THE INFLUENCE PARENTS' ATTITUDES, SUBJECTIVE NORMS, PERCEIVED BEHAVIORAL CONTROL, AND INTENTIONS HAVE ON THE TIMING AND INTRODUCTION OF COMPLEMENTARY FOODS: AN APPLICATION OF THE THEORY OF PLANNED BEHAVIOR

by

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(Under the Direction of David W. Wright)

ABSTRACT

Using data from 131 first-time parents with children between six and 12 months, this study applies the theory of planned behavior (Ajzen, 1991) to examine the influence parents' attitudes, subjective norms, perceived behavioral control, and intentions have on the timing and introduction of complementary foods. Path analysis results indicated that parents' attitudes influenced infant feeding behavior at six months old. Contrary to previous studies, additional analyses indicated parents obtain most of their infant feeding information from a doctor or other health professional and that a majority of parents are in fact introducing complementary foods at the age recommended by the American Academy of Pediatrics. Strengths and limitations of the present study are discussed, and directions for future research are presented.

INDEX WORDS: Complementary feeding, Theory of planned behavior, First-time parents, Infant feeding recommendations, Feeding practices

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CHAPTER 1

INTRODUCTION

Infants are born with the innate ability to regulate their caloric intake for survival (Bante, Elliott, Harrod, & Haire-Joshu, 2008), but parents begin influencing infant feeding behaviors from the very first breast or formula feeding. Parents are responsible for what and when they feed their infants, and often feeding decisions are based on infant developmental characteristics, such as age, gender, eating behaviors, weight, or in response to perceived threat to the infant's health (Birch, Savage, & Ventura, 2007; Hamilton, Daniels, White, Murray, & Walsh, 2011; Heinig et al., 2006).

Infant feeding practices can often be categorized into two styles (a) restricting/ monitoring, where the parent tries to limit the amount of food being consumed, even if the infant is hungry or (b) pressuring/forcing, where the parent tries to force the infant to eat even if they are full (Gross, Mendelsohn, Fierman, & Messito, 2011). Parents may begin a restricting/ monitoring style while breastfeeding (i.e. pumping breast milk so they can bottle feed and see exactly how much their infant is consuming) but parent feeding styles often continue into the introduction of complementary foods and beyond. For those new to the term, complementary feeding is the act of introducing an infant to any liquid or solid that is not breast milk or formula (Schwartz, Chabanet, Lange, Issanchou, & Nicklaus, 2011). It is called complementary feeding because its purpose is to complement breast milk or formula, and provide the body with the nutrients it needs but can no longer receive exclusively from breast milk or formula (Schwartz et al., 2011).

Although parents often restrict or pressure infant feeding in good faith (i.e. limiting candy and encouraging fruit and vegetables), research has shown these feeding practices actually weaken the infants ability to regulate their caloric intake by the age of two (Bante et al., 2008; Sherry et al., 2004; Spruijt-Metz, Li, Cohen, Birch, & Goran, 2006). In fact, studies have shown that by the age of three or four, a child's eating behavior is no longer driven by innate abilities, but by external cues such as portion size and food presentation (Horodynski et al., 2007).

Pressuring/forcing also plays a critical role in what foods an infant likes and dislikes (Musher-Eizenman & Holub, 2007). For example, dessert is often used by parents to reward good behavior or to encourage children to eat their broccoli. Contrary to popular belief, using dessert as a reward for an infant eating their broccoli actually leads to the child learning to dislike the forced food (broccoli) and desire the rewarded food (dessert) (Savage, Fisher, & Birch, 2007). Similarly, restricting a certain food (i.e. cookies) leads to an increased desire for the food, which often results in the infant indulging whether they are hungry or not, when they are allowed the food (Savage et al., 2007).

Statement of the Problem

There is an abundance of research showing how the above feeding styles influence not only immediate eating behaviors, but can have a long-term effect on an infants' health, nutrition, and weight status (Kalinowski et al., 2012; Musher-Eizenman & Holub, 2007; Thompson, Adair, & Bentley, 2013). However, most studies on feeding styles focus on preschool children (Polfuss & Frenn, 2012). Also, although parent feeding styles can often be seen in early infancy with breastfeeding or bottle feeding and continue into the introduction of complementary foods and beyond, literature on parent feeding practices in infancy seem to focus solely on the decision to exclusively breastfeed or bottle feed.

Purpose of the Study

According to Hamilton et al. (2011), few studies have investigated the introduction of complementary foods using established theoretical frameworks. Since, there is a large quantity of information on breastfeeding and bottle feeding using the theory of planned behavior (Bai, Wunderlich, & Fly, 2011; Khatun, Punthmatharith, & Orapiriyakul, 2010, Lawton, Ashley, Dawson, Waiblinger, & Conner, 2012; McMillan et al., 2008), this study extends existing research by using this theory to look at the timing and introduction of complementary foods. The theory of planned behavior argues behaviors are determined by an individual's attitudes as well as subjective norms and their perceived behavioral control (Ajzen, 1988). This present study attempts to create a measure to examine the influence parents' attitudes, subjective norms, perceived behavioral control, and intentions have on the timing and introduction of complementary foods at six months.

Path analysis was used to analyze the paths hypothesized by the theory of planned behavior. A sample of first-time parents with children between six and 12 months completed an online survey about their attitudes, subjective norms, perceived behavioral control, intentions, and outcome behavior. Results from this study show where parents receive feeding information from and suggest a direct path that could be added to the theory of planned behavior from attitudes to behavior.

CHAPTER 2

LITERATURE REVIEW

Feeding recommendations are in place because infants are not born developmentally ready to process solid food and beverages, other than breast milk and formula. Infants' digestive systems do not have the enzymes needed to digest certain foods and their kidneys cannot tolerate large amount of protein and electrolytes, which can cause diarrhea (Crocetti, Dudas, & Krugman, 2004). The following paragraphs summarize the current recommendations set forth by the American Academy of Pediatrics (AAP), World Health Organization (WHO), and Women, Infants, and Children (WIC) regarding the timing and the introduction of solid foods. Table 1 compares the three recommendations.

AAP recommends exclusive breastfeeding for about six months, with continued breastfeeding until at least 12 months. They caution that what is developmentally appropriate for one infant, may not be developmentally appropriate for another, and advise an infant should be able to hold his head up, open his mouth when food comes his way, and move food from a spoon into his throat; and should have doubled their birth weight and weigh at least 13 pounds before introducing complementary foods (Dietz & Stern, 2011).

WHO recommends exclusive breastfeeding until six months (180 days), with continued frequent, on-demand, breastfeeding until at least two years. Although they do not provide any signs an infant is ready for complementary foods, they maintain six months is the magic age because an infant has usually at least doubled their birth weight, and are becoming more active, making exclusive breastfeeding no longer sufficient to meet all energy and nutrient needs

without adding complementary foods. They further recommend breastfeeding over two years of age because breast milk continues to provide protective factors and higher quality nutrients than complementary foods (World Health Organization [WHO], 2009).

WIC recommends exclusive breastfeeding until an infant is four to six months, cautioning, like AAP, that what is developmentally appropriate for one infant may not be developmentally appropriate for another. They state research has shown no evidence of harm if an infant is developmentally ready to consume complementary foods and the infant is over four months of age, and few studies have shown significant benefit in waiting to introduce complementary foods at six months. Before introducing complementary foods, they advise an infant should be able to sit up, hold his head steady and straight, open his mouth when he sees food coming, keep his tongue low and flat to receive the spoon, close his lips over a spoon and scrape food off as a spoon is removed from his mouth, and keep food in his mouth and swallow it rather than pushing it back out on his chin (United States Department of Agriculture, Food and Nutrition Service, Special Supplemental Nutrition Program for Women Infants, and Children [WIC], 2009).

Table 1.

Side-by-Side Comparison of Feeding Recommendations

	Exclusive breastfeeding until…	Continued breastfeeding until…	Signs an infant may be ready for complementary foods
AAP	About 6 months	At least 12 months	Can hold his head up Can sit fully upright Opens his mouth when food comes Can move food from a spoon into his throat Has doubled his birth weight and weigh about 13lbs or more
WHO	6 months (180 days)	2 years of beyond	No signs – By 6 months, exclusive breastfeeding is no longer sufficient to meet all energy and nutrient needs and complementary foods should be introduced to make up the difference
WIC	4 – 6 months	No mention	Sit up, alone or with support Hold his head steady and straight Open his mouth when he sees food coming Close his lips over a spoon and scrape food off as a spoon is removed from his mouth Keep food in his mouth and swallow it rather than pushing it back out on his chin

Inappropriate Feeding Practices

With three similar, yet different, recommendations regarding the timing and introduction of complementary foods, from three reputable professional organizations, this transition can be a confusing one for parents and professionals alike. This makes it important to define, that for the purpose of this study, inappropriate feeding practices will be defined as not adhering to the infant feeding recommendations set forth by AAP. AAP recommendations were chosen for two reasons (a) WIC cite several AAP sources in their recommendations and are similar largely for that reason, and (b) WHO recommendations are less conservative so they are appropriate for

both developing and developed countries. Since the United States does not have the same health problems and food insecurity as developing countries, breastfeeding until at least two years is not as necessary to protect against hunger and disease.

Several studies have documented inappropriate feeding practices. Globally, Synott et al. (2007) found 85% of mothers do not adhere to feeding recommendations. More locally, a study by Hamilton et al. (2011) found that 18% of infants were introduced to complementary foods before four months of age and 67% before six months of age. Similarly, Crocetti et al. (2004) found the percentage of infants that were introduced to complementary foods early to be between 50% and 78%. Several studies have also reported parent and child characteristics that may make the early introduction of complementary foods more likely. Parent characteristics can include being young, smoking, having a low level of education, having a low income, and never breastfeeding, or only doing so for a short period of time (Baker, Michaelsen, Rasmussen, & Sørensen, 2004; Crocetti et al., 2004; Fewtrell, Lucas, & Morgan, 2003; Hamilton et al., 2011; Horodynski et al., 2007; Huh, Rifas-Shiman, Taveras, Oken, & Gillman, 2011; Scott, Binns, Graham, & Oddy, 2009). Fewtrell et al. (2003) found children who are heavier at birth, seven months, and 14 months are more likely be given/have been given complementary foods earlier.

