, Erb, & Jenkins, 2002).

In summary, family factors in children's microsystems, especially parents' eating habits and parental knowledge and beliefs about children's nutrition, contribute to children's eating habits. Parents who are physically active and limit television time at home may positively influence their child's physical activity and reduce the risk of obesity.

*Home and Preschool Connection at the Mesosystem Level*

The second level, mesosystem, describes the interconnection between the structures of the child's microsystems, home and school (Bronfenbrenner, 2005). The mesosystem includes relationships and interaction between the child's parents and preschool teachers. Preschool teachers collaborate with parents in supporting their children's health. Few childhood obesity studies have addressed the connection between parents and preschool teachers. Therefore, more research is necessary to better understand how preschool teachers may collaborate with the families to further enhance healthy eating behaviors for children.

The connection between parents and teachers is bi-directional. In order to better understand preschool children's behaviors and health, teachers need to share valuable information with parents about their children and vice versa. Positive interactions between two microsystems may help to promote preschool children's healthy eating behaviors at home and preschool. For example, both parents and preschool teachers need to encourage the children to eat fruits and vegetables in order to promote children's healthy eating habits and prevent childhood obesity.

Previous research had argued that there were not enough nutrition education programs in early childhood education settings (Briley, 1994; Briley & Roberts-Gray, 1993). More recently,

preschools have begun to provide children with nutrition education programs (Blom-Hoffman, 2008; Gross, Pollock, & Braun, 2010). According to Hippel and his colleagues (2007), we need not only school education but also family involvement outside of school. Children's BMIs usually increase more than three times faster during the summer vacation than during the kindergarten school year, because children tend to consume more fatty foods and less fruit and vegetables during the long break. Also, preschool teachers' activity levels and attitudes toward modeling of physical activity may contribute to preschool children's physical activity (Dowda, Pate, Trost, Almeida, & Sirard, 2004).

*Exosystem*

The third level, exosystem, involves the larger social system and refers to links between the social settings in which a child's development is affected, although the child does not have an active role in the exosystem (Bronfenbrenner, 1986). For example, child's eating habits at home may be indirectly influenced by a mother's experiences at work. Single-parent households and households in which both parents work full-time are more likely to choose prepared food items, which tend to be high in fat and sodium , because they usually do not have the time or resources to prepare healthy meals for their children (Crockett & Sims, 1995). Parents' busy work may also affect family food choices and contribute to children's poor eating habits (Gable & Lutz, 2000).

*Macrosystem*

The macrosystem, the fourth level, pertains to all three levels and is composed of social and cultural values, policies, customs, and laws in society (Bronfenbrenner, 2005). Societal influences are also important factors that can impact children's health and weight.

First, socioeconomic status can influence children's eating habits and the frequency of their physical activities. Children in low-SES families tend to consume fast foods more often and have higher levels of sedentary behavior than high-SES families (Davison & Birch, 2001), due to low parental support for healthy eating habits and low neighborhood safety. Access to neighborhood parks is positively associated with greater physical activity in young children (Roemmich et al., 2006). Children who do not engage in physical play and sports due to safety issues are more likely to engaged in sedentary activity and may be at higher risk of becoming overweight (Burdette & Whitaker, 2005).

Second, easy access to fast food and restaurants may also affect children's risk of becoming obese, because fast foods are made up of more high-fat, low-nutrient dense foods. About 30 percent of young children consume fast food at least once a day (Simpson, et al., 2009). Families in neighborhoods without grocery stores have limited access to fruits and vegetables, and usually have a plethora of high-calorie foods (L. Epstein, et al., 2001; Simpson, et al., 2009). Therefore, parents and children living near fast food restaurants and convenience stores, but not local grocery stores, are more likely to consume fast food with more total calories, creating a risk of becoming overweight. This limited access to healthy foods may contribute to the childhood obesity problem (DeMattia & Denney, 2008).

*Focus of This Study*

Because many researchers who study childhood obesity have emphasized family factors in the prevention of obesity (Birch & Ventura, 2009; Gable, et al., 2007; Levy & Petty, 2008; McLean, et al., 2003), this study focuses on the family involvement which has been a critical component of school nutrition and physical activity programs. Parents who actively participate in their children's nutrition education, and serve as healthy eating role models, can help prevent

childhood obesity. Children's nutrition education and healthy behaviors are also influenced by preschool. Thus, having good connections between parents and preschool teachers would be helpful for children's healthy eating habits. This pilot study focuses on family involvement in preschool children's health and nutrition education, promoted and supported by a preschool program.

## Childhood Obesity Prevention Programs

Literature reviews of interventions to prevent childhood obesity have shown that there are several common features of current intervention programs. Interventions for children have dealt with children's weight status, physical activity, and eating habits. Many prevention and intervention programs for childhood obesity have been conducted in schools with school-aged children and adolescents (DeMattia & Denney, 2008; Grønbæk, Madsen, & Michaelsen, 2009; Neumark-Sztainer, Story, Hannan, & Rex, 2003; Pearson, et al., 2010). More recently, researchers have also taken notice of the increasing prevalence of obesity among children ages five and younger, and have begun developing prevention programs for younger children (Ariza, Greenberg, & Unger, 2004; Bluford, Scanlon, & Sherry, 2007; Dunn, Thomas, Pegram, Ward, & Schmal, 2004; Fisher & Birch, 1995).

Making healthy food choices for young children during the first 5 years of life is very important. Starting good eating habits at the early stage will help set healthy eating patterns for life (Birch & Ventura, 2009). This suggests an urgent need to identify successful interventions to prevent obesity among young children so that programs can be implemented before the prevalence of obesity among preschool-aged children reaches the levels found among older children and adolescents, and before unhealthy eating patterns become established.

Between 1993 and 2007, researchers developed nutrition programs for preschool-aged children to prevent obesity (Bluford, et al., 2007). These nutrition interventions for preschoolers (Byrd-Bredbenner, Bernstein, & Marecic, 1993; Panunzio, Antoniciello, Pisano, & Dalton, 2007; Tershakovec et al., 1998) were conducted in preschool settings and focused on increasing children's fruit and vegetable intake. Byrd-Bredbenner and his colleagues developed 6 unit-nutrition education programs for the Head Start program. Panunzio et al. provided 36 nutrition education lessons called "Bring some fruit to school", and Tershakovec developed 13 nutrition lessons for preschool teachers. All studies found that children consumed more healthy foods such as fruits and vegetables and had more positive attitudes toward healthy meals after completing programs; nevertheless, there was no significant increase in consumption of fruits and vegetables.

However, Lindsay and colleagues (2006) argue that incorporating parents into comprehensive intervention programs may significantly improve obesity prevention in preschool-age children. Home involvement in school-based prevention programs has been increasingly important as researchers recognize that parents are a significant influence on children's eating behaviors (Blom-Hoffman, et al., 2008; Gross, et al., 2010). Specifically, in order to increase children's fruit and vegetable consumption, studies introduced family-based prevention programs in the home settings. Dunn et al. (2004) and Young et al. (2003) conducted nutrition education programs in preschool settings, which consisted of 12 newsletters about healthy eating behaviors. The programs were developed for teachers to educate their preschoolers in the classroom using newsletters. They also argued that parents of preschoolers should get involved in the education programs to support their children. Overall, a few of the studies found statistically significant improvements in fruit and vegetable consumption in the treatment group, and most improvements were very modest (Thomas, 2006).

In addition, some early approaches to incorporating families into preschool obesity prevention programs focused on both nutrition and physical activity strategies for families. Harvey-Berino and Rourke (2003) developed a home-visiting program focusing on physical activity and parental feeding style for obesity prevention for high-risk Native-American preschoolers. Dennison et al. (2002) examined healthy eating and physical activity patterns of preschoolers at home. Their studies argued that parents displayed healthy behaviors with regard to influence on obesity prevention in children after intervention, but no significant differences between intervention and control groups were found.

## Fruit and Vegetable Consumption

Nutrition researchers have focused on two dietary approaches for childhood obesity intervention or prevention. The first dietary approach is to focus on limiting intake of high-fat, low-nutrient dense foods. This strategy has not been effective, and may actually result in increases in preference for these foods after interventions (Fisher & Birch, 1999). Another approach is to encourage children to increase intake of healthy high-nutrient dense foods (L. Epstein, et al., 2001). Nutrient-dense foods are usually lower in calories and contain plenty of vitamins and minerals. Fruits, vegetables, whole grains, fish, and poultry are all nutrient-dense foods. The approach of increasing fruit and vegetable consumption has been the target of large public health interventions for childhood obesity.

The main notion of this approach is that sufficient fruit and vegetable consumption in early childhood may help decrease the risk of developing chronic diseases related to obesity (Wyse et al., 2010), because fruits and vegetables provide vitamins, minerals, fiber and other nutrients with little fat and a small number of calories, and therefore lower the risk of becoming overweight (Blom-Hoffman, 2008; Davis, et al., 2007; Dennison, Rockwell, & Baker, 1998;

Gross, et al., 2010; Robinson-O'Brien, et al., 2009). Children's low intake of fruits and vegetables is also associated with inadequate intake of vitamin A, vitamin C, and fiber, as well as higher intakes of fat and saturated fat (Dennison, et al., 1998). Children who consume more high-fat, low-nutrient dense foods are particularly at risk of obesity (Cavadini, Decarli, Grin, Narring, & Michaud, 2000; Sharma, Cade, Griffiths, & Cruickshank, 1998). In short, consuming more fruits and vegetables may protect against excess gain in weight, and this eating habit tends to remain stable from early childhood through adulthood (Blom-Hoffman, 2008).

Unfortunately, few children in the United States meet recommendations for daily fruit and vegetable intake. Most children ages three to six years are not meeting the minimum suggested consumption of 5 servings of fruits and vegetables a day (Gross, et al., 2010; Robinson-O'Brien, et al., 2009; Wyse, et al., 2010). According to the USDA, preschool-aged children on average consume about 80% of the recommended 2 servings of fruits a day, but only 25% of the recommended 3 servings of vegetables a day (Jouret, et al., 2009; Pearson, et al., 2010).

Introducing new fruits and vegetables to preschoolers may be challenging at first, because few preschoolers accept new foods the first time they are introduced (Johnson, Bellows, Beckstrom, & Anderson, 2007). According to Birch and colleagues (1989), parents typically must present new foods between 3 and 10 times before their children accept them. Thus, it is necessary to provide a variety of fruits and vegetables on a regular basis, and to encourage children to try new fruits and vegetables through repeated exposure (Wardle, Herrera, Cooke, & Gibson, 2003).

A number of studies have found that children's acceptance of new fruits and vegetables increases when they see their parents consuming and talking about these foods (Gross, et al.,

2010; Robinson-O'Brien, et al., 2009; Wardle, et al., 2003). Therefore, an effective way of increasing children's consumption of fruits and vegetables is to increase exposure in the family setting.

## Family Involvement

Family involvement in early childhood education gives parents or caregivers opportunities to support and participate in their children's school-related activities at home or at school in various ways. Families can be any supportive adult who is committed to the social, emotional, and physical development of children. A family may include not only parents but also extended families, including grandparents, older siblings, aunts, and uncles. In some cases, a neighbor, nanny, or other caregiver may also be involved in the child's early childhood programs. Depending on family availability and interests, families can participate at different levels of commitment and frequency.

There are different types of family involvement in children's education (J. Epstein, 2008). The first type is involving families and children in learning activities at home, including homework and other curriculum-linked activities. According to researchers (J. Epstein & Sheldon, 2002; Hoover-Dempsey et al., 2001; Hoover-Dempsey & Sandler, 1995), there are educational benefits of family involvement in support of their children's learning at home. For instance, schools can offer parents ideas about how to help their children learn at home and provide example activities that parents can do (Hoover-Dempsey, et al., 2001). This involvement strategy can help families reinforce and expand at home what children are learning at school.

Another family involvement strategy is to communicate with families about school programs and children's progress through effective school-to-home and home-to-school communications. This type of family involvement can lead to more effective two-way

communication about children's learning, which helps both families and teachers provide better education for their children (J. Epstein & Sheldon, 2002).

Another type of family involvement involves including families as participants in school decisions and advocacy through school councils, committees, and other parent organizations. For example, parents may be actively involved in parent-teacher conferences and school meetings (Dearing, Kreider, & Weiss, 2008).

The impact of family involvement in learning activities at home is crucial to children's successful learning experiences (Sheldon & Epstein, 2002). Parental participation in children's education at home is positively linked to indicators of children's school success such as improved literacy development (Hoover-Dempsey & Sandler, 1995). Although there are numerous studies on family involvement activities in academic achievement, family involvement focused on preschool children's healthy eating and nutrition education has not been well studied. However, family involvement in children's nutrition education should be essential for the success of learning about healthy foods and healthy behaviors for young children (Brown, et al., 2010; Grønbæk, et al., 2009).When preschools provide nutrition education programs, it is important to include family involvement because families help deliver consistent messages to their children through family nutrition activities including fruit and vegetable consumption (Blom-Hoffman, et al., 2008; Lindsay, et al., 2006). Family involvement activities can increase children's nutritional knowledge, and this may be positively associated with improvements in children's fruit and vegetable consumption (Dalton & Kitzmann, 2008; McLean et al, 2003; St Jeor et al, 2002). Thus, family involvement in nutrition education may play an integral role in children's healthy habits and therefore may increase the effectiveness of childhood obesity prevention programs.

