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Health Belief Model Factors as Predictors of Parental Misclassification of the Weight of the Preschool Child

By Tanna Woods

A dissertation

Submitted in partial fulfillment

of the requirements for the degree of

Doctor of Philosophy in the Department of Nursing

Idaho State University

Spring 2019

Committee Approval

To the Graduate Faculty:

The members of the committee appointed to examine the thesis of TANNA MARIE WOODS find it satisfactory and recommend that it be accepted.

Mary A. Nies, PhD, RN, FAAN, FAAHB
Major Advisor, Committee Chair

Peter Denner, PhD, Professor Emeritus
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Committee Member

Ruiling Guo, DHA, MPH, MLIS
Graduate Faculty Representative

April 24, 2018

Tanna Woods
School of Nursing
MS 8101

RE: regarding study number IRB-FY2018-249 : Health Belief Model Factors as Predictors of Parental Misclassification of the Weight of the Preschool Child

Dear Ms. Woods:

Thank you for your responses from a previous full-board review of the study listed above. These responses are eligible for expedited review under OHRP and FDA guidelines. This is to confirm that I have approved your application.

Notify the HSC of any adverse events. Serious, unexpected adverse events must be reported in writing within 10 business days.

You may conduct your study as described in your application effective immediately. The study is subject to renewal on or before April 24, 2019, unless closed before that date.

Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. Contact Tom Bailey (208-282-2179; email humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

July 12, 2018

Tanna Woods
School of Nursing

RE: study number IRB-FY2018-249: Health Belief Model Factors as Predictors of Parental Misclassification of the Weight of the Preschool Child

Dear Ms. Woods:

I have reviewed your application for revision of the study listed above. The requested revision involves adding an additional site for recruitment.

You are granted permission to conduct your study as revised effective immediately. The date for renewal remains unchanged at 4-24-2019, unless closed before that date.

Please note that any further changes to the study must be promptly reported and approved. Contact Tom Bailey (208-828-2179; email humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

August 8, 2018

Tanna Woods
School of Nursing

RE: study number IRB-FY2018-249: Health Belief Model Factors as Predictors of Parental Misclassification of the Weight of the Preschool Child

Dear Ms. Woods:

I have reviewed your application for revision of the study listed above. The requested revision involves three additional sites being added for the survey:

Oasis Montessori Schools
780 South 2000 West
Building B
Syracuse, UT 84075

Mousecapades Preschool
1997 N. 2195 West
Clinton, UT 84015

Salt
1651 North 700 West
Layton, UT 84041

You are granted permission to conduct your study as revised effective immediately. The date for renewal remains unchanged at 4-24-2019 unless closed before that date.

Please note that any further changes to the study must be promptly reported and approved. Contact Tom Bailey (208-828-2179; email humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

August 13, 2018

Tanna Woods
School of Nursing

RE: study number IRB-FY2018-249: Health Belief Model Factors as Predictors of Parental Misclassification of the Weight of the Preschool Child

Dear Ms. Woods:

I have reviewed your application for revision of the study listed above. The requested revision involves adding three sites to the study:

On My Way Preschool
5971 South 1900 West
Roy UT 84067

Little Munchkins Childcare
928 West 1800 North
Clinton UT 84015

Kool Kids LLC
1094 West 1800 North
Clinton UT 84015

You are granted permission to conduct your study as revised effective immediately. The date for renewal remains unchanged at 4-24-19, unless closed before that date.

Please note that any further changes to the study must be promptly reported and approved. Contact Tom Bailey (208-828-2179; email humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

August 22, 2018

Tanna Woods
School of Nursing

RE: regarding study number IRB-FY2018-249: Health Belief Model Factors as Predictors of Parental Misclassification of the Weight of the Preschool Child

Dear Ms. Woods:

I have reviewed your application for revision of the study listed above. Your request is eligible for expedited review under FDA and DHHS (OHRP) regulations.

The following information and/or changes are required:
Please provide the two remaining site permission letters.

Please submit the requested information or documents for re-review. You may not implement the proposed changes until your revised application is approved. Contact Tom Bailey (208-282-2179; email humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

August 23, 2018

Tanna Woods
School of Nursing

RE: study number IRB-FY2018-249: Health Belief Model Factors as Predictors of Parental Misclassification of the Weight of the Preschool Child

Dear Ms. Woods:

I have reviewed your application for revision of the study listed above. The requested revision involves adding three sites to the study.

You are granted permission to conduct your study as revised effective immediately. The date for renewal remains unchanged at 04-24-2019, unless closed before that date.

Please note that any further changes to the study must be promptly reported and approved. Contact Tom Bailey (208-828-2179; email humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

September 18, 2018

Tanna Woods
School of Nursing

RE: study number IRB-FY2018-249: Health Belief Model Factors as Predictors of Parental Misclassification of the Weight of the Preschool Child

Dear Ms. Woods:

I have reviewed your application for revision of the study listed above. The requested revision involves:
Adding two locations to the study -

Kidz Town
677 East 12th Street
Ogden UT

Discovery Clubhouse
1285 Monroe Blvd
Ogden UT

You are granted permission to conduct your study as revised effective immediately. The date for renewal remains unchanged at 4-23-2019, unless closed before that date.

Please note that any further changes to the study must be promptly reported and approved. Contact Tom Bailey (208-828-2179; email humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

October 1, 2018

Tanna Woods
School of Nursing

RE: study number IRB-FY2018-249: Health Belief Model Factors as Predictors of Parental Misclassification of the Weight of the Preschool Child

Dear Ms. Woods:

I have reviewed your application for revision of the study listed above. The requested revision involves adding 2 sites to the study:

Little Rascals
835 North Main Street
Clearfield, Utah

The Depot Daycare
640 West 1100 South, STE 8
Ogden, Utah

You are granted permission to conduct your study as revised effective immediately. The date for renewal remains unchanged at 04-24-2019, unless closed before that date.

Please note that any further changes to the study must be promptly reported and approved. Contact Tom Bailey (208-828-2179; email humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

Acknowledgments

My journey to complete my dissertation and my doctoral studies was supported and encouraged by many influential people. I want to acknowledge the following individuals for their continued assistance, support, and generosity through this process.

Dr. Mary Nies, my committee chair and mentor, has provided tremendous support and encouragement. She helped me not just complete my needed studies and projects, but also to reach beyond the basic program requirements. Her prompting lead me to successfully submit to two regional conferences, resulting in one panel discussion session and a poster presentation during spring semester 2019, and to three poster presentations at the Idaho State University Graduate Symposium. She also encouraged me to write manuscripts for publication in professional, peer-reviewed journals. This has lead to two published articles and three more that are under consideration. Further, her encouragement also lead me to apply and be granted a $7,500 grant from Sigma Theta Tau for completion of my dissertation. She is not only an excellent adviser and chairwoman, but a great mentor who encourages people to achieve their highest potential.

Dr. Peter Denner, a committee member and professor emeritus, was also an amazing support due to his incredible skills with statistics and method development. He provided me excellent feedback and helped me advance my knowledge of statistical analysis and use of SPSS. He was always kind, helpful, and supportive throughout this process. As he came from a field other than nursing, he was able to help me ensure my work was understood by larger audiences and provided important perspective on my findings.

Dr. Cathy Arvidson, a committee member and faculty member at Idaho State University, provided expert advice relating to working with children and developing a successful IRB proposal. Her wisdom made this process much smoother.

Finally, I would like to thank my supportive and patient husband who encouraged me to complete my program and dissertation. He offered the needed comfort, encouragement, and a solid partnership to ensure our family did not suffer in this process. He and my three beautiful children sacrificed important things to make my achievements possible.

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Abstract

Childhood obesity levels are nearing epidemic proportions and widespread, unnecessary health and social consequences can extend into adulthood (CDC, 2016). Prevention/intervention in the preschool ages is important due to younger children's adaptability (McKee et al, 2016). Parental awareness is key as parents are gatekeepers for child beliefs, behaviors, and diet (Hochdorn et al., 2018). Inaccurate perception of child weight is a confirmed barrier linked to demographic features like child age and gender. Modifiable factors to frame future intervention/prevention efforts have not been explored. This descriptive, cross-sectional study had eight questions relating to Health Belief Model (HBM) components (perceived severity, perceived barriers, and perceived susceptibility) and parental weight classification using three methods: a 4-point Likert scale, reported weight in pounds, and selection of a picture most resembling their child.

Instruments included the Parental Self-Efficacy for Promoting Healthy Physical Activity and Dietary Behaviors in Children Scale (PSEPAD), the Obesity Risk Scale (ORK-10), and the Adolescent Obesity Risk Scale (AORK). The sample included 198 parents and children recruited from daycares and standalone preschools. Analyses included frequencies, chi-square tests, Kappa coefficients, and logistic regressions.

Parents were least accurate (35.9%) identifying child weight when selecting a picture (κ =-.028, p = .42). The pictorial and Likert method (κ = -.032, p = .37) showed parental agreement with child weight was not significantly better than chance. Statistically significant agreement was found in the weight-reporting method (κ = .21). Two of the three HBM-related measures were significantly related to accurate classification. A logistic regression model showed child

sex, PSEPAD scores, and ORK-10 scores were statistically significant predictors in the Likert method. The model had no statistical significance for the pictorial or weight-reporting method.

Results indicate parents support intervening if aware of child weight problems. However, parents do not accurately recognize healthy versus unhealthy weights and report that health providers are not informing them of weight deviations. Further, important relationships between the HBM variables were identified. Instead of the direct effects theorized, results show barriers (self-efficacy) mediate the effect of perceived severity (knowledge) regarding parental ability to assess child weight accurately. These relationships and incorporation of the HBM principles of barriers and severity into prevention/intervention strategies need further exploration.

Chapter I: Introduction

Those who develop childhood obesity have lasting, widespread and unnecessary health and social consequences that could be avoided with a focus on prevention and intervention in the preschool child ages two to five years old (McKee, Long, Southward, Walker, & McCown, 2016). However, for this young population, initiation of healthy lifestyles, regulation of child diet and exercise for prevention as well as intervention and its success relies on parental influence (Cullinan & Cawley, 2017; Howe, Alexander, & Stevenson, 2017; Leary, Ice, Neal, & Cottrell, 2013). The ability to provide a positive influence on child weight and appropriate lifestyle, activity and eating can be hindered or helped by parental awareness of weight-related issues and realistic recognition of child weight (Hochdorn, Faleiros, Camargo, Bousfield, Wachelke, Quintao, Azzolina, & Gregori, 2018). Numerous studies have confirmed inaccuracy of parental classification of child weight, and the staggering rate of continued overweight and obesity at all ages is well-noted (Cullinan & Cawley, 2017; Howe et al., 2017; Lobstein & Jackson-Leach, 2016; Lundahl, Kidwell, & Nelson, 2014; Seidell & Halberstadt, 2015). If identifying childhood weight issues is indeed a first step in treating obesity as researchers have claimed, then the success of this could hinge on parental ability to correctly classify their child's weight (Cullinan et al., 2017; Hochdorn et al., 2018). While misclassification research has explored and identified how demographic characteristics correlate to weight misclassification, these factors including child age and gender are not modifiable (Hochdorn et al., 2018; Howe et al., 2017). It is important to determine if parental misclassification is correlated with factors that could be modified to improve classification, prevention, and intervention. This proposed study seeks to advance knowledge about factors that may influence how parents classify their child weight. These factors could identify important relationships that could be further studied and

developed into prevention and intervention strategies to work with parents of this preschool population.

Background of the Problem

The obesity epidemic is pervasive, spanning across age groups and reaching many countries. More than 2 billion people worldwide were classified as overweight and 671 million of those were classified as obese in the year 2013 (Seidell & Halberstadt, 2015). Children are also experiencing weight issues. Almost one-third of American children are obese now with obesity rates tripling since the 1980s (Faguy, 2016). Worldwide, the rates have increased from 32 million children under age 5 classified as overweight in the year 2000 to 41 million classified as overweight in the year 2014 (World Health Organization, 2017). By 2025, it is estimated that the number of overweight children ranked in order will be China at 48.5 million, India at 17.3 million, and the United States at 16.7 million (Lobstein & Jackson-Leach, 2016).

People who are overweight or obese are more at risk for type 2 diabetes, cardiovascular disease, cancer, arthritis, psychological problems, and for increased associated medical costs due to obesity (Winter & Wuppermann, 2013). Children and adolescents who are obese also have a greater risk for suboptimal health, use of prescriptions, emergency department visits, and emotional and behavioral problems (Turer, Lin, & Flores, 2013). Social problems are increased in children with weight issues. Overweight girls are more likely to be bullied while both sexes are at risk for lower body esteem if overweight during the ages 5 to 7 (Williams, Fournier, Coday, Richey, Tylavsky, & Hare, 2012). Overweight and obese children at 5 and 7 years old also have been linked to more insecurity and adverse treatment than their normal-weight peers (Van Grieken, Renders, Wijtzes, Hirasing, & Raat, 2013). Obesity and its co-morbidities are expected to rise with 90 million obese school-age children estimated in the year 2025 and with

roughly half of them having one or more comorbidities like elevated blood triglycerides or cholesterol (Lobstein & Jackson-Leach, 2017).

The above-mentioned risks of overweight and obesity, as well as the continued prevalence of it, points to a need for intervention. Obesity is a multifaceted disease that involves many contributing factors, including genetic, environmental, cultural, physical, and psychosocial components that have culminated and resulted in obesity rates reaching epidemic proportions. Genetics is an unmodifiable component of obesity, but other factors like nutrition and physical activity can be changed using interventions (Leary, Ice, Neal, & Cottrell, 2013). Infancy and childhood have been identified as a prime target for intervention due to modifiable risk factors for obesity that exist, including insufficient sleep, the introduction of certain foods at young ages, and screen time (Baidal et al., 2015). For these age groups, parents are a crucial factor that needs to be considered and included if prevention and intervention strategies are to be effective. However, parents do not always recognize early lifetime routines and weight as important for future weight and health. In a qualitative study, Baidal et al. (2015) found that mothers did not identify the risk of early life weight gain or its impact on later-life obesity and that mothers even felt that increased weight in this period would solely be related to medical causes.

Parents' inaccurate knowledge and lack of awareness of the importance of the early childhood period to a healthy weight could impact the success and their interest in interventions as well as prevention. Parents who recognize child weight issues and understand the consequences of being overweight or obese may be motivated to initiate the needed lifestyle changes to create healthy habits that could also lead to healthier weights for children (Moreno, 2013). This same knowledge and awareness could even lead to parents engaging in preventative measures that contribute to improved health and weight before it becomes a problem. First,

however, it is necessary to obtain a better understanding of the parental ability to recognize correct child weight.