In addition to introducing complementary foods before recommended, inappropriate feeding practices also include late transitioning and late introduction to complementary foods. AAP recommend children should be completely weaned (transitioned from bottle to a cup) off the bottle by 18 months. Weaning should begin at one year by replacing a cup for a bottle feeding. It is okay for an infant to have up to four ounces of 100% fruit juice after they are six months old. However, nothing should ever be put in a bottle except for breast milk, formula, or water, so if offering juice is desirable, weaning can begin as early as six months (Dietz & Stern,

2011). Bonuck, Huang, and Fletcher (2010) studied weaning practices in the United States and found more than 25% of one year olds had not yet begun weaning, and a shocking nine percent of three-year-olds were still bottle feeding.

Early Introduction of Complementary Foods

Several studies have shown both short and long-term consequences to introducing complementary foods earlier than recommended. As an infants' consumption of complementary foods increases, the amount of breast milk or formula they are drinking decreases. If infants are not reaping the digestive benefits of exclusive breast or bottle feedings, they have to rely on the complementary foods they are eating to make up the vitamins and nutrients, which can lead to inadequate nutrient and energy intake, iron deficiency anemia, stress on the infants' digestive system, and delayed growth and cognitive development (Crocetti et al., 2004; Hamilton et al., 2011; Scott et al., 2009).

Infants' who begin complementary foods prior to four months are also at an increased risk for choking, diabetes, eczema, allergies, dental caries, food aversion, choking, high blood pressure, and obesity (Avery & Baxter, 2001; Bante et al., 2008; Benton, 2004; Black, Siegel, Abel, & Bentley, 2001; Olson, Horodynski, Brophy-Herb, & Iwanski, 2010). In fact, Jimenez-Cruz, Bacardi-Gascon, Pichardo-Osuna, Mandujano-Trujillo, and Castillo-Ruiz (2010) found this early introduction to complementary foods can already be associated with obesity at age three.

Late Introduction of Complementary Foods

Although introducing complementary foods too early can have detrimental effects, introducing them too late (after six months of age) may also result in difficulties, including under-nutrition (since solid foods are needed to complement the breast milk or formula with nutrients they can no longer provide sufficiently at six months of age), feeding problems (both

being physically able to eat and in preference), and may increase the child's risk of developing a wheat allergy (González-Cossío, Rivera-Dommarco, Moreno-Macías, Monterrubio, & Sepúlveda, 2006; Horodynski et al., 2007; Wright, Parkinson, & Drewett, 2004). Infants are also born with an iron store that lasts until approximately six months old. At that point complementary foods should be introduced to provide adequate nutrition and a child's dependence on milk should decrease (Avery & Baxter, 2001). These consequences emphasize the importance of following feeding recommendations beginning in infancy, because dietary habits learned in childhood are likely to be carried on throughout life (Clark, Goyder, Bissell, Blank, & Peters, 2007; Horodynski et al., 2007). Since few studies have investigated the introduction of complementary foods using established theoretical frameworks (Hamilton et al., 2011), one way to understand feeding is by using the theory of planned behavior. This theory proposes a link between attitude toward the behavior, perceived behavioral control, and subjective norms and behavior (Ajzen, 1991).

The Theory of Reasoned Action

The theory of reasoned action (Ajzen, 1988) assumes that an individual's actions are based on their intent to perform, or not perform, some voluntary behavior (see Figure 1). Behavioral intent is determined by two basic factors: one's attitude toward the behavior and subjective norm. Attitude toward the behavior is defined by Ajzen (1988) as one's "positive or negative evaluation of performing the particular behavior of interest," and subjective norm is defined as "the person's perception of social pressure to perform or not to perform the behavior under consideration" (p. 117).

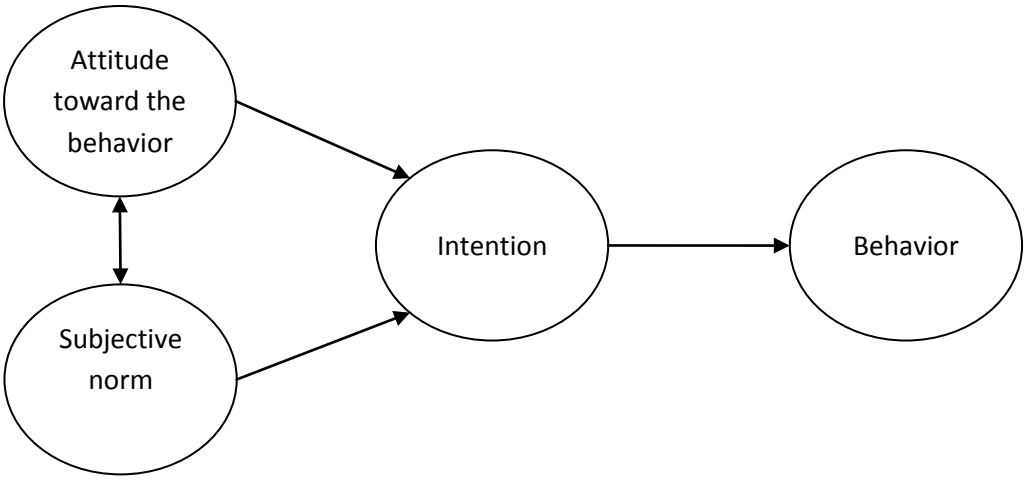

Figure 1. The theory of reasoned action (Ajzen, 1988).

In general, the more positive one's attitudes are towards a behavior and the more one believes others want them to perform a behavior, the more likely they are to intend to perform the behavior. For example, an expectant mother was breastfed as an infant has always assumed she would do the same for her children. During her first visit to the doctor, the doctor discusses the benefits of breastfeeding over formula feeding and provides her with several pamphlets and resources to promote breastfeeding. The mother in this example has a positive attitude towards breastfeeding (attitude toward the behavior) and believes her doctor wants her to breastfeed (subjective norm), making her more likely to intend to breastfeed.

Furthermore, Ajzen (1988) believes that stating one's intent to perform a certain behavior to someone else makes him/her more likely to perform that behavior. Using the previous example, if the expectant mother tells her doctor she intends to breastfeed, this makes it more likely she will end up breastfeeding because the expectant mother will feel more accountable to do so.

The Theory of Planned Behavior

The theory of planned behavior is a well-validated theoretical model that is an extension of the theory of reasoned action. The theory of planned behavior adds perceived behavioral control to the original model, which is defined by Ajzen (1988) as "the perceived ease or difficulty of performing the behavior…it is assumed to reflect past experience as well as anticipated impediments and obstacles" (p. 132). This new variable indirectly influences behavior similar to attitudes and subjective norms, but it also has a unique direct effect on behavior (see Figure 2).

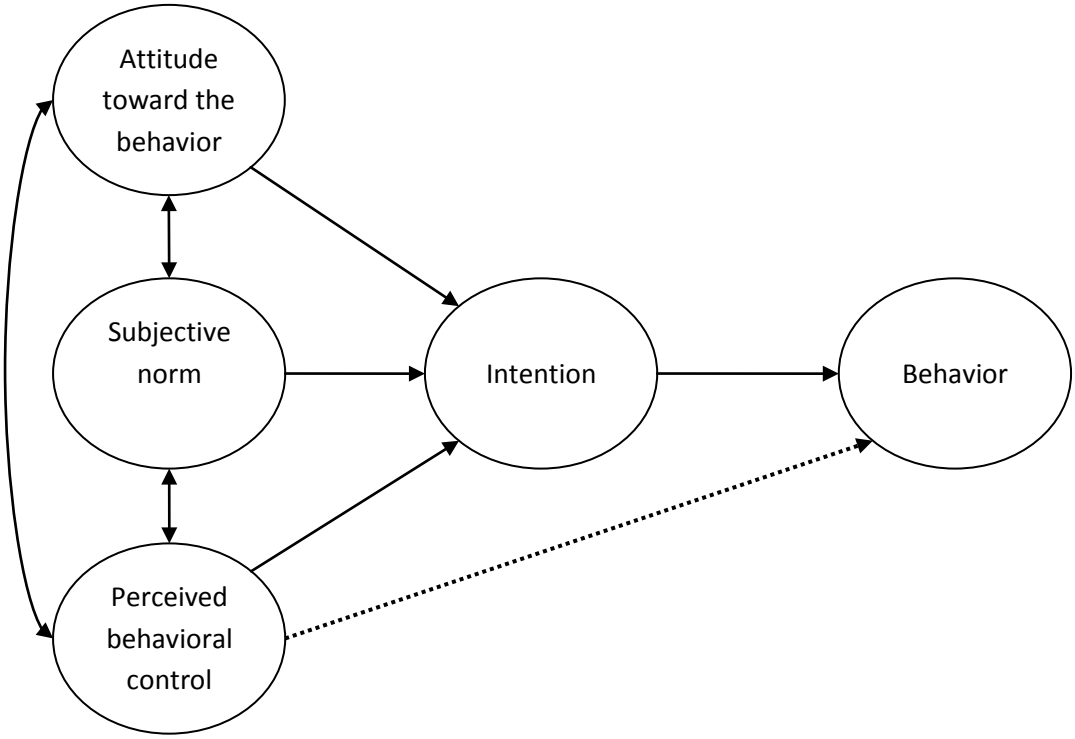

Figure 2. The theory of planned behavior (Ajzen, 1991).

To illustrate perceived behavioral control using the previous example, if the expectant mother does not think she can breastfeed (whether due to resources, opportunities, or ability) she is unlikely to have a strong intent to do so, even if she has positive attitudes towards the behavior because she has always assumed she would breastfeed her children and she believes her doctor

wants her to breastfeed. This example shows an indirect effect on behavior, mediated through intention. On the other hand, if the expectant mother does not think she can breastfeed (whether due to resources, opportunities, or ability) there is some degree of accuracy in predicting she will not end up breastfeeding, even if she has positive attitudes towards the behavior because she has always assumed she would breastfeed her children and she believes her doctor wants her to breastfeed. This example shows a direct effect on behavior.