## Family Backpacks

Many educators have created backpacks with hands-on home activities for preschool-aged and primary school-aged children as a way to help families reinforce children's learning at home. Williams, Rockwell, and Sherwood (1984) created a series of science learning activities, called "Mudpies to Magnets," for preschool children to do at home. Rich (1985) created a "writing the suitcase" backpack to improve preschool children's literacy development. She offered practical suggestions for parents to stimulate their child's early reading and writing skills in the home. Reutzel and Fawson (1990) also developed a writing backpack project, called "Traveling Tales," for engaging children and parents in a home writing activity. Bos (1990) and Orman (1993) developed mathematics backpacks for preschool children to engage families in learning activities. Later, science and mathematics backpacks were developed for families of elementary school children by Kokoski and Patton (1997) as a way to encourage family involvement in schoolwork. This backpack contained various hands-on science activities with step-by-step instructions. Educational backpacks developed in different content areas have been successfully used by preschool and elementary school teachers as a strategy for family involvement in children's learning (Kokoski & Patton, 1994; Valerie, 2004).

There are major benefits of using backpacks. First, backpack activities expand active learning opportunities at home. The backpacks help motivate children to continue school-initiated learning in the home. Second, the backpacks strengthen the parent-child connection by encouraging families to do activities together (Kokoski & Patton, 1997; Orman, 1993). Children have the opportunity to talk about what they are learning and also work with their parents to reinforce learning together at home (Kokoski & Patton, 1997). Educators (Kokoski & Patton, 1997; Orman, 1993; Reutzel & Fawson, 1990; Rich, 1985) who developed backpacks have

emphasized the connection between children's homes and school. Backpacks motivate preschool-aged children and families to experience interactive learning in the home.

Using literacy, science, and mathematics as the starting points, family backpacks can be adapted to other fields as well (Kokoski & Patton, 1997). The family backpacks in this study provide preschool-aged children and families with activities to support nutrition education by reinforcing concepts of eating fruits and vegetables. The description of the backpack for this study is discussed in detail in Chapter 3.

## Gaps in Existing Literature

Although family backpacks are an established family involvement tool for preschoolers, no research exists on the use of backpacks to encourage fruit and vegetable consumption. Nutrition education programs for preschool-aged children have utilized only newsletters sent to the home; however, family involvement in learning nutrition through hands-on activities may be an effective way to help families prevent the development of childhood obesity in preschool-aged children. Moreover, families who have utilized backpacks in other content areas consider the backpacks an effective self-motivating approach that improves children's interest and enhances the home-school connection (Kokoski & Patton, 1997).

No previous studies have evaluated the efficacy of backpacks for preschool-aged children's nutrition education. The backpacks in this study provide families with activities that support nutrition education by reinforcing eating fruits and vegetables. This study evaluates the efficacy of the backpacks as an educational strategy.

## Hypotheses

This study evaluates the effectiveness of family backpacks as an educational tool to increase the consumption of fruits and vegetables in preschool-aged children and their parents. The study tests the following hypotheses:

Hypothesis 1: Preschool-aged children in the experimental group will increase their consumption of fruits and vegetables after using the family backpacks.

Hypothesis 2: Parents in the experimental group will increase their consumption of fruits and vegetables after using the family backpacks.

Hypothesis 3: Parents in the experimental group will increase the availability of fruits and vegetables between or during meals at home after using the family backpacks.

# CHAPTER 3

## METHOD

The present study examined the effectiveness of family backpacks that encourage preschoolers and their parents to eat more fruits and vegetables as a strategy to help prevent childhood obesity. This chapter includes: (a) a description of the participants, (b) a summary of the study design, (c) a summary of the design of the backpacks, (d) descriptions of the measurement instruments, (e) the data collection procedure, and (f) data analysis.

### Participants

Research participants were parents of children enrolled at one preschool in Watkinsville, Georgia between February and May, 2012, as well as their preschool teachers. Watkinsville is a medium-sized town in Oconee County, Georgia with 32,808 people and 11,622 households as of the 2010 census (U.S. Census Bureau, 2012). The racial makeup of the county is 88.4% White, 5.0% Black or African American, 4.4% Hispanic or Latino, 3.1% Asian, 2.0% from other races, 1.4% from two or more races, and 0.1% Native American. The estimated median income for a household in the county is $77,569, and the mean household income is $96,984. About 3.8% of families and 5.0% of the population were below the poverty line in 2010.

The majority of families (over 90%) in this preschool were White. All participants were recruited from six preschool classrooms at the preschool. Parents in the targeted classrooms were recruited through the distribution of a parent letter and consent form (see Appendix A). Consent forms were distributed in children's classroom cubbies, and parents who agreed to participate

returned the consent forms in the envelopes provided and place them in a designated folder in the early childhood classroom within two weeks. All parents who completed an informed consent form were included in the study. A total of 49 families agreed to participate in this study. A total of 42 parents (22 experimental and 20 control) completed all parts of the study. Of the 25 parents from the experimental group, 22 completed all parts of the study, and of the 24 parents from the control group, 20 completed all parts of the study. Seven participants who did not complete the follow-up surveys were excluded from analyses.

Classroom teachers in the 6 target classrooms received a separate teacher letter and consent forms describing their participation (see Appendix B). The consent forms were handed to individual teachers by the researcher. Teachers returned the completed consent forms to the preschool office or the researcher. All teachers who signed their informed consent forms were included in the teacher interview protocol. Five lead teachers in the target preschool classrooms agreed to participate.

## Study Design

There are two separate buildings at the preschool, and each building has four classrooms. In order to reduce the likelihood of conversation about different family backpacks between experimental and control groups, one building was randomly assigned to the experimental group and the other one to the control group. Three classrooms were randomly selected from each building to participate. A total of 22 children in the experimental group were in the E, F, and G classrooms, and a total of 20 children in the control group were in the B, C, and D classrooms.

Families in the experimental group received a family backpack focused on healthy eating (see Appendix C for the experimental group's parent letter). Families in the control group received a different family backpack focused on handwashing, with no nutrition information

included (see Appendix E for the control group's parent letter). All families in both the experimental and control groups completed the same pre-and post-surveys. The researcher conducted interviews with the teachers in both experimental and control groups after parents completed the study in order to ask their nutrition education programs, how parents enjoyed the backpacks, and observed changes in children's fruit and vegetable consumption in the classroom.

## Description of the Family Backpacks

The family backpacks used in this study were self-contained education packets of hands-on activities for families and children to complete together at home, including the necessary supplies for each activity. The experimental family backpack consisted of home activities involving fruits and vegetables. The contents of the backpack included the children's picture book *Eating the Alphabet: Fruits & Vegetables from A to Z,* three hands-on activities, instructions for each activity, necessary supplies, the USDA MyPlate poster, a short feedback form about the activities, and a parent letter explaining the purpose of the backpack and how to use the family backpack. The three hands-on activities were called "Mystery Bag", "My Favorite", and "Graphing Fruits and Vegetables". The "Mystery Bag" activity was a science activity exploring the differences in various fruits and vegetables. The "My Favorite" activity was an art activity that involved drawing children's favorite fruits and vegetables. The "Graphing Fruits and Vegetables" was a math activity focused on counting and graphing the fruits and vegetables families have at home (see Appendix D for the experimental group's activity descriptions). The cost of the backpack contents for the experimental group was about $22 per backpack.

The control group family backpack focused on handwashing. This topic was selected because it was health-related, but did not teach any information about healthy eating. The

contents of the control group backpack included the children's picture book *Those Mean Nasty Dirty Downright Disgusting But-- Invisible Germs*, three hands-on activities, instructions for each activity, necessary supplies, a short feedback form about the activities, and a parent letter explaining the purpose of the backpack and how to use the family backpack. The three hands-on activities were called "Spreading Germs", "What are Germs?", and "Hand Washing Song". The "Spreading Germs" activity was a science activity focused on learning the importance of hand washing to reduce the spread of germs in children's hands. The "What are Germs?" activity was an art activity that involved drawing and talking about germs. The "Hand Washing Song" was a music activity that involved singing handwashing songs while children wash their hands (see Appendix F for the control group's activities). The cost of the backpack contents for the control group was about $13 per backpack.

## Measures

In order to evaluate the effectiveness of the family backpacks, parents completed three measures regarding the availability of fruits and vegetables at home, their child's consumption of fruits and vegetables, and their own consumption of fruits and vegetables. (Because families in the control group received different backpacks related to handwashing, the pre- and post-surveys included questions about handwashing as well. However, the handwashing questions were excluded from analysis because those questions did not relate to the hypotheses of this study.) The backpack activities and instruments were reviewed by child development and nutrition professionals and revised based on their feedback. Content validity of the instruments was established based on professional judgement of child development and nutrition professionals.

The pre-survey also included demographic questions, and the post-survey included a simple parent evaluation of the family backpack. In addition, an interview was conducted with

each teacher to gather additional information on this pilot study. The researcher collected data from teachers about school nutrition education, how parents enjoyed the backpacks, and changes in children's fruit and vegetable consumption in the classroom. The following sections describe the measures.

*Demographics*

Demographic data were collected in a separate section of the pre-survey. Self-reported demographic information included: (a) parent's age, (b) parent's gender, (c) marital status, (d) education, (e) child's gender, and (f) child's age (see Appendix I for the demographic information).

*Measure 1: Children's Fruit and Vegetable Consumption*

The fruit and vegetable consumption measures were designed to assess children's fruit and vegetable consumption. The parents reported the number of servings of fruits and vegetables their preschool child consumed using a 6-point Likert scale (0, 1, 2, 3, 4, and 5 or more servings). Questions measuring fruit and vegetable consumption were 1) "How many fruits does your preschool child usually consume in a day?" 2) "How many vegetables does your preschool child usually consume in a day?" Parents were also asked to circle the specific fruits and vegetables that their child had tried from lists of 37 fruits and 39 vegetables. Parents had space to write in other fruits or vegetables not included on the list (see Appendix I for the questionnaires). The reliability estimates (Cronbach's alpha) of the children's fruit and vegetable consumption scales were .856 in this study.

*Measure 2: Parents' Fruit and Vegetable Consumption*

Parents' fruit and vegetable consumption was measured through a self-report measure using a 6-point Likert scale (0, 1, 2, 3, 4, and 5 or more servings). Questions in this measure included 1) "How many fruits do you usually consume in a day?" 2) "How many vegetables do you usually consume in a day?" (see Appendix I for the questionnaires). The reliability estimates (Cronbach's alpha) of the parents' fruit and vegetable consumption scales were .784 in this study.

*Measure 3: Fruit and Vegetable Availability at Home*

Fruit and vegetable availability in the home was measured using a parental self-report of how often they served fruits and vegetables as a snack or with meals at home. These two questions were measured on a 3-point Likert scale (1= never, 2=sometimes, and 3= often) (see Appendix I for the questionnaires). The reliability estimates (Cronbach's alpha) of fruit and vegetable availability scales were .820 in this study.

*Teacher Interview*

Teacher interview data were coded according to three different themes: (1) their nutrition education programs, (2) students' fruit and vegetable consumption, and (3) family backpack participation. The interviews consisted of six questions about school nutrition education programs, how parents enjoyed the backpacks, and changes in their students' intake of fruits and vegetables in the classroom. Questions were1) "What do you usually do as a preschool teacher to teach children about fruits and vegetables?" 2) "What type of nutrition education program are you currently using in your classroom?" 3) "What changes have you noticed in children's consumption of fruits and vegetables since this project started?" 4) "What changes have you noticed in children's understanding of fruits and vegetables since this project started?" 5) "What

did you hear from children and parents about the family backpacks?" 6) "How effective do you think the backpacks have been in getting families involved in their children's learning?" The teacher interviews were conducted in the classroom for 10 to 20 minutes and were transcribed by the researcher (see Appendix K for the teacher interview protocol).

*Parents' Evaluation of the Family Backpack*

In addition to the fruit and vegetable measures, the researchers included a "How Did You Like the Family Backpack?" feedback form in the family backpacks to ask how many activities parents actually completed. Parents reported the number of activities they used (see Appendix H: "How Did You Like the Family Backpack?").

The parent post-survey also included a simple parent evaluation of the family backpack using a 5-point Likert scale with response options "strongly disagree", "disagree", "not sure", "agree", and "strongly agree." Seven questions in the parent evaluation included 1) "The family backpack was appropriate for my child's age." 2) "The activities in the backpack were fun and interesting." 3) "The instructions for the activities were clear and easy to understand." 4) "The parent letter helped me understand what to do with the backpack." 5) "The backpack materials were well-organized and clearly labeled." 6) "The book in the backpack was interesting and enjoyable." 7) "I would recommend this backpack to other parents of preschoolers."

## Procedure

Informed consent forms were provided to potential participants in February of 2012. Participants were asked to return the consent forms in the envelopes provided and place them in a designated folder to their children's classroom within two weeks. Parents who signed their

consent forms received a pre-survey and returned the surveys in a designated folder in their child's classroom (see Figure 2 for general procedure).

