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## Parents and Health Behavior Change: A Review of the Role of Parents' Behavioral Intentions for Health Behavior Change in Their Children

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RUNNING HEAD: Parents and Health Behavior Change

PARENTS AND HEALTH BEHAVIOR CHANGE: A REVIEW OF THE ROLE OF  
PARENTS' BEHAVIORAL INTENTIONS FOR HEALTH BEHAVIOR CHANGE IN  
THEIR CHILDREN

by

Zoe E. Gipson-Kendrick

A thesis submitted to the Department of Psychology  
In partial fulfillment to the requirements for the degree of  
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## Table of Contents

Abstract.....	v
Introduction.....	1
Models of Development Related to Environmental Influence.....	1
Health Behavior Change Models: Theoretical Background.....	9
Behavioral Intention.....	15
Application to Obesity Prevention.....	17
Current Study.....	20
Method.....	21
Literature Search.....	21
Results.....	30
Intention and Goal Setting.....	34
Effect Sizes of Significant Pathways.....	43
Discussion.....	52
Relevant Pathways and Behavioral Intention.....	54
Conclusion.....	58
Future Directions.....	58
Appendix A: Sample Coding Sheet.....	60
Appendix B: Final Sample References.....	67
References.....	72

List of Figures and Tables

Figure 1.....6  
Figure 2.....17  
Figure 3.....23  
Table 1.....24  
Table 2.....31  
Table 3.....35  
Figure 4.....44  
Figure 5.....45  
Table 4.....46  
Table 5.....50

## Abstract

*Objective:* To examine the existing literature on the relation between contextual and health factors that influence parent intention for child health behavior change, focusing on the importance of a strong theoretical background and measures that match the proposed theory, and to determine the use of intention in the proposed sample of articles.

*Method:* A preliminary search was conducted, seeking out interventions and programs that target nutrition and/or physical activity in relation to childhood obesity prevention using PsycINFO and MedLine databases. This search totaled 29 studies to be included in the final review.

*Results:* Ten articles studied intention as a dependent variable, twelve with intention as an independent variable, and seven with intention as a mediating variable. A majority of the articles included a theoretical background (86.2%), while 13.8% of the articles did not include any. Seven overall constructs of interest were established: intention/goal, attitudes, self-efficacy, behavior, social support, knowledge/awareness, and norms. Effect sizes for significant pathways were collected/calculated for the specified variables. Finally, behavioral intention was measured inconsistently in each article, some providing reliability, validity, and/or references for the scales measuring intention, while some did not.

*Conclusions:* Childhood obesity prevention and intervention literature is inconsistent in the use of theory, strong measurement, and incorporation of other fields of psychology.

## Parents and Health Behavior Change: A Review of the Role of Parents' Behavioral Intentions for Health Behavior Change in their Children

Beginning in the 1950's, health psychologists have studied the numerous ways in which people are capable of changing their health behaviors and have attempted to provide theoretical models that approximate the process of health behavior decision-making. A health behavior refers to the actions of a person that enhance or hurt their quality of life (Glanz, Rimer, & Viswanath, 2008) and can be broken into three subcategories: preventative health behavior, illness behavior, and sick role behavior (Glanz et al., 2008). While health decisions that individuals make are of extreme importance, it is not always the case that an individual can make decisions on their own (i.e. children). Developmental psychology, a particular research area that coincides strongly with health psychology, focuses on the cognitive, physical, and emotional changes of an individual across the lifespan, beginning at conception (Louw, 1998). Early theories of development in psychology have greatly emphasized the importance of the parent and context on the development of their child, which can be applied to models of health behavior change (HBC) to enhance their utility for parents who are assisting in their children's health.

### **Models of Development Related to Environmental Influence**

Psychologist Urie Bronfenbrenner studied the relationship between child development and their environment, creating the model now known as the *Bioecological Model* (Bronfenbrenner, 1977). Also focusing on the child's environment, Jay Belsky (1984) configured a model of the determinants of parenting. Additionally, developmental psychologists Paul Baltes (1987) and Arnold Sameroff (2010) hinted at the complex

nature of human development in their respective theoretical perspectives. Baltes (1987) studied the idea of life-span development and specific propositions that need to be accounted for when studying this topic due to the inherent complexities of development itself. Sameroff (2010) also established a theory surrounding the complexity of human development; in doing so, he outlined several types of models (a personal change model, a contextual model, a regulation model, and a representational model; Sameroff, 2010) that need to be considered simultaneously in order to truly begin to understand development and how best to study it. All of these models take an ecological perspective on human development, meaning they focus on contextual factors that influence the way a person sees and adapts to their surrounding environment (Reifsnider, Gallagher, & Forgione, 2005).

*Bronfenbrenner's Bioecological Model.* Bronfenbrenner's model directly applies to health as it addresses the complexity of factors that work together to influence a child's health and wellbeing. Previously titled the Process-Person-Context-Time Model, the Bioecological Model contemplates human development from an ecological perspective, focusing on the interaction between the setting in which a person lives and that person's physical and psychological growth (Bronfenbrenner, 1977; Rosa & Tudge, 2013). This model discusses four levels of settings and how they influence development. The levels include the microsystem, mesosystem, exosystem, and macrosystem. These physical environments range from closest to the child (microsystem) to furthest from the child (macrosystem). The microsystem refers to the immediate environment surrounding the child that directly influences his/her development (i.e. family, home, school, church). The mesosystem includes the interaction between two microsystems in which the child is

involved (e.g. grandparents interacting with the child's immediate family, parents interacting with teachers at child's school). The exosystem is an environment in which the child does not directly interact with, however it still influences their development indirectly, often through decisions that are made that trickle down to the microsystems (e.g. parent workplace, school system, government, media). Finally, the macrosystem is a broad level that includes cultural beliefs, ideologies, and associated environments (e.g. socioeconomic status, politics, tradition; Bronfenbrenner & Morris, 1998). The Bioecological Model is heavily focused on child development. Specifically, Bronfenbrenner was interested in the importance of people in the child's proximal environment (e.g. family) and how they can influence human development (Ceci, 2006). His model has helped further research on the subject of parenting and the role this relationship has on development.

Bronfenbrenner paved the way for research on contextualism in relation to childhood development, though few studies have demonstrated a direct tie between developmental and health models. While Bronfenbrenner's theory is not explicitly present in health psychology research, it is applicable to health and is indirectly a part of some HBC models. Spoth and Redmond (1995), for example, proposed a model using the Health Belief Model (HBM) and family context and their influence on the likelihood of parents enrolling in a parenting skills program. In their research, they highlight the need for the consideration of family context factors (e.g. socioeconomic status). Using a theoretical background outlining the HBM and a limited amount of theory supporting the familial context factors, Spoth and Redmond (1995) proposed such a hypothesized model based on a theory involving behavioral intention. The hypothesized model considers the

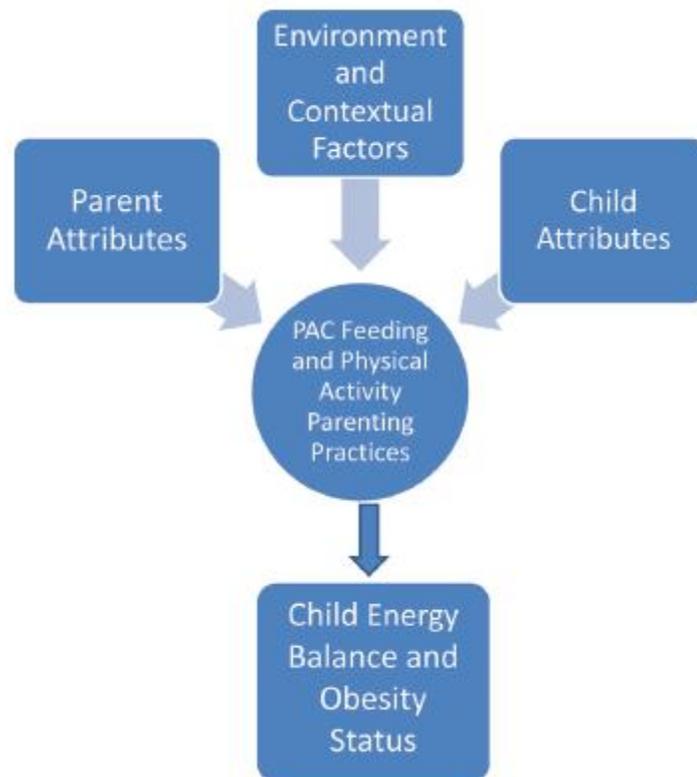
relationship between health beliefs, inclination to enroll in an intervention program, and family context (Spoth & Redmond, 1995). However, Spoth and Redmond (1995) argue that this combination does not have strong empirical support and more research is needed to understand this further. Spoth, Redmond, and Shin (2000) later reinforced the previous model through statistical analyses, providing evidence that a significant positive relationship exists between context, health belief and enrollment inclination. It is evident though this article that Bronfenbrenner's theory connects to HBC through the influence environment has on parent decision-making in regards to their child's health.

*Belsky's Determinants of Parenting.* Soon after the development of Bronfenbrenner's Bioecological Model, Jay Belsky (1984) continued the research on parenting in relation to child development through the creation of a model on the determinants of parenting. Belsky's model includes three determinants of parenting: parent characteristics and personality, child characteristics, and contextual sources of stress and support. Similar to Bronfenbrenner's model, the three determinants of Belsky's model do not exist independently of each other and successful parenting is achieved by incorporating all three determinants (Belsky, 1984).

Through a review of previous literature, Belsky (1984) outlines several existing relationships between the three determinants of parenting and child development. Parent personality traits are known to influence developmental and health outcomes of their child. For example, parent attitude is vital to child health outcomes (e.g. positive attitudes lead to healthy decision-making; Andrews, Silk, & Enel, 2010; Graves, Meyers, & Clark, 1988; Wrontniak, Epstein, Paluch, & Roemmick, 2005). Also, modeling behaviors are important because children mirror the actions of their parents (e.g. positive health

behaviors inspire a child to act in the same way; Andrews, Silk, & Enel, 2010). Finally, family history is a factor that affects childhood obesity (e.g. obesity in parents leads to obese children; Mossberg, 1989). Additionally, maternal age is said to influence sensitive responding, favoring older mothers with higher psychological maturity (Belsky, 1984; Feldman, Greenbaum, Mayes, & Erlich, 1997). In regards to child characteristics influencing parenting, a heavy focus has been placed on child temperament. Specifically, mothers react negatively to their child when they exhibit a difficult temperament (Belsky, 1984; Feldman, Greenbaum, Mayes, & Erlich, 1997). As for the contextual sources of stress and support, numerous studies provide evidence that high levels of support to mothers leads to positive child outcomes (Belsky, 1984; Feldman, Greenbaum, Mayes, & Erlich, 1997; Sherifali & Ciliska, 2006). This model, like Bronfenbrenner's, can be used as a basis for understanding how parents can impact their child's health behavior outcomes and the multitude of factors that work together in their decision-making.

Faith and colleagues (2012) proposed a model of feeding practices based on Belsky's model of the determinants of parenting. Specifically, the model discusses three potential influences on parent feeding practices: (1) parent attributes, (2) child attributes, and (3) environmental and contextual factors (see *Figure 1*; Faith, Van Horn, Appel, Burke, Carson, Franch, Jakicic, Kral, Odoms-Young, & Wansink, 2012). Faith and colleagues mention the need for a better understanding of familial context. Specifically, the researchers argue that there is an insufficient amount of information on the topic of parent influence on child feeding.



*Figure 1.* Proposed conceptual model (Faith et al., 2012).

Belsky's model has not been regularly used in HBC research, however it contains determinants that could be beneficial to parent intention to change their child's behavior. Van Bakel and Riksen-Walraven (2002) argue that more pathways need to be included in Belsky's model that would also influence health decision making: parent resource contribution, parent intelligence, parent ego-resiliency, and child attachment. Nevertheless, similar to Bronfenbrenner's model, Belsky's determinants of parenting heavily focus on context as a factor related to child development. Not only does the relation between child and context need to be deeply considered, it needs to be understood through a bidirectional perspective as well, which psychologist Paul Baltes (1987) emphasizes in his research.