However, perceived behavioral control is not realistic in cases where a person simply does not have control of the behavior. Applied to the example, say the expectant mother has positive attitudes towards the behavior because she has always assumed she would breastfeed her children, believes her doctor wants her to breastfeed, and believes she has the resources, opportunity, and ability to breastfeed, but her infant never latches on. The expectant mother will not be able to perform the outcome behavior of breastfeeding.

Connecting Existing Literature to Elements of the Theory of Planned Behavior

Next, parent feeding practices will be structured around the elements presented in the theory of planned behavior. The first section will describe what parents are doing in their feeding practices of infants, or the behavior ultimately being performed. The next three sections will discuss parents' attitudes, subjective norms, and perceived behavioral control. There is some overlap in these sections as the model shows potential for a bi-directional relationship between each of these variables. For example, if a parent has a negative attitude about breastfeeding, looking at the theoretical model it could definitely fit under "attitude toward the behavior." However, if the parents' attitudes were formed based on their families' pressure/beliefs, it could also fit under "subjective norm." Furthermore, if the parents' attitude was formed because they had trouble getting the child to latch on, looking at the theoretical

model it could fit under "perceived behavioral control." To address this overlap and structure this paper on the elements of the theory and avoid repetition, the existing literature is fit into the variable believed it could *best* describe, based on the information provided. Finally, intention as a mediator is addressed before going into final conclusions.

Parent feeding behaviors. Many parents plan whether they are going to breast/bottle feed, and for approximately how long, during their pregnancy, but few parents plan when they will introduce complementary foods or what foods they will introduce first (Heinig et al., 2006). It is clear from the literature that across different cultural contexts, the timing of the introduction of solid foods varies and typically deviates from the guidance provided (Vereijken, Weenen, & Hetherington, 2011). In the United States, for example, exclusive breastfeeding for the first six months of life is not the cultural norm, despite clear benefits of observing this guideline (Bai et al., 2011).

Part of this problem could be that not all government agencies provide feeding guidance for all age groups. For example, the United States Department of Agriculture (USDA) has been publishing nutrition guidelines since the early 1990s when they introduced their first food pyramid that was divided into six horizontal sections, with "fats, oils and sweets" at the top, and the "bread, grains, rice, and pasta group" at the bottom, with the rest in between. In 2005, they revised the food pyramid and introduced MyPyramid with six vertical sections, while adding a figure walking up stairs on the side of the pyramid to stress the importance of physical activity. Most recently, in July 2011 the USDA discarded the pyramid format and released MyPlate, which divides four of the food groups into quarters and clearly indicates how your plate should look at every meal, and has the dairy food group, resembling a glass of milk, at the top of the plate. It shows half of your plate should be made up of fruits and vegetables (more vegetables

than fruits) and half of your plate made up of protein and grains (slightly more grains than protein). Whether you're looking at the old food pyramid, MyPyramid, or the new MyPlate, the story remains the same, however. They are intended for children and adults ages two and up, leaving a gap in guidance and information for those who are pregnant, planning to become pregnant, and/or have children under the age of two.

Although this gap exists, studies have shown that even when parents are aware of feeding recommendations many infants are introduced to complementary foods earlier than recommended (Black et al., 2001; Crocetti et al., 2004; Horodynski et al., 2007; Wright et al., 2004). Perhaps even more alarming, Baughcum, Burklow, Deeks, Powers, and Whitaker (1998) found mothers were not only introducing complementary foods too early, but most children were being given regular table foods, not just baby food, before recommended.

Mothers who introduce complementary foods before recommended often cite various reasons. Some of the most prevalent include feeling that their child is not satisfied with just breast milk or formula, to help them sleep though the night, or to keep them from spitting up (Heinig et al., 2006; Horodynski et al., 2007; Olson et al., 2010; Scott et al., 2009; Synnott et al., 2007).

Evidence for the influence of attitudes. Attitudes are determined by parents' beliefs that performing a behavior is important, or will lead to certain positive or negative outcomes (Bai et al., 2011; Hamilton et al., 2011; Heinig et al., 2006). As you could imagine, these beliefs can be a strong underlying reason for not adhering to recommended guidelines. This section provides evidence from existing literature of parents' attitudes influencing their decision to not follow recommended feeding guidelines.

Parents' beliefs about how big their child should be, how much they should consume per meal, and even the parents' own weight status can influence the early introduction of complementary foods. For example, studies have shown it is a common belief among parents that a heavier infant is a healthier infant because an infants' weight is a sign of economic status and good parenting (Baughcum et al., 1998; Benton, 2004; Redsell et al., 2010). In fact, a study by Sullivan, Leite, Shaffer, Birch, and Paul (2011) found that as many as one in five urban parents showed a preference for heavier infants than infants that were a healthy or lower weight. Along those same lines, Baughcum et al. (1998) reported some mothers were nervous they would draw attention from social service agencies if their child was underweight, thus they preferred their infant to be heavier. On the other hand, parents with high socioeconomic status are more likely to maintain a desire for lower weight children (Spruijt-Metz et al., 2006). Higher levels of maternal education are predictive of children consuming more fruit and fiber and less fat than mothers with lower nutritional knowledge. Similarly, having parents with a college education is predictive of positive child feeding practices (Clark et al., 2007; Hendricks, Briefel, Novak, & Ziegler, 2006).

Genetics have also been found to influence parents' attitudes. For example, Redsell et al. (2010) found that mothers own weight status can affect their attitudes towards their infants' weight, and those who were overweight or obese preferred larger infants, often because they believed their children were genetically determined to be overweight or obese like they were.

From an outreach standpoint, some parents believe the feeding recommendations they are receiving from health care professionals are inconsistent with what other health professionals or sources say, increasing the likelihood parents will go to less credible sources for information and ultimately receive advice contrary to recommendations in place (Olsen et al., 2010). Parents

may also take infants reaching for food as a sign they want it or are ready to consume these foods (Heinig et al., 2006) and tend to see introducing complementary foods as a developmental milestone, rather than its purpose to complement exclusive breast milk/formula feeding for nutritional reasons (Crocetti et al., 2004).

Evidence for the influence of subjective norms. Subjective norms are determined by parents' beliefs about what others think about performing a behavior and the perceived pressure for them to perform a behavior. Subjective norms are then weighted by the parents' motivation to go along with those people (Bai et al., 2011; Hamilton et al., 2011). Studies on low-income families have shown parents often rely on direct or perceived information from sources such as family members, friends, other parents, parenting groups, social media, secondary health professionals, food packaging, and/or the grocery store and rather than their main healthcare provider (Heinig et al., 2006; Olson et al., 2010). The Millennium Baby Study found advice from friends and family to be the most popular reason given by parents for introducing complementary foods early (Wright et al., 2004).

Swanson and Power (2005) found subjective norms are an important consideration for first-time mothers. Their study found deciding whether to breastfeed or bottle feed, is strongly influenced by what is socially acceptable or desirable and is open to both social and cultural influences and that mothers who ended up breastfeeding perceived more social pressure to do so than bottle feeders, and bottle feeders perceived the opposite. They were also more likely to seek or consider others' opinions because they may lack confidence in their own decisions (Swanson & Power, 2005). Some mothers may not even be aware of others' opinions about infant feeding until they are faced with a decision or experience reactions from others after performing the behavior (Swanson & Power, 2005). However, first-time parents are more likely to follow

feeding recommendations in place than parents who have had more than one child (Synnott et al., 2007).

Culture, race, and ethnicity are major factors to consider when looking at the influence of subjective norms. Studies have shown African American mothers are more likely to turn to grandmothers, sisters, and cousins for advice when it comes to child feeding, then listen to advice from primary or secondary healthcare providers, whereas Caucasian mothers tend to value the advice of their healthcare provider more (Horodynski et al., 2007). Another study (Avery & Baxter, 2001) found in Asian culture, some family and friends stress the key to a healthy diet is giving children sweetened milk in a bottle, and that children should not be transitioned from the bottle until between one and five years. A study by Corsini, Danthiir, Kettler, and Wilson (2008) also found this to be true, regardless of daughters' BMI, meaning parents were just as likely to restrict certain foods for thin daughters as they were for obese daughters (Taveras et al., 2004).

Parents' socioeconomic status has also been shown to influence subjective norms. Studies have shown low income mothers report healthcare providers are an important source of information, but they often rely on their own mother as the primary source of information because they have trouble understanding or relating to health professionals (Benton, 2004; Olson et al., 2010). Additionally, a study by Baughcum et al. (1998) found a majority of low income mothers introduced cereal to their infants well before the recommended four to six months, some as early as three days old, as handed down by the maternal grandmother.

Evidence for the influence of perceived behavioral control. Perceived behavioral control is determined by specific situational factors and the degree to which those factors make it easy or difficult to perform the behavior (Bai et al., 2011; Hamilton et al., 2011). Parents'

socioeconomic status plays a large role in perceived behavioral control since low socioeconomic status is related to a lack of resources, education, social support, poor diet, and lack of access to low-fat and low-calorie palatable foods (Spruijt-Metz et al., 2006). For example, there is evidence that fast food restaurants and convenience stores are more prevalent in low income neighborhoods, and supermarkets that sell fresh fruit and vegetables are fewer (Spruijt-Metz et al., 2006).

Feeding decisions can also stem from parents' beliefs about their ability to adhere to feeding recommendations (Heinig et al., 2006). Horodynski et al. (2007) found that mothers were able to identify appropriate feeding recommendations regarding the introduction of complementary foods, but sometimes believed introducing complementary foods was inevitable because they were not certain that the recommendations were applicable to all children. Heinig et al. (2006) found parents, especially teenage parents, are more likely to cease exclusive breastfeeding if family members, caregivers, or hospital staff introduced the child to formula for one reason or another. Parents in these situations believed their child had become accustomed to formula so they could not go back to exclusive breast feeding, and could mix feed at the best. Parents who go back and forth between feeding breast milk and formula, (for example, breastfeeding nights and weekends and formula feeding during the week) often quickly transition to strictly formula feeding (Heinig et al., 2006). Baughcum et al. (1998) found parents to have a similar mindset regarding complementary feeding, and that once children were introduced to a type of complementary food they could not go back and withhold that food, even if advised to do so by healthcare providers. Breastfeeding may be the best example of perceived behavioral control, as many mothers know breastfeeding is the most recommended practice, but stop

breastfeeding due to complications with latching, poor milk production, or other complications (Heinig et al., 2006).