The ability to recognize when children are overweight or obese, both by affected individuals and by parents who have children who are overweight or obese, is a significant problem. Gordon and Mellor (2015) found that 42% of parents did not accurately state their child's weight within two pounds in a sample of 1,119 youth ages three to twelve. These weight classification errors were linked mostly to underestimation. Parents incorrectly identified overweight and obese children as normal weight and normal weight children as underweight. These findings are representative of other research examining parental misclassification (Merema, Sullivan, Pollard, Abraham, Tomlin, & Radomiljac, 2016; Tompkins, Seablom, & Brock, 2015). Studies have confirmed the prevalence of underestimation and have identified that this issue is even more substantial when examining subpopulations of parents with obese children. Twarog, Politis, Woods, Daniel, and Sonneville (2016) found more than one in three obese children were identified as about the right weight by a parent in a sample of 1,445 U.S. children. Another study reported that in a subpopulation of obese children, 72% of parents believed the child to be only somewhat overweight while 28% identified the child as about right (De La O, 2009). In children who were overweight, 71% of parents identified the child as about right while 4% were identified as underweight (De La O, 2009). In a review of literature that examined underestimation of child weight, Robinson (2017) found that several studies have pointed to the pronounced parental misclassification of younger children's weight in the two- to the five-year-old range.

As just noted, research on parental misclassification continues to support the idea that parents do not recognize when weight is a problem in their children. The competence of parental

classification has the potential for improvement. For childhood obesity research, it is important to understand factors that contribute to child weight misclassifications and the implications such factors might have when weight changes are needed. Parents are the individuals who present food choices and encourage activity with their child. Yet, parents may not recognize the need for better choices if they are not even aware that their child is overweight or obese. While a recent literature review of misclassification notes a push in interventions to increase physical activity in children, it is also noted that such advice may go unheeded if parents lack the competence to accurately perceive correct child weight status (Tompkins et al., 2015). Based on a review of 37 research articles relating to parental underestimation of child weight, Hochdorn et al. (2018) concluded that parental awareness and recognition of accurate weight requires a focus on education.

According to McKee et al. (2016), interventions to prevent unhealthy weight and to reverse obesity trends require a focus on the preschool age where there is fluidity in development and habits, such as tastes, activity, habits, and food choices, and openness to new ideas. However, this age group relies heavily on parental influences and care, thus making the parent crucial to any planned intervention or study. For parents to be willing to make changes and recognize the need to modify family lifestyles that could prevent future increases in weight trajectories, they must first correctly classify their child's weight and recognize healthy weight deviations. The present research has shown that many parents do not correctly classify child weight at any age.

So far, research has mainly examined the problem of weight misclassification in relation to demographic moderating factors, such as parental education level, and child age and gender. While these factors are important, they are also, in most cases, unmodifiable. Thus, available

research has only minimally explored moderating factors that could be used as a basis to create potential interventions to help parents improve their ability to classify child weight.

One potentially modifiable factor that has been investigated is parental concern about their child's weight. According to a literature review conducted by Tompkins et al. (2015), four studies have examined parental concerns regarding child weight in relation to parental child weight classifications. The findings indicated parents who underestimated child weight had less concern regarding child weight status than parents who recognize the correct child weight (Tompkins et al., 2015).

One reason parents may lack concern for their child's weight is that changes in population weight have caused a shift in how weight is viewed. Under-detection of weight and misclassification by parents may be linked to re-calibration of what normal weight means, especially as visual thresholds for normal increase (Robinson, 2017). In other words, it now takes larger amounts of excess weight to be deemed as overweight or obese (Robinson, 2017). As increased weight correlates to increased risk of disease in both children and adults, this shift in weight views can be problematic for the health of these children. For instance, Miller, Johnson, Miller, Miller, and Sutin (2016) did a quantitative study and found that parents who had an obese child perceived heavier children as healthier. This finding supports the idea that weight increases in the general population may alter parental concern for child weight and how parents understand the health consequences and related risks to being heavier as a child.

However, the changing perception of normal weight and parents understanding of health risks/disease has scarcely been explored in relation to weight misclassification, especially involving the preschool age. Vuorela, Saha, and Salo (2010) performed a quantitative study that analyzed factors affecting classification and included a question about the history of parent and

grandparent history of obesity-related diseases (high blood pressure, +coronary heart disease, high cholesterol, and type 2 diabetes) as a potential moderating factor. They used logistic regression to explore its relationship to misclassification. There was not a significant relationship found for the small subclass of those who misclassified weight and had a family history of these illnesses. Vuorela et al. (2010) did not provide information on how this question was asked, making a determination of the validity of this finding of insignificance difficult to gauge. Peracetic et al. (2012) performed research indicating that the presence of family history was correlated with increased parental misclassification of child weight, especially when there was a family history of diabetes. However, these studies were the only two studies found in a recent literature review that attempted to examine the relationship between family history of obesity-related disease and misclassification (Woods & Nies, 2017). The limited nature of research that explores factors beyond demographics to identify relationships with parent misclassification of child weight leaves a gap in knowledge.

Statement of Purpose

Current misclassification research has focused largely on how demographic features related to misclassification and not on determining potentially modifiable factors that could also affect it. The purpose of this dissertation is to examine potential moderating factors for correct and incorrect parental child weight classification in preschool children. Gaining an understanding of modifiable factors that may influence the correct and incorrect classification of child weight can lead to tailored interventions that address these factors and improve parental recognition of weight deviations and willingness to intervene. The factors that will be examined in this investigation are based on components of the Health Belief Model (HBM), which has been used

in past research to understand how health beliefs and decision-making processes inspire behavior changes (Dedeli & Fadiloglu, 2011).

Conceptual Framework

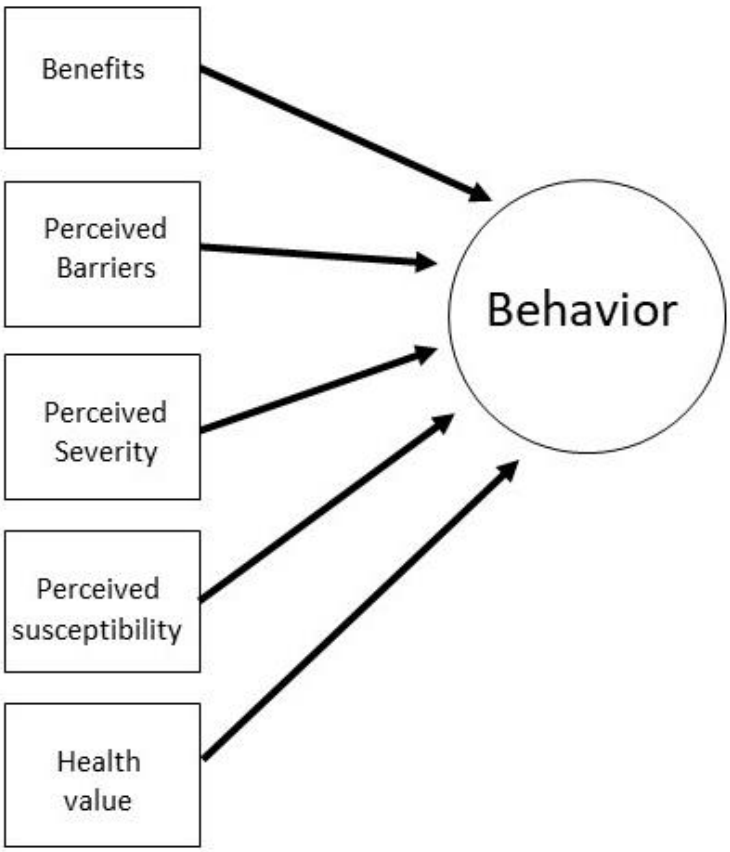
It is important to consider a framework that can adequately address the complexity of perception, obesity, and health concerns relating to obesity. Though considerable research has examined parental misclassification of obesity, a thorough literature review shows a scarcity of studies that employ theoretical frameworks to understand this complex issue. In those studies that have used theoretical frameworks to examine misclassification, the most commonly used approach was the Health Belief Model (Visscher et al., 2017; Dedeli & Fadiloglu, 2011).

Health Belief Model

A premise of the Health Belief Model (HBM) is that health-related actions are dependent on three classes of factors that occur simultaneously: a health concern (or sufficient motivation) that makes health issues salient, a perceived vulnerability (or threat) of a serious health problem, and the connection (or belief) that a suggested change could reduce the perceived threat at an acceptable cost (Rosenstock, Strecher, & Becker, 1988). Later interpretations of the model have added and removed items for consideration as part of the model. For example, Dedli and Fadiloglu (2011) propose there are five components that are needed to inspire change: benefits, barriers, severity, susceptibility, and health value as depicted in Figure 1. Ogden (2012), meanwhile, used susceptibility, severity, cost, benefits, and cues to action as the variables motivating behavior change. The key components of the interpretations were the same.

The theory specifies that an individual must be ready to make the change, which means that they feel susceptible to the condition and this occurrence could have serious consequences (Cummings, Jette, & Rosenstock, 1978). Further, the individual must find the benefit of reducing

susceptibility to the condition and that the benefits of doing something outweigh the psychological and real costs (Cummings, Jette, & Rosenstock, 1978). The HBM explains individual behaviors and emphasizes the importance of perceiving conditions as severe or as a severe risk as necessary to increase the likelihood of action to counteract it (Visscher et al., 2017). Self-efficacy as a separate important factor needed for behavioral change has also been used and justified as confidence in the ability to change is important, though self-efficacy has also been considered as part of the perceived barriers factor (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003).



F*igure 1*. The five factors of the Health Belief Model that inspire change. Adapted from "Development and Evaluation of The Health Belief Model Scale in Obesity," by O. Dedeli and C. Fadiloglu, 2011, *TAF Prevention Medical Bulletin 10*, p. 534.

The HBM can be broken into two main types of beliefs that affect a person's readiness for change: those influencing preventative action and those influencing facilitation or inhibition of action (Dedli & Fadiloglu, 2011). Susceptibility to illness and severity of illness relates to readiness for action while benefits, barriers, and health value relate to either facilitation or inhibition of action (Dedli & Fadiloglu, 2011). Using Ogden (2012) and her explanation of how these concepts relate to disease and the individual's perception, the HBM components could be represented by these statements:

- my chance of becoming obese is high (susceptibility), Obesity is a serious illness (severity)
- attempting to lose weight will make me feel hungry and tired (barriers or costs),
- losing weight will make me feel and look better (benefits), and I feel short of breath due to my weight (cues to action).

The last component of cues to action is similar to how Dedli and Fadiloglu (2011) explained health value, which described there being a value in changing the behavior.

The three main factors of perceived barriers, perceived susceptibility, and perceived severity have been constant in many interpretations. Using various additions, the model has been applied in health settings to explore vaccination use, physical activity, cancer screening, and more recently to explore weight loss interventions and behaviors (Baranowski et al., 2003; Daddario, 2007; Ogden, 2012).

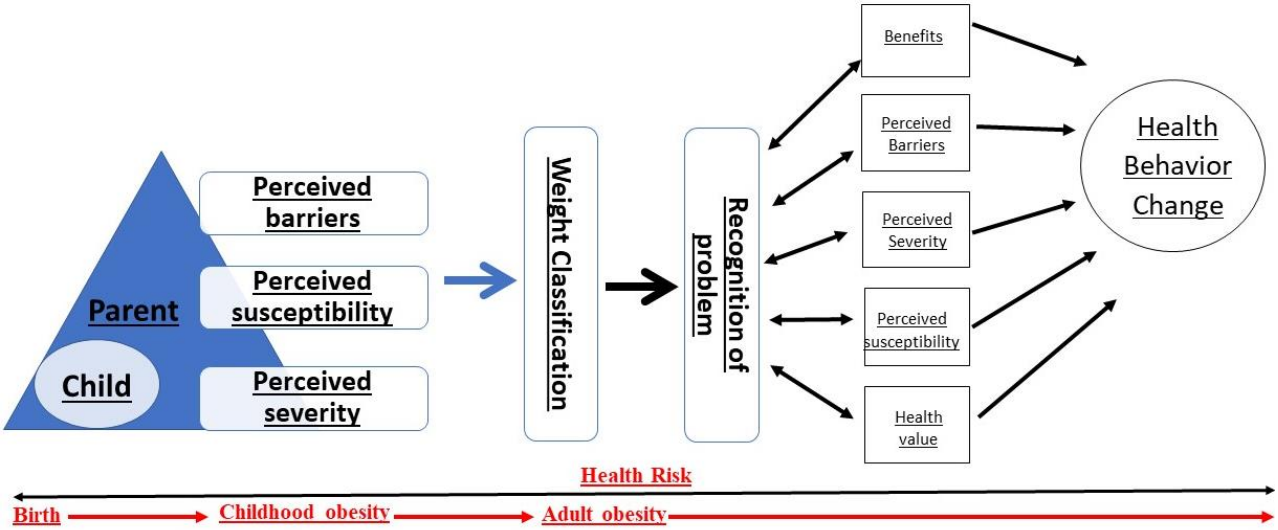
Kelly (2004) proposed the key components of the HBM with respect to weight loss were understanding the connection between weight and health risk (perceived susceptibility), understanding weight deviation has a consequence (perceived seriousness), awareness of the benefits that can occur with weight loss (benefit), awareness of barriers to weight loss (barriers),

and understanding the value of action (health value). Kelly (2004) found the HBM was a useful model to use in weight loss and weight management trials but did not evaluate the effects of the model components separately.

The HBM has been used to predict when health-related change can occur in a person. Carpenter (2010) performed a meta-analysis examining the effectiveness of the HBM variables in predicting behavior change through an examination of effect sizes. In the examination of 18 studies, Carpenter (2010) found that desired target behavior changes were influenced most by the moderators of severity, barriers, and benefits. Benefits and barriers were also correlated as the strongest predictors of behavior change. Meanwhile, susceptibility was found to be unrelated to behavior, though Carpenter (2010 posited this could be because those examined already have the disease in question and thus are clearly susceptible. Still, the inconsistency in the effects of susceptibility and severity lead to the conclusion that they are weak predictors for change in longitudinal studies involving the HBM.

While the HBM factors have been applied to an individual's intent for and ability to achieve weight loss, no studies examining the relationship between these factors and weight classification have been identified. As noted previously, parental recognition of weight deviation is a logical precursor to the recognition of weight as a problem and would be needed before change can occur. This proposed study will use the HBM as its basis because it allows examination of how parents understand obesity and can gauge how this affects readiness for change. If parents lack the expertise to identify child weight and do not understand the risks of excess child weight, then they will not be able to move forward and make the required behavior changes. Thus, the same factors that motivate behavior change could also affect the parent's ability to correctly classify weight as depicted in Figure 2. Figure 2 shows the proposed relations

of HBM factors to weight classification and behavior change, including arrows depicting the proposed directional or bidirectional relationship of these factors. As the HBM has been linked to weight changes, it could be applied to parental willingness to make changes that improve



weight trajectories for their child.

Figure 2: Relationship of the HBM factors to weight classification and behavior change.