*Baltes' Multidimensionality and Multidirectionality.* Aforementioned, Baltes (1987) studied life-span development, which is important to consider in both developmental and health psychology research, as parent decision-making impacts the child's entire life course. Life-span development includes the study of behavior change and growth throughout the entire life course, while focusing on individual differences and changes (Baltes, 1987). Baltes established two propositions explaining life-span development psychology: multidimensionality and multidirectionality (Baltes, 1987). Baltes' proposition of multidimensionality states that behavior and development cannot be explained by just one criterion, but rather by multiple criteria and their interactions (Baltes, 1987). In health behavior change, there are several factors that will contribute to a change, not just a single thought or action. For example, an article by Swanson and colleagues (2011) studied parent intention to eat as a family, to cook from scratch, to provide breakfast for the family, and the effect these have on development. Using the Theory of Planned Behavior (TPB) as background knowledge, the researchers measured parent intention by looking at several components of the Theory of Planned Behavior (TPB; ex: attitudes, perceived behavioral control, etc.). It would be quite an assumption to take just one component of TPB and attribute parent intention to that component alone; however, Swanson and colleagues (2011) used several components, which provide a stronger connection between parent intention and the actual behavior change. Baltes's proposition of multidimensionality is important to consider because it reflects the complex nature of human development, further emphasizing the need for a theory of health behavior change that includes parents' changing their child's behavior.

Additionally, Baltes's proposition of multidirectionality is important in research, as it can help explain causation a little more clearly. Similar to Bronfenbrenner's (1977) bioecological model, this proposition states that the direction of causality might not be unidirectional, rather, there are other factors that contribute to a particular outcome (Baltes, 1987; Howland et al., 2016; Lenne et al., 2019). In health behavior change research, the bidirectional nature of variables is seldom acknowledged. For example, while parents' intention likely impacts their child's behavior, it is also feasible to consider how the child's behavior will influence parents' intention. Although, an example of child/context bidirectionality in research is an article by Leah Brennan and colleagues (2012) focusing on intervention acceptability and psychosocial outcomes of overweight and obese children and teenagers. The participants of the study were placed in treatment groups in which they completed self-report measures addressing family functioning and psychopathology. Once completed, the researchers found significant improvements in weight control behaviors, impulse control, and social support from family members (Brennan et al., 2012). This weight control improvement could be due to increased support from family members, but increased support from family members could be due to better weight control behaviors. This further emphasizes Baltes's (1987) proposition of multidirectionality because health behavior change does not occur in a vacuum and constructs like treatment outcomes and social support may exist in a bidirectional nature.

*Sameroff's Unified Theory of Development.* Similarly, in his research, Sameroff (2010) proposed that human development cannot be explained by one theory or model. Rather, there are at least four models that need to be understood: a personal change model (i.e. development from infancy onward), a contextual model (i.e. how experience impacts

development), a regulation model (i.e. dynamic between person and context), and a representational model (i.e. abstract thinking; Sameroff, 2010). This *Unified Theory of Development* can be applied to health behavior change in that health behavior change requires an understanding of physical development and the person/context dynamic. Bélanger-Gravel and Godin (2010), sought to help children and parents better understand physical activity using the TPB. These researchers administered questionnaires to both parents and children, in which the children answered questions about health-related psychological constructs and their behaviors (Bélanger-Gravel & Godin, 2010). Some specific constructs of interest were self-identity, attitudes about physical activity, and self-efficacy (Bélanger-Gravel & Godin, 2010). Like Sameroff explains, several aspects of human behavior need to be taken into consideration. For example, in line with Sameroff's representation and regulation models, self-identity tackles different psychological phenomenon than attitudes about physical activity. The way someone develops self-identity differs from how someone adopts attitudes about a particular action because self-identity is created within a person and attitudes are adopted from the surrounding environmental influences (Bélanger-Gravel & Godin, 2010). In addressing the need for several models to understand human development, Sameroff's *Unified Theory of Development* reiterates just how complex human development can be, and Sameroff explicitly called for theoretical models to more appropriately match the complexity of human behavior and development (Sameroff, 2010).

### **Health Behavior Change Models: Theoretical Background**

Similar to developmental models providing insight on factors that influence change, health behavior change models provide an approximation of factors essential to

altering a behavior to better the course of an individual's life. These models look at the attitudes, beliefs, and expectations a person has about changing a particular behavior and the factors that influence their attitudes, beliefs, and expectations (Pbert, Ockene & Riekert, 2014). A variety of HBC models exist which are similar in some ways, but differ in terms of the type of health behavior to which the model applies, the constructs of focus in the model, the current relevance of the model, and whether the model is a continuum model (approximating simultaneous factors influencing health), a qualitative model (acknowledging a temporal ordering or stage-like progression), or a mixed model. Continuum models include the Health Belief Model (Hochbaum, 1958; Rosenstock, 1960, 1974), the Theory of Reasoned Action (Fishbein, 1967; Fishbein & Ajzen, 1975), the Theory of Planned Behavior (Ajzen, 1985, 1991), and the Protection Motivation Model (Rogers, 1975). The Transtheoretical Model (Prochaska & Velicer, 1997) is an example of a qualitative model which allows researchers to study individuals moving through stages of change. A model incorporating aspects of a continuum model and qualitative model is the Health Action Process Approach (Schwarzer & Luszczynska, 2008).

*Health Belief Model.* According to Rosenstock (1974), the Health Belief Model (HBM), a continuum model, was created initially in the 1950's (Hochbaum, 1958) to explain preventative health behavior. This model takes into consideration that a person holds a drive to prevent illness and they will take necessary steps to avoid or eliminate illness. The HBM is very motivation-driven. Within the HBM, there are several components: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and cues to action. Combined, these five elements can influence behaviors and

motivations to make a health change (Pbert et al., 2014). Perceived susceptibility refers to the person's perception of risk of developing an illness. Perceived severity is the person's feelings regarding the threat of developing an illness. Perceived benefits are the feelings a person has about preventative measures and their effectiveness. Perceived barriers are negative aspects of a particular health action. Finally, cues to action refer to the stimuli that begin the behavior change process (Pbert et al., 2014; Rosenstock, 1974). As the HBM developed, the concept of self-efficacy was added in order to better help understand the process of behavior change decision-making (Bland, Kegler, Escoffery & Malcoe, 2005; Stretcher & Rosenstock, 1997). A particular issue with the HBM is that instead of looking at the model as a whole, researchers tend to break it down and look at the constructs individually. Stretcher and Rosenstock (1997), advise that the constructs should be combined in research. The HBM is useful in studying areas such as health-promoting behaviors (i.e. diet or exercise), health-risk behaviors (i.e. smoking), and sick role behaviors (Conner & Norman, 1996).

*Theory of Reasoned Action.* The Theory of Reasoned Action (TRA), a continuum model, states that behavioral intentions are a function of beliefs that the behavioral action will ultimately lead to an expected outcome (Madden, Ellen, Ajzen, 1992). These beliefs are divided into two categories: behavioral and normative. Behavioral beliefs mainly influence the person's attitude about making the behavior change. Normative beliefs are beliefs about the extent to which other people (i.e. family and friends) influence behavior change (Madden et al., 1992). Additionally, there are three conditions that can influence the magnitude of the relationship between intention and behavior: (1) how much intention and behavior measures correspond, (2) the amount of time between intention and

behavior change, and (3) the degree to which acting is under the person's control (Madden et al., 1992). This model was widely used in research; however, researchers believed it was missing a deeper explanation about why people carry out behaviors or why they do not. This issue brought about the most current version that is applied to health behavior, the Theory of Planned Behavior (Madden et al., 1992; Paquin & Keating, 2016). The TRA is explicitly used to discuss behavior change related to the individuals' beliefs, making it widely used in designing health education interventions (Baker, Morrison, Carter, & Verdon, 1996).

*Theory of Planned Behavior.* The Theory of Planned Behavior (TPB), a continuum model, is an expansion of the Theory of Reasoned Action (TRA). Both theories focus heavily on the intention to change a behavior or act a certain way (Ajzen, 1985). In addition to intention, TPB addresses the need to have a plan. These plans tend to be general and unfold depending on if previous behaviors are successful or if they fail. Another component of this theory is the person's attitude towards trying to change a behavior. Additionally, social norms contribute to behavior change. Combined, these elements (intention, perceived behavioral control, attitudes, and social norms) help determine behavior change. The TPB discusses the level of control a person feels they have over the particular behavior, an idea similar to the concept of self-efficacy. The TPB is one of the most regularly cited HBC theories, making it susceptible to harsh criticism. Some researchers argue that the constructs contain measurement error, the TPB does not properly account for human emotion and affect, and the TPB is extremely context-dependent (Ajzen, 2011). Since its creation, TPB has been used in a number of health-related studies ranging from sexual behavior to physical activity (Pbert et al., 2014).

*Protection Motivation Model.* The Protection Motivation Model (PMM), a continuum model, focuses on precautionary behaviors to HBC. Specifically, it assesses the idea that a person will respond to a threat and develop a coping response (Abraham, Norman & Conner, 2000). In the original version of the theory, two processes are explained that are involved in action taking: threat and coping appraisal. Threat appraisal refers to the perception that someone is susceptible to disease and that the disease will have severe consequences. Coping appraisal is determined by response efficacy (i.e., the belief that adopting a behavioral response will make the threat disappear), self-efficacy, and perceived costs and rewards (Rogers, 1975; Abraham et al., 2000). The outcome of the appraisal processes is a state referred to as protection motivation (Ho & Sun, 2016). The PMM is used in research, especially when fear-arousing information is used. For example, in a study by Cismaru and Lavack (2007), the PMM is used to control the use of tobacco in Canada by eliciting fear about lung disease.

*Transtheoretical Model.* The Transtheoretical Model (TTM) is a stage model of HBC consisting of six stages: precontemplation, contemplation, preparation, action, maintenance, and termination (Prochaska & Velicer, 1997). In the precontemplation stage, people are unsure of the consequences following a behavior change; therefore they have no intention of taking action immediately. Contemplation is the stage in which people are considering making a change in the next six months. In this stage, the person will weigh the pros and cons of their potential action. The preparation stage consists of people willing to make an immediate change. They have a plan and understand what will happen next. The action stage is when people have made lifestyle changes within the past six months. Maintenance, lasting from six months to five years, is the stage the person is

trying to keep up with the change they made previously and prevent relapse. Finally, the termination stage is when the person is one hundred percent sure they can continue the change and they have complete confidence in their abilities (Prochaska & Velicer, 1997). Some issues discovered with the TTM include: no known long-term effects and the possibility that someone might progress through a stage but their behavior might not actually change (Brug, Conner, Harre, Kremers, McKellar, & Whitelaw, 2004). Research states that TTM can be useful in improving behavior in patients with chronic diseases to help them manage their diseases. While initially the TTM was used in smoking cessation, it can also be applied to weight loss and substance abuse studies (Arafat, Ibrahim & Awaisu, 2016).

*Health Action Process Approach.* The Health Action Process Approach (HAPA), a combination of a continuum and a qualitative model, was created by merging the ideas of Social-Cognitive Theory, the Theory of Reasoned Action, and volition theories (i.e., theories incorporating motivation and self-regulation; Byman & Kansanen, 2008; Schwarzer & Luszczynska, 2008). This approach consists of two stages/phases. The first includes the “preintentional motivation processes that lead to behavioral intention” and the second includes the “postintentional volition processes that lead to actual health behavior” (Schwarzer & Luszczynska, 2008, p. 142). People in phase one have not yet begun the behavior change process, whereas people in phase two have begun taking action.

Within the first phase, three predictors of intention formation are known: risk perception, outcome expectancies, and self-efficacy (Berli, Loretini, Radtke, Hornung & Scholz, 2014; Schwarzer & Luszczynska, 2008). Self-efficacy is a major component of

HAPA; however, it is different than in other theories and models. There are several self-efficacy constructs (preaction, maintenance, and recovery) and they are phase-specific. For example, preaction self-efficacy is used to predict intentions (phase 1), whereas maintenance self-efficacy is used to predict behaviors (phase 2; Schwarzer & Luszczynska, 2008). Within the second phase, action planning and action control are important features. Action planning is the process of figuring out when, where, and how to complete the behavioral change. Action control refers to the ability to self-monitor and continue the behavior change (Berli et al., 2014). The HAPA is a widely used model in HBC and is applicable to a vast range of research including, but not limited to, physical activity, drug and alcohol use, and various kinds of hygiene behaviors (Berli et al., 2014).

Each of the theories listed offer a unique approach to HBC and provides researchers many theoretical perspectives to apply to a variety of research questions and hypotheses. It is imperative that researchers apply several models of HBC to their research questions, which is reinforced by Sameroff's (2010) *Unified Theory of Development* in which he outlines development as a culmination of models, not just one (Badcock, 2012; Sameroff, 2010).