After recruitment, the researcher prepared 10 backpacks for each group. Not all families had backpacks at the same time. Parents in both groups who completed pre-surveys first received backpacks first. Parents and children in the experimental group took home a family backpack teaching about fruits and vegetables. Parents and children in the control group took home a family backpack about handwashing. Families kept and used the backpacks at home up to 2 weeks, when time permitted, and returned them to the school after 1 or 2 weeks. When families returned backpacks after 2 weeks, they were repacked and sent home with another family. All backpacks were distributed, used, and returned over a period of 12 weeks.

Two weeks after the parent returned the family backpack to the classroom, that parent received a written post-survey. Parents returned the survey to their child's classroom.

After all the parents returned the family backpacks and completed their post-surveys, the researchers contacted the classroom teachers to schedule one-on-one interviews. The interviews with teachers in targeted classrooms were conducted in the classroom during afternoon naptime. The researcher collected the teachers' qualitative feedback about the family backpacks and the changes teachers observed in the students' fruit and vegetable knowledge and consumption after they used the family backpacks.

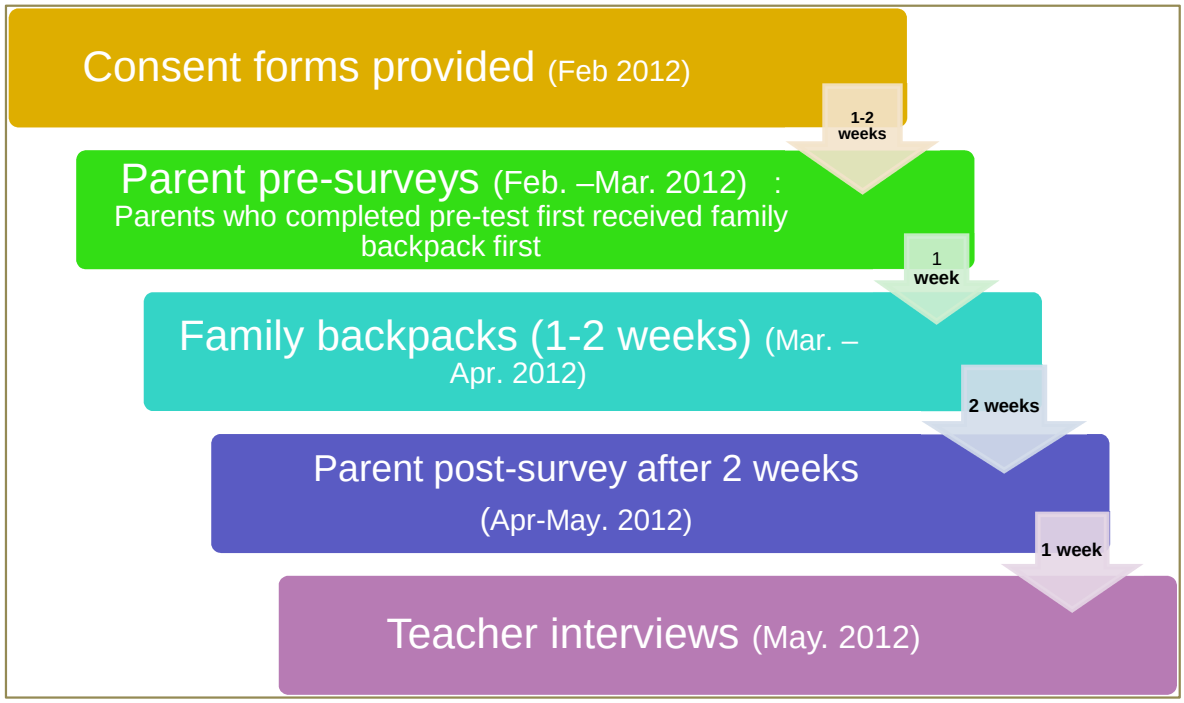


Figure 2: General Procedure for the Pilot Study

## Data Analysis

All analyses were conducted using SPSS version 18.0. Independent t-tests were used to examine demographic differences between the experimental group and the control group in education level, marital status, parents' age, child gender, and child age. Paired sample t-tests were used to compare the mean pre-test and post-test scores in order to determine whether using the family backpacks improved children's and parents' fruit and vegetable consumption scores and fruit and vegetable availability scores. The level of statistical significance was defined at $p < 0.05$ for the data analyses. In addition to parental surveys, teacher interview data were analyzed using qualitative coding. Interview data were coded according to three basic themes: (1) school nutrition education programs, (2) children's fruit and vegetable consumption, and (3) family backpack participation.

# CHAPTER 4

## RESULTS

The purpose of this pilot study was to assess the effectiveness of family backpacks in the improvement of fruit and vegetable consumption in preschool-aged children and their parents. The results of this study are presented in six sections: (a) demographic information about the children and parents, (b) children's consumption of fruits and vegetables, (c) parents' consumption of fruits and vegetables, (d) parents' serving of fruits and vegetables at home, (e) teacher interview, and (f) parents' evaluation of the family backpack.

### Demographic Data

The study population consisted of 42 parents. Almost all parents participating were females (97.6%). With regard to marital status, 83.3% of the parents were married, 11.9% of the parents were single, 2.4% were divorced, and 2.4% were separated. The control group (90.0%) had slightly more married parents than the experimental group (77.3%).

The parents' ages ranged from 18 to 44 years. Among the participants, 52.4% of the parents were between 35 and 44 years old, and 35.7% of the parents were between 25 and 34 years old. Only 11.9% of the parents were between 18 and 24 years old. Roughly similar percentages of parents in the experimental group (50.0%) and control group (55.0%) were between 35 and 44 years old. The experimental group (40.9%) had more parents between 25 and 34 years old than the control group (30.0%).

The parents' educations varied; 40.5% of the parents had completed a four year degree, 19% had a Master's or Doctorate degree, 19% had completed some college education, 11.9% had an associate degree, and 9.5% had a high school diploma The experimental group (68.2%) had more parents with four year college or higher education degree than the control group (50.0%). Among the parents in the experimental group, 59.1% of the parents had a four year college degree and 9.1% of the parents had a Master's or Doctorate degree. Among the parents in the control group, 20% of the parents had a four year college degree and 30% of the parents had a Master's or Doctorate degree (see Table 1).

Of the 42 preschool children in this study, 25 children (59.5%) were boys and 17 (40.5%) were girls. There were more boys in the experimental group (68.2%) than the control group (50%). Twenty children (47.6%) were four years old, and twenty-two (52.4%) were five years old. There were slightly more younger children in the experimental group (54.5%) than the control group (40.0%) (see Table 2).

A total of five preschool teachers participated in this study. All teachers were White females and between 25 and 45 years old. All of them were lead teachers in their classroom and were certified to teach Pre-K through 5th grade by the Georgia Professional Standards Commission. One teacher in the control group and one teacher in the experiment group had a Bachelor's degree in Education. Another teacher in the control group and two teachers in the experimental group had a Master's degree in Education.

Table 1

*Frequencies and Percentages of Parent Demographics*

| Measure | Experimental group (N=22) | | Control group (N=20) | | Overall (n=42) | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Education | | | | | | |
| High school | 3 | 13.6 | 1 | 5.0 | 4 | 9.5 |
| 2 year degree/Associate | 3 | 13.6 | 2 | 10.0 | 5 | 11.9 |
| Some college work | 1 | 4.5 | 7 | 35.0 | 8 | 19.0 |
| 4 year degree/Bachelor's degree | 13 | 59.1 | 4 | 20.0 | 17 | 40.5 |
| Masters/Ph.D. | 2 | 9.1 | 6 | 30.0 | 8 | 19.0 |
| Marital status | | | | | | |
| Single | 3 | 13.6 | 2 | 10 | 5 | 11.9 |
| Married | 17 | 77.3 | 18 | 90 | 35 | 83.3 |
| Separated | 1 | 4.5 | 0 | 0 | 1 | 2.4 |
| Divorced | 1 | 4.5 | 0 | 0 | 1 | 2.4 |
| Parent age | | | | | | |
| 18-24 years | 2 | 9.1 | 3 | 15.0 | 5 | 11.9 |
| 25-34 years | 9 | 40.9 | 6 | 30.0 | 15 | 35.7 |
| 35-44 years | 11 | 50.0 | 11 | 55.0 | 22 | 52.4 |
| Over 45 years | 0 | 0 | 0 | 0 | 0 | 0 |

Table 2

*Frequencies and Percentages of Child Demographics*

| Measure | Experimental group (n=22) | | Control group (n=20) | | Overall (n=42) | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Child gender | | | | | | |
| Boys | 15 | 68.2 | 10 | 50.0 | 25 | 59.5 |
| Girls | 7 | 31.8 | 10 | 50.0 | 17 | 40.5 |
| Child age | | | | | | |
| 4 years | 12 | 54.5 | 8 | 40.0 | 20 | 47.6 |
| 5 years | 10 | 45.5 | 12 | 60.0 | 22 | 52.4 |

## Changes in Children's Fruit and Vegetable Consumption

Hypothesis 1 stated that children in the experimental group would increase their consumption of fruits and vegetables after using the family backpacks. Fruit and vegetable consumption scores ranged from 0 to 5, with lower scores indicating fewer fruits and vegetables consumed per day. Children's fruit consumption scores were calculated separately from children's vegetable consumption scores (see Table 3). Paired samples t-tests comparing the mean scores pre-test and post-test for each group were conducted to evaluate hypothesis 1.

### *Changes in children's average fruit consumption*

The average number of fruits the children in the experimental group consumed daily was significantly greater after using the backpacks *(M*=2.77, *SD*=.922*)* than before the backpacks *(M*=2.32, *SD*= .995*), t* (21) =2.49, *p*< .05 (*p*= .021). The average number of fruits the children in the control group consumed was not greater after the backpacks *(M*=2.30, *SD*=.864*)* than before the backpacks *(M*=2.50, *SD*= .889*), t* (19) =1.07, *p*= .297.

### *Changes in children's average vegetable consumption*

The average number of vegetables the children in the experimental group consumed daily was significantly greater after using the backpacks *(M*=2.68, *SD*=1.17*)* than before the backpacks *(M*=2.18, *SD*= 1.18*), t* (21) =3.92, *p*< .01 (*p*= .001). The average number of vegetables the children in the control group consumed was not grater after the backpacks *(M*=1.95, *SD*=1.09*)* than before the backpacks *(M*=2.1, *SD*= 1.29*), t* (19) =0.90, *p*= .379 (see Table 3 and Figure 3).

*Changes in number of fruits and vegetables children tried*

To determine whether children tried different fruits and vegetables after the backpacks, parents circled the fruits and vegetables the child had tried. Scores were calculated as the total number of fruits or vegetables parents circled. Separate scores were calculated for fruits and vegetables. Scores ranged from 0- 37 for fruits and 0-39 for vegetables, with higher scores indicating more fruits and vegetables tried. Paired samples t-tests comparing the mean scores pre-test and post-test for each group were conducted to further examine hypothesis 1.

*(1) Number of fruits children tried*

There was a statistically significant change in the number of fruits the children in the experimental group tried between the pre- and the post-test measures ($t$ (21) = 6.739, $p$=.000). Children in the experimental group tried a greater number of fruits after using the backpacks ($M$=22.31, $SD$=4.78) than before the backpacks ($M$=18.95, $SD$=4.80). However, in the control group, the average number of fruits children tried was not greater after the program ($M$=18.10, $SD$=5.91) than before ($M$=18.75, $SD$=5.48), $t$ (19) =1.36, $p$= .189.

*(2) Number of vegetables children tried*

There was a statistically significant change in the number of vegetables the children in the experimental group tried between the pre- and the post-test measures ($t$ (21) = 5.287, $p$=.000). Children in the experimental group tried a greater number of vegetables after using the backpacks ($M$=21.45, $SD$=6.29) than before the backpacks ($M$=18.31, $SD$=5.09). However, in the control group, the average number of vegetables children tried was not greater after the program ($M$=17.20, $SD$=6.21) than before ($M$=18.10, $SD$=5.80), $t$ (19) =1.20, $p$= .245 (see Table 3 and Figure 4).