One of several unanswered questions regarding parental weight classification is whether there are modifiable factors that relate to both misclassification and behavior change. So far, Rune, Mulgrew, Sharman, and Lovell (2015) have conducted the only study that applied the HBM to the classification of child weight. Rune et al. (2015) performed a randomized controlled trial using the HBM as a framework to examine parental knowledge of obesity risk factors as well as causes and consequences and its effect on how parents viewed their child's weight. This study used a pamphlet on obesity and one on stress (control group) as an educational intervention for parents. Parents took a 34-question survey before viewing the pamphlet and after. This survey had them rate their child's weight using a Likert scale from very underweight to obese

and their knowledge of obesity from no knowledge to a lot of knowledge. Parents were also asked to calculate the child's actual BMI and input it as part of the post-survey. Self-reported knowledge of obesity was found to significantly change in the obesity intervention compared to the control condition. However, there was not a significant difference in ability to correctly classify child weight between the groups.

While Rune et al. (2015) showed that knowledge intervention can increase self-reported understanding of obesity, it did not measure actual knowledge. Thus, it is still unclear if parents understand the health risks associated with childhood obesity and how this knowledge interacts with other potential moderating factors of child weight classification. The Rune et al. (2015) study also had other limitations. It relied on parents' self-report of child weight and it had a small sample of 80 total parents with 40 in each group. Hence, the HBM has not yet been investigated with respect to parents' actual knowledge in relation to the accuracy of parental weight classification. Despite the limitations of the Rune et al. (2015) study, it did point toward how the HBM might be related to understanding parental misclassification as well as how knowledge might be an important modifiable factor that can be used to improve parental identification of child weight.

Understanding parental misclassification of the preschool child will lay a foundation for future research and for the development of interventions that aim to counter misclassifications and the health issues associated with misclassifications. For instance, if it is found that parents do not recognize that health risks of obesity can start in the preschool age, then interventions that focus on improving understanding of the relationship between obesity and health can be created. The end goal is to engage parents, so they can introduce or model healthy behavior changes within the family. These healthy habits could then impact the child's weight trajectory, and

present and future health risks. First, parents must correctly classify their child's weight and recognize associations between weight and health if strategies to combat the persistent weight problem are to be successful. As explained previously, Figure 2 showcases how the three potential moderating factors of perceived barriers, perceived susceptibility, and perceived severity potentially relate to misclassification and how this fits into the cues to action that are identified as important in the HBM. Examination of the relations among these factors and the accuracy of parental child weight classification is the major purpose of the proposed investigation.

Framing Obesity Importance

Obesity has biological components, but the socialization of traits like diet, exercise, tastes, and accepted foods can also increase obesity and its risk inside families. Just as obesity can run in families, so does the modifiable weight-related behaviors that are learned or influenced by families (Leary et al., 2013). Socialization is crucial for preschool children where parents are major influences on child development and lifestyle. Parents help establish and model eating and physical activity (Lundahl et al. 2014). With significant consequences for childhood obesity, teaching children and family's habits for healthy lifestyles is imperative and can help minimize the risks associated with increased weight (Bridger, 2009).

The complexities of the physiological and psychosocial components affect the course of obesity, but also how it is treated and understood. A person who is obese has more risk for physical health problems like cardiovascular disease, type II diabetes, musculoskeletal disorders, and overall reduced quality of life (Seidell & Halberstadt, 2015). Heart-related issues such as high blood pressure and increased triglycerides that were once isolated to adulthood are now being faced by overweight children who are at risk for the same co-morbidities as overweight or

obese adults (Black, Victora, & Walker, 2013; Lundahl et al., 2014). Dyslipidemia, hypertension, and insulin resistance have been linked to childhood weight problems. In fact, obese children are three times more likely than their normal-weight peers to have hypertension (Bridger, 2009). Overweight children who have an early diagnosis of these health issues will suffer from these conditions much longer – 20 to 30 years more – than normal-weight individuals (Visscher et al., 2017). Overweight children and adolescents are also more likely to remain overweight as they age thus compounding the problem. If a child is overweight from birth through age 5, they have five times greater likelihood of being overweight at age 12 (Lundahl et al., 2014). Increased body mass index (BMI) in childhood tracks into adulthood with an average of 40% to up to 80% of overweight children become obese adults (Bridger, 2009).

The health consequences of obesity relate to the perceived severity of obesity. That is if obesity is left untreated, is there a serious effect on medical consequences like death disability, or pain or on social consequences like work and social relationships? While there is a growing medical awareness of these issues in research findings and medical communities, evaluation of parental knowledge of these items is missing.

Furthermore, despite concrete connections between weight and health consequences, weight continues to be an issue at all ages. Infancy and childhood have been identified as a prime time for intervention due to modifiable risk factors for obesity that exist (Baidal et al., 2015). At this age, parents are moderators of child weight because they serve as role models and gatekeepers for a child's behavior and choices (Woods & Nies, 2017). This is problematic when parents are known for their failure to correctly distinguish weight classification of their own children (Woods & Nies, 2017; Black, Victora, & Walker, 2013; Lundahl et al., 2014).

Obesity, although a morbidity, is also a risk factor linked to developing co-morbidities. This dissertation will discuss the importance of recognizing overweight and obesity as a risk factor and a disease. It will also examine how exposure to chronic health conditions associated with obesity affects how parents classify their child's weight status. As Visscher et al. (2017) describe, those who are obese or overweight and actively seeking treatment can see obesity as a disease and recognize it, while others have a flawed perception of obesity. This idea of obesity as a risk factor affecting misclassification is missing from most parental misclassification studies that have largely focused on socioeconomic status, a child's age/sex/weight, and parent BMI and education (Woods & Nies, 2017).

Other potential moderating factors like concern about a child's weight, shifts in concern about overall population weight, the effect of health conditions, and familial exposure to obesity-related disease warrant further exploration as results have been inconsistent in the few studies that have examined these items. These potential moderating factors could relate to items of the HBM as family history of weight issues could affect perceived susceptibility to obesity as well as perceived severity, depending on the magnitude or absence of problems related to obesity. Ogden (2012) notes that risk perception and susceptibility are important components of health beliefs that can affect action. If there is a history of smoking by family members and no consequence of lung cancer, then smoking can seem low risk; meanwhile, if obesity runs in a family, a person could assume that there are little means to prevent this from happening (Ogden, 2012).

As Carpenter (2010) concluded with their meta-analysis, severity, barriers, and benefits are considered the most influential predictors of behavior change. Therefore, with limited research examining the relationship of these items to parental classification ability and their

potential to lead to potential interventions for parents, these items are among the first that should be considered for further research. Therefore, this study attempts to determine what relationship perceived barriers and perceived severity have with the parental ability to classify weight.

Research Questions

It is posited that a reduction in excess weight and prevention of excess weight in children is impeded by parental misclassification of their child's weight status. It is also posited that this, in turn, limits parents from behavior changes needed to correct or prevent overweight and obesity problems in their children. These propositions are grounded in the tenants of the HBM. This proposed study seeks to explore connections between components of the HBM and parental classification of preschool child weight. This dissertation research will seek to answer these eight questions.

Question 1: What is the parental rate of misclassification of preschool children as determined by three methods of parental assessment of child weight (coded as correct/incorrect) compared to actual child weight (coded as underweight, healthy weight, overweight, or obese)?

Question 2: Are parents better able to correctly classify child weight scale (coded as correct/incorrect) by identification with a categorical label on a Likert scale (underweight, healthy weight, overweight, obese), by reporting an actual weight, or by selecting an image representing their child's weight?

Question 3: Does perceived severity as measured separately by the Obesity Risk Knowledge Scale (ORK-10; Appendix B) and the Adolescent Obesity Risk Knowledge Scale (AORK, Appendix C) correlate to the accuracy of parental child weight assessment (correct or incorrect) of the three, parental child weight assessment methods?

Question 4: Do the continuous ORK-10 scores predict parental child weight classification for the three methods of weight classification?

Question 5: Do the continuous AORK scores predict parental child weight classification for the three methods of weight classification?

Question 6: What are the associations of perceived susceptibility (as measured by two separate parental concern questions) and obesity exposure (as measured by one exposure question) to the parental classification of preschool child weight as measured by the accuracy of parental child weight assessment for all three assessment methods?

Question 7: Do perceived barriers as measured by Parental Self-Efficacy for Promoting Healthy Physical Activity and Dietary Behaviors in Children Scale (PSEPAD, Appendix A) correlate with and predict the parental classification of preschool child weight status as measured by the accuracy of parental assessment for all three assessment methods?

Question 8: If sample size allows, does the weighted combination of parental self-efficacy gauged by the PSEPAD score and knowledge of obesity health risks (based on the ORK-10) predict the accuracy of parental classification (correct/incorrect) for all three assessment methods (Likert, visual, and reported weight)?

Operational Definitions

It is important to understand the terms and definitions of words and ideas used in this study to facilitate a better understanding of this research. This study uses childhood obesity and childhood overweight.

Body mass index (BMI): The division of weight in kilograms by height in meters squared Ogden & Flegal, 2010).

Childhood overweight: BMI for age between the 85th and 95th percentile on the sex-specific Centers for Disease Control growth charts (Ogden & Flegal, 2010).

Childhood obesity: BMI for an age that is at or above the 95th percentile on the sex-specific Centers for Disease Control growth charts (Ogden & Flegal, 2010).

Knowledge: Composite score of correct answers regarding obesity complications and/or risks as judged by the ORK-10 and AORK scale (Swift, Glazebrook, & Macdonald, 2006; Rutkowski & Connelly, 2016).

Perceived barriers: Perception of both difficulties and negative consequences to performing specific behaviors, cues to action (such as environmental events or bodily events like pain), and even self-efficacy (confidence in being able to perform needed behaviors) (Baranowski et al., 2003).

Perceived benefits: Perception of how engaging in specific behaviors that reduce the threat of the disease can cause positive experiences (Baranowski et al., 2003).

Perceived severity: Perception of how developing an illness relates to how it personally impacts the individual (Baranowski et al., 2003).

Perceived susceptibility: A person's perceived risk of developing an illness or health problem (Baranowski et al., 2003).

Preschool child: A child between the ages of 2 and 5.

Parents: A person who is legally responsible for the child, whether there is a biological connection or not. This person is the one who performs everyday care for the child who is participating in the study (Conger, Conger, & Martin, 2010).

Misclassification: Inaccurate discrimination of weight range (Woods & Nies, 2017).

Assumptions

This study assumes that participants will answer the questions on the questionnaire honestly and represent their knowledge accurately on the health knowledge instrument. The anonymity of responses will be discussed, and the use of unique identifiers to conceal the identity of participants will be explained to provide participants with an assurance of privacy. Further, these measures combined with the ability of participants to withdraw without ramifications will support this assumption. The study further assumes that the sampling method will provide an accurate representation of parents and children in the geographic area of the study. There is also a response bias that is an inherent risk of self-reported measures. Social desirability response bias is the most noted example and refers to the tendency for individuals to portray themselves in a more flattering light by giving answers based on congruent social values (Polit & Beck, 2017). This specifically applies to parental reports of height/weight for themselves. It also may be reflected in the way they answer the demographic and general health questions. Ensuring a non-judgmental atmosphere, providing anonymity, and using delicately worded questions help eliminate this problem (Polit & Beck, 2017).

Delimitations

This research study will rely on the participation of one parent and only one preschool age child in each family. It is important that parents only use one child who fits the preschool age and that their data are connected to the appropriate parent. Attempts will be made to include both male and female caregivers, though only one parent and one child from each family may participate. The parent needs to be an adult who has legal guardianship of the child and can consent to participation in the study.

The sample for this study will be drawn from daycares as well as stand-alone preschools to capture working and non-working parents. However, this could exclude individuals who choose not to have their child in preschool and/or chose to homeschool. Similarly, the use of convenience-type sampling also affects the ability to draw a sample that is representative of population demographics (e.g items like race, gender, and income) and that has adequate numbers of male versus female caregivers. This sampling method is not able to control the proportions of gender for either parent or child. This means the data is limited by who is willing to participate, which could impact what analyses and findings are found. This is similar to delimitations found in other classification studies. This could limit the generalizability of the subsequent results.

Limitations

Survey methodology is non-experimental and involves a cross-sectional approach to evaluate the study aims. This will allow the general effect to be explored and may identify specific populations that warrant further evaluation. Due to the state of science regarding the reason for misclassification in the 2- to 5-year-old population and its relation to health knowledge, this design is appropriate and will address the gap in knowledge, though there are limitations.

The limitations include the use of self-reports, so there is an assumption that the participants will respond with honesty and without bias or errors. Generalizability will also be affected by the sampling method that while purposive, it will not be a random sample. Sampling will be limited to volunteers and limited by the participant ability to speak English. This means there is a limitation because only individuals who choose to participate will be included. The mother, father, grandparent relative, or another legal guardian may fill out the form, thus

allowing the potential for more varied participants than previous research has had. Strategic sampling may help eliminate this because locations of more diversity will be included in the sample, though people will not be targeted by race or sex. Also, the use of multiple locations throughout the geographic area will improve the sample distribution and the validity of the results, but it will not completely overcome the issue of generalizability. This study also involves the parents self-reporting that they are the legal guardian of the child.

Significance of the Study

The literature demonstrates there is an issue with parental misclassification of their child's weight and thus with their ability to realize when weight becomes a problem. Parents are better able to classify weight when dealing with extreme deviances, not smaller deviances, and in older versus younger children (Almoosawi et al., 2016). This is problematic as research has shown that adolescents are four times more likely to be obese if they were overweight at age 5 (Cunningham et al., 2016). Several factors have been related to parental misclassification of child weight, including the child's sex, age, parental weight status, socioeconomic status, and education level (Cunningham et al., 2016). However, factors beyond demographic features that may affect misclassification and that can serve as a basis for future interventions have not been fully explored.

Research has investigated factors linked to misclassification beyond the common factors of age, race, gender, and SES. These factors include future concern about the child's weight (Almoosawi et al., 2016, Garrett-Wright, 2011; Parkinson et al., 2011; Regber, Novak, & Eiben, 2012), concern about the weight of the overall country (Almoosawi et al, 2016), health literacy (Garrett-Wright, 2011), the effect of having diagnoses of health conditions like obesity, diabetes, and cardiovascular disease in parents/grandparents (Peracetic et al, 2012), and obesity-related

diseases like high blood pressure, coronary artery disease, and type 2 diabetes in parents (Garrett-Wright, 2011), and obesity risk knowledge and its relationship to child weight classification (Rune et al., 2015). These concepts relate to components of the HBM, though the connections presented by the researchers are vague as in Rune et al. (2015) or absent as most of the others do not list a theoretical framework. This proposed study will add this to the existing literature by examining components of the HBM and assessing their relationship to parental misclassification. As the HBM is a model used to predict readiness for change, it could help identify areas where parents need intervention to improve their understanding of weight and willingness to intervene to prevent future child weight gain.

Past obesity research has focused mostly on adolescents, though newer studies have identified the importance of in-utero, infancy, and early childhood on obesity incidence and prevalence. Black et al. (2013) said that conception through 24 months old is a critical period for child development and nutrition. If a child is overweight in this period, they face immediate as well as long-term health risks, including type 2 diabetes, high blood pressure, as well as increased cholesterol and triglycerides (Black et al., 2013). Being overweight in this early period through to 5 years old has also been linked to adolescent and adult obesity (Lundahl et al., 2014). Baidal et al. (2015) stress there are modifiable risk factors that exist in pregnancy, infancy, and early childhood.