### **Behavioral Intention**

In HBC research, behavioral intention is assessed as a predictor, mediator, or outcome of behavior change through the use of many HBC models (i.e. TPB, HAPA, TTM; Rhodes & de Bruijn, 2013). Intention also has been noted as a key indicator of behavior performance and motivation (Kelly, Zyzanski, & Alemagno, 1991; Rogers, 1983). Several meta-analyses have calculated that the relation between intention and behavior displays an estimated effect size of  $r=.50$ , indicating a moderate connection

between the two (Rhodes & de Bruijn, 2013). A study by Riebl and colleagues (2016) suggests that intention is one of the strongest determinants of behavior change. After participants completed a series of questionnaires, the researchers discovered that intention was a significant predictor of sugar sweetened beverage (SSB) consumption in both parents and children (Riebl et al., 2016). Although some evidence of the intention-behavior relation exists, it is not always a predictor of behavior change. For example, a meta-analysis conducted by Rhodes and Dickau (2012) show a disconnect in intention and behavior. Specifically, they discovered that changes in intention only resulted in very small amounts of behavior change ( $r=.06$ ; Rhodes & Dickau, 2012). This inconsistency has ultimately led to the ‘intention-behavior gap’ in HBC literature seen today and suggests that behavioral intention should be understood with regard to a specific health behavior (Spath & Redmond, 1995).

One important point to note is that the majority of research conducted on the intention-behavior gap focus solely on an individual changing their own behavior (i.e. Rhodes & de Bruijn, 2013; Rhodes and Dickau, 2012), not the involvement of another person (i.e. a parent) in behavior change. It seems that the relation between parent intention and child development (i.e., behavior) is a large part of HBC; however, no model of HBC tackles the notion of parenting and decision-making for their child. The goal of the current study is to address this issue in HBC research and examine the pathways relevant to understanding intention for parents in relation to their child’s nutrition and physical activity (see *Figure 2*).

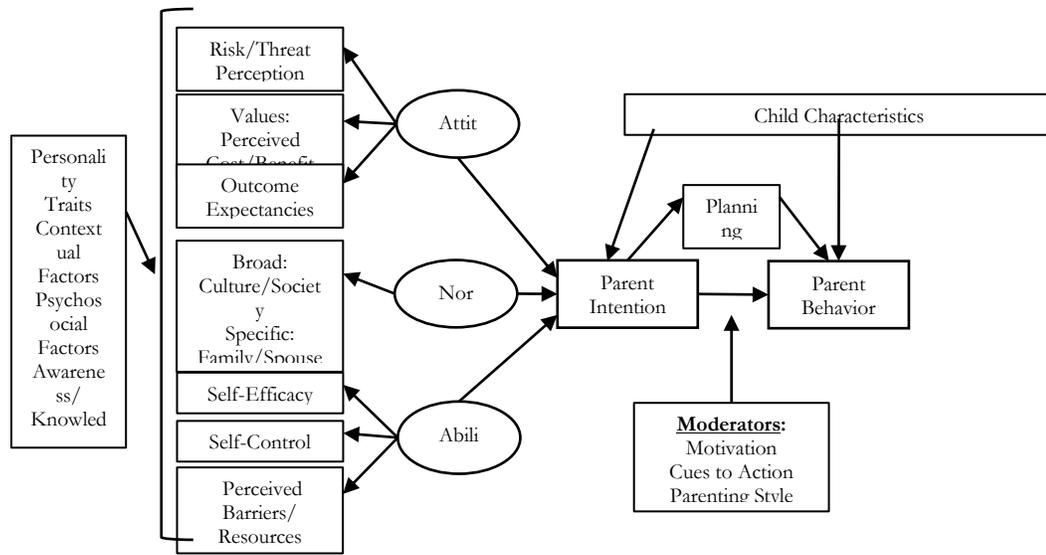


Figure 2. Proposed model of parent influence on child health behavior change (Nicholson & Barton, n.d.)

**Parents’ Influence on Children’s Health Behavior Change: Application to Obesity Prevention**

Childhood obesity is a growing problem in the United States affecting roughly 12.7 million children and adolescents in 2011-2014 (Hales et al., 2017). There are several known contextual factors that affect a child’s weight. For example, socioeconomic status, physical activity levels, and parent feeding practices heavily influence weight gain, or lack thereof (Kheirollahpour & Shohaimi, 2014). Additionally, genetics, individual difference, family, and society play a large role in childhood obesity (Andrews, Silk, & Enel, 2010). Although there are many known determinants of childhood obesity, a particular determinant that is highly overlooked is the role of parents on their child’s feeding practices and physical activity and how parents’ beliefs, attitudes, and psychological factors influence the success of obesity prevention initiatives.

*Obesity Prevention Research.* Obesity in children and adults is linked to poor psychological and physiological outcomes throughout the lifespan. Psychologically, obese individuals suffer from poor social stigmatization, negative emotional states, lower self-esteem, and troubling internalizing/externalizing behaviors (Gori, Guaraldi, Cinocca, Moser, Rucci, & Fantini, 2017; Yavuz, van Ijzendoorn, Mesman, & van der Veek, 2015). Physiologically, obese individuals are prone to cardiovascular disease, musculoskeletal complications, sleep apnea, asthma, and even premature death (Gori et al., 2017; Hung, Tidwell, Hall, Lee, Briley, & Hunt, 2015; Sbruzzi, Eibel, Barbiero, Petkowicz, Ribeiro, Cesa, Martins, Marobin, Schaan, Souza, Schaan, & Pellanda, 2013; Yavuz, van Ijzendoorn, Mesman, & van der Veek, 2015). Treatment and prevention of obesity, especially beginning in childhood, is pertinent to avoiding lifelong psychological and physiological complications. The following section outlines common trends in childhood obesity prevention literature as noted in several meta-analyses, focusing specifically on context as an influence of obesity prevention. While it is meaningful that these meta-analyses address the importance of environment on HBC, they do so in a very narrow way, ignoring the broader theoretical perspectives underlying HBC.

*Trends in Obesity Prevention Research.* Though research on obesity prevention and treatment varies widely in terms of results and research goals, there are some common areas reported in obesity prevention meta-analyses. A key component of childhood obesity prevention is the age at which the child receives the intervention. Multiple meta-analyses have discovered that children age 6-12 are the most receptive to health behavior change interventions (Gori et al., 2017; Sbruzzi et al., 2013; Hung et al., 2015). Gori and colleagues (2017) suggest that this age group is most willing to change

their ways because of their exposure to teachers and educators at school. They argue that school is an appropriate time for children to learn about healthy lifestyle choices. Sbruzzi and colleagues (2013), as well as Hung and colleagues (2015), explicitly include children beginning at age 6, again focusing on a school-aged sample. In reviewing research articles for the present study, age played a large role in obesity prevention and treatment.

A second common thread amongst obesity prevention research is the emphasis on the specific environment of the program, in this case school-based educational interventions. The majority of interventions researched contained an educational component and was administered in a school setting. Gori and colleagues (2017) reported that the most effective interventions were those administered in a school setting or family setting. Sbruzzi and colleagues (2013) reported that educational interventions for at least six months were associated with reduced BMI and blood pressure. Yavuz and associates (2015) observed that obesity interventions were most effective when an educational component was included in the intervention. On the contrary, Hung and colleagues (2015) claim that school-based educational interventions did not have an effect on childhood obesity. Although the results are not completely consistent, there is evidence that educational components of intervention programs can influence health outcomes when the child's environment and context are considered.

Another criterion specified was the type of intervention. Specifically, nutrition or diet based interventions, physical activity interventions, and/or the combination of the two. Each meta-analysis revealed a requirement that the interventions have a nutrition and/or physical activity component. After statistical analysis, multiple meta-analyses made evident that the combination of a nutritional component and a physical activity

component were more beneficial to the interventions than just one (Gori et al., 2017; Sbruzzi et al., 2013; Hung et al., 2015).

A final factor associated with health behavior change interventions focusing on obesity is parenting and family life. While school is a key component of the health education process, much time spent out of school for a child is spent with parents and family, ultimately influencing child health behaviors. This emphasizes the need to involve families and parents in the HBC intervention process (Gori et al., 2017). Parents provide services to a child that teachers and educators might not in school. For example, parent feeding behaviors (e.g. structured feeding, sensitivity to cues, high control over eating), specific parent behaviors (e.g. modeling, reinforcement), and parenting styles (e.g. authoritarian, authoritative) have been associated with childhood obesity levels (Yavuz et al., 2015). Additionally, parents taking an active role in child feeding practices and physical activity levels could reduce childhood obesity risks (Hung et al., 2015). Parent and family influence is vital for child health behavior change; however, theoretical grounding for the research currently being conducted is limited and not completely understood.

### **Current Study**

The objective of the current study is to evaluate the research gap between HBC in childhood obesity and in factors that affect parenting, such as child age, family context, and the parent-child relationships. Previously developed models of human development (Baltes, 1987; Bronfenbrenner, 1977; Sameroff, 2010) have inspired further research on the relationship between family context and HBC (Faith et al., 2012; Spoth & Redmond, 1995); however, empirical evidence is still insufficient. The current study seeks to

examine the existing literature on the relation between contextual and health factors that influence parent intention for children HBC, focusing on the importance of a strong theoretical background. A strong theoretical background and measures that match the proposed theory aid in understanding health behavior change in children when assessing nutrition and physical activity. Using a more inclusive model of parenting and HBC (see *Figure 2*), a comprehensive review of studies focusing on childhood obesity prevention that measured parent psychological factors was conducted. This focused specifically on parent intention as a factor influenced by parent characteristics and child health outcomes and investigated prominent pathways between parent psychosocial variables and intention to change children's behavior. A review of the literature and strength of the relation between parenting and health behaviors of children was conducted to 1) explore components of the proposed model (see *Figure 2*) and 2) propose where gaps in research should be focused on influential variables related to children's health.

## **Method**

### **Literature Search**

A preliminary search was conducted, seeking out interventions and programs that target nutrition and/or physical activity in relation to childhood obesity prevention. Using PsycINFO and MedLine databases with the "all text" function, the following terms were searched: "Childhood obesity\*", "Nutrition OR physical activity OR fitness OR diet\*", "Prevention OR intervention OR treatment OR program", "Parent\*", and "intent\*". The use of "\*" broadened the search, allowing for the inclusion of articles that start with the same letters as the search terms. All articles included in the final sample were coded (see *Appendix A* for example) and entered into Qualtrics, where the data was then extracted

and transferred into Excel. The literature search resulted in 13,066 articles and dissertations. The search was refined with a publication date of 1980 or later and dissertations were removed, resulting in 10,520 articles. When including an additional search criterion for a measure of parent intention and/or goals to participate in HBC, the article number was reduced to 320 articles. Duplicates were removed from the sample, decreasing the articles to 269. The abstracts of all 269 articles were searched to eliminate review and protocol articles, confirm the article included parent involvement (i.e., including psychosocial measures and parental consent), and only include articles that examined intention to complete a health behavior change; this next step eliminated 196 articles. The full-text of the remaining 73 articles was obtained and electronically searched for intention and/or goal to eliminate those who 1) did not measure parental intention in relation to HBC ( $K = 30$ ), 2) had no psychosocial measures ( $K = 10$ ), 3) were repetitive with other studies already included ( $K = 2$ ), or 4) were qualitative studies ( $K = 2$ ). This resulted in a total of 29 studies to be included in the final review (see *Figure 3* and *Table 1*).