Evidence for intention as a mediator for behavior. Evidence for the influence of intentions as a mediator for behavior has been shown to vary. Bai et al. (2011) found attitudes, subjective norms, and perceived behavioral control all to be all significant predictors of intention, but when looking at exclusive breastfeeding, attitude and subjective norms were significant predictors of intention, with subjective norm being more influential (Bai et al., 2011). Swanson and Power (2005) also found breastfeeding and bottle feeding beliefs, but not subjective norms, to be significant predictors of intentions.

Final Conclusions about Existing Literature

The preceding literature review shows abundant research on infant feeding practices. Although Ajzen (1988) mentioned the benefits of studying breastfeeding using the theory of planned behavior as a framework, only recently studies begun to emerge using this framework to look at complementary feeding practices. The studies reviewed provide significant insight into maternal thoughts and actions regarding recommended feeding practices that can be helpful in developing parent education materials. Although some findings are sample dependent, there are some general take-away messages from the reviewed literature.

First and foremost, attitudes, subjective norms, and perceived behavioral control are extremely important in parenting decisions. Studies agree mothers tend to believe “bigger is better,” the maternal grandmother has a significant impact on infant feeding decisions, mothers report being aware of recommended feeding practices but still not adhering to them, and education and income are important factors in parents adhering to recommended feeding practices.

Parents and caregivers also need a better understanding of infant developmental readiness in feeding and eating, and more help on what to feed and when to feed. Mothers may be confused by the mixed messages that are sometimes given in the various recommendations on the duration of exclusive breastfeeding, and the appropriate age of introduction for complementary feedings. Others will not or cannot follow recommendations for exclusive breastfeeding for six months. For them, partial breastfeeding is still better from the health standpoint than not breastfeeding at all. They must be provided with advice about formula preparation, frequency, and amounts of feeding and introduction of other complementary foods (Dwyer, Butte, Deming, Siega-Riz, & Reidy, 2010).

Gaps in the literature. According to Hamilton et al. (2011), few studies have investigated the introduction of complementary foods using established theoretical frameworks. Many studies also did not highlight the child's position in the family as an important factor in feeding practices, but Hamilton et al. (2011) suggest feeding behaviors applied to the first child are predictive of feeding choices with subsequent children, so future research should be very specific in whether their samples consist of first-time parents, second-time parents, etc. Research adopting the suggestions above can contribute significantly to the existing literature. This study addressed these gaps and examined the influence parents have on the introduction of complementary foods utilizing path analysis.

Research Questions

1. Do parents' attitudes influence the timing of the introduction of complementary foods?
2. Do parents' perceptions of subjective norms influence the timing of the introduction of complementary foods?

3. Does parents' perceived behavioral control influence the timing of the introduction of complementary foods?
4. Do parents' intentions influence the timing of the introduction of complementary foods?

CHAPTER 3

DESIGN AND METHODS

Based on the existing research, it appears that attitudes, subjective norms, perceived behavioral control, and intentions are related to, and potentially influence, infant feeding behavior at six months. However, little research has fully explored these connections using a theoretical model. Employing path analysis, the current study explores how attitudes, subjective norms, perceived behavioral control, and intentions are connected to infant feeding behavior of six month old infants. In this chapter, details about the sample and how it was recruited will be discussed. Next, the measures that were used to collect data from respondents will be explained. Finally, the statistical analyses employed will be reviewed.

Recruitment

Information about the study was distributed using internet sources, such as Facebook, Twitter, and electronic listservs, as well as the use of flyers that were distributed at child care centers, mothers groups, and restaurants in Athens, Georgia. Parents that wanted to participate and received the information about the study electronically were able to simply click a hyperlink, or copy and paste it into their web browser. The flyers had tabs at the bottom that parents could rip off if they were interested in participating in the study that contained the hyperlink for the survey and the researchers contact information. Parents could either type the link into their web browser, or contact the researcher to obtain the hyperlink electronically or have a paper version of the survey and a pre-addressed stamped envelope mailed to them. Snowball sampling was encouraged, as friends, friends of friends, colleagues, and respondents were asked to tell others about the online survey. Respondents were recruited largely through the researchers' personal

Facebook page and the sample is quite representative of the researchers' Facebook friends. Although a paper version was available, no respondents filled out the paper survey, meaning the sample was limited to those with internet access. Although difficult to determine beforehand because there is little evidence to guide the anticipated effect size, 10 subjects per parameter is generally deemed appropriate, though there should be a minimum of 100 subjects (Norman & Streiner, 2003). The number of parameters is calculated by adding the number of paths, the number of variances of exogenous variables, the number of covariances, and the number of disturbance terms. In the theoretical model there are five paths, three variances of exogenous variables, three covariances, and one disturbance term, for a total of 12 parameters. Therefore, with 10 subjects per parameter, the necessary sample size was calculated at 120. After one month of recruitment and online data collection the desired sample size was exceeded, and analyses proceeded with 131 respondents.

Participants

The sample included 131 first-time parents, whose children were between the ages of six months and 12 months at the time of the survey. Both the infants' mother and father could respond to the survey if desired, but only three mother/father pairs did so. First-time parents were chosen because research suggests they are more likely to follow feeding recommendations than parents who have more than one child (Synnott et al., 2007). They were also chosen because feeding behaviors applied to the first child have also been found to be predictive of feeding choices with subsequent children (Hamilton et al., 2011). This age range was chosen because, based on current feeding recommendations, most parents will have introduced solid foods by the time their child turns six months old, and it was believed parents would still recall their six months feeding practices at 12 months of age but not much later.

A majority of respondents identified themselves as the infants' mother (91.6%; *n* = 120) with 7.69% (n = 10) identifying as the infants' father. One parent did not specify their relationship to the infant. The sample predominantly identified as "not Hispanic or Latino" (95.42%, *n* = 125) and "white" (93.89%, *n* = 123). Parents' most commonly identified age group was "26 to 30" (53.44%, *n* = 70). This was higher than the average age of first-time parents in 2009 at 25 years (Matthews & Hamilton, 2009). Respondents' educational attainment ranged from a "high school diploma/GED" to a "doctoral/professional degree," but overall, the sample was well-educated. The majority held at least a "bachelor's degree" (45.8%, *n* = 60) or some type of post- bachelorette degree (45.04%). The median U.S. household income in 2011 was $50,054 (DeNavas, Proctor, & Smith, 2012) and this sample reported a high annual household income, with 71.32% reporting making $60,000 or more (*n* = 92). The majority of respondents were married to their baby's other parent (89.31%, *n* = 117). Table 2 shows detailed parent demographics.

Table 2.

Parent Demographics

Characteristic	Number of Responses	Percentage
Ethnicity (*n* = 129)		
Hispanic or Latino	4	3.1%
Not Hispanic or Latino	125	95.42%
Race (*n* = 131)		
American Indian or Alaska Native	1	.76%
Asian	5	3.82%
Black or African American	3	2.29%
White	122	93.13%
Age (*n* = 131)		
21 to 25	13	9.92%
26 to 30	70	53.44%
31 to 39	43	32.82%
40 or older	5	3.82%
Education (*n* = 131)		
High school diploma/GED	1	.76%
Some college/technical school	10	7.63%
Associates degree	1	.76%
Bachelor's degree	60	45.8%
Master's/specialists degree	40	30.53%
Doctoral/professional degree	19	14.5%
Income (*n* = 129)		
Less than $20,000	3	2.33%
$20,000 - $39,999	19	14.73%
$40,000 - $59,999	15	11.63%
$60,000 - $79,999	31	24.03%
$80,000 - $99,999	23	17.83%
$100,000 or more	38	29.46%
Relationship with Baby's Other Parent (*n* = 131)		
Single Parent	7	5.34%
We both parent…but are not in a personal relationship	1	.76%
We're dating/engaged and living together	6	4.58%
We're married	117	89.31%

Procedure

First-time parents with infants between six and 12 months of age were asked to complete a survey about a variety of topics regarding the timing and introduction of solid foods, including: (a) their attitudes, (b) their perception of subjective norms, (c) their perceived behavioral control,

(d) their intentions, and (e) their behavior. The survey took respondents on average eight to 10 minutes, with some finishing in as few as six and a few taking over an hour. Both the baby's mother and father were able to take the survey if they wanted to, they were just asked to provide the last four digits of their phone number and the baby's other parents' phone number and their birthday and the baby's other parents' birthday so they could be matched. Only three mother/father pairs completed the survey. Although there was both a paper and an online version of the survey, no parents opted to take the paper survey. When parents went to the survey website, they were first shown a consent statement and had to select "I agree to participate in this study" before they could begin the survey. If they did not agree to the consent statement, they could simply close the browser window. As parents progressed through the survey questions, they could skip any questions they did not want to answer and they could also stop taking the survey at any time. The very last question on the survey asked if they wanted to "submit their survey to be included in the study" or "discard my survey, I no longer wish to be included in the study." Only one parent that completed the survey chose for their survey to be discarded, and it was permanently deleted.

Measures

Attitudes. A self-report measure of attitudes was constructed by summing the responses to five items written by the researcher (see Appendix A) examining why parents fed their baby solid foods for the very first time. It used a seven-point scale ranging from "strongly disagree" to "strongly agree." This measure was developed based on attitudes commonly reported by parents in the literature. Items were analyzed by four experts, all PhDs in human development and family science, to establish face validity and it was piloted with 11 parents with children between 12 and 18 months to ensure clarity. As a result, only minor wording problems were

changed. In general, a Cronbach's Alpha of .7 or higher is desired to establish an acceptable level of reliability, however, the recommended minimum is .6 (Hassad, 2009). For the current sample, the measure had a poor internal consistency ($\alpha = .532$). Factor analysis has been used to establish instrument validity in similar studies (Bai et al., 2011), so to improve internal consistency, factor analysis was conducted on the five items. Those that loaded poorly (<.5) were deleted because they did not appear to reliably assess the intended construct. As a result of the factor analysis, the final measure used a sum score of three items, "I fed my baby solid food for the very first time because I thought it would help them sleep longer at night;" "I fed my baby solid food for the very first time because I felt my baby needed something in addition to breast milk/formula;" and "I fed my baby solid food for the very first time because I didn't think my baby weighed enough." With a possible range of 0 - 21, internal consistency increased to $\alpha = .593$, which is close to the acceptable limit.