This time-period of 2- to 5-year-olds is critical in future obesity and health problems as well as a time when improved outcomes can be realized by modifying behavioral causes of obesity. This is linked to parents as they are ones that must first recognize obesity and have the motivation to change the environment. Parents must have this motivation and understanding to reduce behavioral factors like excess food intake, reduced activity, sleep patterns, and screen

time that contribute to obesity (Burgess & Broome, 2012). This study will not be limited by weight status and will seek to expand the understanding of the parental ability to classify weight in preschool children, regardless of their weight status. Unlike past studies that focused on unmodifiable demographic predictors, this study will shed light on possible predictive factors that are modifiable and that may have the potential to serve as the basis for interventions to help parents correctly classify their child's weight and understand the consequences of not doing so.

Chapter II: Review of Literature

Although there is a biological component to obesity, some children have a tendency toward increased weight and other children have stronger protection against it. Subsequent socialization can nurture obesity and risk for obesity within the family context (Moore et al., 2016). Research has related this nurturing of obesity, in part, to parental misclassification. Misclassification has been demonstrated globally and consistently with results showing parents do not accurately discriminate child weight. Understanding parental misclassification of child weight can help develop appropriate interventions to mitigate barriers to accurate classification and to improve recognition of weight issues.

This chapter examines how the HBM can be related to parental classification, proposed theoretical relationships, why preschool children are the appropriate age to study, misclassification rates and how weight classification is measured, discusses gaps in existing literature, and identifies the importance of the measures being suggested in this study.

Literature Search Strategy

The articles included in this literature review were identified through CINAHL, PubMed, and Onesearch, which allows simultaneous access to the entire library catalog and ranks results by relevance. Search terms included “parental misclassification,” “parental perception,” “childhood,” “obesity” or “overweight,” “health risk,” “knowledge,” and “Health Belief Model” or “HBM.” References to articles were examined to find additional related literature. Only articles that were available in English were included. The literature search was performed between August 2017 and January 2018 to locate studies for this review. The search included all studies published between 2000 and 2017.

Conceptual Framework

The Health Belief Model (HBM) was conceptualized as a framework to understand health behaviors and has been applied to many issues, including obesity. This social-psychological theory addresses health behavior and shows how theory-based scientific research can better understand health behavior (Steckler, McLeroy, & Holtzman, 2010). It focuses on an individual's readiness for change and modifying factors that can lead to either action or inaction. These are important considerations when examining obesity. The HBM can also be applied to this study to examine misclassification by applying theory components to a parent's ability to correctly classify child weight.

Research studies have used this model frequently with positive results relating to change outcomes to HBM components in areas including health screenings and physical activity (Ogden, 2012). Only a handful of studies examining the parental classification of child obesity included any framework, though those that did primarily used the HBM (Rune et al., 2015). This model is framed to explain participation in healthy actions that reduce the chance of disease and premature death, and it focuses on beliefs relating to readiness for action and beliefs related to modifying factors that can both facilitate and inhibit actions (Dedeli & Fadiloglu, 2011). The model has been applied to parents and their knowledge of obesity by Rune et al. (2015), though this was the only study found that examines parental misclassification and knowledge together.

The HBM is a good foundation for this study because it examines readiness for change and predicts when health-related change can occur. The same factors that can predict behavior change may also affect the accuracy of parent's perceptions of child weight as demonstrated in Figure 2 (presented in Chapter 1). By examining the HBM components and assessing their relationship to misclassification, it is possible to identify potential moderating factors that might

be used to form future interventions to increase parents' ability to correctly classify weight and to help them understand the implications of weight deviations. The HBM has already proven successful and appropriate for weight management (Kelly, 2004; Lambert et al., 2005). Dedeli and Fadiloglu (2011) examined the five variables of health value, severity, susceptibility, barriers, and benefits. Use of these variables allowed researchers to examine the readiness for a change in participants instead of simply relying on indications of a general willingness or desire to lose weight. This is important because the HBM describes behavior (change) as the result of perceived severity, perceived barriers, perceived benefits, health value and benefits as needed for change to occur (Dedeli & Fadiloglu, 2011).

These same variables can be applied to parents and their perception of their child's weight to determine if these variables are also related to misclassification as potential moderating factors. Is there greater misclassification of child weight when a parent is concerned or not concerned about weight (perceived susceptibility) if they feel the threat is a risk for their child (perceived susceptibility), or if they think the child's health can be impacted negatively now or in the future (perceived severity)? It is unclear if parents understand the health risks associated with childhood obesity and how this knowledge interacts with other factors, such as SES, child weight, race, and parental misclassification of child weight. Examining correlations and identifying predictors that can serve as the basis for future intervention studies is important as a foundation for work to develop prevention and intervention strategies. Identified predictors can lead to future experimental studies that further examine relationships to determine if there is a causal connection.

As described earlier, Rune et al. (2015) posited that parental knowledge is an important component related to the proper classification of child weight. They applied the HBM to this idea

stating that parental inaction reflects inadequate risk assessment of health problems and lack of knowledge of health behavior changes. Their findings showed parents of normal weight children had significantly greater knowledge of risk factors than parents of overweight children. While their findings did not show a significant difference between their control group that read a pamphlet on stress and the experimental group that read a pamphlet on how obesity affects health and risk for diseases in terms of their accuracy in weight perception, their application of the HBM was insightful and unique.

Use of the HBM to examine parental views and knowledge has also been done by others. Abdeyazdan, Moshgdar, and Golshiri (2017) used a quasi-experimental design with 64 mothers of obese and overweight fifth and sixth-grade students and their child to examine the effectiveness of a lifestyle training program based on the HBM. While the experimental group received the four educational sessions, the control group did not receive any education until after the study. Results showed that obesity-related behaviors were significantly different both immediately after the intervention and two months after the intervention, indicating the HBM-based education was effective at improving obesity-related behaviors. Abdeyazdanet al. (2017) conclude that the intervention helped the mothers become more sensitive to obesity, its complications, and its severity as indicated by the significant findings and reports of improved obesity-related behaviors. These results show promise of the relationship between components of the HBM and to the idea that understanding obesity and its complications as a serious health threat for children could change the mother's behaviors and their efforts to eliminate barriers for controlling child weight and modify obesity-related behaviors in children.

Using survey results and regression analysis, Langlie (1977) examined components of the HBM and its use for predicting preventative health services and differences in preventative

health behavior. Important connections between childhood and formed habits that can contribute to or prevent health behaviors were identified. Their findings support the idea that attitudes are formed in childhood and persist into adulthood unless there is an extreme experience that alters them. This identification of childhood as a pivotal time reaffirms the need to focus on parents and how they influence children.

For preschool children, the decision to act or not to act is more related to the parents who have a large amount of control in the home environment. As the HBM describes needed variables to spur change, parents need sufficient identification of susceptibility, severity, benefits, health value, and barriers as important and related to how they classify child weight to move toward health-related behavior changes. In an analysis of five studies using the HBM as a foundation, Daddario (2007) concluded research findings support the idea that individuals change if they believe health is at risk and that the current behavior can lead to detrimental consequences, but the benefits of behavior change also must outweigh barriers. Recognizing weight deviations and then having sufficient connection to the HBM variables is important for parents to move toward behavior changes that can impact issues with child weight. As Rune et al. (2015) did, the variables of the HBM can be framed into measurable ways to determine their effect on misclassification of child weight. Ideas need to be reframed and applied to parents if we seek change in the preschool population. Tompkins (2015) confirmed that evidence from a meta-analysis of 15 studies showed that education is a factor that requires further exploration because it is unclear if educating parents can improve parental classification of child weight.

Conceptual Relationships

Misclassification is the discrepancy between measured child weight and perceived child weight as presented in current research. This is an important factor as it is a quantitative,

measurable way to evaluate how parents view their child. By itself, this can only tell whether parents can correctly determine weight. It is important to consider other factors that may influence that ability and the parental motivation to engage in positive health behaviors. Current research on misclassification has explored mainly demographic features, such as parent weight status and child sex, and has not looked at other potentially influential features that indicate higher cognitive appraisal linked to awareness, comprehension, and understanding.

According to the Health Belief Model, the ability to change requires sufficient motivation that makes health issues salient (perceived susceptibility), a perceived vulnerability (or threat) to the health problem (perceived severity), and the belief that a suggested health change reduces the perceived threat at an acceptable cost (perceived benefits; Rosenstock, Strecher, Becker, 1988). This means people must be aware of risks, understand the implications of weight, and be motivated to do something. The Health Belief Model principles are used as a guide to examine the relationship between knowledge and correct classification. This study will show whether knowledge can predict correct classification. It is important to understand knowledge of obesity and its risks as well as exposure to health risks when looking at how well parents can observe weight differences in children and how motivated they are to change.

It is important to assess an individual's knowledge base when evaluating their ability to correctly classify weight status. The purpose of this study will be to evaluate parental classification of preschool child weight by examining how perceived barriers, perceived susceptibility, and perceived severity relate to the classification of child weight.

Importance of Parental Classification and the Preschool Age

In-utero, infancy, and early childhood have been identified as critical periods in child development as well as indicators for future overweight and obesity problems. Immediate and

long-term health risks, including type 2 diabetes, high blood pressure, and increased cholesterol and triglycerides, are linked to the in-utero to 24-month age range, though it has also been acknowledged that this same period through early childhood has modifiable risk factors that can improve health (Baidal et al., 2015; Black et al, 2013). Younger children, especially in the preschool age group, have been identified as a target for intervention and prevention strategies, but this also means that parents are a crucial component to consider (Regber et al., 2012). Children in younger age groups are more reliant on parents (Baidal et al., 2015; Lundahl et al., 2014). This can be problematic when considering healthy weight because research has shown that younger children's weight is more frequently misclassified by their parents (Almoosawi et al., 2016; Czajka & Kolodziej, 2015; Garrett-Wright, 2011; Jeffery et al., 2014; Manios et al., 2008). In a comprehensive literature review, Tompkins et al. (2015) even found that parents are becoming more inaccurate in their ability to correctly identify child weight, which was identified by comparing misclassification rates in this review with one from 2006. Their review showed an underestimation of obesity ranging from 27.9% to 100% of parents of children with a BMI greater than or equal to the 95th percentile (based on CDC indexes). In 10 of the 13 studies, Tompkins et al. (2015) found parental underestimation of child weight at more than 40% for parents of overweight and obese children.

Misclassification Rates

Misclassification is the actual discrepancy between measured child weight and perceived child weight as presented in current research. This is an important factor as it is a quantitative, measurable way to evaluate how parents view their child. Overall misclassification rates range from 20% to 29% of parents misclassifying their child either as normal weight when overweight or obese or as overweight when actually obese. This underestimation of child weight is seen in

the recent studies published in 2015 and 2016 (Almoosawi et al., 2016; Czajka & Kolodziej, 2015; Meredith-Jones, Williams, & Taylor, 2016; Miller et al., 2016; Robinson & Sutin, 2016). In a meta-analysis that included 69 research articles dealing with misclassification of child weight in overweight and obese populations, Lundahl et al. (2014) found the total adjusted effect size was of parental underestimation was 50.7%. Studies have also found that the percentage of misclassification is drastically higher when examining misclassification within groups of clinically obese children versus the entire sample. For example, the percentage of misclassification in groups of clinically obese children has been shown to vary from 17% (Almoosawi et al., 2016), to 60.9% (Czajka & Kolodziej, 2015), and to as high as 81.4% (Robinson & Sutin, 2016). This variable rate of parents thinking an overweight or obese child is normal weight has been frequently observed in the literature. For instance, Lundhal et al. (2014) found that while overall parental misclassification was 50.7%, this number jumped to 67.5% when looking at how parents classified children who were identified as either overweight or obese in the 76 research articles. As parents who have overweight and obese children are less likely to realize their child is at an unhealthy weight, the importance of understanding why this is occurring is accentuated.

Parental determination of weight

Determining misclassification of weight has been examined mostly by a verbal scale asking parents to choose a categorical description of their child using options on a Likert scale or by asking parents to select an image that looks most like their child. In a meta-analysis examining parental misclassification of the weight of 35,103 children spanning ages 2 to 18 in 18 countries, Rietmeijer-Mentink, Van Middlekoop, Bindels, and Van der Wouden (2012) found that 32 of the 51 studies used a verbal scale and 19 a pictorial scale for evaluation. This

compares to the findings of Lundhal (2014) who found 8 studies using a visual scale and 70 using a non-visual scale. Another review of 13 articles, which included only one that used a visual scale, reported that the Likert scale descriptions were most common (Woods & Nies, 2017). These Likert scales either involved four or five choices that included verbal options with the terminology of very underweight to very overweight or with about the right weight as the middle option (Woods & Nies, 2017). Variations of these descriptions include asking if the child's weight is fine for their age as was done by Hudson and McGloin (2011). A single study was found that asked parents to specifically state the child's weight in kilograms or pounds on the survey instrument (Gordon & Mellor, 2015).

Rietmeijer-Mentink (2012) performed an analysis of the 51 studies and found that parental perception was more accurate using visual scales. Parent perceptions were accurate 52.3% with visual scales and 37.6% with verbal descriptions. Lundhal (2014) reported results as a percent of underestimation, therefore not distinguishing total accuracy between scale types. She did show that the rate of underestimation was 66.3% on visual scales and 67.8% on non-visual scales. In comparison, Gordon and Mellor (2015) found that parent reports of weight for children ages 3 to 12 (N = 1,119) were accurate 58.2% of the time when identified as correct if within ± 2 pounds. However, it is important to note that only about 76% of parents filled in the requested weight.

Lundahl (2014) and Rietmeijer-Mentink (2012) were the only studies found that compared verbal versus visual description, though it was done as a secondary analysis to already performed studies. No individual study was found that examined rates of perception and how they compared using verbal and visual scales within the sample population.

Importance of the Child's Age

One of the moderating factors that affect misclassification is the child's age. Parents are more likely to misclassify a younger child's weight (Almoosawi et al., 2016; Czajka & Kolodziej, 2015; Garrett-Wright, 2011; Jeffery et al, 2014; Manios et al., 2008). McKee, Long, Southward, Walker, and McCown (2016) found the greatest misclassification occurred in kindergarten children with their results of 83.9% of parents classifying children as a healthy weight when only 28.3% actually were. Using a large random sample of 14,808 parents of public school children from kindergarten to 12th grade, they also found that parents who misperceived their child's weight were almost 12 times more likely to have an obese child than those who correctly identified their child's weight. Their sample started at the kindergarten age so they could not determine effects for preschool children. However, Lundhal et al. (2015) found that misclassification of child weight was higher in younger children in the 2- to 5-year range. This meta-analysis of 76 studies showed that parental classification of child weight was more accurate in older children than younger children. As increasing evidence supports the idea that excess weight in young children predicts excess weight in adolescence and adulthood, Lundhal et al. (2014) emphasized the need for early intervention. The need for early intervention has been supported by others who have examined misclassification with research studies, including Regber et al. (2012) who concluded it is crucial for parents to recognize problems early to make the needed lifestyle changes at a younger age.