Table 3

*Changes in Daily Fruit and Daily Vegetable Consumption among Preschool Children in the Experimental and Control Groups*

| Group | Pretest | | Posttest | | *p* |
|---|---|---|---|---|---|
| | M | SD | M | SD | |
| Experimental (n=22) | | | | | |
| Children's fruit consumption | 2.32 | 0.99 | 2.77 | 0.92 | .021* |
| Children's vegetable consumption | 2.18 | 1.18 | 2.68 | 1.17 | .001** |
| Number of fruits tried | 18.95 | 4.80 | 22.31 | 4.78 | .000*** |
| Number of vegetables tried | 18.31 | 5.09 | 21.45 | 6.29 | .000*** |
| Control (n=20) | | | | | |
| Children's fruit consumption | 2.50 | 0.88 | 2.30 | 0.86 | .297 |
| Children's vegetable consumption | 2.10 | 1.29 | 1.95 | 1.09 | .379 |
| Number of fruits tried | 18.75 | 5.48 | 18.10 | 5.91 | .189 |
| Number of vegetables tried | 18.10 | 5.80 | 17.20 | 6.21 | .245 |

*Note.* *p< .05, **p< .01, ***p<.001

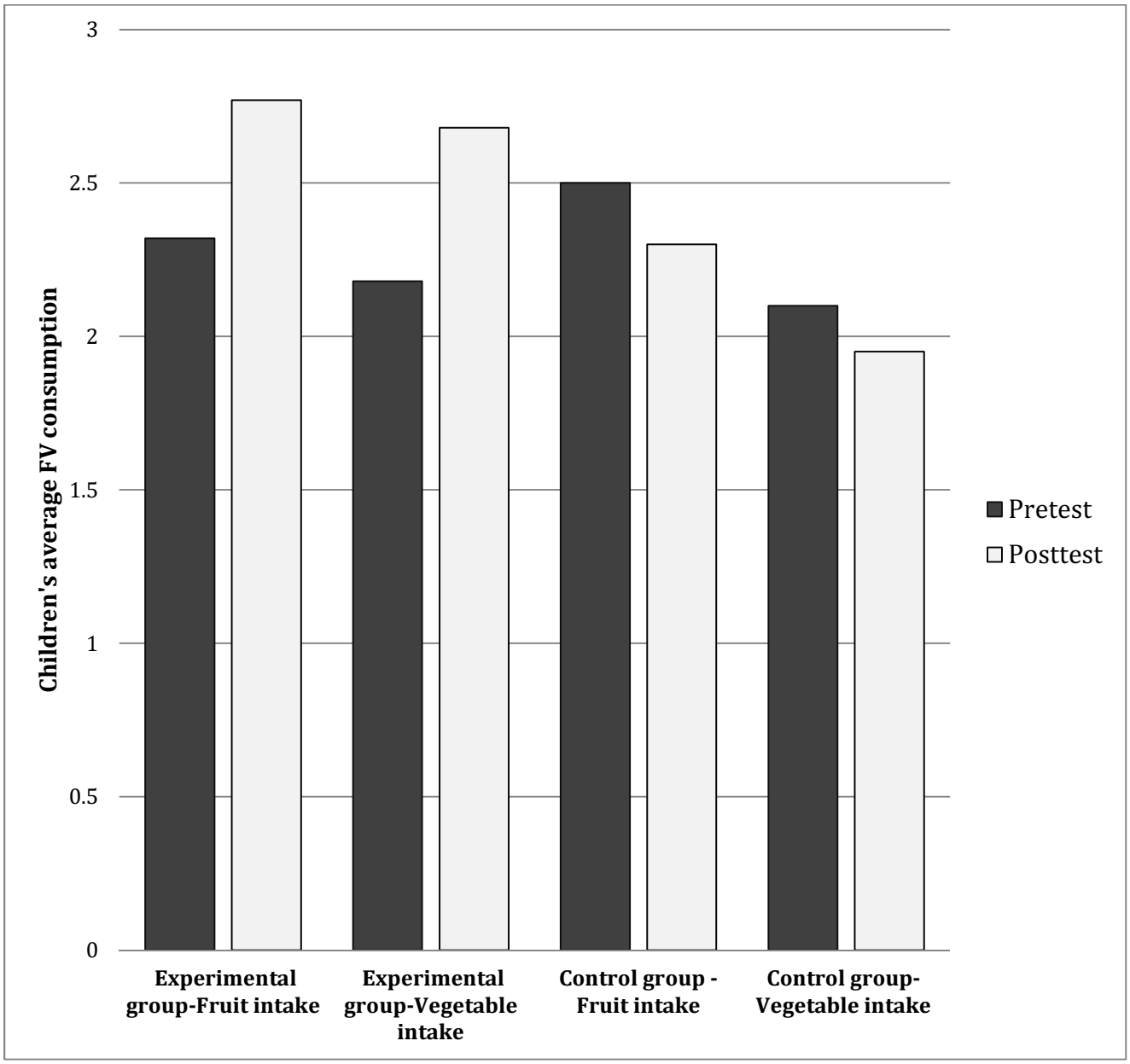


Figure 3: Changes in Children's Fruit and Vegetable Consumption

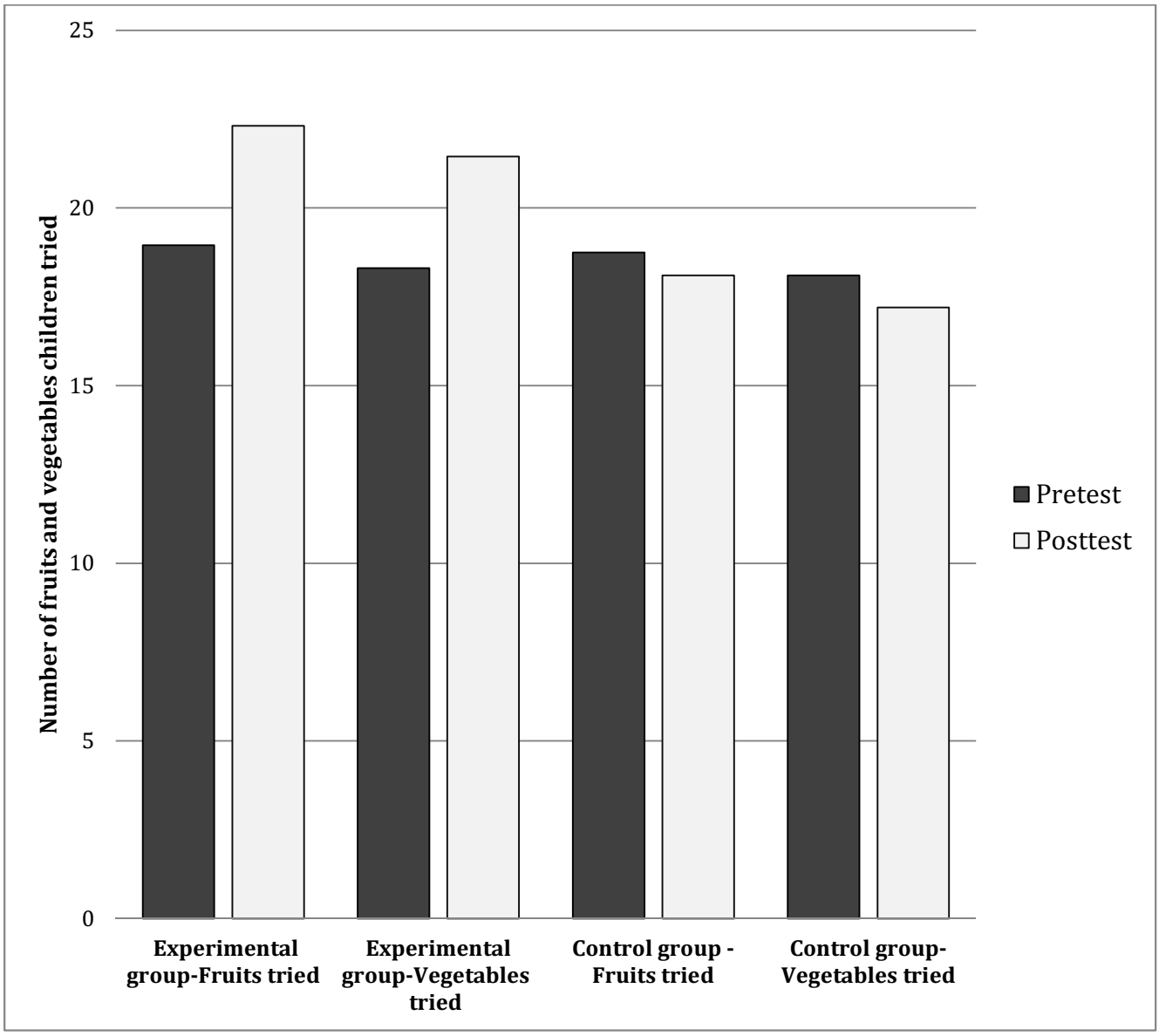


Figure 4: Changes in Number of Fruits and Vegetables Children tried

## Changes in Parents' Fruit and Vegetable Consumption

Hypothesis 2 stated that parents in the experimental group would increase their consumption of fruits and vegetables after using the family backpacks. Fruit and vegetable consumption scores ranged from 0 to 5, with lower scores indicating fewer fruits and vegetables consumed per day. Parents' fruit consumption scores were calculated separately from parents' vegetable consumption scores. Paired samples t-tests comparing the mean score between pre-test and post-test in each group were conducted to evaluate the hypothesis 2 (see Table 4).

### *Changes in parents' average fruit consumption*

The average number of fruits the parents in the experimental group consumed was significantly greater after using the backpacks *(M*=2.72, *SD*=.935*)* than before *(M*=1.95, *SD*= 1.046*), t* (21) =4.82, *p*<.000 (*p*= .000). The average number of fruits the parents in the control group consumed was not greater after the backpacks *(M*=2.05, *SD*=.887*)* than before the backpacks *(M*=2.30, *SD*= 1.081*), t* (19) =1.22, *p*= .234.

### *Changes in parents' average vegetable consumption*

The average number of vegetables the parents in the experimental group consumed was significantly greater after using the backpacks *(M*=2.77, *SD*=1.10*)* than before the backpacks *(M*=2.36, *SD*= 1.04*), t* (21) =3.25, *p*<.01 (*p*= .004). The average number of vegetables the parents in the control group consumed was slightly greater after the backpacks *(M*=3.20, *SD*=2.21) than before *(M*=2.75, *SD*= 1.07*),* but this difference was not statistically significant, *t* (19) =0.79, *p*= .439 (see Figure 5).

Table 4

*Changes in Daily Fruit and Daily Vegetable Consumption among Parents in the Experimental and Control Group*s

| Group | Pretest | | Posttest | | *p* |
|---|---|---|---|---|---|
| | M | SD | M | SD | |
| Experimental (n=22) | | | | | |
| Parents' fruit consumption | 1.95 | 1.04 | 2.73 | 0.93 | .000*** |
| Parents' vegetable consumption | 2.36 | 1.04 | 2.77 | 1.10 | .004** |
| Control (n=20) | | | | | |
| Parents' fruit consumption | 2.30 | 1.08 | 2.05 | 0.88 | .234 |
| Parents' vegetable consumption | 2.75 | 1.07 | 3.20 | 2.21 | .439 |

*Note.* **p< .01, ***p<.001

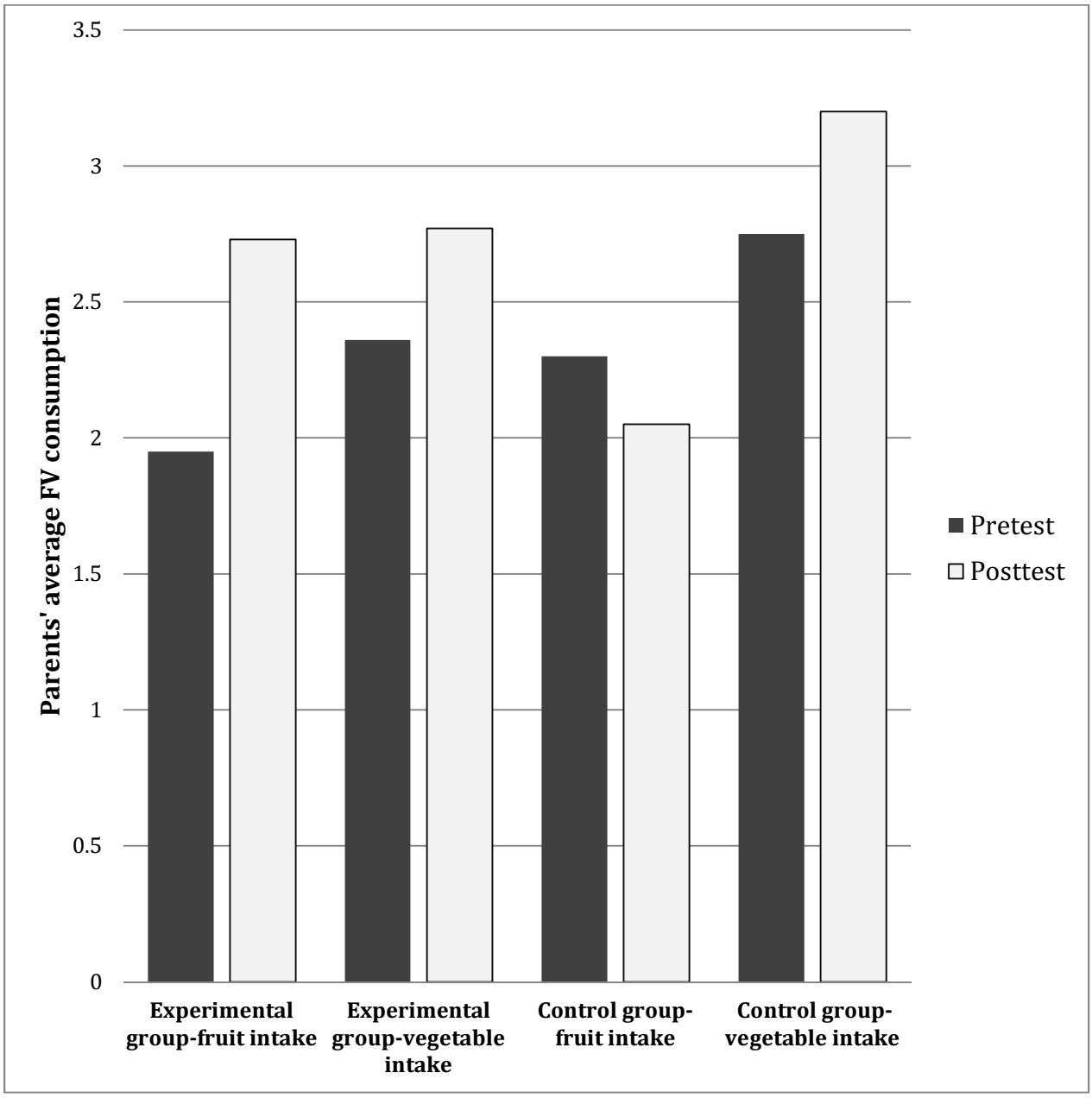


Figure 5: Changes in Parents' Fruit and Vegetable Consumption

## Changes in Fruit and Vegetable Availability at Home

Hypothesis 3 stated that parents in the experimental group would increase the availability of fruits and vegetables during meals or as snacks at home after using the backpacks. Fruit and vegetable availability scores ranged from 1 to 3, with the lower scores demonstrating less frequent serving in the past two weeks. Fruit availability scores were calculated separately from vegetable availability scores. Paired samples t-tests comparing the mean score between pre-test and post-test in each group were conducted to evaluate the hypothesis 3 (see Table 5).