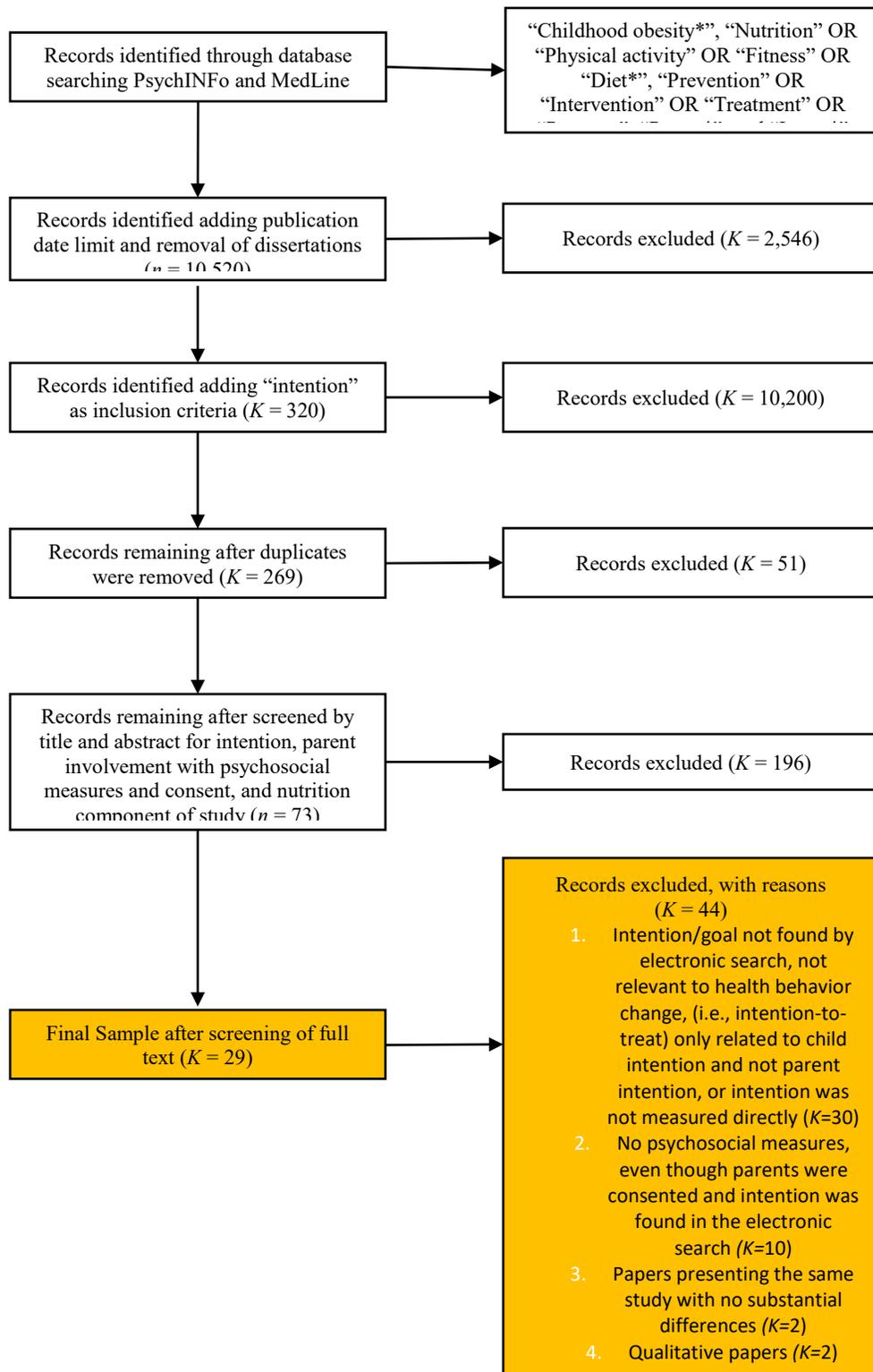


Figure 3. Literature review flowchart.

Table 1.

*Article sample used in the proposed literature review.*

Authors	Title	Year	Sample Size	Type of Variable (intention)	Variables Significantly Related to Intention	Variables Not Significantly Related to Intention
				<b>Dependent Variable</b>		
Bailey-Davis, L., Peyer, K. L., Fang, Y., Kim, J-K., & Welk, G. J.	Effects of enhancing school-based body mass index screening reports with parent education on report utility and parental intent to modify obesity risk factors	2017	1745 parents 1469 children	Dependent variable		Intervention
Baranowski, T., Beltran, A., Chen, T-A., Thompson, D., O'Connor, T., Hughes, S., Diep, C., & Baranowski, J.C.	Predicting use of ineffective vegetable parenting practices with the model of goal directed behavior	2015	307 parents 307 children	Dependent variable		Ineffective parenting practices
Cottrell, L., Harris, C.V., Bradlyn, A., Gunel, E., Neal, W.A., Abildso, L., & Coffman, J. W.	Identifying the people and factors that influence children's intentions to make lifestyle changes	2012	342 parents 342 children	Dependent variable	Attitudes, perceived behavioral control	Subjective norms
De Steur, H., Mogendi, J.B., Wesana, J., Makokha, A., & Gellynck, X.	Stakeholder reactions toward iodine biofortified foods: An application of protection motivation theory	2015	360 parents	Dependent variable	Self-efficacy, response cost	Threat appraisal (perceived severity, perceived vulnerability, perceived fear), coping appraisal (response efficacy),

						protection motivation
Hart, L.M., Damiano, S.R., & Paxton, S.J.	Confident body, confident child: A randomized controlled trial evaluation of a parenting resource for promoting healthy body image and eating patterns in 2- to 6-year old children	2016	401 parents 284 children	Dependent variable		Intervention
Lu, W., McKyer, E.L.J., Lee, C., Wang, S., Goodson, P., & Ory, M.G.	Active commuting to school: A test of a modified integrative model.	2014	857 parents	Dependent variable	Perceived barriers, self- efficacy, health beliefs and outcomes	
Mareno, N.	An early-phase translation study of the ways to enhance children's activity and nutrition (We Can!) programme for low-income families	2014	11 parents	Dependent variable	Knowledge, attitude	Intervention effectiveness
Rodearmel, S.J., Wyatt, H.R., Stroebele, N., Smith, S.M., Ogden, L.G., & Hill, J.O.	Small changes in dietary sugar and physical activity as an approach to preventing excessive weight gain: the America on the Move family study	2007	262 parents 118 children	Dependent variable		Intervention

Shriver, L.H., Hildebrand, D., & Austin, H.	Determinants of fruit and vegetable availability in Hispanic head start families with preschool-aged children living in an urban midwestern area.	2010	113 parents	Dependent variable		Food availability, perceived costs
Sweitzer, S.J., Briley, M.E., Roberts-Gray, C., Hoelscher, D.M., Harrist, R.B., Staskel, D.M., & Almansour, F.D.	Psychosocial outcomes of Lunch is in the Bag, a parent program for packing healthful lunches for preschool children	2011	132 parents 132 children	Dependent variable	Knowledge, outcome expectations, perceived behavioral control, subjective norms	Intervention effectiveness
				<b>Independent variable</b>		
Bagherniya, M., Sharma, M., Mostafavi Darani, F., Maracy, M. R., Safarian, M., Allipour Birgani, R., Bitarafan, V., & Keshavarz, S. A.	School-based nutrition education intervention using social cognitive theory for overweight and obese Iranian adolescent girls: A cluster randomized controlled trial	2017	187 parents 187 children	Independent variable	Self-efficacy, social support	Outcome expectations, dietary situation
Barnes, A. T., Plotnikoff, R. C., Collins, C. E., & Morgan, P. J.	Feasibility and preliminary efficacy of the MADE4Life program: A pilot randomized controlled trial	2015	40 parents 48 children	Independent variable	Self-efficacy	Outcome expectations, social support
Bere, E. & Klepp, K.-I.	Correlates of fruit and vegetable intake	2004	1547 parents	Independent variable	Accessibility, preference	Modeling, self-efficacy, awareness,

	among Norwegian schoolchildren: Parental and self-reports		1950 children			parent intake, preference
Bleakley, A., Jordan, A., Mallya, G., Hennessy, M., & Piotrowski, J. T.	Do you know what your kids are drinking? Evaluation of a media campaign to reduce consumption of sugar-sweetened beverages	2017	1367 parents 1367 children	Independent variable	Behavioral belief	Attitude, exposure to advertisements
Casiro, N.S., Rhodes, R.E., Naylor, P.J., & McKay, H.A.	Correlates of intergenerational and personal physical activity of parents	2011	126 parents	Independent variable	Attitude, subjective norms, perceived control	Frequency of activity
de Nooijer, J., Jansen, R., & van Assema, P.	The use of implementation intentions to promote vitamin D supplementation in young children	2012	171 parents 171 children	Independent variable		
Gainforth, H.L., Jarvis, J.W., Berry, T.R., Chulak-Bozzer, T., Deshpande, S., Faulkner, G., Rhodes, R.E., Spence, John C Tremblay, M.S., & Latimer-Cheung, A.E.	Evaluating the ParticipACTION 'Think Again' campaign	2016	652 parents	Independent variable	Knowledge, perception, outcome expectations, perceived behavioral control	Parental support, physical activity behavior
Harvey-Berino, J. & Rourke, J.	Obesity prevention in preschool Native-American children: A pilot	2003	43 parents 43 children	Independent variable		Outcome expectations, self-efficacy

	study using home visiting					
Mangunkusumo, R.T., Brug, J., de Koning, H.J., van der Lei, J., & Raat, H.	School-based internet-tailored fruit and vegetable education combined with brief counselling increases children's awareness of intake levels	2007	240 parents 495 children	Independent variable		Awareness, knowledge, self-efficacy, liking, availability
Rhodes, R.E., Naylor, P-J., & McKay, H.A.	Pilot study of a family physical activity planning intervention among parents and their children	2010	85 parents	Independent variable		Perceived behavioral control, physical activity behaviors
Rhodes, R.E., Spence, J.C., Berry, T., Deshpande, S., Faulkner, G., Latimer-Cheung, A.E., O'Reilly, N., & Tremblay, M.S.	Understanding action control of parental support behavior for child physical activity	2016	1253 parents 1253 children	Independent variable	Attitude, perceived behavioral control, behavioral regulation	
Trude, A.C.B., Kharmats, A.Y., Hurley, K.M., Anderson Steeves, E., Talegawkar, S.A., & Gittelsohn, J.	Household, psychosocial, and individual-level factors associated with fruit, vegetable, and fiber intake among low-income urban African American youth	2016	285 parents 284 children	Independent variable		Self-efficacy, outcome expectation, food knowledge, food purchase
				<b>Mediator Variable</b>		
Bélanger-Gravel, A., & Godin, G.	Key beliefs for targeted interventions to increase physical	2010	325 parents 334 children	Mediator	Behavioral beliefs, control beliefs, self-identity	

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	activity in children: Analyzing data from an extended version of the theory of planned behavior					
Brennan, L., Wilks, R., Walkley, J., Fraser, S.F., & Greenway, K.	Treatment acceptability and psychosocial outcomes of a randomised controlled trial of a cognitive behavioural lifestyle intervention for overweight and obese adolescents	2012	63 parents 63 children	Mediator	Social support	Intervention, outcome expectation, knowledge
Hamilton, K., Cox, S., & White, K.M.	Testing a model of physical activity among mothers and fathers of young children: Integrating self-determined motivation, planning, and the theory of planned behavior	2012	458 parents	Mediator	Attitude, subjective norms, perceived behavioral control	
Park, M.H., Falconer, C.L., Croker, H., Saxena, S., Kessel, A.S., Viner, R.M., & Kinra, S.	Predictors of health-related behavior change in parents of overweight children in England	2014	202 parents 202 children	Mediator		Recognition of overweight child, health risks
Riebl, S.K., MacDougal, C., Hill, C., Estabrooks, P.A., Dunsmore, J.C., Savla, J.,	Beverage choices of adolescents and their parents using the theory of planned	2016	66 parents 100 children	Mediator	Perceived behavioral control (of parents), subjective	

Frisard, M.I., Dietrich, A.M., & Davy, B.M.	behavior: A mixed methods analysis				norms (of adolescents)	
Spinks, T. & Hamilton, K.	Investigating mothers' decisions to give their 2- to 3- year-old child a nutritionally balanced diet	2016	197 parents	Mediator	Attitude, subjective norms, perceived behavioral control	Parental role construction
Swanson, V., Power, K.G., Crombie, I.K., Irvine, L., Kiezebrink, K., Wrieden, W., & Slane, P.W.	Maternal feeding behavior and young children's dietary quality: A cross- sectional study of socially disadvantaged mothers of two- year old children using the Theory of Planned Behaviour	2011	300 parents 300 children	Mediator	Perceived behavioral control, attitudes	Norms, self- efficacy

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*Note.* Articles with a smaller sample size increase in likelihood of Type II Error.

## Results

The present study assessed articles published between 2003 and 2018 that focused on childhood obesity prevention interventions. Overall, the sample included a total of 12,137 parents and 9,449 children (see *Table 1*) participating in a childhood obesity intervention program. Specific items in the articles that were of interest were how intention was placed in the research question (i.e., independent variable, mediating variable, dependent variable), the type of HBC models used, the psychosocial measures assessed by the researchers and how often each construct was investigated relevant to intention, and how intention was measured and the strength of the effect between intention and the different constructs.

The final sample yielded twenty-nine articles: 10 with intention as a dependent variable, 12 with intention as an independent variable, and 7 with intention as a mediating variable (see *Table 1*). Theoretical models present in the sample of articles include TPB, SCT, HBM, TTM, PMM, HAPA, and TRA, hinting at a strong theoretical background in some of the HBC interventions used in this study. Majority of the articles included a theoretical background including a minimum of one theory (86.2%), while 13.8% of the articles did not include any theory at all. Fourteen articles used TPB, two used HBM, four used TTM, one used PMM, four used TRA, eleven used SCT, one used HAPA, and six used other theories/models that are not included in the theories of focus.