McKee et al. (2016) recognized the importance of parents as a guiding principle for their work as other studies have shown parents as the main gatekeepers for child health and nutrition. Researchers like Lundhal et al. (2014) and Baidal et al. (2015) also note that children in younger

age groups are more reliant on parents and that early childhood is a critical time for child development and nutritional interventions (Lundahl et al., 2014). Baidal et al. (2015) examined the first 1,000 days of life, which encompasses gestation through to 2 years old, by hosting seven focus groups involving 49 women. Their analysis of this data revealed that there are risk factors that begin in these early stages, including diet choices and use of screen time, but that the mothers are unaware of this. Their findings also revealed an overriding belief that children in this age range will grow out of weight concerns, thus a theme that mothers did not recognize how early life weight gain affects future weight. Baidal et al. (2015) concluded that modifying risk factors during early childhood might change a negative trajectory in weight, health, and habits (Baidal et al., 2015). Using a prospective prebirth cohort study of 1,116 mother-child pairs, Taveras et al. (2013) found an association between early life risk factors -- sleep patterns, sugar-sweetened beverage intake, fast food intake, and television use -- for childhood obesity and future weight. They found that this type of factors mitigated the difference in overweight and obesity across races/ethnicities in their sample. After adjusting for early infancy and risk factors, they found the odds ratios lessened to 1.35 in black and 1.46 in Hispanic children. The conclusion that the best time for obesity intervention and prevention is in infancy and early childhood when children are modifiable in their behavior and their physiological characteristics are more pliant was confirmed by Gillman et al. (2008) who examined modifiable and non-modifiable risk factors in the prenatal period to the first year of life in 1,283 mother-child pairs to estimate the probability of weight at age three. They found the four factors of smoking during pregnancy, gestational weight gain, breastfeeding through 12 months, and daily sleep in infancy were associated with odds ratios ranging from 1.3 to 1.8. The risk of childhood overweight in

this cohort ranged from just under 10% to 30%. Based on these findings, they concluded a focus on early life interventions is critical.

With McKee et al. (2016) finding significance in the gap between parent perceptions and actual weight status, they concluded that it is important to use a two-generation approach for dealing with weight issues by focusing on education and increasing awareness for both children and parents. These conclusions are similar to others who have found that risk factors for childhood obesity begin as early as in-utero and continue through early childhood development as discussed above. However, children in this age range are reliant on parents for care and any interventions would require that parents be aware of weight issues and be motivated to do something for them to instigate behavior change.

Gaps in Literature

The phenomenon of parental misclassification of child weight has largely focused on adolescents and not preschool-aged children ages 2 to 5. In the Lundhal (2014) meta-analysis involving 128 studies, the mean age of normal weight children examined was 8.08 years old and the mean age of overweight and obese children was 7.44 years old. In normal-weight children, 29.3% of the child sample were aged 2 to 5, 55.2% were 6 to 12, and 15.5% were 13 to 18. Meanwhile, in the overweight and obese children sample, 38% were in the 2-to 5-year range, 51.9% in the 6- to 12-year range and 10.1% in the 13 to 18 range. Pooled effect sizes revealed that age was a moderator of parental underestimation of child weight in both normal-weight and overweight-obese children. Another literature review of 18 research articles, showed that only four studies included children in the age range of two to five years old exclusively, while the remaining studies targeted ages 5 to 18 in varying intervals (Woods & Nies, 2017).

Further, the explored moderating factors were mainly demographic features, such as child's and parent's age/weight/sex/race and some form of socioeconomic status (SES) such as parent education or income. Identified factors that moderate parental misclassification included both child-related factors and parent related-factors. Investigated child-related factors have been gender (Hudson, McGloin, McConnon, 2011; Jeffery et al., 2014; Manios et al., 2008; Parkinson et al., 2011; Regber et al., 2012), age (Hearst et al., 2011; Hudson, McGloin, & McConnon, 2011; Jeffery et al, 2014; Lundahl et al., 2014; Regber et al., 2012), and BMI (Lundahl et al., 2014; Parkinson et al., 2011). Investigated parent-related factors have been BMI (Al Junaibi, Abdulle, & Nagelkerke, 2013; Almoosawi et al., 2016; Manios et al., 2008, Juliusson et al., 2011, Miller et al., 2016, Parkinson et al., 2011) and education (Al Junaibi, Abdulle, & Nagelkerke, 2013; Manios et al., 2008; Rivera-Soto & Rodriguez-Figueroa, 2012). Even though demographic data were most frequently used to examine how they affected misclassification, the variables examined were not consistent across studies. For instance, parent age was used as a variable in 4 of 18 studies (Woods & Nies, 2017). The most commonly evaluated items included some form of socioeconomic status (SES), such as parent education level or income, and child age, weight, and sex (Woods & Nies, 2017). Also, while demographic variables have been shown to influence parental ability to correctly classify child weight and have been well-explored, other potential moderating factors have been underexplored and the relationship between these other potential moderating factors and demographics has not been considered.

The literature does not explain if a visual method, parent-report of actual weight, or Likert scale listing categorical options is best to determine misclassification. Two meta-analyses looked at combined results from research studies and thus reported rates of misclassification for visual and Likert-scale assessment of child weight (Lundhal et al., 2014; Tompkins et al., 2015).

This provided a secondary analysis of existing research, though the limited number of studies using a visual method makes this comparison difficult. The total studies cited that employed visual methods were eight and four in the meta-analyses, respectively. However, no original research has examined if either of these options is more accurate using the same sample, which would increase the reliability of the findings as the same people would be using all assessments types to determine child weight status. Further, only Gordon and Mellor (2015) was found as using the parental self-report of child weight to determine parental classification. Therefore, it is unclear what the best methodology is to examine the parent classification of weight.

Perceived Severity as Examined by Knowledge of Obesity Risks

Parental knowledge of obesity health risks correlates to important components of the HBM, such as perceived severity. The importance of that awareness and motivation is an integral component of the HBM, which is why it was chosen as the foundation for this proposed dissertation study. It is currently unclear if parents have adequate knowledge and if they connect weight to health risk, or if they understand how early life weight issues affect future obesity and health conditions, especially for children ages 2 to 5 who are at a critical point in their development. Literature has also revealed that it is unknown how varying levels of knowledge affect parental ability to correctly classify child weight. The need to further explore this concept was identified in the Tompkins et al. (2015) meta-analysis and the Woods & Nies (2017) literature review.

Knowledge is an important part of many frameworks for change, including the HBM. The HBM indicates individuals must be ready to change, which means they must feel susceptible to the health condition and that developing it could have serious consequences (Cummings, Jette, & Rosenstock, 1978). Individuals must also find benefit in reducing susceptibility to the

condition and decide that the benefits of doing something outweigh the costs, which can be psychological or real (Cummings et al., 1978). Perceived severity relates to the perception of how developing an illness relates to how it personally impacts the individual (Baranowski et al., 2003). This is being conceptualized for this study as how parents perceive the child's risk of developing an illness, which is similar to the application done by Rune et al. (2015).

As represented by research on early life risk factors for obesity, there are modifiable risks as early as the in-utero period (Gillman et al., 2008; Taveras et al., 2013). However, there is also a lack of realization of the importance of this time period on the future weight and health status of children as demonstrated by Baidal et al. (2015). This lack of knowledge and understanding of health risks relates to perceived severity and is similar to previous applications seen with anti-smoking campaigns that have related to perceived severity and the impact of smoking as part of health promotion teaching (Ogden, 2012). Just as knowledge of the risks of smoking was used to motivate behavior changes, knowledge of obesity risks and the implications of excess weight can motivate parents to make changes. However, as Visscher et al. (2017) describe, those who are obese or overweight and actively seeking treatment see obesity as a disease and recognize it, but others have a flawed perception of obesity. This flawed perception of weight has been demonstrated by the misclassification rates discussed earlier as parents are more likely to underestimate weight, thus not recognizing when a child passes the threshold from normal to overweight or obese. Further, in a meta-synthesis of 15 cross-sectional studies, Doolen, Alpert, and Miller (2007) found only 26% of parents of overweight or at-risk children were concerned about health risks associated to weight status. Recognition of health risks has been related to the HBM as important to behavioral change, but is also recognized as a problem for parents who misclassify child weight as they do not understand the harm of excess weight in childhood and

are not always aware of what comprises a healthy diet and adequate exercise (Rune et al., 2015). These findings point to the need to examine knowledge.

Studies have also shown that parents do not understand the significance of obesity and may even have a desire to shield their children from negativity associated with diagnoses of weight problems (Newson et al., 2013). Parents of normal weight children have even been reported to have significantly greater knowledge of risk factors compared to parents of overweight children (Rune et al., 2015). Knowledge of obesity and related health risks could be a factor to help parents gain the needed awareness and motivation required for change, though it has not been explored much in classification research. Only Rune et al. (2015) was identified as attempting to examine the relationship of these concepts. A major purpose of this dissertation research is to determine whether parents' misclassification of their young child's weight is related to their knowledge of obesity and its health risks.

Most commonly health knowledge of obesity has been operationalized into "knowledge scores" and then correlated with BMI of the study participants. The results are mixed as to whether knowledge differs significantly among weight classes, which likely reflects the multiple ways the concept of health knowledge of obesity has been operationalized.

Obesity risk scale (ORK-10). Swift (2006) developed the first knowledge scale that offers a systematic way to evaluate understanding of obesity and health risks using 10 questions. Since its creation, the scale has since been used as a systematic way to evaluate obesity knowledge in studies outside of the country of origin and with various participant ages. Prior to this, Swift performed official validation and reliability testing to confirm the psychometric tool and ensure its effectiveness as a knowledge construct.

Swift (2006) did pilot work using an unknown number of items (researchers describe it as a large number only) and 283 individuals who tested them to develop an initial pool of scale items. Items were selected and tested to create the 10-item scale. Results showed a Cronbach's alpha coefficient above .70, showing adequate internal consistency. This 10-item scale was then administered to experts (n = 200) and non-experts (n = 230). The non-expert group had scores ranging from 0 to 8 (median 4). The expert group had scores ranging from 4 to 10 (median 9). The researchers looked at the proportion of non-experts who could get the item correct. They also looked at the corrected item compared to the total correlation. All 10 items had a corrected item-total correlation of .30 or higher.

Validity was established using statistical analyses. Standard linear regression examined potentially confounding factors: age, self-reported BMI, gender, marital status, expertise, SES, and education levels. These were considered independent variables. Partial regression coefficients were statistically significant for age and expertise. Only education and age were retained in the final analysis. The hierarchical multiple regression analysis showed that age and education level explained 29.9% of the variance in the index knowledge scores. Higher scores on the health index knowledge scale were associated with age (older), higher education levels, and classification as an expert, which was coded as a dummy variable. The last step in the scale's validation involved measuring internal consistency and item discrimination. Cronbach's alpha coefficient was .83 for the ORK-10 scale. This points to internal consistency as it exceeded the minimum of .70. There were no similarly worded items that would artificially increase the alpha. The scale did well with length, inter-item correlation, and item redundancy.

Evaluation of other knowledge assessments. Swift's scale has been used frequently, including by Rutkowski and Connelly (2016) who created an adolescent version of the scale

called the AORK. This adaptation was created to devise a scale with understandable terminology for adolescents that could also still measure knowledge (Rutkowski & Connelly, 2016).

Similar to the AORK and ORK-10, most studies identified in the literature used quantitatively measurable ways to evaluate knowledge of obesity and health risks that allowed knowledge to be compared to other factors, such as weight. For instance, Mazloomy-Mahmoodabad, Navabi, Ahmadi, Askarishahi (2017) developed a questionnaire using experts to help validate the use of the items, though there was no other evaluation for validity or reliability. Several others used a similar technique of preparing study-specific questionnaires to gauge knowledge within their research. Risk for development of health problems like cancer, diabetes, and stroke as well as premature death and even how obesity affects development of co-morbidity has also been a common approach to test knowledge (Finklestein, Brown, & Evans, 2008; Soriano, Ponce de Leon Rosales, Garcia, Garcia-Garcia, & Mendez, 2012).

Many studies, including Gavaravarapu et al. (2015) and Pesch (2016), did not share details about what type of questions were used to measure knowledge or relied on a qualitative method that could not be directly measured against weight. Not having a consistent method for evaluation of knowledge and not being able to compare questions due to unavailable data makes a comparison of the knowledge assessed across studies difficult. The reliability and validity of the tools were also suspect unless efforts had been made to evaluate them before use. The AORK scale and ORK-10 were the only knowledge measures found where formal validation studies had been completed to ensure the scales had desirable measurement properties to ensure the scores were valid indicators of knowledge.

Parental health knowledge related to obesity. Baidal et al. (2015) showcased the lack of understanding that can be found in some groups of parents. With the examination of 49

Hispanic women and the use of focus groups, research themes showed limited understanding of the risk factors present in early life as well as incorrect beliefs about weight. This finding revealed a knowledge deficit. Wright et al. (2016) also showed that parents did not consistently associate childhood obesity with potential for adult weight issues and did not recognize that BMI is a predictive risk factor for developing for hypertension, heart disease, type II diabetes, and depression. At present, only limited research has evaluated whether parents of younger children realize there are future risks associated with weight status. In a systematic review of 13 studies examining parental classification of child weight, Tompkins et al. (2015) reported that several research studies identified a lack of concern about weight, though the research did not explain if the lack of concern was related to not realizing excess weight posed a health risk or because they did not identify their child as overweight or obese. Furthermore, it was unclear from these studies if parental misclassifications of their child's weight status influenced their understanding or if they were minimizing the effects of obesity as a coping mechanism. Other research has shown that even when parents recognize health risks, they do not believe they apply to their child (Kersey et al., 2010). Further, parents can fail to promote positive health behaviors, even when they recognize a child as overweight (Sylvetsky-Meni et al., 2015). Due to these varied findings, the effect of knowledge on child weight and health promotion is not clearly understood.

Knowledge and classification. No study was found that evaluated parental classification of preschool child weight status and compared it to the parental knowledge of obesity and related health risks. However, Berenson, Pohlmeier, Laz, Rahman, and Saade (2016) examined obesity risk knowledge, weight misclassification, and attitudes of women intending to become pregnant compared to those not intending to become pregnant. This study added an examination of existing weight status versus misclassification of weight and knowledge of obesity health risks.

Of the 126 planning to be pregnant, 51% had low obesity risk knowledge and 31% misclassified their body weight. These findings point to a problem in both obesity risk knowledge and adult ability to correctly classify their own weight. One aim of this dissertation study is to determine if parental knowledge of obesity and related health risks is related to misclassification of child weight.

Potential effect of knowledge on weight. While classification and knowledge have a limited presence in the literature, the effect of knowledge on successful weight change has been explored more often. This has yielded positive results that indicate a change in knowledge can correlate to healthier weights and increased weight loss. Mazloomy-Mahmoodabad et al. (2017) furthered understanding of this by evaluating how knowledge changes patterns of weight in obese adolescents who were part of an intervention focused on knowledge behavior constructs used for weight loss. The researchers found that six weeks after the intervention mean knowledge scores increased significantly, and that mean weight, BMI, and waist circumference decreased significantly. Their findings indicate that an increase in knowledge can help weight loss.