### *Changes in fruit availability at home*

For the experimental group, frequency of fruits served at home was significantly greater after using the backpacks *(M*=2.91, *SD*=.294*)* than before *(M*=2.73, *SD*= .550*), t* (21) =2.16, $p<.05$ ($p$= .042). For the control group, frequency of fruits served at home was also greater after using the backpacks *(M*=2.85, *SD*=.366*)* than before *(M*=2.80, *SD*=.410*)*, but the difference was not statistically significant *t* (19) =0.56, $p$= .577.

### *Changes in vegetable availability at home*

For the experimental group, frequency of vegetables served at home was greater after using the backpacks *(M*=2.82, *SD*=.394*)* than before *(M*=2.77, *SD*= .429*)*, but the difference was not statistically significant *t* (21) =1.0 $p$= .329. For the control group, frequency of vegetables served at home was not greater after using the backpacks *(M*=2.80, *SD*=.410*)* than before *(M*=2.85, *SD*= .366*), t* (19) =1.0, $p$= .330 (see Figure 6).

Table 5

*Changes in Fruit and Vegetable Availability at Home in the Experimental and Control Groups*

| Group | Pretest | | Posttest | | *p* |
|---|---|---|---|---|---|
| | M | SD | M | SD | |
| Experimental (n=22) | | | | | |
| Serving of fruits at home | 2.73 | 0.55 | 2.91 | 0.29 | .042* |
| Serving of vegetables at home | 2.77 | 0.42 | 2.82 | 0.39 | .329 |
| Control (n=20) | | | | | |
| Serving of fruits at home | 2.80 | 0.41 | 2.85 | 0.36 | .577 |
| Serving of vegetables at home | 2.85 | 0.36 | 2.80 | 0.41 | .330 |

*Note.* *p< .05

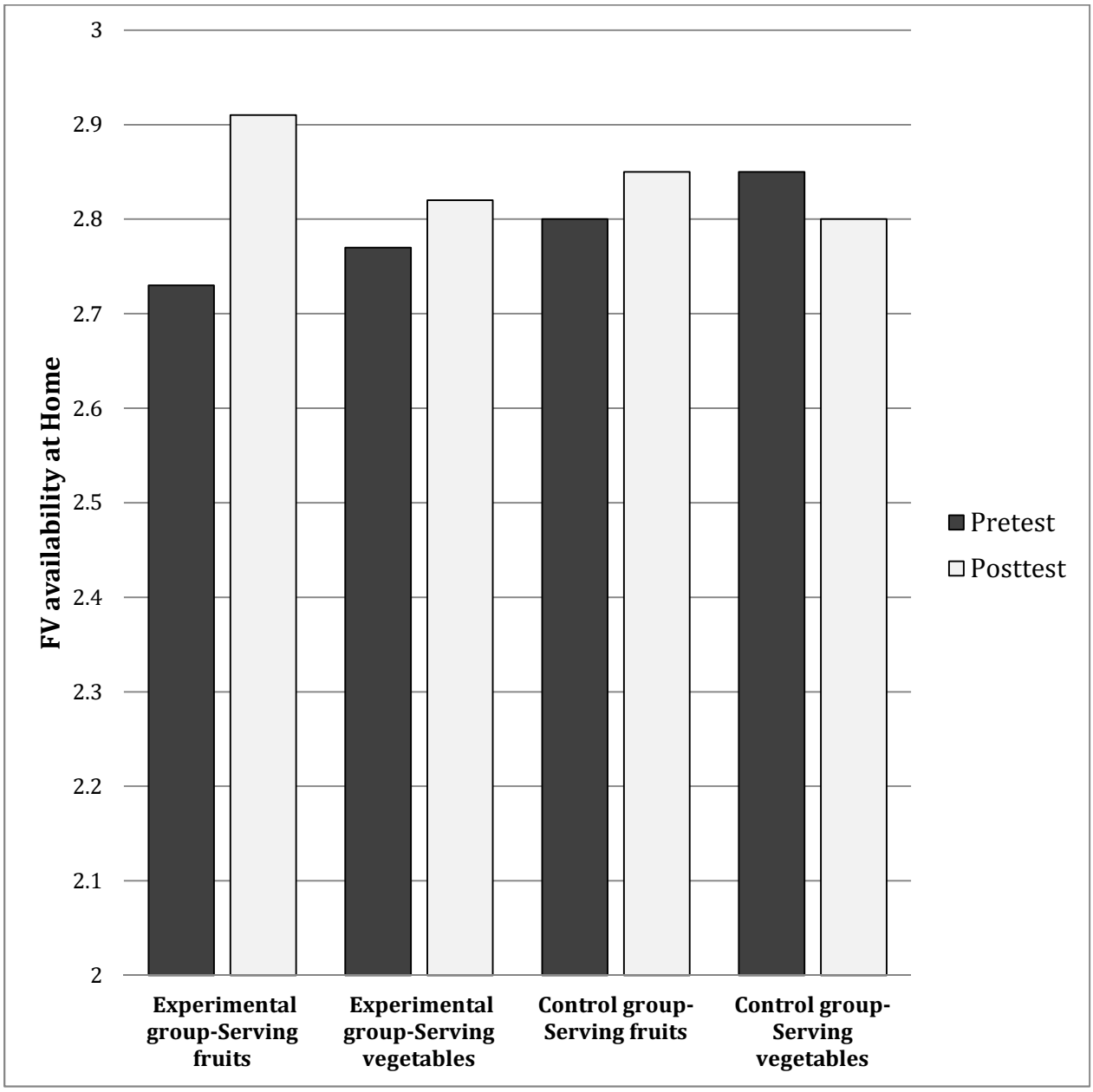


Figure 6: Changes in Fruit and Vegetable Availability at Home

## Teacher Interview Data

Teacher interview data were coded with three different themes: (1) their nutrition education programs, (2) students' fruit and vegetable consumption, and (3) family backpack participation. Three teachers in the experimental group and two teachers in the control group participated.

The first topic was about teachers' nutrition education. Teachers' responses from the both experimental and the control group were similar. Teachers in the both groups communicated with their students about fruits and vegetables at lunch or during the healthy food theme the class which was usually provided weekly or bi-weekly. However, they answered that there were no particular school-based nutrition education programs in either experimental or control group classrooms during this study.

The second theme was about students' consumption and understanding of fruits and vegetables. Teachers from each group showed different responses. Teachers in the experimental group reported that children in the experimental group tried more fruits and vegetables at lunch and talked with the teachers about fruits and vegetables more often since the backpack project started; however, teachers in the control group had not noticed changes in children's consumption of fruits and vegetables at lunch and had not found any change in children's understanding of fruits and vegetables. Teacher interview responses supported the hypothesis that preschoolers in the experimental group would increase their consumption of fruits and vegetables after using the family backpacks.

The third topic was about family backpack participation. Teacher responses from both the experimental and the control group were similar. All teachers reported that parents and children seemed to enjoy the backpacks and gave the teachers positive feedbacks during teacher-parent

conferences or during pick-up and drop-off time. Parents spent time using backpacks with their kids after school and talked about the activities they did with their child. The qualitative data from teachers provided additional evidence to support the benefit of using family backpacks for promoting children's fruit and vegetable consumption.

## Parents' Evaluation of the Family Backpack

Before returning the family backpacks, parents completed a short survey indicating the number of activities they completed. For the experimental group, 90.9% of the parents used all three activities, and 9.1% used two activities. For the control group, 85.0% of the parents used all three activities, and 15.0% used two activities.

Parents also rated their satisfaction with the family backpacks with seven questions using a 5-point Likert scale ranging from 1(strongly disagree), 2(disagree), 3(not sure), 4(agree), and 5(strongly agree). Most parents in the experimental group and the control group agreed or strongly agreed with the positive statements. Specific percentages for individual questions are as follows (see Table 6 & 7).

*1) The family backpack was appropriate for my child's age.*

For the experimental group, 68.2% of the parents strongly agreed and 31.8% agreed with the statement. For the control group, 70% of the parents strongly agreed, 25.0% agreed, and 5% were not sure.

*2) The activities in the backpack were fun and interesting.*

For the experimental group, 68.2% of the parents strongly agreed with the statement, and 31.8% agreed to the statement. For the control group, 60% of the parents strongly agreed and 40% agreed.

*3) The instructions for the activities were clear and easy to understand.*

For the experiment group, 72.7% of the parents strongly agreed with the statement, and 27.3% agreed. For control group, 70% of the parents strongly agreed and 30% agreed.

4) *The parent letter helped me understand what to do with the backpack.*

For the experimental group, 63.6% of the parents strongly agreed with the statement, and 36.4% agreed to the statement. For the control group, 70% of the parents strongly agreed and 30% agreed.

*5) The backpack materials were well-organized and clearly labeled.*

For the experimental group, 81.8% of the parents strongly agreed with the statement, and 18.2% agreed to the statement. For the control group, 70% of the parents strongly agreed and 30% agreed.

*6) The book in the backpack was interesting and enjoyable.*

For the experimental group, 36.4% of the parents strongly agreed with the statement, 54.5% agreed to the statement, and 9.1% disagreed with the statement. For the control group, 40% of the parents strongly agreed, 55% agreed, and 5% were not sure.

*7) I would recommend this backpack to other parents of preschoolers.*

For the experimental group, 59.1% of the parents strongly agreed with the statement and 40.9% agreed to the statement. For the control group, 60% of the parents strongly agreed, 35% agreed, and 5% were not sure.

Table 6

*Family Backpack Evaluation of the Experimental Group (N= 22)*

| | Strongly disagree (%) | Disagree (%) | Not sure (%) | Agree (%) | Strongly agree (%) |
|---|---|---|---|---|---|
| 1) Backpack was appropriate for child age | 0.0 | 0.0 | 0.0 | 31.8 | 68.2 |
| 2) Activities were fun and interesting | 0.0 | 0.0 | 0.0 | 31.8 | 68.2 |
| 3) Instructions were clear and easy | 0.0 | 0.0 | 0.0 | 27.3 | 72.2 |
| 4) Parent letter was helpful to understand | 0.0 | 0.0 | 0.0 | 36.4 | 63.6 |
| 5) Materials were well-organized and clear | 0.0 | 0.0 | 0.0 | 18.2 | 81.8 |
| 6) Book in the backpack was interesting | 0.0 | 9.1 | 0.0 | 54.5 | 36.4 |
| 7) Recommend the backpack to others | 0.0 | 0.0 | 0.0 | 40.9 | 59.1 |

Table 7

*Family Backpack Evaluation of the Control Group (N=20*

| | Strongly disagree (%) | Disagree (%) | Not sure (%) | Agree (%) | Strongly agree (%) |
|---|---|---|---|---|---|
| 1) Backpack was appropriate for child age | 0.0 | 0.0 | 5.0 | 25.0 | 60.0 |
| 2) Activities were fun and interesting | 0.0 | 0.0 | 0.0 | 35.0 | 70.0 |
| 3) Instructions were clear and easy | 0.0 | 0.0 | 0.0 | 30.0 | 70.0 |
| 4) Parent letter was helpful to understand | 0.0 | 0.0 | 0.0 | 30.0 | 70.0 |
| 5) Materials were well-organized and clear | 0.0 | 0.0 | 0.0 | 30.0 | 70.0 |
| 6) Book in the backpack was interesting | 0.0 | 0.0 | 5.0 | 55.0 | 40.0 |
| 7) Recommend the backpack to others | 0.0 | 0.0 | 5.0 | 35.0 | 60.0 |

# CHAPTER 5

# DISCUSSION

The purpose of this study was to evaluate the effectiveness of family backpacks for increasing fruit and vegetable consumption in preschool-aged children and their parents. To the author's knowledge, this is the first family backpack study focused on nutrition education for preschoolers. Results of the pilot study showed significant increases in preschool children's and parents' fruit and vegetable consumption in the experimental group, but not the control group, following backpack use. Interpretations of changes in children's fruit and vegetable consumption, the usefulness of the family backpacks, limitations of this study, implications for teaching fruit and vegetable consumption to children, and directions for future research are presented in this section.

## Changes in Fruit and Vegetable Consumption

The primary question of this pilot study was whether using family backpacks would increase daily fruit and vegetable consumption in children and their parents. The family backpack pilot study confirmed that the backpacks were effective. Increases in fruit and vegetable consumption in the experimental group, but not the control group, supported the hypotheses that the family backpacks help improve children's and parents' daily fruit and vegetable consumption. Parents reported an average increase of about 0.5 daily servings of fruits and vegetables in both children and their parents in the experimental group. The fact that using

backpacks increased healthy eating underscores the importance of family involvement in preschoolers' healthy eating habits.