Psychosocial measures included varied widely from article to article, resulting in fifteen overall constructs of interest. Those constructs were then combined into broader categories to increase the sample size associated with each construct, resulting in seven total constructs to be analyzed. The constructs include intention/goal, attitudes, self-efficacy, behavior, social support, knowledge/awareness, and norms (see *Table 2*). Intention/goal focuses on intention to change behavior and goal setting. Attitudes includes measures such as attitudes about physical activity and nutrition, as well as outcome expectations. Self-efficacy includes items measuring confidence, perceived behavioral control and food-related self-efficacy. Behavior includes measures such as child feeding practices, child fruit and vegetable intake, and child food preferences. Social support measures family and friend involvement. Knowledge/awareness includes measures focusing on knowledge of physical activity and nutrition. Finally, the norms measured are group norms and subjective norms.

Table 2.

*Constructs used in evaluating parental influence on child health behavior change.*

Article	Intention/ Goal	Attitude	Self- efficacy	Beha vior	Social Support	Know ledge/ Aware ness	Norms
Bagherniya et al. (2017)	✓	✓	✓		✓		
Bailey-Davis et al. (2017)	✓	✓					
Baranowski et al. (2015)	✓	✓	✓	✓			
Barnes et al. (2015)	✓	✓	✓		✓		
Bélanger-Gravel & Godin (2010)	✓	✓	✓	✓	✓		✓
Bere & Klepp (2004)	✓		✓	✓		✓	
Bleakley et al. (2017)	✓	✓					
Brennan, Wilks, Walkley, Fraser, & Greenway (2012)	✓				✓		
Casiro et al. (2011)	✓	✓	✓	✓			✓
Cottrell et al. (2012)	✓	✓		✓			
de Nooijer, Jansen, & van Assema (2012)	✓			✓			
De Steur, Mogendi, Wesana, Makokha, & Gellynck (2015)	✓		✓			✓	

Gainforth et al. (2016)	✓	✓	✓		✓	
Hamilton, Cox, & White (2012)	✓	✓	✓	✓		✓
Hart, Damiano, & Paxton (2016)	✓				✓	
Harvey-Berino & Rourke (2003)	✓	✓		✓		
Lu et al. (2014)	✓	✓	✓	✓		
Mangunkusumo, Brug, Koning, van der Lei, & Raat (2007)	✓		✓	✓		✓
Mareno (2014)	✓	✓		✓		✓
Park et al. (2014)	✓			✓		
Rhodes, Naylor, & McKay (2010)	✓		✓	✓		
Rhodes et al. (2016)	✓	✓	✓	✓	✓	
Riebl et al. (2016)	✓	✓	✓			✓
Rodearmel et al. (2007)	✓					
Shriver, Hildebrand, & Austin (2010)	✓		✓	✓		
Spinks & Hamilton (2016)	✓	✓	✓	✓		

Swanson, Power, Crombie, Irvine, Kiezebrink, Wrieden, & Slane (2011)	✓	✓	✓	✓		✓
Sweitzer, Briley, Roberts-Gray, Hoelscher, Harrist, Staskel, & Almansour (2011)	✓	✓	✓	✓		✓
Trude, Kharmats, Hurley, Steeves, Talegawkar, & Gittlesohn (2016)	✓	✓	✓		✓	

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### Intention and Goal Setting

The main construct of focus, intention and goal setting, is heavily influential in predicting health behavior change (Kelly, Zyzanski, & Alemango, 1991; Rogers, 1983; Spoth & Redmond, 1995). Stronger intention to change a health behavior has been known to predict the success of changing that specific behavior. For example, a study by Schifter and Ajzen (1985) discussed the correlation between strength of intention and weight loss, favoring the argument that stronger intention predicted weight loss in women. Similarly, the action of setting a goal leads to higher HBC performance when compared to setting no goals at all (Stretcher et al., 1995). In the final sample, twenty-four articles measured intention directly, three measured goal setting, and two articles did not report their measurement of intention or goal setting (see *Table 3*). Each article in the final sample measured intention differently, some measuring intention with anywhere

from one question to twelve questions. Likewise, each question or scale used to measure intention was different from one another, indicating that the measurement of the same construct is quite inconsistent (see *Table 3*). This result parallels inconsistencies that have previously been reported in TPB research. Specifically, researchers argue that the TPB constructs contain measurement error (they rarely exhibit reliability larger than 0.70; Ajzen, 2011).

Table 3.

*Ways in which intention was measured in each study in the final sample.*

Authors	Year	Number of Items	Description of Items	Reliability/Validity	References?
				<b>Reported Reliability/Validity</b>	
Bélanger-Gravel, A., & Godin, G.	2010	3	Intention was assessed with the following three items: “This week...(1) will you do physical activities? (2) will you try to do physical activities?,and (3) what are the chances of you doing physical activities?”	$\alpha = .75$	✓
Baranowski, T., Beltran, A., Chen, T-A., Thompson, D., O’Connor, T., Hughes, S., Diep, C., & Baranowski, J.C.	2015	4 subscales	Authoritative parenting intentions, active child involvement intentions, controlling parenting intentions, permissive parenting intentions	$\alpha = .61-.84$	
Hamilton, K., Cox, S., & White, K.M.	2012	3	Three items assessed the strength of intention to perform PA (“I intend to do regular PA in the next week,” “I plan to do regular PA in the next week,” and “I expect that I will do regular PA in the next week” scored	$\alpha = 0.94$	✓

strongly disagree [1]  
to strongly agree [7])

Spinks, T. & Hamilton, K.	2016	3	Three items measured the strength of behavioral intention to perform the target behaviors (eg, "I intend to [target behavior] every day in the next week," scored 1 = strongly disagree to 7 = strongly agree)	$\alpha = 0.90$	✓
Riebl, S.K., MacDougal, C., Hill, C., Estabrooks, P.A, Dunsmore, J.C., Savla, J., Frisard, M.I., Dietrich, A.M., & Davy, B.M.	2016	4	Four items for intention (eg, "How motivated are you to limit your sugary drinks to less than 1 cup each day?"	$\alpha = 0.85$	✓
Rhodes, R.E., Naylor, P-J., & McKay, H.A.	2010	2	These included: (1) "how committed are you to participating regularly in family physical activity over the next month?" from extremely uncommitted to extremely committed on a seven-point scale and (2) "I intend to engage in regular family-based physical activity ___ times per week over the next month."	$A = 0.71$	✓
Gainforth, H.L., Jarvis, J.W., Berry, T.R., Chulak-Bozzer, T., Deshpande, S., Faulkner, G., Rhodes, R.E.,	2016	2	Two items, rated on a scale from 1 (strongly disagree) to 4 (strongly agree), were used to assess parents' intentions toward providing	$A = 0.70$	✓

<p>Spence, John C Tremblay, M.S., &amp; Latimer-Cheung, A.E.</p>		<p>Unknown</p>	<p>parental support for their child/ children's PA. An example item is, "Over the next 6 months, I intend to help my child be more physically active."</p>	<p><math>\alpha = 0.70</math></p>	<p>✓</p>
<p>Rhodes, R.E., Spence, J.C., Berry, T., Deshpande, S., Faulkner, G., Latimer-Cheung, A.E., O'Reilly, N., &amp; Tremblay, M.S.</p>	<p>2016</p>	<p>Unknown</p>	<p>The items followed the phrase "In the next six months, I intend to . . .": (a) ". . . encourage my child to do physical activity or sport most days of the week," (b) ". . . play outdoors or do physical activity with my child most days of the week," and (c) ". . . drive or provide transportation to a place so my child can do physical activity or play sports most days of the week." The items were evaluated on a five-point Likert-type scale ranging from 5 (strongly agree) to 1 (strongly disagree)</p>	<p><math>\alpha = 0.70</math></p>	<p>✓</p>

De Steur, H., Mogendi, J.B., Wesana, J., Makokha, A., & Gellynck, X.	2015	4	Behavioral intention to adopt biofortified foods was determined by four 5-point Likert scale items (“extremely unlikely” = 1 to “extremely likely” = 5): “How likely are you to accept iodine biofortified legumes as a source of iodine for your children?”, “How likely is it that you will include iodine biofortified legumes in the household/school menu for the children?”, “Are you likely to buy iodine biofortified legumes for the household/school?”, and “I will consider advocating for inclusion of iodine biofortified legumes in school meals.”	A = 0.69	✓
Trude, A.C.B., Kharmats, A.Y., Hurley, K.M., Anderson Steeves, E., Talegawkar, S.A., & Gittelsohn, J.	2016	12	Twelve questions focused on how respondents intend to select food for themselves in the future. The responses were graded by assigning 1 point to the healthiest option and zero otherwise.	A = 0.44	✓
Casiro, N.S., Rhodes, R.E., Naylor, P.J., & McKay, H.A.	2011	2	Exercise intention was assessed using 2 items. The first item used a 7-point scale (extremely uncommitted – extremely committed) and asked, “How committed are you exercising regularly over the next month?” The second question that assessed intention required	inter item $r = .48$ for family; inter item $r = .52$ for personal	✓

			that participants complete the statement “I intend to engage in regular (family-based) physical activity times per week over the next month”		
Hart, L.M., Damiano, S.R., & Paxton, S.J.	2016	6	Six brief vignettes are presented and parents are asked to rank four possible behavioral responses. These responses were designed to assess: (1) a positive parenting response that is likely to assist in the prevention of body dissatisfaction and disordered eating, (2) a response indicating a lack of parenting knowledge, (3) a negative parenting response that is likely to increase the risk of negative body attitudes or unhealthy eating by increasing stigmatising body, weight, or shape attitudes, and (4) an unhelpful but non-stigmatising response	ICC = 0.64	✓
Swanson, V., Power, K.G., Crombie, I.K., Irvine, L., Kiezebrink, K., Wrieden, W., & Slane, P.W.	2011	2	Two questions representing ‘planning’ and ‘wanting’ for each of the behaviors (later combined into one overall construct)	“acceptable”	✓
Bagherniya, M., Sharma, M., Mostafavi Darani, F., Maracy, M. R., Safarian, M., Allipour Birgani, R., Bitarafan, V., & Keshavarz, S. A.	2017	5	Five questions with four choices (Likert-type scale, 1 = not at all true of me to 4 = very true of me)	“acceptable range”	✓

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				<b>No Reported Reliability/Validity</b>
Bailey-Davis, L., Peyer, K. L., Fang, Y., Kim, J-K., & Welk, G. J.	2017	5	These behaviors included the following: “limit(ing) the use of sugar-sweetened drinks,” “offer(ing) fruits and vegetables at meals/snacks,” “limit(ing) screen time (TV, video games, iPod/iPad),” “help(ing) child get enough physical activity,” and “help(ing) child get enough sleep.”	✓
Barnes, A. T., Plotnikoff, R. C., Collins, C. E., & Morgan, P. J.	2015	Unknown	Unknown	✓
Bere, E. & Klepp, K.-I.	2004	1	Intention was measured by one item: ‘I intend to eat at least 5 servings of fruit and vegetables a day’	
Bleakley, A., Jordan, A., Mallya, G., Hennessy, M., & Piotrowski, J. T.	2017	1	“In the next month, how likely is it that you will substitute your sugary drink with non-sugary drinks?”	
Brennan, L., Wilks, R., Walkley, J., Fraser, S.F., & Greenway, K.	2012		Intention not measured directly – goal setting was a part of the questionnaires	
Cottrell, L., Harris, C.V., Bradlyn, A., Gunel, E., Neal, W.A., Abildso, L., & Coffman, J. W.	2012	3	Children’s intentions to lose weight, exercise more, and eat healthier over the next 6 months and were asked to respond to the items by choosing one of the following four categories: true,	✓

sometimes  
true/sometimes false,  
false, or don't know

de Nooijer, J., Jansen, R., & van Assema, P.	2012	2 items on Likert scale and one planning item	Intention to give vitamin D supplementation was assessed with two items on a 5-point Likert scale: "Do you intend to give your child the recommended amount of vitamin D (10 µg) every day this week?" (yes, certainly to no, certainly not) and "How sure are you that you will give your child the recommended amount of vitamin D (10 µg) every day this week?" (very sure to not at all sure)	✓
Harvey-Berino, J. & Rourke, J.	2003	1	A 10-point scale where 1 = very unlikely and 10 = very likely on the probability they would engage in physical activity and control their calorie and fat intake in the next 4 months	✓
Lu, W., McKyer, E.L.J., Lee, C., Wang, S., Goodson, P., & Ory, M.G.	2014	1	This construct was represented by one item scaled 1 to 5 asking how often parents encouraged their children to walk or bike to school. Responses ranged from "never" to "all of the time."	✓
Mangunkusumo, R.T., Brug, J.,	2007		Intention not measured – goal	

de Koning, H.J., van der Lei, J., & Raat, H.			setting was part of the curriculum	
Mareno, N.	2014	Unknown	Unknown	✓
Park, M.H., Falconer, C.L., Croker, H., Saxena, S., Kessel, A.S., Viner, R.M., & Kinra, S.	2014	2	“After receiving feedback on your child’s result, did you make any changes to your child’s diet/how much physical activity your child does?” “In the past month, have you accessed any of the following health professionals or leisure services regarding your child’s weight?”	
Rodearmel, S.J., Wyatt, H.R., Stroebele, N., Smith, S.M., Ogden, L.G., & Hill, J.O.	2007		Intention not directly measured – goal accomplishment was measured	
Shriver, L.H., Hildebrand, D., & Austin, H.	2010	Unknown	Questions about intention to serve fruits and vegetables to their children	✓
Sweitzer, S.J., Briley, M.E., Roberts-Gray, C., Hoelscher, D.M., Harrist, R.B., Staskel, D.M., & Almansour, F.D.	2011	3 open- ended questions	Intentions for packing fruit, vegetables, and whole grains in the child’s lunch every day	