Perceived Susceptibility as Examined by Parental Concern and Obesity Exposure

As Baranowski et al. (2003) defined, perceived susceptibility is related to a person's perceived risk of developing a specific illness or health problem. For this present study, it is related to the parental view of how likely their child is to develop overweight and obesity. In misclassification research, a similar concept of examining parental concern with child weight has been explored. The idea that parental concern over the future weight of a child has been related to parental ability to classify child weight, though the application has been limited and results inconsistent. This was partially evidenced by the lack of mention of concern as an explored

factor in the Lundhal (2014) meta-analysis involving 128 studies. Meanwhile, the Tompkins et al. (2015) literature review including 13 articles, found concern was explored in four studies published from 2006 to 2011. An important finding in these four studies was that parents who had overweight and obese children and underestimated weight status also had a more evident lack of concern with child weight, though no overall analysis was conducted to quantify this finding. Two additional studies were also identified in this current literature review that addresses the parental concern. Regber et al. (2012) found parental concern can moderate appropriate weight classification, allowing more accurate weight perceptions when parents express concern for the child's future weight. Overall, the study results showed 29.9% of parents reported concern over future child weight. The importance of concern was also verified by Almoosawi et al. (2016) who found parents who were concerned over future child weight status also were more likely to incorrectly classify their child's weight. Specifically, they showed that in their sample of 361 parents, 28.6% of those who misclassified weight were unconcerned about future weight, while 42.9% were a little concerned, 7.9% concerned, 12.7% fairly concerned, and 7.9% very concerned. Concern over future child overweight was statistically different among parents who misclassified child weight compared to those who correctly classified child weight. This study also showed that concern about the nation's risk for weight-related issues was evident both in parents who misclassified child weight and correctly classified child weight, and the differences between these groups were not significant. Almoosawi et al. (2016) posited parents who incorrectly perceive weight were also less likely to engage in improvements in lifestyle and behavior changes that could improve the weight of children. Their findings supported this claim as their study also examined children's diet in relation to weight classification and found children

whose parents misperceived child weight had an overall unhealthy diet (which can be linked to weight gain).

While these above-discussed results describe parental concern as a potential moderating factor of child weight classification, at least one study had findings contradicting this claim. Garrett-Wright (2011) found parental concern for future weight was a minimal and nonsignificant factor in a parent's classification of their child's weight. With this observed discrepancy between her study and others examining parental concern and the overall limited amount of research examining parental concern, this justifies further investigation of parental concern as a potential moderating factor of parental classification of child weight. In this proposed investigation, parental concern will be examined as the HBM component of perceived susceptibility as it addresses the perceived risk of developing obesity/overweight.

Obesity exposure. The concept of obesity exposure has been examined by a few studies and related to the presence of obesity-related disease in families (Peracetic, Puharic, Posavec, Pavic Simetin, & Pejnovic Franelic, 2012; Vuorela et al., 2010). With population weight shifts, there is a larger number of overweight and obese individuals, which can be problematic as the comparison to others is a noted gauge for relative or acceptable size. This idea was posited as an important consideration of Vuorela et al. (2010) with their attempt to examine parental weight classification of parents of 5-year-old (n = 310) and 11-year-old children (n = 296). Their aim included evaluating how the presence of obesity-associated diseases like high blood pressure, coronary artery disease, high cholesterol, and type 2 diabetes in parents and grandparents were associated with misclassification. Their results based on parents indicating yes or no to the presence of these illnesses were not significantly correlated to weight classification. The specifics of how the question was presented and if any questions beyond this simple yes/no

question were asked was not reported, making it difficult to determine the significance of their finding. Only one other study was found that examined the relationship of obesity exposure to parental misclassification.

Peracetic et al. (2012) used a cross-sectional approach examining 1,068 child-parent dyads to examine how a family history of obesity-related diseases impacted weight classification by parents. Their justification was based on the idea that family history is important in determining risk for diseases, including heart disease and diabetes, and on research findings indicating family history may impact the parental perception of health risks. They examined family history of individual disease of hypertension, heart attack, stroke, hyperlipidemia, diabetes, obesity, and any other illness. They found 65.4% of the sample had a family history, and this was more common (though not a statistically significant finding) in overweight and obese children. While parent misclassification and a number of reported illnesses were found to be associated in a univariate correlational analysis, this finding was not sustained in the final adjusted regression model. However, family history of diabetes remained significantly correlated to misclassification of overweight and obesity in the final model.

Peracetic et al. (2012) reasoned that even though the findings were not significant, there ought to be great concern nevertheless that parents who have a history of these obesity-related diseases are still no better than those without exposure at classifying weight. This sentiment is echoed by others like Regber et al. (2012) who explained the prevalence of obesity and thus heightened exposure to it (and potentially to related disease) may make it difficult for people to determine healthy versus unhealthy weights. Regber et al. (2012) also inferred that exposure levels may lead parents to perceive their child as healthy regardless of their weight. A major aim

of this dissertation study is to determine whether perceived susceptibility is related to the misclassification by parents of their child's weight for parents of preschool children.

Perceived Barriers as Examined by Self-efficacy

Perceived barriers relate to both the difficulties and consequences of performing specific behaviors, cues to action, and even the self-efficacy needed for action (Baranowski et al., 2003). Bandura's Social-Cognitive Theory also highlights self-efficacy as an important concept that relates to the ability to perform behaviors and notes that self-efficacy is a bridge between knowing how to do something and actually doing it (Bandura, 1989). In terms of obesity research, self-efficacy has been related to parents and their ability to inspire health-related changes. High parental self-efficacy has been shown to be an important factor in affecting healthy child behaviors, such as improved sleep and less TV time, as well as in improving parental depressive symptoms (Heerman, Taylor, Wallston, & Barkin, 2017).

Perceived self-efficacy (PSE) has been shown to be a causal mechanism in behavior change that could also prove to be important in prevention efforts. Prevention efforts have been deemed a more realistic and cost-effective approach to managing childhood obesity. This was the premise used by Bohman, Ghaderi, and Rasmussen (2013) in the creation of a measurement scale to examine self-efficacy in relation to behaviors that affect obesity. These researchers are among those that contend self-efficacy is an important and under-studied component in childhood obesity. While there have been studies relating parental self-efficacy to some obesity-related measures, like diet and physical activity, few were found that discussed how self-efficacy related to issues like misclassification.

Heerman, Taylor, Wallston, & Barkin (2017) performed a cross-sectional study involving data from a three-year family-based intervention (randomized controlled trial) to prevent obesity.

Their study examined the relation of parental self-efficacy to multiple factors. They found it had a significant positive correlation with child sleep and significant negative correlations to the amount of time children watched television and to parental depressive symptoms. They concluded that parental self-efficacy could be important in fostering a supportive home environment that aligns with healthy child growth.

While the limited self-efficacy research has indicated positive associations between child health measures and higher parental self-efficacy, even less research is available to describe its relation to child weight or misclassification. However, a potential connection between these factors was found in at least two studies (Ekim, 2016; Marvicsin & Danford, 2014). Ekim (2016) confirmed the finding of Marvicsin & Danford (2014) that showed a significant negative correlation between children's body mass index and parental self-efficacy in their examination of 425 parents of 3- to 6-year old children. The major difference between these studies was that Marvicsin & Danford (2014) were only able to confirm the significant negative correlation by using parental self-efficacy as evaluated by the adolescent children in the study. Their cross-sectional approach looked at 27 parent-child dyads. Their analysis showed a moderate negative correlation between BMI and self-efficacy, though the finding was not statistically significant. The researchers assumed this was due to the clustering of scores on self-efficacy on the high end, thus lacking score variability and to the small study sample. However, this study also examined child perspective on parental efficacy and found that the child report of parental efficacy was significantly and negatively correlated to child BMI. This gives credence to the idea that parental efficacy has an important relationship to child weight.

Bohman, Ghaderi, and Rasmussen (2013) was one of the early articles that identified a gap in research describing how self-efficacy may be related to child weight and healthy

behaviors, though it has since been noted by others (Heerman, Taylor, Wallston, & Barkin, 2017; Marvicsin & Danford, 2014). This gap also applied to misclassification. Garrett-Wright (2011) was the only study to include self-efficacy as a potential moderating factor of child weight classification, though she did not find a statistically significant result. Her interpretation of self-efficacy was based on parental control. However, the efficacy scale used only had a Cronbach's alpha of .53. This showed lower internal consistency than was observed in other uses of the scale (Garrett-Wright, 2011). It may be possible that using a measure that evaluates specific questions dealing with child health behaviors with higher internal consistency may show a different result.

Measure of parental self-efficacy. Scales like the Promoting Healthy Physical Activity and Dietary Behaviors in Children Scale (PSEPAD) are used to identify and predict the determinants of behavior change and maintenance (Bohman et al., 2013). This relates to barriers via the self-efficacy application that determines if parents feel they can do important health behaviors. This scale (Appendix A) asks parents to select how confident they are in promoting health-related behaviors with their children. An advantage of this scale over those used to judge efficacy in Marvicsin and Danford (2013) is the former only used two scales with six and five items. Meanwhile, the PSEPAD scale has 16 items. The scale also assesses three factors: No. 1 is PSE for promoting healthy dietary behaviors, No. 2 is PSE for limit setting of unhealthy dietary or physical activity behaviors in children and No. 3 PSE for promoting healthy physical activity behaviors in children. (Bohman, et al., 2013). Meanwhile, Marvicsin et al. (2013) used scales examining control and discipline.

The psychometric properties of the PSEPAD scores were assessed for validity and reliability using a written or web-based questionnaire and a randomized sample of 2,232 mothers

of 3 year olds in 2009 (Bohman et al., 2013). This initial study confirmed that PSEPAD scores met several types of reliability and validity.

The scale was based on the self-efficacy domains suggested by Bandura and an existing measure of PSE being used by the researchers in a prevention program. There was no discussion concerning the process for developing the PSE measure. It was just noted that the new scale totaled 16 items. The researchers did a cross-validation study by splitting the sample into two groups. The first group's results led to a three-factor model, which was tested in the second group yielding a root mean square of error approximation (RMSEA) of .07. This indicated an acceptable fit between the data and the model. The researchers ultimately had a three-factor structure that supported domain-specificity as the factors were correlated but did not merge into a single factor. The indicators were judged to be representative of the factors, and they were linked to the factors well. Discriminate validity was also assessed and the PSEPAD scores were significantly related to scores of measures examining parental self-esteem (r = -.29) and parental health locus of control (r = .28), but only modestly so.

The PSEPAD was also tested temporal stability. The researchers did use test-retest with a subpopulation of participants (56.4%). Test-retest reliability was assessed at two weeks showing r = .75 overall for the three factors that the scale measures. Results also included a PSE Factor 1, r = .73 for PSE Factor 2, and r = .69 for PSE Factor 3. This points to stability.

Homogeny of Samples

The literature also revealed a homogeny in the samples used to investigate the classification of child weight (Regber et al., 2012; Robinson & Sutin, 2016). This homogeny is defined by studies that focus on samples consisting primarily of participants of only one race/ethnicity (Robinson & Sutin, 2016) and that focus largely on mothers (Hearst et al., 2011;

Manios et al., 2008, Miller et al., 2016; Petricevic et al., 2012; Regber et al., 2012; Robinson & Sutin, 2016; Vuorela et al., 2010). With each study focusing largely on a single race/ethnicity, accurate comparisons cannot be made to identify if any one group is struggling more than others or if there are significant differences between groups. It is unclear if mothers, fathers, other legal guardians such as grandparents or relatives; or various race/ethnicities are better able to classify child weight status. Present research does not answer these questions and thus leaves a gap. More diverse samples consisting of a mix of male and female participants of multiple races are needed to determine what differences exist.

While the issues with homogeneous samples have persisted in misclassification research, it is a difficult limitation to correct in a single study. This difficulty is due to limitations on time, population, and manpower. However, this dissertation will attempt to minimize the effects of this limitation by using a purposive sampling of locations to include areas of more diversity and having a broad inclusion criterion that allows mothers, fathers, and other legal guardians the opportunity to participate in hopes to have a more representative sample included. Still, the purposive sampling can only improve the likelihood of more diversity and may not provide adequate diversity in participants to conduct meaningful disaggregated statistical analyses due to sample size constraints and the limited diversity in the population being examined. These methods will be discussed further in Chapter 3.

Summary of Gaps

Parental ability to correctly classify weight continues to be an important component of the obesity problem as it directly relates to indicators of behavior change as outlined in the HBM. This research has historically emphasized the use of demographical variables of children and parents, including age, sex, education, and SES. There have been studies that have expanded

past this to include other features like the parental concern with weight and exposure to obesity-related illness. Many times, these factors have been investigated in isolation and not compared to other known demographic factors that affect the parental classification of child weight. Further, research related to the parental classification of child weight has been limited by homogeny in the sample's race/ethnicity and by mainly examining mothers. The method of evaluating misclassification has also varied in studies with some choosing to use a categorical classification while others used parent-reported weight and visual scales. It is unclear if any of these methods are best suited to measure classification. While correcting all the gaps in a single study may not be feasible, it is important to begin an examination of these areas.

Importance of What is Known

Research supports that parents do not correctly classify child weight. This phenomenon of misclassification has been noted in all ages, demonstrated across ethnicities, and found in multiple countries. While demographic factors have been found as an important moderator of classification ability, these are not, in most cases, modifiable traits. While it may be possible for someone to improve education, or lose weight, other features like race/ethnicity and gender are not changeable. However, studies involving classification have started to examine factors that could be used as components for future interventions to help parents recognize when weight is a problem and inspire motivation to do something. As the preschool age has been identified as important in development and habit formation, this time-period needs further exploration. There is a need to further examine parents of preschool children and identify modifiable factors that influence misclassification. This information would be helpful in forming future interventions for this population.

Importance to Nursing

Parents are key to addressing the childhood obesity epidemic as they are primarily responsible for child habits and development in the 2- to 5-year-old age range. However, their ability to positively influence preschool children is affected by their perception of obesity and its importance. They must not only recognize obesity but understand the links to health risks now and in the future of their children. While misclassification is a noted phenomenon, it needs to be further explored in the preschool age group. This is an important next step to gain understanding and highlight components needed for adequate interventions to counteract and prevent childhood obesity in this 2- to 5-year-old subgroup. Literature suggests the 2- to 5-year-old age group is when interventions can make the most difference. This is especially crucial as obesity rates rise and the need for health promotion and intervention increases. Nurses are key advocates and educators of patients. We have a unique position as care providers and are a large part of patient education in the hospital and in the community setting.

Future Implications

The findings of this study will begin to provide the evidence needed to support future, larger, longitudinal studies of parental misclassification and childhood obesity interventions involving parents starting between ages 2 and 5 and following into adulthood. While the immediate focus is on reducing the epidemic proportions of childhood obesity, the ultimate goal is prevention. Being overweight in the 2- to 5-year-old age group is associated with increased future obesity risk and health problems. However, research has also suggested that the 2- to 5-year-old group is one that is highly susceptible to modification because children have not formed concrete attitudes, tastes, and habits. With this early childhood age group, the ability to affect

existing overweight and obesity and prevent future obesity is improved and the chance of instilling healthy habits greater.