There are several possible explanations for why children increased their consumption of fruits and vegetables after using the family backpacks. One possibility can be related to parents' fruit and vegetable consumption. Parents may have tried to eat more fruits and vegetables after using the backpack to be a good role model, and encouraged their children to eat more fruits and vegetables as well. This explanation is consistent with prior research showing that parents' fruit and vegetable consumption is directly related to preschoolers' fruit and vegetable consumption (Bante, et al., 2008; Blom-Hoffman, et al., 2008).

Another possibility is that the activities may have encouraged parents to prepare more fruits and vegetables between or during meals at home. Backpack activities related to nutrition education helped families explore, count, and compare fruits and vegetables at home. Activities may have reminded parents of importance of eating enough fruits and vegetables. Parents therefore may have made fruits and vegetables available for their children between and during meals at home. Furthermore, most parents in this study were well educated participants. They could easily read and understand backpack activities, and that may affect the amount of fruits and vegetables children consumed. Previous research shows that the availability of fruits and vegetables at home can be associated with children's fruit and vegetable consumption (Blom-Hoffman, et al., 2008; Horne et al., 2004). Children are likely to eat more fruits and vegetables that are familiar to them.

The study's results showed a significant increase in the availability of fruits at home after using the backpacks. However, no significant increases in the availability of vegetables were found in the study. One of the reasons may be that parents already served vegetables between

and during meals at home before they began using the backpacks. This is confirmed by the fact that the majority of the parents reported that fruits and vegetables were often served at home (77.3%). If the baseline level for serving vegetables was already high, any increase in vegetable availability may not be statistically significant.

Teachers' interview data provided additional evidence to support the benefit of using family backpacks for promoting children's fruit and vegetable consumption. The teachers stated that parents and children gave them positive feedbacks about backpack activities during teacher-parent conferences or during pick-up and drop-off time and talked about the activities they did with their children. Teachers in the experimental group confirmed that children in their classrooms tried more fruits and vegetables at lunch, and also talked with their teachers about fruits and vegetables more often since the backpack project started. In contrast, teachers in the control group had not noticed changes in children's consumption of fruits and vegetables at lunch, and had not noticed increases in children talking about fruits and vegetables since the project started. According to the teachers in the experimental group, the family backpack project had a positive impact on children's fruit and vegetable consumption at school and could reinforce children's learning at home, which affects learning at school.

## Suggestions for Using Backpacks with Preschoolers

A secondary goal of this study was to create a family backpack that parents were willing to use with their preschool children. The parents reported that the backpacks were organized and provided clear instructions for the activities, the backpacks contained age appropriate materials, and the activities and materials gave them ample opportunities for talking with their children about fruits and vegetables. Many parents also read the children's book with their children over

and over and used the hands-on activities repeatedly. They expressed a wish that they could continue to take home family backpacks that reinforce their children's learning.

For the successful use of family backpacks, all necessary materials and explicit instructions should be included (Kokoski & Patton, 1997). All of the parents in both groups answered that the instructions for the activities were clear and easy to understand, and the backpack materials were well-organized and clearly labeled. Easy instructions and well-organized materials helped parents and children follow the steps easily and quickly engaged them in the backpack activities.

The family backpack in this study was developed for preschool-aged children. Parents reported that the family backpack was developmentally appropriate for their child's age. During teacher interviews, one teacher in the control group mentioned two parents who said the book in the backpack was a little bit advanced for preschool-aged children. Although the majority of parents reported that the children's picture book in the backpack was interesting and enjoyable, the fact that some parents found the book too challenging is a good reminder that teachers should be careful to choose age-appropriate books and hands-on activities to include in these backpacks.

In addition, participating in this study may have positively affected these parents' attitudes about family involvement in children's education. The researcher received a great deal of additional positive feedback and letters about the family backpacks from parents. Many parents stated that the activities and materials were very useful and made their children talk about fruits and vegetables more often. Overall, these family backpacks appeared to be an effective educational strategy for preschoolers and parents as a way to learn more about fruits and vegetables and increase fruit and vegetable consumption. Researchers can further develop family backpacks and evaluate the study more in-depth in the future. Teachers may develop

additional family backpacks for their preschoolers to reinforce their learning and involve parents in their children's educational process.

## Implications for Teaching Fruit and Vegetable Consumption to Children

This study has implications for the development of family backpacks about fruit and vegetable consumption for preschoolers. Although there are family involvement programs for young children, a family backpack study focusing on preschoolers' nutrition education has not been evaluated. Thus, this pilot study can be used to further develop a nutrition intervention for preschoolers and families using family backpacks.

The study measured the effectiveness of the backpacks in increasing children's fruit and vegetable consumption. Although the sample size was small, this study expands the research concerning preschoolers' fruit and vegetable consumption by demonstrating that family backpacks can be a good tool for supporting nutrition education through active learning opportunities at home. This backpack pilot information can be shared to help those who develop similar nutrition education interventions that actively involve families.

When preschool teachers teach good eating habits through nutrition education, teachers may want to work together with parents to coordinate nutrition education. Preschool teachers can consider using family backpacks to teach nutrition education to young children and their parents. Other topics related to healthy behaviors and nutrition education might be included in a backpack to support childhood obesity prevention. Teachers in this study viewed the family backpack as an effective tool to work together with parents to promote children's fruit and vegetable consumption. Results from this study showed that the family backpacks can positively affect the attitudes of families toward eating fruits and vegetables.

The findings of this study also suggest that developing family backpacks can be an effective strategy for family involvement in preschool education. Early childhood educators should take advantage of family backpacks as a way to promote healthy eating. This pilot study was focused on a preschool-aged group; however, family backpacks may be applicable to many different age groups if backpack contents are developmentally appropriate.

It is also recommended that a family backpack may be further developed for families with various types of hands-on activities regarding fruits and vegetables. Fruit and vegetable activities can be expanded to other food concepts related to nutrition education. Additional backpacks could help children continue practicing healthy eating concepts, including fruit and vegetable consumption. Many parents in this study actually wanted to continue using backpacks in their home on a regular basis. However, making family backpacks requires considerable preparation, time, and ideas. Teachers who develop or use family backpacks need to establish a system for checking the backpacks in and out and also have their own system to reload the backpacks with supplies when they are returned. In order to create and use backpacks in effective ways, continuing education should be provided to preschool teachers on family involvement strategies, including (but not limited to) using family backpacks.

## Limitations

The results of this pilot study indicate that family backpacks can be a useful tool in promoting fruit and vegetable consumption; however, the study has several important limitations. The sample size was relatively small (N=42), which makes it more challenging to generalize the findings to other groups. Because of the time limitations for data collection, recruitment for this

family backpack study was limited to one preschool in Georgia. Participants from this one preschool may not be representative of all parents and preschool children in the United States.

In addition, the sample in this study was relatively homogenous. This was a pilot study with a highly educated and higher socioeconomic status population. The majority of parents who participated had high levels of education, and they may not adequately represent people with less education. Even though the survey did not directly assess the participants' socioeconomic status and ethnicity, teachers reported that parents were middle- and high-socioeconomic status families and predominantly White. The results may be different in a more ethnically and socio-economically diverse sample. For example, low-income families may experience barriers to the consumption of fruits and vegetables because of the high cost of fresh fruits and vegetables.

Another limitation of this study is that the data on children's and parents' fruit and vegetable consumption were based on self-report measures. The data may not accurately reflect the actual consumption of fruits and vegetables in their home. When participants were asked to report the amount of fruits and vegetables they and their children consumed, they may have overestimated the number of fruits and vegetables their child tried in order to give the answers that they thought the researcher wanted to hear. There is a need for more objective instruments for assessing the fruit and vegetable intake of preschoolers and their parents. For example, researchers could compare parents' self-reports to more objective measures obtained through direct child observation. In addition, the teacher interview data were also subject to limitations. The researcher only spent 10 to 20 minutes with each teacher for the interviews. Extending the interview time, using more in-depth interview questions, and also collecting quantitative data through written surveys could provide more comprehensive information from teachers.

Another limitation is the short duration of the pilot study. This study examined the short-term effects of the family backpacks over 12 weeks for increasing fruit and vegetable consumption in preschoolers and their parents. The time lag between returning the backpacks and completing the post-survey was only two weeks. A longer backpack intervention may be more beneficial for preschoolers and families than a short term one in order to reiterate and maintain children's healthy eating habits. For example, researchers may develop several nutrition education backpacks which contain different kinds of hands-on activities in each backpack for preschoolers and families. The backpacks can be provided to families every two months for 3 to 6 months in a row. Researchers may also conduct longer follow-ups for 3 or 6 months to examine if the backpack effects fade over time or produce long-lasting benefits for preschoolers and parents.

## Directions for Future Research

A larger-scale study of family backpacks with more ethnically, economically, and educationally diverse participants will be needed to better determine the effectiveness of backpacks in increasing fruit and vegetable consumption. We may need to make adaptations for other populations. Using a larger sample may allow researchers to further investigate the backpack's use and effectiveness in various ethnic groups and socio-economic status families with different levels of education.

There is a need for better instruments for assessing fruit and vegetable intake of preschoolers and their parents. In this study, parents were asked to report the number of servings of fruits and vegetables their preschool child and they consumed daily, and how often they served fruits and vegetables as a snack or with meals at home; however, participation of

preschoolers or child observation was limited due to the time constraints of this study. It is suggested that researchers use direct child observation as a measuring instrument regarding children's attitudes toward fruit and vegetable consumption before and after using the family backpacks. In-depth parent interviews may be another useful tool to help evaluate the effectiveness of family backpacks, because researchers can explore changes in parents' perceptions of fruit and vegetable consumption. Using more in-depth questionnaires and child observations will assist with the reliability and validity of the measurements to assess the effectiveness of the family backpacks.

## Conclusions

In an effort to prevent childhood obesity among young children, teachers and parents need to promote children's healthy eating. Increasing children's fruit and vegetable consumption is considered critical to good nutrition. This pilot study measured the effectiveness of family backpacks as a tool to help preschool-aged children and their parents increase their fruit and vegetable consumption. The results indicated that families using the backpacks increased their fruit and vegetable consumption. Because sufficient fruit and vegetable consumption is important for young children and families to help prevent childhood obesity, family backpacks can be a useful and effective tool to reinforce preschoolers' healthy eating habits at home.

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# APPENDICES

Appendix A: Parent Consent Form


Dear Parents:

You are invited to participate in a research study entitled “Family Involvement in Preschool Children’s Health: A Pilot study of a Family Backpack Program.” The purpose of this study is to evaluate the effectiveness of *Family Backpacks* as a way to encourage preschool children and their families to learn about good health together. The information you provide during this study will help us learn how families use take-home backpacks with their children, which will help us create more effective family backpacks in the future. Results of this project will be shared through Master’s thesis research. Your child’s class has been chosen to take part in the study because the children are between 3 and 5 years old.

**What Will Happen During the Study**
If you agree to participate, you will receive a family backpack to take home to use with your preschool-age child one time. The backpacks are self-contained education packets of hands-on activities, along with necessary supplies for each activity.

You will be asked to fill out a pre-survey at the beginning of the project. When you return the pre-survey, you will receive a family backpack to take home. The backpack will include a short “How Did You Like the Backpack?” form that you will be asked to complete and return with the backpack. Two weeks after you return the family backpack to your child’s classroom, you will receive a post-survey to complete. Each survey is short and can be completed about 5 to 10 minutes.

**What You and Your Child Will Do**
When you take home a family backpack, you and your child will try out the hands-on activities in the family backpack at your convenience. Each activity should take you and your child about 10-15 minutes. You are not required to complete all of the activities. You and your child are not expected to experience any discomforts, stresses or risks by participating in this project.

**Receive a Children’s Book**
All parents who agree to participate in this study will receive a free children’s book after the project. All parents who return a signed consent form are eligible for the book. You are not required to complete the pre-survey and post-survey in order to receive the book.

**Your Rights as a Participant**
Participating in this project is voluntary. You are not required to sign the consent form, and will not be forced or pressured to participate. You may withdraw from the study at

any time. If you decide to withdraw, researchers will destroy all information you shared with us.

You will be assigned an identifying code number during the project. All data sheets with information about you and your child will be stored in a locked office at the University of Georgia, and only the members of the research team will have access to them. Researchers will keep the sheets for one year, during which time the data will be entered into a computer data set. All information that could identify you individually will be destroyed as soon as all data collection is complete, or no later than one year after you participate in the study.

All data will be analyzed and reported as group averages. No individually identifiable information about you and your child will be shared with anyone (not even the child care center staff) without your prior consent, except as required by law.

This project is being conducted by **Dr. Diane Bales (706-542-7566; dbales@uga.edu) and Jisoo Hong (706-542-4905; jhong@uga.edu)** in the Child and Family Development Department, Dawson Hall, The University of Georgia, Athens, GA 30602. If you have any questions about this project, don't hesitate to contact either of the researchers at any time.