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Additionally, twenty-one articles (72.4%) cited their scales measuring intention while eight articles provided no citation for their scales, indicating that the researchers created the scale themselves. When reporting reliability and validity of the scales used to measure intention, twelve articles (41.4%) reported an actual number, while two articles simply stated that the reliability and validity was acceptable without providing number

evidence. Contrastingly, fifteen articles (51.7%) failed to report any reliability and/or validity of the scales used to measure intention (see *Table 3*).

### **Effect Sizes of Significant Pathways**

The final sample addressed several pathways present in the proposed model. Specifically, 29 articles examined intention, 19 articles examined attitude as well as self-efficacy, 18 articles examined behavior of the child, 8 articles examined knowledge/awareness, and 6 articles examined norms. Additionally, 5 articles examined social support, which was not included in the proposed model (see *Figure 4*). While the articles investigated a number of pathways, only a small portion of the pathways had significant correlations between intention and a construct that was studied. The remaining significant correlations (see *Tables 4 and 5*), were in relation to intervention effectiveness. Specifically: 7 articles reported significant pathways between attitude and intention, 8 articles reported significant pathways between self-efficacy and intention, 7 articles reported significant pathways between behavior and intention, and 4 reported significant pathways between norms and intention (see *Figure 5*). In other words, 36.8% of articles that studied attitude reported significant results, 42.1% of articles that investigated self-efficacy reported significant results, 38.9% of articles that studied behavior reported significant results, and 66.7% of articles that studied norms reported significant results (see *Figure 5*).

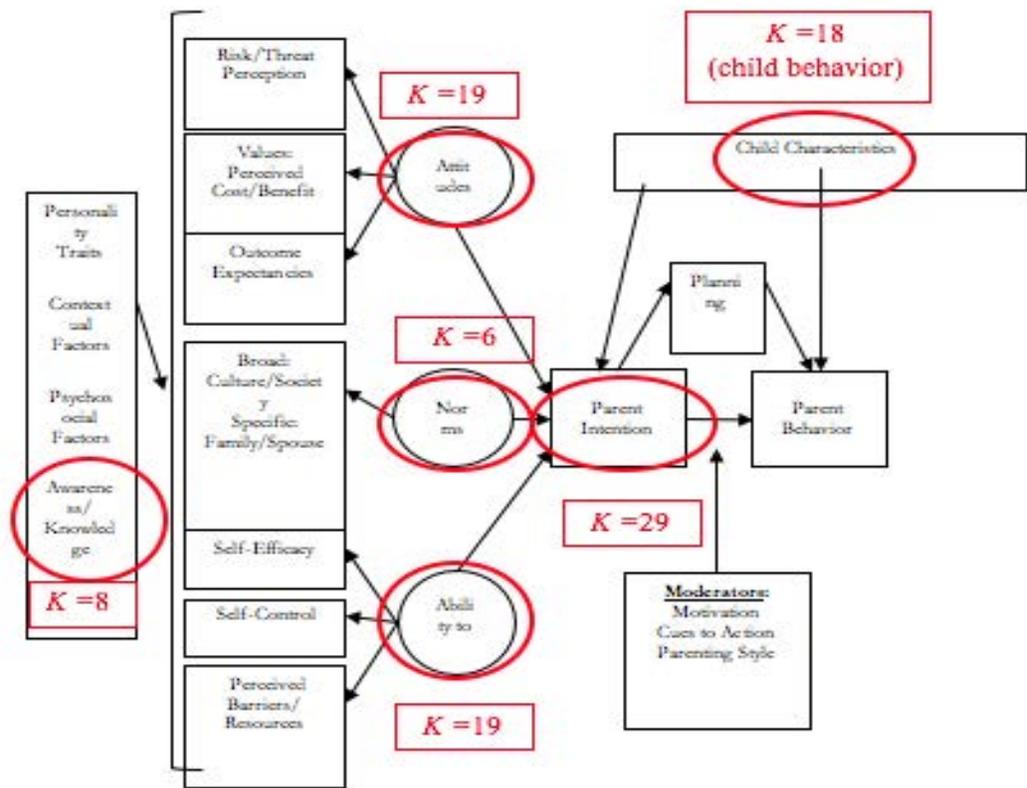


Figure 4. Pathways tested in the final sample in relation to the proposed model

(Nicholson & Barton, n.d.).

Note. The numbers displayed include articles that investigated the specific pathway regardless of significant results.

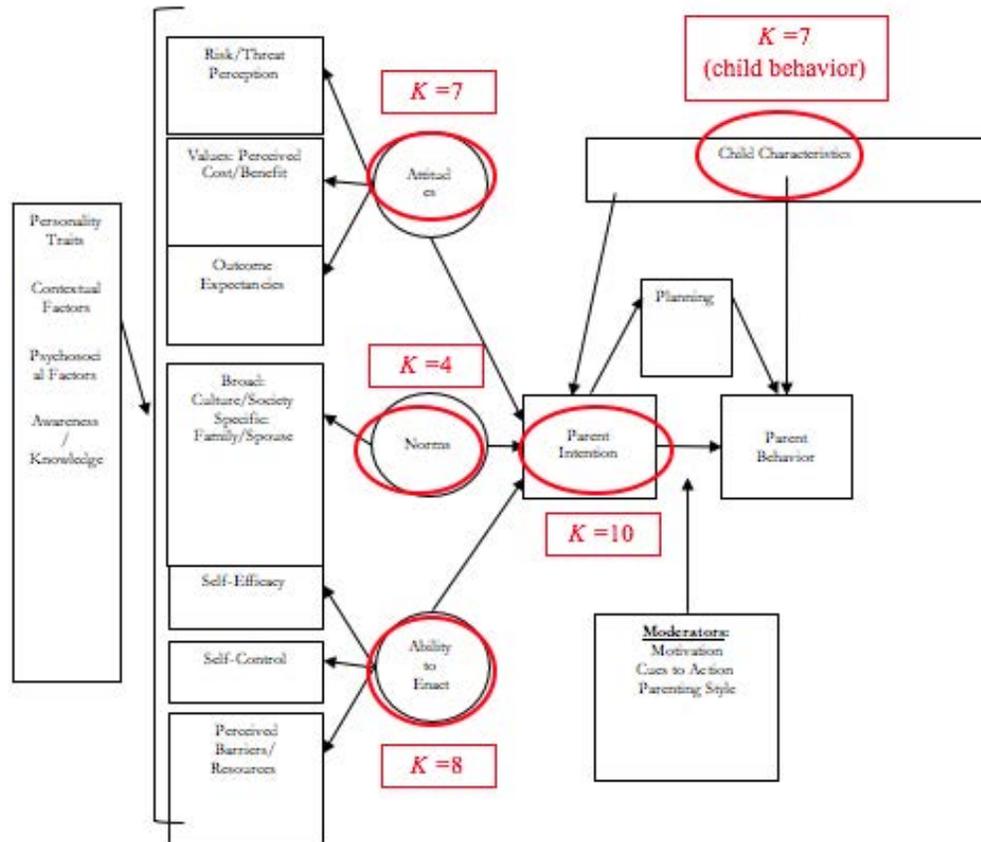


Figure 5. Pathways tested in the final sample in relation to the proposed model that were significant (Nicholson & Barton, n.d.).

Note. These values do not include the articles with missing data.

Effect sizes were located in each article for the significant pathways (see Table 4). When addressing effect size in this review, it has been reported in the common metric of Pearson’s *r*, which allows for the effect sizes to be averaged. This statistic measures an association between two continuous variables and provides information regarding the magnitude of the association, as well as the direction (positive or negative correlations). It is important to note that when reporting multiple correlations for the same pathway, biases do exist and that has been acknowledged in Table 4 if it is the case.

Table 4.

*Prominent pathways and corresponding Pearson's r effect sizes of the final sample.*

Authors	Analytic Approach	Pathway and Effect Size			
<b>Analysis of Covariance (ANCOVA)</b>					
Hart, et al., 2016	ANCOVA	Intention of body image and eating issues → intervention*			
Gainforth, et al., 2016	ANCOVA (continuous variables) Chi-square (categorical variables)	Campaign effectiveness → knowledge*	Campaign effectiveness → self-efficacy (perception of PA, PBC of parent influencing child, helping child become active)*	Campaign effectiveness → attitude (outcome expectations)*	Campaign effectiveness → intention*
<b>Analysis of Variance (ANOVA)</b>					
Shriver, et al., 2010	ANOVA	Parent intention → serving fruits and vegetables*	Self-efficacy → behavior change*	Behavior (decisional balance/process of change) → behavior change*	
Rhodes, et al., 2010**	ANOVA – repeated measures				
<b>Chi-Square</b>					
Harvey-Berino & Rourke, 2003**	Chi-square				
<b>Descriptive Statistics</b>					
Mareno 2014	Descriptive statistics	Knowledge → intervention effect*	Attitude → intervention effect*	Intention → intervention effect*	

<b>Discriminant Analysis</b>					
Rhodes et al., 2016***	Discriminant function analysis	Intention → attitude <i>r</i> = 0.48 (instrumental) <i>r</i> = 0.52 (affective) <i>r</i> = 0.28 (child PA)	Intention → self-efficacy <i>r</i> = 0.66	Intention → behavior (regulation) <i>r</i> = 0.72	Parental support → intention <i>r</i> = 0.53
<b>Factor Analysis</b>					
De Steur, et al., 2015	Factor analysis	Intention → self-efficacy <i>r</i> =0.48			
<b>Linear Models</b>					
Bagherniya, et al., 2017	General linear model univariate analysis	Intervention effectiveness → self-efficacy*	Intervention effectiveness → social support*	Intervention effectiveness → intention*	
Barnes, et al., 2015	Linear mixed models	Intervention effectiveness → self-efficacy (time 2 for control) <i>r</i> = 0.12	Intervention effectiveness → intention (time 1 and time 2) <i>r</i> = -0.07 <i>r</i> = 0.00		
<b>Multigroup Analysis</b>					
Hamilton, et al., 2012	Multigroup analysis	Attitude → intention <i>r</i> = 0.46 (mothers) <i>r</i> = 0.52 (fathers)	Norms → intention <i>r</i> = 0.51 (mothers) <i>r</i> = 0.31 (fathers)	Self-efficacy → intention <i>r</i> = 0.41 (mothers) <i>r</i> = 0.32 (fathers)	Intention → behavior <i>r</i> = 0.59 (mothers) <i>r</i> = 0.58 (fathers)
<b>Multivariate Analysis of Variance (MANOVA)</b>					
Brennan, et al., 2012	MANOVA	Social support → intention*			
<b>Regression</b>					