Obesity in children requires an understanding of causative factors for the individual as well as an understanding of influential factors within the family. These factors can be due to parental influences on diet, exercise, habit formation, and even attitude and beliefs. These are part of the socialization effect that can occur. Socialization is crucial for preschool children where parents are major influencers on development and lifestyle. Determinants of obesity in children of preschool age have not been fully explored, particularly parental social factors that might affect child weight status. It is unclear if parents understand the short- and long-term health consequences associated with obesity in early childhood and whether it affects the weight of their children and their perceptions of their child weight status.

Chapter 3: Method

This study used a cross-sectional approach to address the research questions. The study examined how the HBM factors of perceived susceptibility, perceived barriers, and perceived severity relate to parental misclassification of child weight. Appendix D shows how the survey questions are related to the HBM components and the parent, family, and child characteristics variables.

Though the association between factors and classification ability was determined, causation cannot be determined as this is not an experimental design. Examining these factors did, however, clarify potential influences that need to be examined in future research and lay a foundation for research that may help develop tailored interventions based on increased understanding of moderating factors of correct or incorrect parental classification. This focus on addressing moderating factors that predict classification may help increase the likelihood of success in subsequent interventions and even in future prevention strategies.

This design was chosen for several reasons. There is a solid foundation of research that examines parental classification, though most studies have concentrated on demographic features, such as SES, race, gender, and BMI, and their ability to predict the parental classification of child weight. These are important moderating factors, but the inclusion of only these factors is not enough for a full picture. By examining the identified three factors of the HBM that have proven most influential in behavior change, this study can assess how well they correlate to parental child weight classifications.

Setting

Since the target population for this study is parents of children aged 2 to 5 years old, participants were recruited from daycares and stand-alone preschools in the urban Wasatch Front

area in Utah, U.S. The largest segment of the population in Utah is located in that area. Demographics of the population in this area are described in the next section.

Sample

The study focused on recruiting parents of children age 2 to 5 to participate. Parents were defined as a person who is legally responsible for the child, whether there is a biological connection or not because this person performs everyday care for the child who is participating in the study (Conger, Conger, & Martin, 2010). This study employed purposive, non-probabilistic and convenience sampling to obtain a diverse sample. While the inclusion of daycares and preschools increased the chance of a more diversified sample, it still had the potential to eliminate parents who choose to homeschool or not utilize preschools.

Any person who meets the inclusion criteria was allowed to participate. For inclusion, participants needed to read and speak English and be a self-identified legal guardian for the participating child who is within the identified age group. If multiple siblings attended the daycare or preschool and were in the 2 to 5 age range, only one of the children participated. Similarly, only one parent in a family could participate. People were excluded if a 2- to 5-year-old child already had a sibling participating in the study or if the child had a disease known to affect weight/size such as pituitary and thyroid conditions. The inclusion criteria were broad to allow a variety of participants. Due to this, the study included women and minorities since women or men of any race/ethnicity could complete the survey if they had a child in the 2- to 5-year-old range and spoke English. There were no restrictions based on race/ethnicity, education level, or income. It was possible that a written questionnaire could limit participation to only those who can read and write, which is an unavoidable limitation.

Table 1

Select characteristics in two counties and overall state based on US Census data.

	Davis County	Weber County	Utah
Population	342,281	247,560	3,051,217
Income and Poverty			
Median household Income	71,112	56,581	60,727
Per capita income in 12 months (2015 dollars)	26,411	23,545	24,686
Education			
Bachelor's degree or higher	*34.8*	23	31.1
Race			
American Indian and Alaskan Native	0.7	1.3	1.6
Asian	2	1.6	2.5
Black	1.4	1.7	1.4
White	84.2	76.5	78.8

*Note***:** Data are %, except income and poverty are $. Adapted from available statistics from the United States Census Bureau (2016). http://www.census.gov/quickfacts/fact/table/UT,daviscountyutah,webercountyutah/RH1225216.

Utah population

Utah's population is heavily concentrated in Weber, Davis, Salt Lake, and Utah Counties, which is known as the "Wasatch Front" and includes 87% of residents being concentrated in those areas (Utah Department of Health, n.d.). Though most residents are white, there are small percentages of other races, including 2.4% Asian/Pacific Islander, 1.4% American Indian/Alaska Native, .7% black, and 6.1% Hispanic (Utah Department of Health, n.d.). Table 1 showcases a breakdown of the population in the major sample areas. Davis and Weber Counties were focused on for sample recruitment as their demographic makeup closely resembles the overall state and includes variety in race, education, and income. Weber County has a lower education level, income, and more diversity in ethnicity than Davis County. By utilizing both areas and incorporating a mix of daycare facilities and preschools the likelihood of a more diverse and

representative sample increased. Although this sample still had limitations based on the overall Utah population because the state overall has limited diversity.

Sampling for Study Participants

To ensure diversity in the participants, a variety of areas were sampled along the Wasatch Front in Utah. Populations of Weber and Davis counties will be included as there is a range of income and education levels as well as of race/ethnicity. Weber County, particularly the Ogden area, has more diversity in ethnicity/race, income, and education level than Davis County. Also, Ogden with a population of 86,701 is the biggest city in Weber County while Layton with a population of 75.655 is the largest in Davis County (U.S. Census Bureau, 2016). These two cities were the primary locations for sampling, though the inclusion of cities like Roy and Clearfield will also be done. The inclusion of Roy and Clearfield is due to their proximity to Hill Air Force Base, which is a major employer in the area and several daycares and/or preschool facilities are in these areas to attract people working on base.

Sample Size and Power Analysis

Sample size calculations were performed using G*Power: Statistical Power Analyses to determine the maximum needed samples to answer the questions. These sample size needs vary for the questions. For questions involving the point-biserial correlation, the sample size needed is 82. This would detect a point-biserial correlation of .30 or higher at alpha = .05 (two-tailed) with minimum power = .80 and thus only require a minimum sample size of 82 participants. For logistic regression, the sample depends on the final distribution for the categories of 1 = correct and 0 = incorrect. The research done in this area has wide variability for misclassification rates with some being very high. If looking at the portion of correct classifications being as low as .40 for correct and .60 for incorrect with a power .80 using a one-tailed test and having a meaningful

odds ratio detected at 1.5, the sample needs to be 169. By changing the odds ratio to 1.7, the sample size would need to be 104. A larger sample size would allow increased ability to detect a smaller effect size (odds ratio).

As attrition can be expected, the sample goal was 106 participants to account for 30% attrition. The 30% was determined as a conservative, low number would be a 10% return while a conservative higher number could be 40% (Fryrear, 2015). With 30% attrition being planned for in this study, 10 recruitment sites were needed to account for varying numbers of eligible children at each location. To plan for attrition and improve the ability to detect smaller effects, the minimum sample size needed was 104 with a goal of 150 participants.

Instruments

Investigator-assessed weight and height for participating children were used. Standing height and weight of the child was measured using an electronic digital body weight scale with step-on technology and a stable stadiometer, following World Health Organization guidelines (2006). The Early Childhood and Family Health Questionnaire was a second component that was used to capture self-reported parental data (Appendix E). The knowledge scales and the PSEPAD scales, all previously described, were embedded in this questionnaire along with other demographic questions. The other portions of the scale combined demographic questions and other investigator-designed questions to allow parents to provide self-reported information on demographics, socioeconomic status, and the health of the child and their family. Specific survey questions as they are linked to the study factors and HBM components are portrayed in Appendix D.

Parent Questions

Parent-related questions began at question 22 of the survey. The first six questions gauged demographic information, including age range, gender, race/ethnicity, family role, income, education, and the number of children in the household. Parental income and education evaluate SES. These demographic questions were important in describing the population being studied.

The remaining parental questions from 29 to 37 related to other concepts, including how parents view their own weight status and health, which relates to concern and beliefs. The questions about parent health also included if they feel losing weight could improve health, how frequently they see a doctor, and if they have any chronic conditions, which relates to health value. While this is not one of the primary purposes of the review, it provided baseline information for future work involving the other components of the HBM model. Further, the questions on disease exposure are not part of a previously-validated scale, but they related to the HBM concept of perceived susceptibility with their relationship to exposure to disease. Participants were asked to consider their immediate family, including siblings, parents, and grandparents when answering the next section of questions from 38 to 43 that involve family history. These questions related to exposure to obesity and obesity-related disease. As these questions are not part of an already validated scale, their ability to be a cohesive measurement of parental concern is limited and thus they require analysis on a question-by-question basis. Vuorela, Saha, and Salo (2010) similarly examined parent and grandparent obesity-associated diseases, including high blood pressure, coronary artery disease, high cholesterol, and type-2 diabetes. Questions in this measure were modified to better gauge if participants linked obesity to the diseases. For example, question 39 asks if a family member has been diagnosed with

depression, type-2 diabetes, heart disease, hypertension, or high cholesterol. The next question (No. 40) asks if the participant feels the weight is related to improving or eliminating any of these diseases, which relates to the HBM concept of benefits for change. This provided preliminary information for future work on how this component could relate to misclassification and the HBM model.

Parental knowledge. To measure parental knowledge of health risks associated with childhood obesity the ORK-10 (Appendix B) and AORK (Appendix C) scales were used. The AORK scale was a newly created and validated scale by Rutkowski (2016). The ORK-10 scale was a 10-question scale that is used to measure knowledge of the effects of obesity on health and has shown to have adequate validity and internal consistency (Cronbach's alpha > .70) in adults (Swift, 2006; Swift, 2009). The AORK-10 scale was adapted from the ORK-10 to measure knowledge of the effects of adolescent obesity on health. The AORK-10 scale has shown adequate validity and internal consistency (Cronbach's alpha = .68) in adolescents. While the alpha score does not meet the .70 criteria established for the Cronbach test, this was the only measure found to evaluate health knowledge from a younger perspective. With its use only being reported in one study with a small, homogenous population, it is unclear if this number is due to methodology or the actual measure. Use in this study was a way to help determine if it is a viable measure or not.

The scales were part of the Early Childhood and Family Health Questionnaire. The scale assessed risks and consequences of obesity in children of preschool age from the parental perspective. The knowledge scales also assessed basic understanding of obesity-related terminology, diet choices, and the relationship to weight status, risk and reversibility of obesity-related diseases through the lifespan, and health effects associated with body fat distribution.

Both scales have been used in previous research on their own. The ORK-10 scale has been used in several studies to gauge knowledge (Alasmari, 2017; Berenson, 2015; Redsell, 2011; Rutkowski, 2016; Rutkowski, 2011; Swift, 2009; Swift, 2007; Swift, 2006; Ward, 2011). Meanwhile, the AORK scale has been newly created and validated by Rutkowski (2016).

Child-related Questions

The first portion of the Early Childhood and Family Questionnaire focused on the child who is participating in the study. The first five questions related to eligibility for participation and clarify which child is being enrolled (in the instance that the parent has more than one child in this age range). Demographic questions, such as the child's age, gender, and race-ethnicity, are asked in questions 4 to 6. As with adults, child demographic features like age and gender have been linked as moderators of correct classification. These questions allowed examination of how child factors like age, sex, and weight affect the parental perception of child weight.

Concern, which is part of perceived susceptibility, about weight is looked at by questions 15-17. This includes questions asking if a physician has expressed concern about child weight and asked the parents to rate how concerned they would be if the child was diagnosed as either obese or overweight using a Likert scale ranging from not at all to extremely concerned. Regber et al. (2012) also looked at concern, though they framed it as concern about the child becoming overweight and used a four-point Likert scale to gauge concern. In this study, history of obesity-related illness was evaluated in relation to the child by questions 8 to 13, which asks parents such information as the number of times they have taken this child to the MD, if the child has any diagnosis of conditions, and if the child is as healthy as other children. The last component of looking at beliefs was done via the knowledge scale, which had already incorporated questions that relate to beliefs. For instance, the knowledge scale asked about whether being fat is a

concern for children. The wording implies a belief that children can easily grow out of weight issues in time.

Weight Classification

Parental classification of their child's weight status was assessed using three different approaches: 1) parents will be asked to classify their child into one of the four weight status categories using a four-point Likert scale (underweight, normal, overweight, obese), 2) parents will use a pictorial scale showing children from various weight status to select the picture they consider to most accurately represent their child's physique, and 3) parents will be asked to provide how much their child weighs in pounds. These questions allowed determination of weight discordance in all areas (visual, numerical, and categorical assessment of child weight) or if parents can better gauge weight in one area more than another. In each instance, a parental assessment was categorized as incorrect or correct. The weight report was based on Gordon and Mellor (2015) that used actual weight +- reported weight for the determination of correct.

Likert scale. The Likert-scale assessment of child weight had also been used as the most commonly used form to evaluate the perception of child weight. The wording of the questions and choices has varied slightly among studies. Regber et al. (2012) used a five-point Likert scale with options ranging from "much to underweight" to "much too overweight." However, the most common method seen in 18 reviewed articles was to ask parents to describe their child on a three to a five-point scale ranging from underweight to very overweight (Woods & Nies, 2017). This study used a weight classification question patterned after Almoosawi et al. (2016) and used a five-point Likert scale ranging from very underweight to very overweight.

Pictorial scale. The pictorial scale had been used in multiple studies (Eckstein et al., 2006; Yilmaz, Erkorkmaz, Ozcetin, & Karaslan, 2013). It was developed by a Scott Miller, a

graphic artist, and based on digital images of child spanning the weight spectrum (Eckstein et al., 2006). Seven images of girls and boys in four age groups corresponded to weight changes, and the middle image shows a child at the 50th BMI percentile (Eckstein et al., 2006). Only the preschool images were used in this study (Appendix A).

Child weight. Parents were asked to write their child's weight.

Data Collection

Parents were recruited from a daycare or a preschool as they had an ongoing connection to the site and were likely to come to the facility multiple times a week or even weekly. IRB approval at Idaho State University was the first step to this process and was completed per requirements.

Recruitment

Daycares and preschools. A list of facilities in the sampling area was created and sites contacted to obtain approval for sampling. This process was ongoing with plans to find 10 to 15 willing facilities. Recruitment occurred at three to five facilities at a time until the needed population sample is obtained. An authorization letter/email for documentation purposes was received for each potential facility. While the study was not actively seeking participants of any one ethnicity/race, income, or education level, it was important to sample in areas that give the chance for increased sample variety and population size, meaning that facilities with larger numbers of children or in higher population areas were sought. The ideal make-up of participating facilities included facilities that offered both daycare and preschool in each Davis and Weber counties and preschool only facilities in Davis and Weber Counties. These facilities were not randomly selected but were chosen for their willingness to participate.

It was important to sample both daycares with preschools and standalone preschools because there may be something different about parents and children attending facilities with no extended care. By including both facility types, this was a strategy that is inclusive of participants with different social, educational, and financial backgrounds. This also increased the chance of finding families with working and non-working parents.