## PARENT CONSENT FORM

I, _____, agree to participate in a research study titled "Family Involvement in Preschool Children's Health: A Pilot study of a Family Backpack Program" conducted by Jisoo Hong from the Department of Child and Family Development at the University of Georgia under the direction of Dr. Diane Bales, Department of Child and Family Development, University of Georgia. I understand that my participation is voluntary. I can refuse to participate or stop taking part at any time without giving any reason, and without penalty or loss of benefits to which I am otherwise entitled. If I decide to withdraw, researchers will destroy all information I shared. I understand the procedures described above. My questions have been answered to my satisfaction. I have been given a copy of this form.

**Parent's Signature**:

Signature Date

Name (please print)

**Researchers' Signatures**:

| Diane W. Bales | | |
|---|---|---|
| Name of Researcher | Signature | Date |
| Jisoo Hong | | |
| Name of Researcher | Signature | Date |

**Please sign both copies of this form.**
**Keep one and return one to the designated envelope in your child's classroom.**

*Additional questions or problems regarding your rights as a research participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 629 Boyd Graduate Studies Research Center, Athens, Georgia 30602; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu.*

Appendix B: Teacher Consent Form


Dear Teacher:

You have been invited to participate in a research study entitled “Family Involvement in Preschool Children’s Health: A Pilot study of a Family Backpack Program.” The purpose of this study is to evaluate the effectiveness of *Family Backpacks* as a way to encourage preschool children and their families to learn about good health together. The information you provide during this study will help us learn how families use take-home backpacks with their children, which will help us create more effective family backpacks in the future. Results of this project will be shared through Master’s thesis research. You are being invited to take part in the study because you are a teacher in a class of children between 3 and 5 years old.

**What Will Happen During the Study**
During the study, families who agree to participate will take home a family backpack to use with their preschool child. The backpacks are self-contained education packets of hands-on activities to complete at home, along with necessary supplies for each activity. Parents will complete a pre-survey before receiving the backpack and a post-survey two weeks after returning the backpack.

After all parents have returned the family backpacks and completed their post-surveys, the researchers will contact you to schedule a one-on-one interview. This interview will be conducted in the classroom before or after class hours. Your response will help us gather additional information about preschool-children’s fruit and vegetable consumption during the project. The interview will be short and can be completed about 5 to 10 minutes.

**Benefits and Risks**
As a preschool teacher, you will help us determine whether the family backpacks are effective ways to get families involved in children’s learning and help them connect with school. There are no anticipated risks or discomforts from participating in this project.

**Your Rights as a Participant**
Participating in this project is voluntary. You are not required to sign the consent form and will not be forced or pressured to participate. You may withdraw from the study at any time. If you decide to withdraw, researchers will destroy all information you shared with us.

Interview notes will not include your name, and any information that could identify you

individually will be kept confidential. Interview notes will be stored in a locked office at the University of Georgia, and only the members of the research team will have access to them. Researchers will keep the interview notes for one year, during which time the data will be analyzed and reported. All information that could identify you individually will be destroyed as soon as all data collection is complete, or no later than one year after your interview.

All data will be analyzed and reported as group averages. No individually identifiable information about you will be shared with anyone without your prior consent, except as required by law.

This project is being conducted by **Dr. Diane Bales (706-542-7566; dbales@uga.edu) and Jisoo Hong (706-542-4905; jhong@uga.edu)** in the Child and Family Development Department, Dawson Hall, The University of Georgia, Athens, GA 30602. If you have any questions about this project, don't hesitate to contact any of the researchers at any time.

## TEACHER CONSENT STATEMENT

I, _____, agree to participate in a research study titled "Family Involvement in Preschool Children's Health: A Pilot study of a Family Backpack Program" conducted by Jisoo Hong from the Department of Child and Family Development at the University of Georgia under the direction of Dr. Diane Bales, Department of Child and Family Development, University of Georgia. I understand that my participation is voluntary. I can refuse to participate or stop taking part at any time without giving any reason, and without penalty or loss of benefits to which I am otherwise entitled. If I decide to withdraw, researchers will destroy all information I shared. I understand the procedures described above. My questions have been answered to my satisfaction. I have been given a copy of this form.

**Teacher's Signature**:

Signature Date

Name (please print)

**Researchers' Signatures**:

| | | |
|---|---|---|
| Diane W. Bales | | |
| Name of Researcher | Signature | Date |
| Jisoo Hong | | |
| Name of Researcher | Signature | Date |

**Please sign both copies of this form.**
**Keep one and return one to the researchers.**

*Additional questions or problems regarding your rights as a research participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 629 Boyd Graduate Studies Research Center, Athens, Georgia 30602; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu.*

Appendix C: Parent Letter for Experimental Group

## Dear Parent:

We would like to introduce you to the "Eating Fruits and Vegetables" family backpack that your child has brought home. This family backpack includes a book called *Eating the Alphabet: Fruits & Vegetables from A to Z*, as well as three hands-on fruit and vegetable activities for you and your child to do together.

The purpose of this backpack is to help your child learn to identify, describe, and count fruits and vegetables. You can help your child learn more by talking about fruits and vegetables, comparing them, and encouraging your child to try new fruits and vegetables (without forcing him or her).

This backpack includes complete instructions for each activity, along with the supplies you will need to do the activity. Please choose the activities you and your child would like to try. You don't have to do all of the activities, but you are welcome to try them all if you want to. We encourage you to make time to read the book and to try out at least one activity. Most activities will take only 10 – 15 minutes.

This backpack is yours to use for a week, up to two weeks. You are welcome to do the activities at whatever time works best for your family.

Please return the backpack to your child's classroom no later than _____. Before you return it, please take a moment to give us feedback on the "How Did You Like the Family Backpack?" form. Place that form in the backpack before you return it.

If you have any questions about the backpack, feel free to ask us. We appreciate your time and participation, and hope this will be a fun chance to interact with your child. Thank you for your time.

Sincerely yours,

Dr. Diane Bales and Jisoo Hong

Department of Child and Family Development
University of Georgia

# Appendix D: Activities for Experimental Group

Activity 1: Mystery Bag


# Activity 1: MYSTERY BAG

Supplies in the backpack:

- Six mystery paper bags
- Fruit and vegetable models
- Book : *Eating the Alphabet*

Step one: Preparing

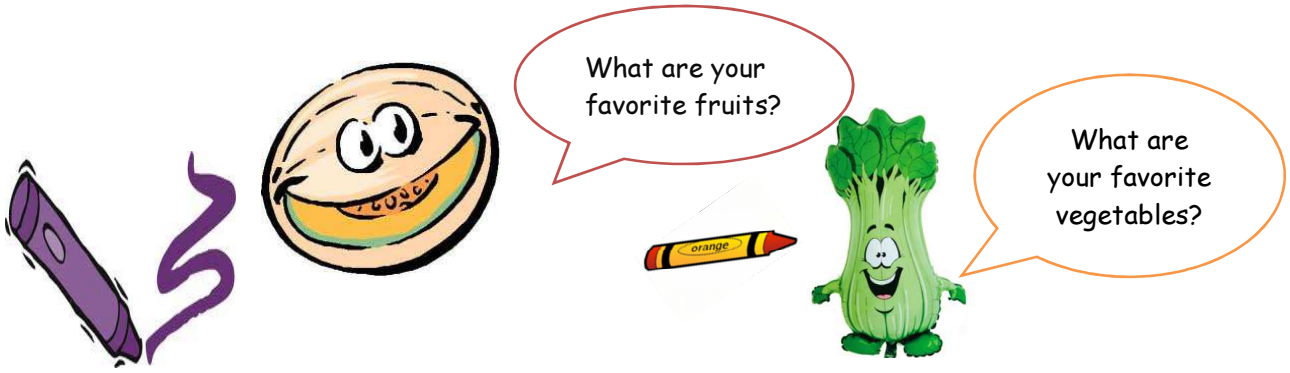
- Place one fruit model in each paper bag. Fold the tops of the bags so your child can't see into them. You don't have to match the color.
- Read the book with your child before starting the activity.

Step two: Playing

- Show your child the mystery bags. Explain that he/she should feel each fruit and guess what it is. Be careful not to show your child what is inside.
- Ask your child what the fruit feels like. Is it round? Is it big?
- Ask your child to guess the fruit.
- Have your child pull the fruit model out of the bag and name the fruit. If he/she doesn't know it, tell him/her the name.
- Talk about its color and shape.
- Repeat the activity with vegetable models.

Step three: Comparing

- If you have real fruits or vegetables that match the models, encourage your child to compare the real fruits and vegetables with the models. How are they different? What does it smell like? What does it taste like?




# Activity 2:MY FAVORITES

Supplies in the backpack:

- Washable markers
- Poster paper: My Favorites
- Book: *Eating the Alphabet*

Step one: Preparing

- Read the book with your child before starting the activity.
- Talk about favorite fruits and vegetables in the book. Ask your child to point out his/her favorite fruits and vegetables.

Step two: Playing

- Tell your child that you are going to draw pictures of fruits and vegetables.
- Work together with your child to draw your favorite fruits and vegetables.
- Look at the book again if you need ideas.
- If your child doesn't have favorite fruits or vegetables, talk about what your child has recently eaten and ask him/her to draw the fruits and vegetables.
- Help your child write the names of the fruits and vegetables on the paper if your child wants.

Step three: Talking

- Put the paper on a wall, so you can see your favorite fruits and vegetables.
- Visit 'My Favorites' later and talk about it. Name the fruits and vegetables. Talk about what they taste like.
- Encourage your child to add more fruits and vegetables to the 'My Favorites' as he/she thinks of them.


# Activity 3: GRAPHING FRUITS AND VEGETABLES

Supplies in the backpack:

- Fruit and vegetable bar graph
- Fruit and vegetable stickers
- Washable markers
- Smile stickers
- Book: *Eating the Alphabet*

Step one: Preparing

- Get out the graph, fruit and vegetable stickers, and washable markers.
- Fill in your child's name on the graph.
- Read the book with your child before starting the activity.

Step two: Playing

- Ask your child to find fruits and vegetables in the kitchen.
- Choose one kind of fruit or vegetable. Ask your child to name it.
- Count together the number of that fruit or vegetable.
- Have your child pick the same fruit or vegetable picture from the stickers.
- Put the sticker below a bar on the graph.

If you don't have a sticker for that fruit or vegetable, you can draw a picture of it.

- Color in the squares on the graph with the number you counted. If you had thee oranges, color in three bars. You don't have to count individual items if they have a lot. For example, a bag of frozen corn can count as one, and a can in the cupboard can count as another one.
- Repeat the activity with other fruits and vegetables.

Step three: Comparison

- Talk about the bar graph. Which one has the tallest bar? Which one has the shortest bar? Point out that the tallest bars are the ones you have the most of right now.
- Have your child put smile stickers on his/her favorite fruits or vegetables.

Appendix E: Parent Letter for Control Group

**Dear Parent**:

We would like to introduce you to the "**Hand Washing**" family backpack that your child has brought home. This family backpack includes a book called *Those Mean Nasty Dirty Downright Disgusting But-- Invisible Germs* as well as three hands-on hand washing activities for you and your child to do together.

The purpose of this backpack is to help your child learn the importance of hand washing to reduce the spread of germs.
This backpack includes complete instructions for each activity, along with the supplies you will need to do the activity. Please choose the activities you and your child would like to try. You don't have to do all of the activities, but you are welcome to try them all if you want to. We encourage you to make time to read the book and to try out at least one activity. Most activities will take only 10 – 15 minutes.

This backpack is yours to use for a week, up to two weeks. You are welcome to do the activities at whatever time works best for your family. Please return the backpack to your child's classroom no later than _____. Before you return it, please take a moment to give us feedback on the "How Did You Like the Family Backpack?" form. Place that form in the backpack before you return it.

If you have any questions about the backpack, feel free to ask us. We appreciate your time and participation, and hope this will be a fun chance to interact with your child. Thank you for your time.

Sincerely yours,

Dr. Diane Bales and Jisoo Hong
Department of Child and Family Development
University of Georgia
Phone: 404-422-0890
Email: jhong@uga.edu

# Appendix F: Activities for Control Group


# Activity 1: SPREADING GERMS

Supplies in the backpack:

- Hand lotion
- Glitter
- A magnifying glass
- Book: *Those Mean Nasty Dirty Downright Disgusting But-- Invisible Germs*

You will also need:

- Hand soap (You can use any type of hand soap. e.g. bar or liquid)
- Towel
- A paper towel

Step one: Preparing

- Read the enclosed book together before starting the activity.
- Gather all necessary materials and sit down with your child.

Step two: Playing

- Put some hand lotion on your hands. Give your child some lotion.
- Pretend to sneeze in your hands.
- Sprinkle some glitter on your hands. Ask your child to pretend that the glitter is germs.
- Shake your child's hands and have the child look at his/her hands. Say, look, you got my germs.
- Have your child rub his/her hands to spread the glitter evenly.
- Ask your child to try to get the glitter off with a dry paper towel.
- Use the magnifying glass to look at his/her hands. Ask if you can still see germs. Ask what we can do to get rid of germs.
- Wash your hands with warm water and soap, and have your child wash his/hers.
- Let your child look at his/her hands after hand washing and drying.
- Use the magnifying glass to take a close look at your hands after you wash them together. If you still see glitter on your hands, wash and dry them again.