Subjective norms. A self-report measure of subjective norms was constructed by summing the responses to five items, with a possible range of 0 - 35 (see Appendix B) examining why parents fed their baby solid foods for the very first time. It used a seven-point scale ranging from "strongly disagree" to "strongly agree." This measure was developed based on subjective norms commonly reported by parents in the literature. Items were analyzed by four experts, all PhDs in human development and family science, to establish face validity and it was piloted with 11 parents with children between 12 and 18 months to ensure clarity. As a result, only minor wording problems were changed. For the current sample, the measure had an acceptable internal consistency ($\alpha = .709$).

Perceived behavioral control. A self-report measure of perceived behavioral control was constructed by summing the responses to five items (see Appendix C). Three questions

examined why parents fed their baby solid foods for the very first time using a seven-point scale ranging from “strongly disagree” to “strongly agree.” Two questions examined parents’ perceived control using a five-point scale ranging from “no control” to “complete control.” Items were analyzed by four experts, all PhDs in human development and family science, to establish face validity and it was piloted with 11 parents with children between 12 and 18 months to ensure clarity. As a result, only minor wording problems were changed. For the current sample, the measure had an unacceptable internal consistency ($\alpha = .298$). To improve internal consistency, the five items were factor analyzed. Items that loaded poorly (<.5) were deleted as these items did not appear to reliably assess the intended construct. As a result of the factor analysis, the final measure used one item with a possible range of 0 - 7, “I fed my baby solid foods for the very first time because my baby seemed unsatisfied with breast milk/formula.”

Intention. A self-report measure of intention was constructed by summing the responses to four items, with a possible range of 0 - 28 that asked parents about their plans regarding the introduction of solid foods before their baby was born (see Appendix D). The items were measured on a seven-point scale ranging from “strongly disagree” to “strongly agree.” Items were analyzed by four experts, all PhDs in human development and family science, to establish face validity and it was piloted with 11 parents with children between 12 and 18 months to ensure clarity. As a result, only minor wording problems were changed. For the current sample, the measure had an acceptable internal consistency ($\alpha = .656$).

Behavior. Behavior was assessed using five items asking about the infants’ feeding behaviors at six months of age (Appendix E). The first two items, “He/she was only drinking breast milk and/or formula and consuming no other foods or beverages” and “He/she was eating pureed solid foods (homemade or store bought)” were deemed appropriate feeding practices

based on current feeding recommendations from the American Academy of Pediatrics. The last three items, "He/she was eating finger foods," "He/she was drinking cow's milk, soy milk, or almond milk," and "He/she was eating the same foods I ate" were deemed inappropriate feeding practices based on current feeding recommendations from the American Academy of Pediatrics. The five items were then coded as 1 = appropriate, 0 = inappropriate and summed to form a continuous index of the number of appropriate behaviors ranging from 0 - 4 (0 = all behaviors were inappropriate, 4 = all behaviors were appropriate).

Table 3.

Factor Loadings for Original Measures

Item	Factor Loading
Factor 1: Attitudes	
I thought it would help my baby sleep longer at night	.51
I thought my baby was old enough to begin eating solid food	**.12**
I felt my baby needed something in addition to breast milk or formula	.73
I didn't think my baby weighed enough	.50
It was inconvenient to feed my child breast milk or formula	**.25**
Factor 2: Perceived Behavioral Control	
My baby wanted food I ate	**.27**
My baby seemed unsatisfied with breast milk or formula	.96
I wasn't producing enough breast milk (or my baby's mother wasn't producing enough breast milk)	**.24**
How much control did you have over the decision to introduce your baby to solid foods?	**-.13**
How much control do you currently have over what you feed your baby on a daily basis?	**-.05**

Statistical Analyses

Descriptive statistics, frequencies, and correlation analyses were calculated. Additionally, based on the theory of planned behavior, pathways were hypothesized between attitudes, subjective norms, perceived behavioral control, intention, and behavior (see Figure 3).

Path analysis using the Amos Graphics 21 software was used to obtain maximum likelihood estimates for the tested model.

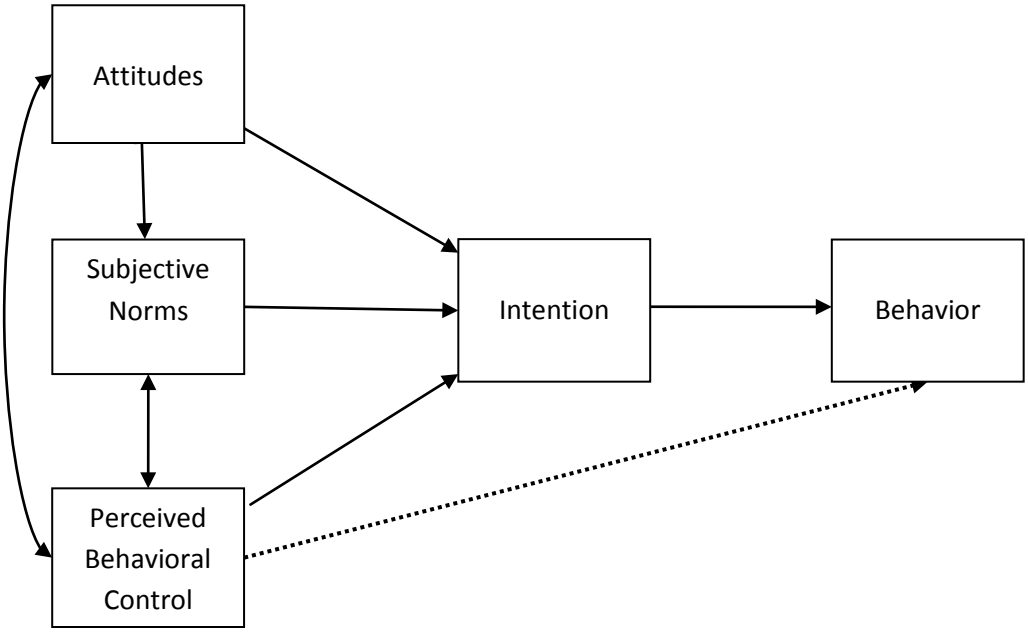

Figure 3. Model to be tested.

Goodness-of-fit was assessed based on multiple fit indices, including the chi-square statistic, comparative fit index (CFI), and root mean square error of approximation (RMSEA). RMSEA values less than .08 (Browne & Cudeck, 1993) and CFI values greater than .93 (Byrne, 1994) are thought to indicate a reasonable model fit. Additionally, the chi-square statistic divided by the model's degrees of freedom was examined as an estimate of the overall model fit. Values less than 3.0 suggest a good model fit (Carmines & McIver, 1981).

CHAPTER 4

RESULTS

In the following section univariate analyses will be discussed first with frequencies followed by the correlation analyses being presented. Then, the findings from the path analysis, as they relate to the study's research questions, are examined.

Univariate Analyses

Frequencies were calculated for the questions that made up each variable in the path analysis (Table 4). The frequencies gave a detailed description the potential mean scores showed in the previous chapter. Frequencies agreed a majority of parents in this study disagreed with attitudes that have been reported to lead to inappropriate feeding practices, reported low influence from subjective norms, and extremely high levels of perceived behavioral control. A majority of parents also reported high levels of behavioral intent, and most parents reported appropriate feeding practices at six months of age.

Table 4.

Frequencies for Questions in the Path Model

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Agree	Strongly Agree
Attitudes							
I thought it would help my baby sleep longer at night	53	27	2	12	22	12	3
I felt my baby needed something in addition to breast milk or formula	21	14	12	14	30	25	15
I didn't think my baby weighed enough	79	23	3	8	6	8	4
Subjective Norms							
A doctor or health professional said my baby should begin eating solid food	39	6	3	21	18	51	20
My baby's other parent said our baby should begin eating solid foods	39	25	3	37	11	13	3
Relatives said my baby should begin eating solid foods	47	26	8	13	22	10	5
Friends said my baby should begin eating solid foods	49	31	11	19	13	6	2
My employer said my baby should begin eating solid foods	74	36	4	15	1	1	0
My baby seemed unsatisfied with breast milk/formula	42	26	10	15	23	9	6
Intentions							
I planned to feed my baby breast milk…	2	2	4	1	6	24	92
I knew what solid food I was going to introduce first	9	18	9	6	45	22	22
I knew how old I wanted my baby to be when I introduced him/her to solid food	6	15	9	13	29	25	34
My baby was introduced to solid food at the age I originally had planned	22	6	4	3	23	40	33
					Yes		No
Behavior							
He/she was only drinking breast milk and/or formula and consuming no other foods or beverages					58		73
He/she was eating pureed solid food (homemade or store bought)					73		58
He/she was eating finger foods					15		115
He/she was drinking cow's milk, soy milk, or almond milk					1		129
He/she was eating the same foods I ate					10		119

Next, parents were provided a list of nine sources and asked to identify which sources they obtained information about breastfeeding, formula feeding, and feeding their baby solid foods from. Table 5 shows this information. One hundred percent of the sample reported receiving information about breastfeeding from at least one source. Most parents reported receiving breastfeeding information from a "doctor, nurse, or other health professional," and few indicated "television or radio" as a source (3.1%, *n* = 4). Eighty-three percent (*n* = 109) of the sample reported receiving information about formula feeding from at least one source. Parents who received information about formula feeding reported a "doctor, nurse, or other health professional" as the main source (68.8%, *n* = 75) and few indicated the "WIC food program" as a source of information about formula feeding (9.2%, *n* = 10). Most of the sample (99.2%; *n* = 130) reported receiving information from at least one source about feeding their baby solid foods. Similar to the other types of feeding, most parents indicated they received information about feeding solid foods from a "doctor, nurse, or other health professional" (83.8%, *n* = 109) and few indicated "television or radio" as a source of information (3.8%, *n* = 5).