Baranowski, et al., 2015**	Regression – block				
Bélanger-Gravel & Godin, 2010	Regression – hierarchical multiple linear	Attitude (behavioral beliefs, self-identity) → intention <i>r</i> =0.19	Self-efficacy (control beliefs) → intention <i>r</i> =0.24	Intention → behavior <i>r</i> =0.25	
Bleakley, et al., 2017	Regression – linear	Campaign effectiveness → intention <i>r</i> = 0.22			
Swanson, et al., 2011	Regression – linear	Self- efficacy → intention*	attitude → intention*	intention → behavior*	
Cottrell, et al., 2012***	Regression – logistic	intention → attitude <i>r</i> =0.07	intention → norms <i>r</i> =0.73	intention → self-efficacy <i>r</i> =0.18 <i>r</i> =0.31 <i>r</i> =0.41	
de Nooijer, et al., 2012**	Regression – logistic				
Park, et al., 2014	Regression – logistic	intention → behavior*			
Bailey-Davis, et al.,2017***	Regression – logistic	intention → behavior <i>r</i> = 0.64 <i>r</i> = 0.21			
Bere & Klepp, 2004	Regression – multiple	intention → behavior <i>r</i> = 0.05			
Spinks & Hamilton, 2016	Regression – multiple	Attitude → intention <i>r</i> = 0.49	Norms → intention <i>r</i> = 0.61 (subjective) <i>r</i> = 0.32 (group)	Self-efficacy → intention <i>r</i> = 0.56	Intention → behavior <i>r</i> = 0.43
Mangunkusumo, et al., 2007**	Regression – multiple logistic				
Riebl, et al., 2016	Regression – stepwise multiple	Attitude → intention <i>r</i> = 0.21 (child)	Norms → intention <i>r</i> =0.52 (child)	Self-efficacy → intention	Intention → behavior <i>r</i> = -0.36 (child)

		$r = 0.21$ (parent)	$r = 0.25$ (parent)	$r = 0.32$ (child) $r = 0.55$ (parent)	$r = -0.58$ (parent)
Sweitzer, et al., 2011	Regression – three-level	Knowledge → intervention effect $r = 0.11$ (serving whole grains)	Attitude → intervention effect $r = 0.02$ (serving vegetables)	Self-efficacy → intervention effect $R = 0.05$ (serving vegetables)	Intention → intervention effect $r = 0.01$ (serving vegetables)
Trude, et al., 2016	Regression – ordered logit	F/V/Fiber intake → intention*			
<b>Repeated Measures</b>					
Rodearmel, et al., 2007**	Repeated measures mixed model				
<b>Structural Equation Modeling (SEM)</b>					
Lu, et al., 2014	SEM	Intention → attitude (perceived barriers) $r = -0.17$	Intention → self-efficacy $r = 0.46$		
<b>T-Test</b>					
Casiro, et al., 2011	T-test	PA differences → attitude (affective) $r = 0.03$ $r = 0.01$ (instrumental)	PA differences → norms $r = 0.07$	PA differences → self-efficacy $r = -0.10$	PA differences → intention $r = -0.02$

\*Effect sizes were not provided and the authors have been contacted for missing data.

\*\*No significant pathways.

\*\*\*Biases exist when pulling multiple correlations from one study for the same pathways.

Fourteen articles reported the Pearson's  $r$  statistic, six articles did not have any significant pathways to report, and nine articles did not report the correlation coefficients for the significant pathways (see *Table 4*). For those that did not report the significant correlations, the authors have been contacted and the information will be updated at a later date. Of the fourteen articles with significant Pearson's  $r$  statistics, only six of the articles contained large correlations, seven contained medium correlations, ten contained small correlations, and five contained correlations considered less than small (see *Table 5*). This indicates that the majority of pathways tested were not strongly related to each other. When assessing *Table 5* it is evident that several articles tested the same/similar pathways and the results varied widely, furthering the idea that studies use vastly different methods for studying the same concept.

Table 5.

*Pearson's r interpretations of significant pathways in the final sample.*

Authors	< Small ( $<.10$ )	Small (.10-.30)	Medium (.30-.50)	Large (.50-1.00)
Bailey-Davis, et al., 2017		(intention → behavior)		(intention → behavior)
Barnes, et al., 2015	(Intervention effectiveness → intention)	(Intervention effectiveness → self-efficacy)		
Bélanger-Gravel, et al., 2010		(attitude → intention, self-efficacy → intention, intention → behavior)		
Bere, & Klepp, 2004	(intention → behavior)			
Bleakley, et al., 2017		(Campaign effectiveness → intention)		
Casiro, et al., 2011	(PA differences → attitudes, PA	(PA differences → intention)		

	differences → norms, PA			
	differences → self-efficacy)			
Cottrell, et al., 2012	(intention → attitude)		(intention → self-efficacy)	(intention → norms)
De Steur, et al., 2015			(intention → self-efficacy)	
Hamilton, et al., 2012			(attitude → intention, norms → intention, self-efficacy → intention)	(attitude → intention, norms → intention, intention → behavior)
Lu, et al., 2014		(intention → attitude)	(intention → self-efficacy)	
Rhodes, et al., 2016		(intention → attitude)	(intention → attitude)	(intention → self-efficacy, intention → behavior, parental support → intention, intention → attitude)
Riebl, et al., 2016		(attitude → intention, norms → intention)	(self-efficacy → intention)	(norms → intention, self-efficacy → intention, intention → behavior)
Spinks & Hamilton, 2016			(attitude → intention, intention → behavior, norms → intention)	(self-efficacy → intention, norms → intention)
Sweitzer, et al., 2011	(attitude → intervention effect, self-efficacy → intervention effect, intention → intervention effect)	(knowledge → intervention effect)		

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*Note.* Actual Person’s *r* values can be found in *Table 4*. Only fourteen of the twenty nine articles in the final sample reported significant results.

## Discussion

Sociologist Gabriel Abend (2008) stressed the importance of theory in social sciences. Specifically, he defined theory as an “original interpretation, reading, or way of making sense of a certain slice of the empirical world (Abend, 2008).” He continues, stating that this definition of theory insinuates that a theory may causally explain a phenomenon. More specific to HBC, Glanz and Bishop (2010) emphasize how important a theoretical background is in health behavior change interventions. Specifically, they report that an intervention program should be designed with a strong theoretical grounding and programs with a greater understanding of health behaviors and contexts in which they occur are more successful and effective (Glanz & Bishop, 2010; see *Figure 7* for the author’s table on the importance of theory). It would be beneficial for health psychologists to consider the mentioned developmental theories (i.e. Bronfenbrenner’s bioecological model, Belsky’s determinants of parenting, Baltes’ multidirectionality and multidimensionality, Sameroff’s *Unified Theory of Development*; Bronfenbrenner, 1977; Belsky, 1984; Baltes, 1987; Sameroff, 2010) because they take an ecological perspective, meaning they consider the individual’s environment and contextual factors surrounding development. In conducting the literature review of childhood obesity prevention interventions, several trends were discovered across the sample: the use of a strong theoretical background (or lack thereof), the prominence of the TPB as a theoretical basis, common pathways to intention and their importance, inconsistencies in the measurement of intention, and effect sizes and their implications for future research.

Table 1 Reviews of theory use in health behavior intervention research<sup>a</sup>

Article	Topical focus	Theories used	Comments
Ammerman et al. 2002 (4)	Dietary fat, fruit and vegetable (F&V) consumption	Theory use yes/no; SCT constructs (goal setting); social support	Using a theoretical basis was associated with greater fat reduction and higher F&V intake Goal setting, family, and social support strategies were more effective.
Legler et al. 2002 (63)	Mammography promotion in historically underserved groups	Theory used in 68.4% of included studies. Most used: HBM, TTM, SCT, PRECEDE/PROCEED	Strongest interventions were access-enhancing, consistent with SCT, HBM, and ecological model.
Trifiletti et al. 2005 (108)	Unintentional injury prevention research	Most used: TRA/TPB, HBM, PRECEDE/PROCEED model	Theories were not well represented in injury prevention research from 1980 to 2001.
Noar et al. 2007 (78)	Tailored print health behavior change interventions	TTM/stages of change, HBM, TRA/TPB, most used. Nearly every study tailored on at least one theoretical concept	Tailoring with 4–5 concepts yielded larger effect sizes than did tailoring on 0–3 concepts. Nearly all studies that tailored on theoretical constructs had larger effect sizes.
Joronen et al. 2008 (59)	School-based drama interventions	SCT, TTM	Use of SCT was most common (role models, interaction, etc). Mostly positive effects were found.
Noar 2008 (77)	Reducing HIV-related sexual risk behavior; review of 18 meta-analyses	Most often mentioned: self-management, problem-solving training, skills training with SCT concepts	3 meta-analyses found theory-based strategies to be superior, 2 showed possible evidence, and 2 were null or against theory-based components.
Albada et al. 2009 (3)	Tailored information about cancer risk and screening	Most used were TTM, HBM, SCT, and PAMP	Review suggested that theory-based interventions are most effective.
Lopez et al. 2009 (65)	Interventions for contraception (non-high-risk groups)	SCT was the main theoretical basis in most trials	Theory-based intervention groups had more positive results in most trials
Lustria et al. 2009 (66)	Computer-tailored interventions delivered over the Web; various behaviors (diet, activity, alcohol, smoking)	Most used theories are SCT, TTM, and TRA/TPB. Most studies indicated a theoretical framework.	Use of multiple theories and concepts was common because online computer-tailored strategies are more complex than print tailoring.
Noar et al. 2009 (79)	Computer technology-based HIV prevention interventions	Theories used: SCT, TPB, IMB, and TTM	Interventions using TTM/stages of change and individual tailoring were most effective.
Noar et al. 2009 (81)	HIV/AIDS mass communication campaigns	Mass communication theories used; message content based on HBM, SCT, TTM, TPB, and others	44% of campaigns reported using theory, mainly for message design.

<sup>a</sup>Abbreviations: F&V, fruits and vegetables; HBM, health belief model; IMB, integrated model of behavior; PAMP, precaution adoption process model; SCT, social cognitive theory; TPB, theory of planned behavior; TRA, theory of reasoned action; TTM, transtheoretical model.

Figure 7. Table presented in an article by Glanz and Bishop (2010) providing evidence for importance of a theoretical background in health behavior change interventions.

The first component of interest in the sample is the prominence of a theoretical background. The majority of the articles reviewed (86.2%) included a minimum of one HBC theory in their study, but articles with more theories present as the basis for their research tended to exhibit more complex methodological designs in which multiple predictors were measured in relation to intention. Seven articles in the final sample utilized multiple theories when creating their measures. One example, Hamilton, Cox, and White (2012) used a combination of four theories and models, similar to what Sameroff (2010) proposed in his *Unified Theory of Development* (e.g. Self-determined Motivation, TPB, Reasoned Action, and the Health Action Process Approach; Hamilton, Cox, & White, 2012). As expected, the study design was quite complex as it measured

seven different psychosocial variables (e.g. intention, attitude, subjective norms, perceived behavioral control, self-determination, action and coping planning, and behavior; Hamilton, Cox, & White, 2012). This allows the researchers to analyze several pathways to behavioral intention, which more appropriately models the complexity of human behavior (Sameroff, 2010; Stretcher & Rosenstock, 1997).

The majority of the seven studies with strong theoretical grounding (intention as a mediator) measured multiple pathways of variables (2 or more; 71.4%) to intention with TPB as one of their theoretical frameworks. For example, a study by Spinks and Hamilton (2016) utilized the TPB as their theoretical basis. After the study was completed, they made evident three significant pathways to intention (e.g. attitude, subjective norms, and perceived behavioral control; Spinks & Hamilton, 2016). Additionally, they revealed that intention was a significant predictor of behavior change (Spinks & Hamilton, 2016). Similarly, a study by Bélanger-Gravel and Godin (2010) attempted to provide insight on developing more physical activity interventions. Their study was based on TPB and SCT. Like Spinks and Hamilton (2016), they found several significant pathways to intention (behavioral beliefs, control beliefs, and self-identity; Bélanger-Gravel & Godin, 2010). Contrastingly, a study by Rodearmel and colleagues (2007) measured small changes in diet and physical activity with no theoretical background. This study did not yield significant pathways related to intention, perhaps due to lack of theoretical grounding. This result further stresses the importance of theory and tactical measurement in order to provide logical implications for future research.

### **Relevant Pathways and Behavioral Intention**

As a result of the detailed literature review, several trends have been made clear in health behavior change research regarding childhood obesity prevention interventions. Specifically, the majority of the articles (48.3%) analyzed pathways between constructs of the TPB (attitudes, norms, perceived behavioral control; Ajzen, 2011) and behavioral intention. For example, a study by Godin and Kok (1996) revealed that TPB has a significant relation with intention to change a behavior. Attitude and perceived behavioral control were significant more often than the other constructs in TPB; however, the others still explained variation in intention (Godin & Kok, 1996). Similarly, a large number of the articles in the final sample addressed the relation between Bandura's (1998) notion of self-efficacy and behavioral intention. Research has emphasized that self-efficacy is a large influence on physical exercise behaviors and those that are more confident in their ability to change their health outcome exhibit more exercise behaviors than those that are not confident (Schwarzer & Fuchs, 1996).