# Activity 2: WHAT ARE GERMS?

Supplies in the backpack:

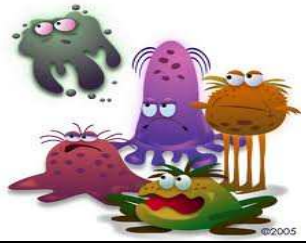
- Markers
- Paper
- Book: *Those Mean Nasty Dirty Downright Disgusting But-- Invisible Germs*

Step one: Preparing

- Read the enclosed book together before starting the activity.
- Gather all necessary materials and sit down with your child.

Step two: Playing

- Encourage your child to draw a germ of his/her own. While your child is creating, draw your own germ.
- Review the pictures in the book. Talk about what the germs look like.
- Ask about the shape of the germs, and explain that there are many types of germs.
- Compare your drawings. Talk about the colors and shapes of the germs. Imagine what the germs you drew might do.
- Remind your child that germs make us sick. We need to wash our hands with soap and water to get rid of the germs.




# Activity 3: HAND WASHING SONG

Supplies in the backpack:

- Hand washing Song sheet
- 'Hand cleaning steps' picture
- Book: *Those Mean Nasty Dirty Downright Disgusting But-- Invisible Germs*

You will also need:

- Hand soap
- Towel
- Internet access (You can also visit your child's school, a public library, or a community center for internet access.)

Step one: Preparing

- Read the enclosed book together before starting the activity.
- If you have internet access, you may want to listen to the songs yourself before playing them for your child.

Step two: Pretending

- Review the steps of hand washing with your child.
- Choose one song you and your child like. Play the song or make your own hand washing song.
- You and your child sing together while rubbing hands for 15-20 seconds.
- Go to your bathroom and wash your hands with soap while singing the song.

Step Three: Adaptation

- Post the song words near the sink in your bathroom. Practice the song with your child each time you wash your hands together.

Appendix G: Backpack Checklist for Families

Please return the following supplies!

Activity 1: 12 Fruit and vegetable models

Activity 2 &3: Washable markers

Book 'Eating the Alphabet Fruits & Vegetables from A to Z'

Parent letter

Activity instructions

"How Did You Like the Family Backpack?" form after you complete it.

Please return the backpack to your child's classroom by _____.

Thank you so much for your cooperation,

*Jisoo Hong*
jhong@uga.edu
Child and Family Development
University of Georgia

Please return the following supplies!

Activity 1: hand lotion, glitter, and magnifying glass

Activity 2: washable markers

Activity 3: hand washing song sheet

Book 'Those Mean Nasty Dirty Downright Disgusting But—Invisible Germs'

Parent letter

Activity instructions

"How Did You Like the Family Backpack?" form after you complete it.

Please return the backpack to your child's classroom by _____.

Thank you so much for your cooperation,

*Jisoo Hong*

jhong@uga.edu
Child and Family Development
University of Georgia

Appendix H: Feedback Form

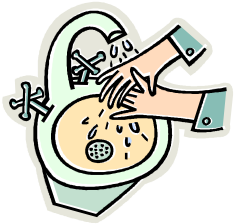
# How did you like the family backpack?

For the following questions, please mark (X) your responses to the following questions.

| | Like it | Neutral | Didn't like it | Didn't try |
|---|---|---|---|---|
| How did you and your child like the book: Eating the Alphabet? | | | | |
| How did you and your child like Activity 1: Mystery Bag? | | | | |
| How did you and your child like Activity 2: My Favorites? | | | | |
| How did you and your child like Activity 3: Graphing Fruits and Vegetables? | | | | |
| Any Comments? | | | | |

Thank you for sharing your opinions!

Please return this form with the backpack when you are finished.



# How did you like the family backpack?

For the following questions, please mark (X) your responses to the following questions.

| | Like it | Neutral | Didn't like it | Didn't try |
|---|---|---|---|---|
| How did you and your child like the book: Invisible Germs? | | | | |
| How did you and your child like Activity 1: Spreading Germs? | | | | |
| How did you and your child like Activity 2: What Are Germs? | | | | |
| How did you and your child like Activity 3: Hand Washing Song? | | | | |
| Any Comments? | | | | |

Thank you for sharing your opinions!

Please return this form with the backpack when you are finished.

Appendix I: Parent Pre-Survey

# Parent Pre-Survey for Family Backpack Project (Form A)

This survey is designed to collect information from parents before you and your child take home a family backpack. **Please check or fill in the best response to each question.** Return your completed survey to your child's classroom.

| | Often | Sometimes | Never |
|---|---|---|---|
| 1. My child follows all the steps of proper hand washing. | 3 | 2 | 1 |
| 2. My child washes his/her hands after using the toilet. | 3 | 2 | 1 |
| 3. My child washes his/her hands before eating. | 3 | 2 | 1 |
| 4. My child washes his/her hands with soap and warm water. | 3 | 2 | 1 |
| 5. My child scrubs his/her hands for 20 seconds when washing. | 3 | 2 | 1 |
| 6. My child and I sing a handwashing song as we wash our hands. | 3 | 2 | 1 |
| 7. We have served fruits at home as a snack or with family meals in the past two weeks. | 3 | 2 | 1 |
| 8. We have served vegetables (other than French fries) at family mealtime or as a snack in the past two weeks. | 3 | 2 | 1 |
| 9. I have talked about what my child eats at school with my child's teacher in the past two weeks. | 3 | 2 | 1 |
| 10. I have talked about what fruits and vegetables my child eats at school with my child's teacher in the past two weeks. | 3 | 2 | 1 |

| | YES | NO | Don't know |
|---|---|---|---|
| 11. My child can name fruits and vegetables. | | | |
| 12. What are your child favorite fruits? | | | |
| 13. What are your child favorite vegetables? | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 14. How many fruits do you usually consume a day? | 0 | 1 | 2 | 3 | 4 | 5 or more |
| 15. How many vegetables (other than French fries) do you usually consume a day? | 0 | 1 | 2 | 3 | 4 | 5 or more |
| 16. How many fruits does your child usually consume a day? | 0 | 1 | 2 | 3 | 4 | 5 or more |
| 17. How many vegetables (other than French fries) does your child usually consume a day? | 0 | 1 | 2 | 3 | 4 | 5 or more |
| 18. How many fruits do you think your preschool child should eat a day? | 0 | 1 | 2 | 3 | 4 | 5 or more |
| 19. How many vegetables do you think your preschool child should eat a day (other than French fries)? | 0 | 1 | 2 | 3 | 4 | 5 or more |

20. Please *circle* all of the following fruits that your child has tried. (Include fresh, frozen, and canned fruits)

Apple, Apricot, Avocado, Banana, Blackberry, Blueberry, Cantaloupe, Cherry, Clementine, Date, Durian, Fig, Grape, Grapefruit, Guava, Honeydew, Huckleberry, Kiwi, Kumquat, Lemon, Lime, Lychee, Mango, Nectarine, Orange, Peach, Pear, Pineapple, Plum, Pomegranate, Prune, Raisin, Raspberry, Rhubarb, Strawberry, Tangerine, Watermelon, other fruits (_____)

21. Please *circle* all of the following vegetables that your child has tried. (Include fresh, frozen, and canned vegetables)

Arugula, Asparagus, Beans, Beets, Broccoli, Brussels sprouts, Cabbage, Cauliflower, Carrots, Celery, Collard Greens, Corn, Cucumbers, Eggplant, Garlic, Kale, Kohlrabi, Leeks, Lettuce, Mustard Greens, Okra, Onions, Parsnips, Peas, Peppers, Potatoes, Pumpkins Radishes, Rhubarb, Rutabagas, Scallions, Shallots, Spinach, Squash, Sweet Potatoes, Swiss chard, Tomatoes, Turnip, Yam, Zucchini, other vegetables (_____)

The following questions ask general information about your background. ***Please check the best answer for each question.***

**Your Age:**

_ 18-24 _25-34 _35-44 _45-54 _55 +

**Your Gender:**

_Male _ Female

**Your Marital Status:**

_Single _Married _Separated _Divorced _Widowed

**Your Highest Educational Level:**

_High School _2 year degree/Associate _Some college work (no degree)

_4 year degree/Bachelor's Degree _Masters/Ph.D. Degree

**Your preschool/ pre-K child's gender:**

_Boy _Girl

**Age of your preschool/pre-K child:**

_3 years old _4 years old _5 years old

**Number of children in your family:**

_One _Two _Three _Four or more

Thank you so much for taking the time to complete this survey.
We appreciate your help!

Appendix J: Parent Post-Survey

# Parent Post-Survey for Family Backpack Project (Form B)

This survey is designed to collect information from parents after you and your child have taken home a family backpack. **Please check or fill in the best response to each question.** Return your completed survey to your child's classroom.

| | Often | Sometimes | Never |
|---|---|---|---|
| 1. My child follows all the steps of proper hand washing. | 3 | 2 | 1 |
| 2. My child washes his/her hands after using the toilet. | 3 | 2 | 1 |
| 3. My child washes his/her hands before eating. | 3 | 2 | 1 |
| 4. My child washes his/her hands with soap and warm water. | 3 | 2 | 1 |
| 5. My child scrubs his/her hands for 20 seconds when washing. | 3 | 2 | 1 |
| 6. My child and I sing a handwashing song as we wash our hands. | 3 | 2 | 1 |
| 7. We have served fruits at home as a snack or with family meals in the past two weeks. | 3 | 2 | 1 |
| 8. We have served vegetables (other than French fries) at family mealtime or as a snack in the past two weeks. | 3 | 2 | 1 |
| 9. I have talked about what my child eats at school with my child's teacher in the past two weeks. | 3 | 2 | 1 |
| 10. I have talked about what fruits and vegetables my child eats at school with my child's teacher in the past two weeks. | 3 | 2 | 1 |

| | YES | NO | Don't know |
|---|---|---|---|
| 11. My child can name fruits and vegetables. | | | |
| 12. What are your child favorite fruits? | | | |
| 13. What are your child favorite vegetables? | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 14. How many fruits do you usually consume a day? | 0 | 1 | 2 | 3 | 4 | 5 or more |
| 15. How many vegetables (other than French fries) do you usually consume a day? | 0 | 1 | 2 | 3 | 4 | 5 or more |
| 16. How many fruits does your child usually consume a day? | 0 | 1 | 2 | 3 | 4 | 5 or more |
| 17. How many vegetables (other than French fries) does your child usually consume a day? | 0 | 1 | 2 | 3 | 4 | 5 or more |
| 18. How many fruits do you think your preschool child should eat a day? | 0 | 1 | 2 | 3 | 4 | 5 or more |
| 19. How many vegetables do you think your preschool child should eat a day (other than French fries)? | 0 | 1 | 2 | 3 | 4 | 5 or more |

20. Please *circle* all of the following fruits that your child has tried. (Include fresh, frozen, and canned fruits)

Apple, Apricot, Avocado, Banana, Blackberry, Blueberry, Cantaloupe, Cherry, Clementine, Date, Durian, Fig, Grape, Grapefruit, Guava, Honeydew, Huckleberry, Kiwi, Kumquat, Lemon, Lime, Lychee, Mango, Nectarine, Orange, Peach, Pear, Pineapple, Plum, Pomegranate, Prune, Raisin, Raspberry, Rhubarb, Strawberry, Tangerine, Watermelon, other fruits (_____)

21. Please *circle* all of the following vegetables that your child has tried. (Include fresh, frozen, and canned vegetables)

Arugula, Asparagus, Beans, Beets, Broccoli, Brussels sprouts, Cabbage, Cauliflower, Carrots, Celery, Collard Greens, Corn, Cucumbers, Eggplant, Garlic, Kale, Kohlrabi, Leeks, Lettuce, Mustard Greens, Okra, Onions, Parsnips, Peas, Peppers, Potatoes, Pumpkins Radishes, Rhubarb, Rutabagas, Scallions, Shallots, Spinach, Squash, Sweet Potatoes, Swiss chard, Tomatoes, Turnip, Yam, Zucchini, other vegetables (_____)

Now that you have used the family backpack, we want to know what you think about it. Please check the box with the best answer to each question.

| | Strongly Disagree | Disagree | Not sure | Agree | Strongly Agree |
|---|---|---|---|---|---|
| The family backpack was appropriate for my child's age. | | | | | |
| The activities in the backpack were fun and interesting. | | | | | |
| The instructions for the activities were clear and easy to understand. | | | | | |
| The parent letter helped me understand what to do with the backpack. | | | | | |
| The backpack materials were well-organized and clearly labeled. | | | | | |
| The book in the backpack was interesting and enjoyable. | | | | | |
| I would recommend this backpack to other parents of preschoolers. | | | | | |

How would you make the backpack better?

Thank you so much for taking the time to complete this survey.
We appreciate your help!

Appendix K: Teacher Interview Protocol

# TEACHER INTERVIEW PROTOCOL

## (Form C)

Date: _____
Group:
___Experimental
___Control

*To gather additional information about preschool-children's fruit and vegetable consumption and family backpacks, researchers will ask preschool teachers the following questions at the conclusion of the pilot study.*

1. What do you usually do as a preschool teacher to teach children about fruits and vegetables?

2. What type of nutrition education program are you currently using in your classroom?

3. What changes have you noticed in children's consumption of fruits and vegetables since this project started?

4. What changes have you noticed in children's understanding of fruits and vegetables since this project started?

5. What did you hear from children and parents about the family backpacks?

6. How effective do you think the backpacks have been in getting families involved in their children's learning?