Descriptive statistics for the number of sources parents received information from are presented in Table 6. On average, parents reported receiving information about breastfeeding from the most sources (*M* = 3.94, *SD* = 1.37), followed by feeding their baby solid foods (*M* = 2.95, *SD* = 1.18), then formula feeding (*M* = 2.51, *SD* = 1.55).

Table 5.

Where Parents Obtained Feeding Information

	Breastfeeding		Formula feeding		Feeding solid foods	
	N	%	*n*	%	*n*	%
Doctor, nurse, or other health professional	121	92.4%	75	68.8%	109	83.8%
WIC food program	15	11.5%	10	9.2%	7	5.4%
Baby care class or support group	87	66.4%	33	30.3%	20	15.4%
Relative or friend	100	76.3%	49	45%	87	66.9%
Books or videos	104	79.4%	40	36.7%	78	60%
Newsletters	15	11.5%	15	13.8%	15	11.5%
Newspapers or magazines	24	18.3%	22	20.2%	13	10%
Television or radio	4	3.1%	17	15.6%	5	3.8%
Website	50	38.2%	13	11.9%	49	37.7%

Table 6.

Descriptive Statistics for Feeding Information

	Mean	Std. Dev.	Skewness	Kurtosis
Breastfeeding	3.94	1.37	-.27	-.544
Formula feeding	2.51	1.55	.99	.280
Feeding solid foods	2.95	1.18	.45	-.207

Parents were also asked approximately how old their baby was when he/she was first given anything besides breast milk, formula, or water. Table 7 presents this information. Over half of the sample (56.5%; $n = 74$) reported their baby was four months to six months and 36.6% ($n = 48$) reported their baby was six months to eight months. Chi-square results indicated a large difference between the results and what you'd expect by chance, indicating there is not an association.

Table 7.

Age at first introduction to anything besides breast milk, formula, or water

	N	%	Expected *N*	Residual
Birth to 2 months	-	-	-	-
2 months to 4 months	4	3.1%	21.8	-17.8
4 months to 6 months	74	56.5%	21.8	52.2
6 months to 8 months	48	36.6%	21.8	26.2
8 months to 10 months	1	0.8%	21.8	-20.8
10 months to 12 months	2	1.5%	21.8	-19.8
Never	2	1.5%	21.8	-19.8

Finally, descriptive statistics for the sum scores in the study are presented in table 8. Recall from the previous description of the measures used in the current study that sum scores were computed for attitudes, subjective norms, perceived behavioral control, and intention. For ease of interpretation of descriptive statistics, potential mean scores were computed. With a possible range of 1 – 7, the mean score for parents' attitudes toward introducing solid foods was 3.01 (*SD* = 1.41), signifying low agreement with attitudes that often lead to the early introduction of complementary foods. Parents perceived the influence of subjective norms to be low (*M* = 3.05, *SD* = 1.14). Perceived behavioral control was also low (*M* = 3.02, *SD* = 1.92), where a low score indicates disagreement with the statement that complementary foods were first introduced because the parent deemed the infant wanted or needed it; indicating the decision to begin feeding was not completely under the parents control. The mean score for intention was high (*M* = 5.23, *SD* = 1.26), with a higher score indicating more parental planning when it comes to infant feeding. Finally, as explained in the previous chapter, scores ranging from 0 - 4 were used to measure behavior signifying inappropriate feeding practices to appropriate feeding practices, respectively. On average, the parents in this sample were following appropriate feeding practices when their baby turned six months old (*M* = 3.83, *SD* = .65).

Table 8.

Descriptive Statistics for Variables in the Path Model

	Mean	Std. Dev.	Skewness	Kurtosis
Attitudes	3.01	1.41	.31	-.54
Subjective Norms	3.05	1.14	.31	-.41
Perceived Behavioral Control	3.02	1.92	.49	-1.09
Intention	5.23	1.26	-.762	-.45
Behavior	3.83	.65	-2.08	6.36

Although behavior had skewness and kurtosis values larger than the rest of the variables in the path model, Kline (2005) states skewness can be greater than three and kurtosis greater than 10 without indicating a problem. For that reason, the values were not deemed to be problematic.

Correlation Analyses

Pearson correlations among variables in the path analysis are presented in Table 8. Parents' attitudes were positively correlated with parents' subjective norms, perceived behavioral control, and behavior (r = .35, .39 and .26, respectively, $p < .01$). Although two of the statistically significant correlations (attitudes and subjective norms and attitudes and perceived behavioral control) are consistent with the theory of planned behavior, the third statistically significant correlation (attitudes and behavior) suggested a pathway that is not included in the theoretical model.

Table 9.

Pearson Correlation Coefficients of Path Model Variables

Variable	1	2	3	4	5
1. Attitudes	1.00				
2. Subjective norms	.345**	1.00			
3. Perceived behavioral control	.391**	.006	1.00		
4. Intention	-.009	-.030	-.127	1.00	
5. Behavior	.255**	.155	.163	-.024	1.00

***p* < .01.

Path Analysis

To test the theory of planned behavior, a path analysis was conducted with Amos Graphics 21 to obtain maximum likelihood estimates. Figure 4 shows the standardized path coefficients predicting infant feeding behavior at six months old. The squared multiple correlations, or the amount of variance explained, for intention and behavior were both small, at .03. Concerning the model fit, the model has a chi-square statistic of 6.85 ($df = 2$, $p = .033$), χ/df ratio of 3.43, CFI of .892, and RMSEA of .137. None of the goodness-of-fit statistics were within the acceptable range. Therefore, it appears that, overall, the model did not fit the data. However, as found in the correlation analysis, attitudes and subjective norms and attitudes and behavioral control were positively correlated with each other in this path analysis ($\beta = .34$, $p < .01$; $\beta = .39$, $p = <.01$, respectively).

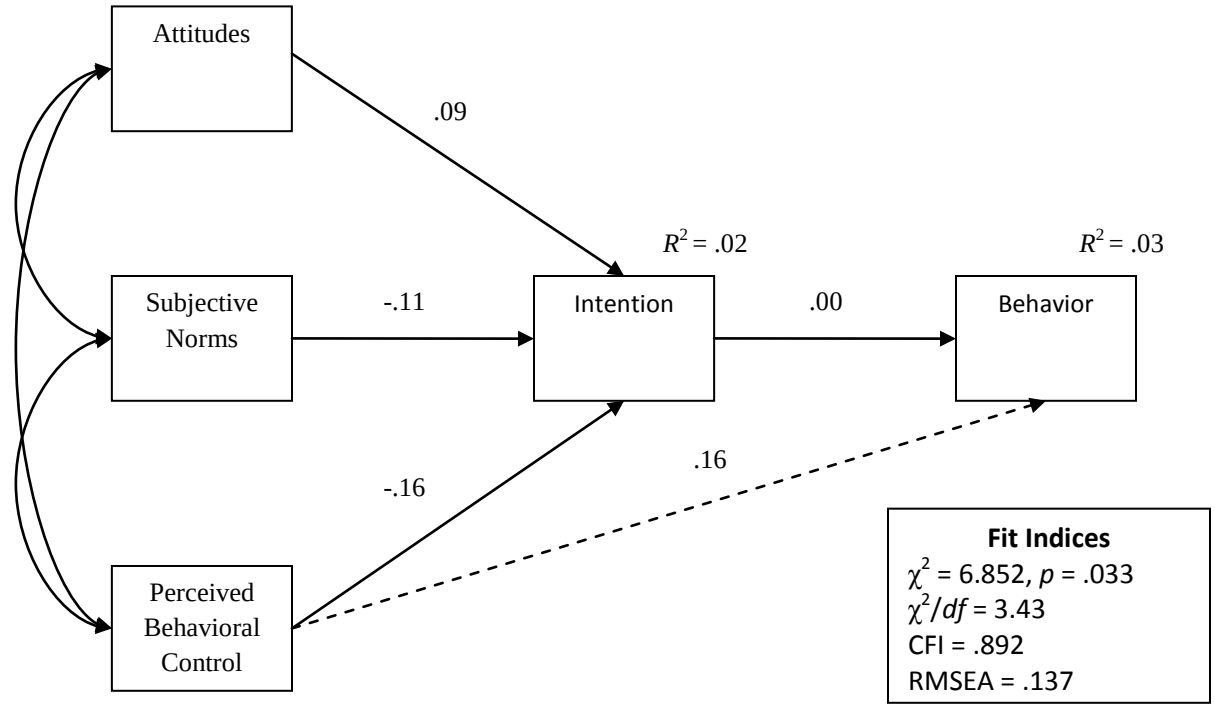

Figure 4. Results from the path analysis with standardized coefficients

Next, because the correlational analysis indicated a pathway that was not included in the theoretical model, a second model was tested (shown in Figure 5) (Kenny, 2011). This model added a direct pathway from attitudes to behavior. Bold lines are used to indicate significant paths at the $p < .01$ level. As expected, there was a statistically significant association between attitudes and infant feeding behavior at six months old ($\beta = .23$, $p < .01$).