As outlined previously, only a small percentage of the articles in the final sample reported significant results for the pathways of interest (see *Figure 4* and *7*). These articles were much more detailed in the reporting of a theoretical background, measurement and methodology and results than those that did not have significant results. Of the fourteen articles that reported Pearson's  $r$  or presented the information necessary to calculate Pearson's  $r$ , five of the articles included intention as a predictor, five as an outcome, and four as a mediator, indicating that the placement of intention in the research question does not influence the results necessarily. Additionally, seven of the articles with reported correlations had more detailed measures of intention with reported reliability and references citing their scale, indicating that the researchers were thorough

in the reporting of their methodology (see *Table 3*). Six of the fourteen articles with significant pathways utilized a minimum of one theory when establishing their theoretical background. The remaining eight articles used two or more theories, which indicates that a theoretical background is essential in order to establish significant results in a study.

Intention is a large facet of HBC, as it is often known to be a predictor or a mediator of behavior change (Rhodes & de Bruijn, 2013). It is plausible that if intention was measured more consistently and rigorously, it could better aid in HBC and be a stronger predictor of change. However, this is not the case in the articles reviewed on intention relevant to parent's HBC for children's nutrition and physical activity. Of the twenty-nine articles, every article measured intention differently. Hamilton, Cox, and White (2012) measured intention with three items. Their measure of intention had a Cronbach's alpha of 0.94, indicating a strong reliability of the measure. Additionally, the authors provided references for their measure, stipulating that they did not simply create the measure on their own. In opposition to Hamilton, Cox, and White (2012), Park and colleagues (2014) measured intention with two items, provided no reliability or validity for their measure, and provided no references for their measure. *Table 3* demonstrates the sparsity of strong measurement of intention in research on obesity prevention and intervention in childhood, which emphasizes the assumption that better measurement of intention could allow for intention to be a strong predictor of behavior change.

Gail Sullivan and Richard Feinn (2012) raise a point that reporting statistical significance in an article is not enough to draw valid conclusions about the research. Rather, the reported effect size is essential because it describes the magnitude of the result (Sullivan & Feinn, 2012). Similarly, Jacob Cohen (1990) states that the "primary

product of a research inquiry is one or more measures of effect size, not P values.” This further accentuates the importance of reporting effect sizes, even if they are not large effect sizes. The final sample articles in the present study did a poor job of reporting effect sizes, which makes it difficult to know the true results of their studies. Those that did report effect sizes reported mostly small and medium effect sizes, implying that their results were significant; however, the magnitude of the differences between groups were quite small (see *Table 5*). While the effect sizes provided were interpreted as small to medium, it is honorable that they were reported because it provides readers the strength of the relations between variables.

In this area of research, it is evident that consistency is lacking. Whether it be measures of intention or establishing a theoretical background, HBC research varies in theory, methodology, and statistical analysis, making it much more difficult to apply the research to real world situations. Within the final sample of 29 articles, it seems that research is lacking on a handful of variables such as, social support, norms, and knowledge. These are just as important as some of the more heavily researched variables such as attitudes, self-efficacy, and behavior. It important that researchers address all variables associated with the theoretical background, not just a select few.

The patterns that have been generated in this review can help researchers to better understand and study the role of parent intention to change their child’s behavior in childhood obesity prevention interventions focusing on nutrition and physical activity behaviors.

### **Conclusion**

The current study aimed to understand the relation between family context and HBC with the use of a model combining HBC and parenting factors by Nicholson & Barton (n.d.; see *Figure 2*). In completing this literature review, it has been made evident the need to consider both perspectives (health and developmental) to best approximate what happens when parents make decisions for their children. It appears that models of HBC do not account for the role of another individual in changing one's own health behaviors (i.e. parent and child) and by analyzing HBC through a developmental lens focusing on environment and context, the role of parent intention to change their child's health behaviors can be better understood. Both health and developmental psychologists offer a unique and important perspective on humans and why they behave the way they do. It is not simply that humans are going through developmental stages or that they are driven by a model of health behavior change. Rather, it is a combination of the two areas (i.e. Baltes' idea of multidimensional research, Sameroff's *Unified Theory of Development*; Baltes, 1987; Sameroff, 2010). In order to truly understand the complexity of human development, it is vital that all areas of psychology combine their knowledge and expertise to create an inclusive model that will ultimately strengthen future psychological research.

### **Future Directions**

This review is part of an ongoing research project assessing the proposed model. As was mentioned in the results segment of the review, nine of the articles in the final sample did not report correlation coefficients in their publications. These authors have been contacted in order to retrieve the missing information. Once the data is obtained, the

correlations will be averaged for each pathway investigated in the literature and *Figure 4* will be updated to reflect those changes.

Appendix A

Sample coding sheet used to aid in entering data into Qualtrics.

**BASIC STUDY INFORMATION**

2) Authors Names: \_\_\_\_\_

3) Year of Publication: 20\_\_\_\_\_

4) Journal Published In (if applicable): \_\_\_\_\_

5) First Author’s Institution: 1. University/College  
 2. Hospital  
 3. Research Lab  
 4. Other,  
 specify \_\_\_\_\_

20. Not identified

6) First Author’s Institutional Area (bold/underline area):

Psychology	Psychiatry	Counseling
Health Education	Medicine	Kinesiology/Physical Therapy
Nutrition	Obesity research and education	Not identified
Other, Specify:		

7) Country of Origin (bold/underline area):

USA	United Kingdom
Canada	Germany
Australia	Not identified
Other, Specify:	

9) Was there funding: 1. Yes 2. No

If yes, list the granting type and where it came from (NIH, NFS, internal, etc).

\_\_\_\_\_

**GENERAL PARTICIPANT CHARACTERISTICS**

1) Parent Sex: 1. Female 2. Male 3. Both 4. Unknown

Indicate the % of sample that is female: \_\_\_\_\_

1b) Child Sex: 1. Female 2. Male 3. Both 4. Unknown

Indicate the % of sample that is female: \_\_

2) Total Number of Participants (enter zero if no parents or no children were involved =  
 \_\_\_parents \_\_\_\_\_ children

3) Parent Age: M age \_ \_\_\_\_ Age Range: \_\_\_\_

3b) Child Age: M age \_\_\_\_\_ Age Range:

- Age category:
1. Infancy (0-2)
  2. Preschool years (>2-5)
  3. Early childhood/Grade school
  4. Middle school/preteens
  5. High school/adolescence
  6. Other. List \_\_\_\_\_
  20. Not identified

- 4) Body Composition Measure
1. Self-reported height and weight
  2. Actual height and weight assessments
  3. BMI
  4. Circumference
  5. Skin fold calipers
  6. None
  7. Both BMI and %BF
  8. DEXA
  9. Other \_\_\_\_\_

- 6) Ethnicity Reported: 1. Yes 2. No  
 If yes, report % Ethnicity:  
 %White/Caucasian \_\_\_\_\_  
 %Black/African American \_\_\_\_\_  
 %Asian \_\_\_\_\_  
 %American Indian/Alaska Native \_\_\_\_\_  
 %Hispanic/Latino \_\_\_\_\_  
 % Native Hawaiian/Pacific Islander \_\_\_\_\_  
 % Other \_\_\_\_\_ [describe] \_\_\_\_\_  
 % Ethnic minority \_\_\_\_\_

- 8) Socioeconomic Status:
- |  |        |       |       |
|--|--------|-------|-------|
|  | 1. Yes | 2. No | 3. NA |
| If yes. A) Reported family income:                 | 1. Yes | 2. No | 3. NA |
| b) Breakdown by SES?                               | 1. Yes | 2. No | 3. NA |
| c) Reported parental education level:              | 1. Yes | 2. No | 3. NA |
| If yes, indicate average parental education level: | _____  |       |       |
| d) majority low-income/low SES?                    | 1. Yes | 2. No | 3. NA |

9) Breakdown of body description for parents

- Average BMI \_\_\_\_\_  
 Percent underweight \_\_\_\_\_  
 Percent healthy weight \_\_\_\_\_  
 Percent overweight \_\_\_\_\_  
 Percent obese \_\_\_\_\_
- 9b) Breakdown of body description for children  
 Average BMI \_\_\_\_\_  
 Weight for Height Z score \_\_. \_\_\_\_\_  
 Percent underweight \_\_\_\_\_  
 Percent healthy weight \_\_\_\_\_  
 Percent overweight \_\_\_\_\_  
 Percent obese \_\_\_\_\_

### DESIGN/PROCEDURE CHARACTERISTICS

- 1) Design:**
1. Longitudinal/Correlational
  2. Experimental (random assignment with control & treatment conditions)
  3. Quasi-experimental (comparison groups)

**1a) Describe:**

- 2) If longitudinal or experimental, length of time participants were in the study (in months): \_\_\_\_\_

- 3a) General Program Type (Circle all that apply):
1. Nutrition
  2. Physical activity
  3. Both/Combination

3b) Describe how program targets nutrition and/or physical activity: \_\_\_\_\_

- 4) Power analyses reported:** 1. Yes 2. No

**5a) Cut and paste text describing power analysis:**

- 6) Recruitment Procedure:
1. Phone
  2. By school/daycare
  4. existing organization (list: \_\_\_\_\_)
  3. Newspaper/flyers/media advertisements
  4. Web
  5. Other. Specify \_\_\_\_\_
  20. Not identified

- 8) Participant Incentive to Complete the Study. 1. Yes 2. No  
 Specify \_\_\_\_\_

**Participant flow through study (i.e., CONSORT flow chart)**

9) Response Rate: 1. Yes                      2. No  
If yes, List in percentage: \_\_\_\_\_

10) Attrition or drop-out Rate: 1. Yes 2. No 3. Not applicable  
If yes, list: \_ \_\_\_\_\_

**THE FOLLOWING QUESTIONS ONLY RELATE TO INTERVENTIONS**

5- 1) If experimental/intervention: what was the curriculum or program based on?

2a) Number of intervention sessions (if applicable): \_\_\_\_\_

2b) Duration of session (minutes per day): \_\_\_\_\_

2c) Frequency of treatment (number of times per week/per month/across the course of the program etc): \_\_\_\_\_

3) Random Assignment to groups: 1. Yes 2. No (skip 7a if no intervention conducted)  
**If yes, describe method for this** \_\_\_\_\_

4a) Was the intervention aimed at the parents, children, or both?

- 1) Parents only
- 2) Children only
- 3) Some sessions together, some separate
- 4) Both, but with separate interventions
- 5) Both together

4b) Type of control group:

1. passive control (no manipulation)
2. active control (manipulation considered standard of care)
3. waitlist control

4c) How many groups? 1 (no random assignment)    2            3            4+

4d) Completer or Intention to treat analysis?

1. Completer
  2. Intention to treat
  3. Both
  4. Not stated/Neither
- 

**MEASUREMENT INFORMATION (enter NA for not available if information is missing)**

Format of Data Collection (highlight all that apply)

1. Self-report (by parent)
2. Self-report (by child)
3. Open-ended or qualitative interview
4. Patient chart review
5. Anthropometrics
6. Ecological Momentary Assessment/Diary data (i.e., food or exercise diary)

Other: \_\_\_\_\_

\_\_\_\_\_

Psychosocial measure related to Nutrition/PA	Who completed measure?	Reliability/Validity Adequate or Good?	How many items?	Elaborate on items to help with interpreting reliability/validity	Reference
EXAMPLE: Outcome expectancies/perceived benefits for PA and dietary modification	<b>Parent</b> Child Both	NA	One		10. Perry CL, Baranowski T, Parcel GS. How individuals, environments and health behavior interact: social learning theory. In: Glanz K, Lewis FM, Rimer BK, eds. Health Behavior and Health Education: Theory, Research and Practice. San Francisco: Jossey-Bass; 1990, pp. 161–186. 11. Calfas KJ, Sallis JF, Lovato CY, Campbell J. Physical activity and its determinants before and after college graduation. Med Exerc Nutr Health. 1994;3:323–34.
	Parent Child Both				
	Parent				

	Child Both				
	Parent Child Both				
	Parent Child Both				

## Appendix B

**Final Sample References**

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**THESIS/DISSERTATION CERTIFICATE OF APPROVAL**

The thesis of Zoe Gipson-Kendrick is approved.

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Dr. Jody Nicholson  
Committee Chair

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Date

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Dr. Dan Richard  
2<sup>nd</sup> Reader

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Date

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Dr. Lori Lange  
Department Chair

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Date