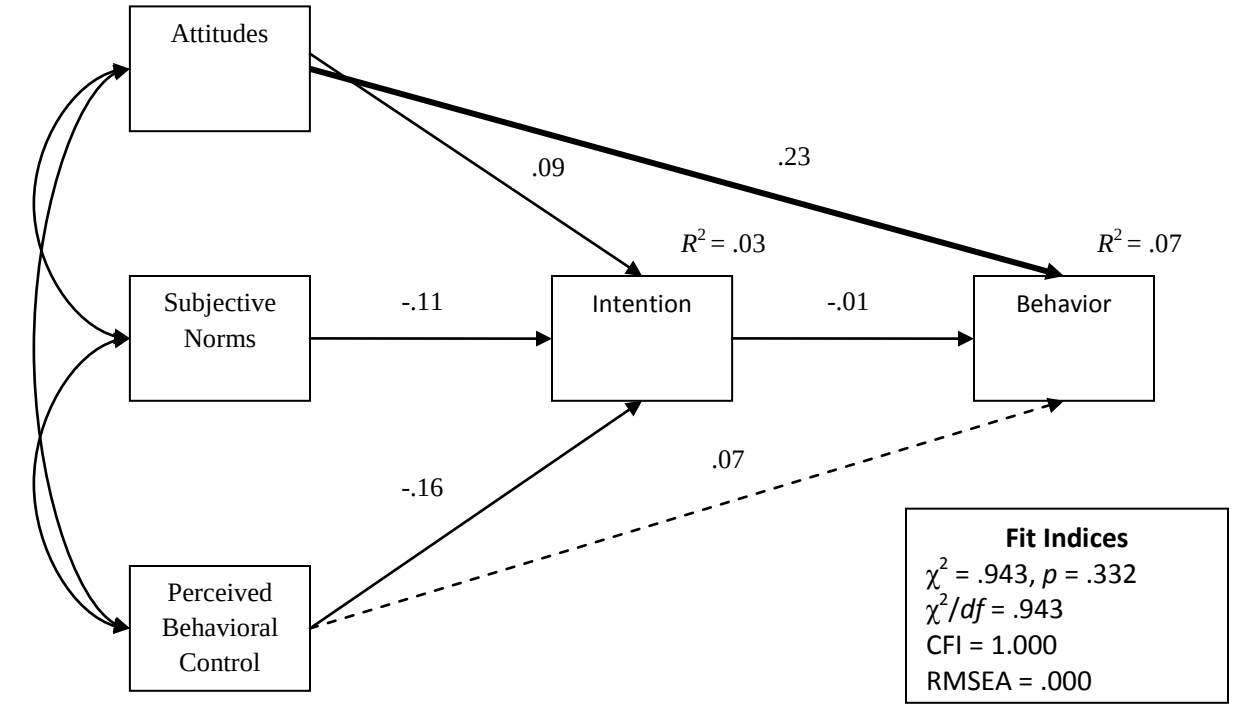

Figure 5. Results from path analysis with a direct link from attitude to behavior.

The squared multiple correlations for intention and behavior were still small, at .03 and .07, respectively, although the coefficient for behavior increased slightly. Concerning the model fit, the model had a chi-square statistic of .943 (df = 1, p = .332.), χ/df ratio of .943, CFI of 1.000, and RMSEA of .000. All of the goodness-of-fit statistics were within the acceptable range. Therefore, it appears that, overall, the model fits the data.

CHAPTER 5

DISCUSSION

This study examined the relationship between parents' attitudes, subjective norms, perceived behavioral control, intentions, and their complementary feeding behavior when their infant was six months old, as guided by the theory of planned behavior (Ajzen, 1991). As indicated by correlations, a model adding a direct path from attitudes to behavior was also examined to determine how parents' attitudes directly influenced complementary feeding behavior at six months of age. In this section, results from the study will be discussed. Strengths and limitations of the study will be presented, as well as directions for future research.

Summary of Path Analysis Results

Two models were tested that explored different aspects of attitudes, subjective norms, perceived behavioral control, and intentions and their effects on behavior. The first model considered how parents' attitudes, subjective norms, perceived behavioral control, and intentions influenced their infant feeding behaviors at six months of age. Contrary to the theoretical model, this model did not fit the data well and none of the path coefficients were statistically significant. Apparently there is a large difference between the observed data and the theoretical model, which contradicts the literature that finds an association between attitudes, subjective norms, perceived behavioral control, intentions, and behavior. This means the results from this sample differ from the results that were expected based on the literature and the theory. This will be explained in a later section. Additionally, the squared multiple correlations were small for both

intentions and behavior because none of the paths were statistically significant. This indicates little variance accounted for, for the variables intention and behavior.

The second model added a path based on the significant correlation between attitudes and behavior. This added coefficient was statistically significant. Although this path is not included in the theory of planned behavior, Ajzen (1991) suggests the theory is open to further expansion. This result suggests parents' low agreement with attitudes related to inappropriate feeding practices related to appropriate feeding behavior at six months. This finding is in agreement with the literature in that attitudes are determined by parents' beliefs that performing a behavior is important, or will lead to certain positive or negative outcomes (Bai et al., 2011; Hamilton et al., 2011; Heinig et al., 2006). Even though the model was a better fit, the squared multiple correlations were still small.

Furthermore, univariate statistics were examined to provide a more detailed description of infant feeding behavior. Frequencies indicated parents received information from more sources on breastfeeding than for the topics of formula feeding and feeding solid foods. Although the survey did not have a question that asked parents whether they breastfed or formula fed, it seems logical to assume the 20.6% of the sample that reported receiving no information on formula feeding may have chosen to exclusively breastfeed and did not require information on formula feeding. It is unknown as to whether or not this is actually the case. It is hard to come up with a conclusion based on the number of sources, as information is not necessarily better if it comes from more than one source. For example, a parent may just go to their friends for information, agree with what they hear, and not search for further information on the subject.

Parents with children between six and 12 months of age were chosen for this sample because based on current feeding recommendations most parents should have introduced their

infant to solid foods by six months, however one person indicated they received no information about feeding their baby solid foods. Although the infant was 9.9 months at the time of the study, this parent was one of two who indicated she had never introduced her infant to "anything besides breast milk, formula, or water." Information on feeding solid foods may not yet be relevant for this parent, which may explain why she has not received any information about it. A majority of parents reported first introducing anything besides breast milk, formula, or water between "4 months to 6 months" and "6 months to 8 months," which agrees with the findings in the path model that the parents in this sample are largely following recommended feeding practices.

Descriptive statistics also indicate parents receive breastfeeding information from an average of 3.94 sources, compared to an average of 2.95 for feeding solid foods and 2.51 for formula feeding. It is unknown as to why this is the case, but it could be hypothesized that parents received more information about topics they were more unsure about because they sought out information from a variety of sources, or that they had more time to plan to breastfeed than introducing solid foods or formula feeding.

How Findings Differ from Previous Studies

First and foremost, this study differs from previous studies because it looks at a homogeneous sample that is not normally studied. Many studies that look at the introduction of complementary foods focus on low-income families and have relied on focus groups to assess the constructs in the theory of planned behavior. Due to their qualitative nature, this study also had a much larger sample size than the other studies cited in this section. When it comes to parents' attitudes, studies by Heinig et al. (2006) and Horodynski et al. (2007) found a majority of low-income mothers introduced solid foods for the very first time because they thought it

would help their baby sleep longer at night. The frequencies in this study indicate this sample of the population may be different, with only 28.2% of respondents "somewhat agreeing," "agreeing," or "strongly agreeing" with this statement.

Subjective norms also differed in this study from previous studies on low-income families that reported family and friends were important influences in infant feeding decisions (Heinig et al., 2006). In this study this was not found to be the case, as doctors or other health professionals were found to be the most important influence on when parents introduced complementary foods to their infants. Mothers in a focus group conducted by Horodynski et al. (2007) found babies not being satisfied with formula or breast milk alone to be a factor in the timing of the introduction of complementary foods, but parents in this study perceived they had control over their infants feeding and a majority disagreed that they introduced complementary foods for the very first time because their baby seemed unsatisfied with breast milk or formula. Intentions in this study were also contradictory to findings in previous focus groups by Heinig et al. (2006) as many parents in this study reported prenatal plans for complementary feeding. As previously discussed, the mean score for intention in this study was high, which is also contradictory to studies that found intention not to be as strong because parents deemed other factors to be more important than intending to do something (Horodynski et al., 2007).

Finally, this study also contradicts newest findings released by the CDC in March 2013 that many babies are starting solid foods too early (Clayton, Li, Perrine, & Scanlon, 2013). Only 3.1% of our sample found this to be the case, while 40.4% of their study found it to be the case based on food-frequency tables. The CDC sample was more diverse than the current study, but still had 85% of parents over the age of 25, 85% were married, and 47% were college graduates. Income seems to be the main difference with their finding of introducing solid foods early, with

31.8% participating in WIC. The current study did not ask about WIC participation, but it can be assumed the 11% of parents that received breastfeeding information qualified for, or participate in WIC programs.

One quantitative study (Hamilton et al., 2011) that looked at complementary feeding using the theory of planned behavior found attitudes and subjective norms to be largely related to intentions, and intentions largely related to behavior, but only a small association between perceived behavioral control and intentions, or behavior. Its sample was much larger than the sample in this study (n = 375) and its measures were similarly measured by a small number of items (attitudes, perceived behavioral control, and intention were assessed with three items and subjective norms was assessed with two items). However the questions asked and internal consistency were not mentioned. This study was also conducted in Australia which may make their parents different than parents in the United States. As previously discussed, this study did not find any of the variables to be related to intentions, and intentions were not found to be related to behavior.

Other studies have assessed a similar construct (exclusive breastfeeding) and have also found significant associations with intentions indicating the theory can be applied to that construct. For example, Bai et al., (2011) found all three variables significantly associated with intention, but a previous study by Khatun et al. (2010) that only looked at how attitudes and subjective norms were related to intentions, found attitudes, but not subjective norms, to be significantly associated. Since exclusive breastfeeding and introducing complementary foods are similar yet different, this may account for lack of similar findings in this study.

Why Differences Exist

Differences found in this study could be attributed to the sample. Respondents were mostly Caucasian, older, married, highly educated, and reported high annual incomes. The studies by Heinig et al. (2006), Horodynski et al. (2007), and McMillan et al. (2008) specifically looked at low-income women, so the results of this study indicate income may be a controlling factor. Similarly, studies that have used the theory of planned behavior to look at breastfeeding practices indicated a difference among different racial/ethnic groups (Bai et al., 2011), something the current study was too homogenous to control.

Not only was the sample homogenous, but several of the items in the original measures failed to load properly, indicating they may not have been assessing the construct they were believed to. For example, perceived behavioral control had an extremely low alpha to begin with and after conducting a factor analysis on the measure four of the five items failed to tap into the construct. Attitudes had a similar issue with two of the five items not measuring the construct as expected. There may also have been a problem with the measure itself due to attitudes being significantly correlated with subjective norms and perceived behavioral control. Although items were placed in the variable they were believed to assess, the subjective nature of some of the items may be seen in the correlations and indicated the items may be measuring the same constructs. Another problem with the measures was the low internal consistency. Although the alphas used in the final measures were deemed acceptable, they were still lower than typically desired and were barely better than flipping a coin. This study fills a gap in the literature by introducing new measures for attitudes, subjective norms, perceived behavioral control, intentions, and behavior, but there is clearly a need for a more reliable and validated, theoretical, quantitative measure of complementary feeding.

Strengths of Present Study

This study has several unique strengths that contribute to the research on the introduction of complementary foods. Most notably, this study contributes to limited literature that uses the theory of planned behavior in examining the relationship between parents' attitudes, subjective norms, perceived behavioral control, intentions, and the timing and introduction of complementary foods at six months of age. Previous research in this area has been largely atheoretical (Hamilton et al., 2011) and much of it has been conducted qualitatively using focus groups. Ajzen (1988) mentioned the benefits of studying breastfeeding using the theory of planned behavior as a framework, so it is reasonable to apply this same framework to another feeding practice, introducing complementary foods.

Limitations of Present Study

Despite the strengths of this study, there are several important limitations. There was a sample bias in this study in that respondents were homogenous in a number of ways that may have impacted the results. Respondents were mostly Caucasian, older, married, highly educated (45% with a degree post-bachelorette), and reported high annual incomes. This sample is clearly not representative of the population as a whole so results may not be generalizable to a larger population. Part of this homogeneity could be explained by the recruitment procedures used, as respondents were recruited largely through the researchers' personal Facebook page and the sample is quite representative of the researchers' Facebook friends. Since this sample is a group that is not normally focused on, the homogeneous sample was deemed to be an additional strength. All of the respondents filled out the online survey, as opposed to the paper survey, meaning the sample was limited to those with internet access. The inclusion criteria used for the study also specified that parents participating in the study would be limited to first-time parents.

This is important because although this limitation was purposely used to control for cohort effects, attitudes, subjective norms, perceived behavioral control, intentions, and behavior may change with each subsequent child.

The characteristics of this sample should be considered in interpreting the results of this study, especially when attempting to generalize results to larger populations that may be less homogenous than the sample used. It is quite possible the poor fitting theoretical model and insignificant paths are related to this sample. Previous research has indicated socioeconomic status plays a large role in perceived behavioral control, as low socioeconomic status is related to a lack to resources, education, social support and poor diet (Spruijt-Metz et al., 2006). For example, Benton (2004) found low income mothers report healthcare providers are an important source of information, but Olson et al. (2010) found they often rely on their own mother as the primary source of information. Other studies have shown similar differences when looking at culture, race, and ethnicity and have also found them to be major factors to consider when looking at the influence of attitudes and subjective norms (Horodynski et al., 2007). The measures are clearly a problem based on the low alphas, however future research on this topic should seek a low income sample (WIC and Head Start families for example), the opposite of this current sample, to determine whether the lack of findings were only related to the measures or could have been attributed to the sample as well.

Sample size was calculated based on the number of parameters in the model (Norman & Streiner, 2003) and the desired sample size was exceeded in this study. However, path analysis is very hungry when it comes to sample size and there are no absolute standards for sample size, only recommendations (Kline, 2005). Since the necessary sample size is also largely dependent on the effect size, 120 may be more than enough if there are large effects. With small effects

however, it is possible the final sample size was still relatively small for path analyses and a much larger sample size would be needed. If the sample size was too small bootstrapping should have helped, but after bootstrapping analysis was performed the model fit showed no difference.

Another limitation is the new measures. Although they were created based on the literature, had established face validity, and were piloted for clarity before data collection, the exploratory factor analysis indicated some problems in terms of what was actually being measured. For instance, based on the literature, face validity, and piloting, the five items for perceived behavioral control was deemed to assess just that. However, once the factor analysis was conducted, four of the five items did not load together and perceived behavioral control ended up being measured by only one item. More work is needed to improve the measures to more effectively assess their construct, and to establish reliability and validity for each measure. In general, a Cronbach's Alpha of .7 or higher is desired to establish an acceptable level of reliability. Although Hassad (2009) recommended .6 as an absolute minimum and this was the minimum used in this study, .6 is not accounting for much variance so the low alphas for attitudes and intentions should attempt to be remedied. Adding more questions to each variable may help, as low alphas can be due to a low number of questions or poor interrelatedness between items (Tavakol & Dennick, 2011).

Another limitation of this study was its retrospective nature. It is possible the parents in this study were not able to accurately recall their attitudes, subjective norms, perceived behavioral control, intentions, or behaviors from before their child was born until they were six months old. Future studies should be longitudinal or cross-sectional in nature and not rely on retrospective data. Parents can be asked to keep food diaries or logs about their infants feeding practices, although this may be too much for first time parents to keep up with on a daily or even

weekly basis. Parents should be asked about the constructs in the theory of planned behavior while they are pregnant, again when their child is three months (pre-recommended feeding age), again at six months (the recommended feeding age), and then again at nine and 12 months. Questions should focus on what they're doing currently doing at that age, and not be as retrospective. Social desirability may also have been an issue in this study if parents were aware of feeding recommendations from seeing it on the news or reading about them, and changed their answers to conform to these.

Directions for Future Research

Future studies can extend on the findings from this study by considering the limitations outlined above. A more diverse sample in terms of education, race, ethnicity, age, income, and marital status could help eliminate the biases created by using a homogenous sample. This would increase the generalizability of results to larger populations. Additionally, more studies are needed using the theory of planned behavior to study the introduction of complementary foods in order to further test the proposed measure. Only a handful of studies look at the introduction of complementary foods using this theoretical framework, and most focus on qualitative measures (Hamilton et al., 2011; Horodynski et al., 2007). Dyadic data would also provide great insight into how parents are influenced by each other in their feeding decisions and to examine the feeding relationship. Based on existing literature, future studies should consider controlling for factors that may have an effect on the variables, such as education, race, age, ethnicity, income, and marital status, which were unable to be controlled for in this study due to the sample's homogeneity, and should ask for the infants' gender and whether the infant was breastfed, bottle fed, or combination fed, which may also be controlling factors.

Both cross-sectional and longitudinal studies asking parents about their attitudes, subjective norms, perceived behavioral control, and intentions while they are pregnant and then asking them about their behaviors at six months and again at one year could provide better information about how these factors are actually related to behavior and can provide valuable information for developing outreach trainings, publications, etc. For example, if longitudinal studies find parents do not feel they have control over infant feeding, outreach programs can focus on barriers to feeding and ways parents can gain more control, or focus on the factors they can in fact control.

Conclusions

Despite the limitations discussed, this study makes several unique contributions to the study of complementary feeding practices. Applying a modified theory of planned behavior to this study showed a statistically significant direct path from attitudes to behavior. This should be considered by professionals in both developing and administering nutrition education curricula as this study shows education should potentially focus on providing knowledge to encourage healthy attitudes. Although this sample did not appear to be heavily influenced by subjective norms and perceived behavioral control, studies of other samples may highlight different topics that may need to be emphasized in educational curricula, such as how handle subjective norms differing from recommended practices and a lack of control over feeding practices.

Previous research that has used the theory of planned behavior has mainly focused on breastfeeding and more work is needed to establish a valid and reliable quantitative measure for the introduction of complementary foods. Most studies that have looked at this time period are qualitative in nature.

Perhaps most telling were the frequencies and descriptive of the questions in the path model, as they suggest this sample of the population is not in dire need of education and outreach efforts. This does not mean we should not target this population however. This sample of the population relies heavily on health professionals, books or videos, and friends and families for infant feeding nutrition, so this may be where outreach efforts should focus, as opposed to directly targeting this group of parents. This sample also said WIC was not a significant source of feeding information; however, this finding is most likely due to the sample demographics.

This study clearly had limitations with the measures itself. However, it is possible that the sample had a strong impact on the results since many existing studies have focused on low income families and preschool children. The next step in this research should be to replicate this study with a low-income, minority population, to determine whether the results may be different based on that sample of the population and the measures may more appropriately fit that sample of the population. After this is determined, researchers will be able to determine how to modify of the measures themselves to increase internal consistency.

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APPENDIX A
Attitudes Scale

I fed my baby solid foods (i.e., anything besides breast milk, formula, or water) for the very first time because…

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

1. I thought it would help my baby sleep longer at night.
2. I thought my baby was old enough to begin eating solid food.
3. I felt my baby needed something in addition to breast milk or formula.
4. I didn't think my baby weighed enough.
5. It was inconvenient to feed my child breast milk or formula.

APPENDIX B
Subjective Norms Scale

I fed my baby solid foods (i.e., anything besides breast milk, formula, or water) for the very first time because…

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

1. A doctor or health professional said my baby should begin eating solid foods.
2. My baby's other parent said our baby should begin eating solid foods.
3. Relatives said my baby should begin eating solid foods.
4. Friends said my baby should begin eating solid foods.
5. My employer said my baby should begin eating solid foods.

APPENDIX C
Perceived Behavioral Control Scale

I fed my baby solid foods (i.e., anything besides breast milk, formula, or water) for the very first time because…

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

1. My baby wanted food I ate.
2. My baby seemed unsatisfied with breast milk/formula
3. I wasn't producing enough breast milk (or my baby's mother wasn't producing enough breast milk).

No Control				Complete Control
1	2	3	4	5

4. How much control did you have over the decision to introduce your baby to solid foods?
5. How much control do you currently have over what you feed your baby on a daily basis?

APPENDIX D
Intention Scale

Before my baby was born…

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

1. I planned whether I was going to feed my baby only breast milk, only formula, or a combination of both.
2. I knew what solid food (i.e., anything besides breast milk, formula, or water) I was going to introduce to my baby first.
3. I knew how old I wanted my baby to be when I introduced him/her to solid food (i.e., anything besides breast milk, formula, or water).
4. My baby was introduced to solid food at the age I originally had planned.

APPENDIX E
Behavior Scale

When my baby turned six months old (24 weeks)…

Yes/No

1. He/she was only drinking breast milk and/or formula and consuming no other foods or beverages.
2. He/she was eating pureed solid foods (homemade or store bought).
3. He/she was eating finger foods.
4. He/she was drinking cow's milk, soy milk, or almond milk.
5. He/she was eating the same foods I ate.