For daycares and preschools, a recruitment flyer (Appendix F) and a consent form (Appendix G) for participation were sent home with children in the appropriate age groups. An envelope was provided so the parents can enclose the consent form for privacy. A locked box was present at the sites for these forms to be stored in once returned. Parents were given the paper survey and an envelope to seal it in. This survey was sent via the child and the sealed survey will be deposited in the locked box once the teachers collected it from a child's backpack. This method allowed for response rates to be determined based on the number of children in each preschool or daycare class who had the forms sent home. The child weight was obtained at the participating daycare or preschool in a public area using a portable screen that reaches the investigator's shoulders to ensure privacy for the child. This allowed the child to stay in a comfortable setting, such as their classroom, with familiar people (teachers) nearby to minimize stress and discomfort.

Human Subjects and Consent. IRB approval was obtained prior to beginning the study and before the addition of each site**.** Written consent was required for all participants. The legal guardian signed the form authorizing for their self-report questionnaire data and the child information (height, weight, gender) to be collected and included in the study. Parental permission was being obtained to collect the child height and weight, which is a reasonable requirement to protect the children (Lo, 2010).

Not much information was provided in the literature to explain how preschool children were asked about obtaining child weight. The investigator explained the height and weight collection in terms the child understands and asked if it is OK. For the preschool age group, parental consent was the appropriate method, which was obtained. As an added safety, the investigator kept the child in their own environment and obtained verbal assent from children prior to measuring the height and weight. If the child did not wish to have their height or weight collected, the child and parent were excluded from the study with no consequences or reprimand.

Survey Locations

Recruitment occurred at daycares and preschools as discussed above. Approval from management and IRB was obtained as needed at participating sites. The investigator contacted the facilities and obtained approval to conduct the research on site.

Procedures

Daycares and preschools. The materials were first sent home to parents for consent and survey completion. The recruitment flier was also be hung in the entrance to the daycare and preschools with facility permission, so people could read about the study and contact the investigator about participation if they somehow missed the information that was sent home. Anyone who contacts the researcher via this method will be asked to verbally confirm that they had not already participated. Arrangements would be made to provide the paper survey and to obtain the needed consent for child involvement.

Once consent was obtained, parents filled out the questionnaire with pen/paper and send it back to the school via the child. An assigned personal identifier allowed the child height and weight and parental survey to be matched. The child weight was obtained at the participating daycare or preschool in a private-public space with a screen to ensure privacy. This was like

other studies, such as Rivera-Soto and Rodriguez-Figueroa (2012) who performed the weight assessments at children's schools. Like their study, the same investigator took the weight and height measurements to ensure consistency.

Enrollment

Those who participated were asked if the child participating had a diagnosed issue with their pituitary, thyroid, or other condition/diagnosis that affects their weight to determine eligibility for the study. If the answer is yes, the parent/child was excluded from the study. Consent was obtained from those eligible to participate. The recruitment flier (Appendix F) and the consent form (Appendix G) list this as part of the inclusion criteria; if a parent completes the information, even though they marked the child as having one of these conditions, the child/parent were not included in the data analysis.

A unique identifier consisting of the letter A and three numbers were assigned to match the child weight/height to the correct parent. This meant both the parent survey will be labeled and the child height/weight labeled with the same identifier (for example A001).

Anthropometric Measurements

Child height and weight were measured at local daycares and preschools by the investigator. World Health Organization guidelines were used for collecting height and weight data (2006). A stable stadiometer was used for mobile height measurement and an electronic digital body weight scale with step-on technology was used to measure weight. Children were asked to remove their shoes, jackets, and anything in their pockets, which is the common method as demonstrated by Miller et al. (2016). They were asked not to wear extra layers of clothing, such as jackets to keep measurement consistent. Weight was also measured to the nearest 0.1 kilograms for accuracy as done by Al Junaibi et al. (2013) and Robinson and Sutin (2016).

Height and weight of all children were measured and recorded. Child weight/height information was used to calculate a BMI. The height, weight, and BMI classification will be coded with the same identifier as the parent to ensure the correct parent questionnaires was associated to the correct child information. This was critical for evaluation and analysis as the perception of weight is a primary objective.

The investigator collected the weights, heights, and genders of the children and ensure they are matched to the correct parent. The child data collection form (Appendix H) was used to collect height, weight, gender, and date of collection of these items on children. To match the child to the correct parent, a piece of paper stating the child's full name and parent name was stapled to the child data collection form. The parent identifier was written on the applicable line with the added "C" at the end to identify child information (prior to taking the weight). This front paper was separated from the child forms and shredded after correct information pairing was confirmed with investigator review.

Survey Administration

All questionnaires were administered to parents in written form. Estimated survey completion time was 5 to 20 minutes. Parents at the daycares and clinics could do a questionnaire on site (written) or return it via the child later. Parents and children were informed that participation was completely voluntary.

Thank You Incentive

Participants had an option to be entered into a drawing to obtain a $50 Amazon gift card for taking the time to participate. Up to 75 people were eligble to receive a giftcard. Participants were asked if they wanted to be included in a drawing for the gift cards at the end of the study. This question was on the consent form. Parents who wished to participate were placed in a

drawing and 75 names were drawn. The gift cards were given to the facility owners to give to the parents with drop off or pick off.

Statistical Analysis

Data Management

Data from written surveys were entered in Excel. Data from written surveys were merged into a single dataset and imported to Stata and SPSS; this dataset had no personal identifiers, except for the identification file which will have the unique identifier on each participant that links to other files and will be kept safely as an encrypted file. Data were checked for errors and inconsistencies. Most of the data collection involved the parent surveys. The child weight-height was a measure used to determine misclassification by a parent; the child weight and height were, therefore, coded into BMI categories of underweight, normal, overweight, and obese. All child information and the actual child weight and height were coded under the same identifier as the parent, except for the added "C" for child information.

Data Analysis

Statistical analysis was done using Stata 14.1 (Stata Corporation, College Station, TX, U.S.) and SPSS. Statistical significance will be set at alpha = .05. Preliminary analyses focused on describing the characteristics of study participants using frequency distributions and measures of central tendency and dispersion, as appropriate for the scale of measurement of the variables.

Research Questions

As part of this survey, a general analysis of the participants occurred first. Four of the five first questions (excluding question 3) were a second means to determine study eligibility, so they were used to make that determination and will not be part of the statistical analyses. Next, the descriptive data, including demographic information, were analyzed to describe the

population in this study. The descriptive statistics included the mean, median, standard deviations as applicable, and interquartile range for all continuous variables, such as child age as well as both parent and child weight and BMI. Frequencies and percentages were reported for the categorical variables, which comprise most variables that will be used in statistical analysis. Continuous variables included child age/weight/BMI and parent BMI/weight. Categorical variables included gender, race/ethnicity, age category (18-20, 21-29, 30-39, 40-49, 50-59, and 60 or older), family income, and parent education.

Other background questions described the population and were summarized including parent report of taking the child to an annual check-up (question 15), if the child has chronic health conditions (question 16), what those conditions are if any (question 17), and how many times the child has been to the MD if the last 12 months excluding well-child visits (question 19).

Weight was a primary factor being explored in all the research questions so the process of initial analysis is described here. Child BMI was calculated and categorical variables were created to label children by categories of underweight, normal weight, overweight, or obese per already discussed guidelines. The parent asked to supply their weight (question 29) and height (question 30), which was used to help describe the population. A basic table showed the percent of overweight parents versus child as defined by BMI categories for this descriptive information. Meanwhile, the investigator assessed the child weight and height. Next, parent assessments of his/her child were evaluated and compared to the child's actual weight status by the above-listed BMI categories.

How analysis was managed for the research questions are described below.

Question 1

What is the parental rate of misclassification of preschool children as determined by three methods of parental assessment of child weight (coded as correct/incorrect) compared to actual child weight (coded as underweight, healthy weight, overweight, or obese)?

Parents were asked to identify child weight in three methods: using a 4-point Likert scale (underweight, healthy weight, overweight, obese), by providing a weight in pounds, and by selecting a picture that most resembles their child. The investigator also assessed child weight and height to determine the child's BMI [weight (kg) / height (m^2)], which was then broken into categories (underweight, healthy weight, overweight, obese). These categories were defined using standard categories from the World Health Organization and the Centers for Disease Control and Prevention (CDC).

The actual child weight category was compared to the corresponding parental assessment of each type to determine correct/incorrect status. For the assessment asking parents to list the child's weight, the concordance between the weight status of the child as perceived by their parent and measured weight status was assessed. If parents were within two pounds of their self-reported child weight, it counted as a correct assessment of weight as this parameter has been used by other researchers (Gordon & Mellor, 2015). The visual image scale correlated to varying BMI levels. If the parent selected the picture relating to the correct child BMI, they were coded as correct in classification. With the Likert scale, the parents were correct if the description they selected matched the actual description underweight, healthy weight, overweight, and obese, which is based on child BMI.

This question sought to examine the rates of misclassification of child weight. Two-way tables of frequency compared parent classification (correct/incorrect) to the four categories of

weight (underweight, healthy weight, overweight, and obese). Concordance between the measured and perceived weight status was assessed using the Kappa statistic.

Question 2

Are parents better able to correctly classify child weight scale (coded as correct/incorrect) by identification with a categorical label on a Likert scale (underweight, healthy weight, overweight, obese), by reporting an actual weight, or by selecting an image representing their child's weight?

This question used the same process as question one to code parental responses as correct/incorrect and to code the child data by categories (underweight, healthy weight, overweight, and obese). The goal for this question was to determine if there is a significant difference in parental ability to recognize child weight status by any of the three methods.

While these three methods have been used in misclassification research, it was not previously clear if one of these methods was best for determining the parental classification of child weight. Rates of misclassification were reported for each classification type and compared side-by-side. The association between types was analyzed using chi-square tests with phi coefficients and a point biserial correlation.

The Kappa coefficients were also used as a measure of equivalence and alternate test reliability. For this assessment, a parental categorization used the categories of underweight, healthy weight, overweight, and obese for all three methods. Both the Likert scale and visual assessment scale display the data in this method. For the report of weight, the parents reported weight and child height will be used to determine a BMI score. This allowed the data to be coded as underweight, healthy weight, overweight, and obese for the analysis.

Question 3

Does perceived severity as measured separately by the Obesity Risk Knowledge Scale (ORK-10; Appendix B) and the Adolescent Obesity Risk Knowledge Scale (AORK, Appendix C) correlate to the accuracy of parental child weight assessment (correct or incorrect) of the three, parental child weight assessment methods?

To characterize parental knowledge of obesity, the ORK-10, and AORK scale was used. Higher scores on the ORK-10 and AORK indicate increased understanding of obesity health risks. This numeric score of each scale was separately compared with parental classification of weight status, which was measured as a dichotomous score of correct and incorrect. This examination was performed for each type of parental classification: Likert scale, weight report, and visual scale. Means and standard deviation were reported for the ORK-10 and AORK scores and a frequency distribution was reported for each scale to give descriptive information about the study sample on these measures of perceived severity. The correlation method was point-biserial.

Question 4

Do the continuous ORK-10 scores predict parental child weight classification for the three methods of weight classification? Logistic regression will be used for this analysis. The continuous ORK-10 scores were used as well as the categorical label representing child weight. As underestimation has also been a significant finding in the research. Hence, weight classification for the three methods of parental child weight assessment was also be broken into 1 = correct, 2 = underestimation, and 3 = overestimation. Correct classification will be used as the referent category for the multinomial logistic regression.

Question 5

Do the continuous AORK scores predict parental child weight classification for the three methods of weight classification?

This was analyzed the same as question 3 with the substitution of AORK scale.

Question 6

What are the associations of perceived susceptibility (as measured by two separate parental concern questions) and obesity exposure (as measured by one exposure question) to the parental classification of preschool child weight as measured by the accuracy of parental child weight assessment for all three assessment methods?

Measures had not been developed to examine parental concern or obesity exposure, but questions related to these factors have been used in previous studies (Almoosawi et al., 2016; Regber et al., 2012).

As there was not a cohesive scale, each question, which will provide data using a 5-item Likert scale, for concern will need to be compared to the dichotomous measure of correct and incorrect to assess for potential associations. The two concern questions were used to provide descriptive data showing the spread of how parents rated their concern on the Likert scale. Again, association tests were used to determine if increased parental concern leads to a more or less accurate classification of their child's weight. The association of responses to the two Likert-type scales with the dichotomy of correct or incorrect for parental child weight classification was assessed for all three methods. A chi-square test and Cramer’s V were conducted.

Exposure was measured by categorizing depression, diabetes, heart disease, hypertension (high blood pressure), and hyperlipidemia (high cholesterol) as yes/no for the presence of family history (exposure). A chi-square test was run to compare the presence of any obesity-related disease (of the five asked about) categorized as yes/no to classification status (yes/no) to assess the association. A phi coefficient was reported to indicate the degree of association. The main

analysis for this variable was conducting a single test for obesity exposure base on a dichotomy of 1 = family history exposure and 0 = no exposure across the five family history questions.

Question 7

Do perceived barriers as measured by Parental Self-Efficacy for Promoting Healthy Physical Activity and Dietary Behaviors in Children Scale (PSEPAD, Appendix A) correlate with and predict the parental classification of preschool child weight status as measured by the accuracy of parental assessment for all three assessment methods?

The 16-item PSEPAD scale assessed three factors: No. 1 is PSE for promoting healthy dietary behaviors, No. 2 is PSE for the limit setting of unhealthy dietary or physical activity behaviors in children, and No. 3 PSE for promoting healthy physical activity behaviors in children (Bohman, Ghaderi, & Rasmussen, 2013). Only the total score was used for analysis in this study. The PSEPAD was measured as a total score. A higher score was indicative of increased self-efficacy for control over child behaviors. This numeric score was compared with the parental classification of weight status, which was measured as a dichotomous variable of correct and incorrect. Logistic regression was used for these analyses and the point-biserial correlation reported.

Question 8

If sample size allows, does the weighted combination of parental self-efficacy gauged by the PSEPAD score and knowledge of obesity health risks (based on the ORK-10) predict the accuracy of parental classification (correct/incorrect) for all three assessment methods (Likert, visual, and reported weight)?

Logistic regression was used for these analyzes.

Summary

This chapter outlined the analytical, cross-sectional, and non-experimental study planned to evaluate parental misclassification of their preschool child's weight. It included information about the setting, sample, and data collection methods that will be used to evaluate the identified components in the specific aims. Combining already validated questions to examine obesity health risk knowledge as well as a survey that collects demographic and health belief knowledge was created to expand what is known about moderating factors of parental misclassification. This quantitative study could help lay the groundwork for future interventions and research. A plan to protect human participants, implement procedures, and analyze data was also presented in this chapter. Ultimately, this study also received IRB approval from Idaho State University.

Chapter Four: Results

This study focused on understanding the factors that contribute to the accurate parental perception of child weight and the best method to determine perception. The research questions examined three components of the HBM model: perceived susceptibility, perceived barriers, and perceived severity. These concepts were aligned with representative measures including knowledge of obesity health risks (perceived susceptibility), self-efficacy toward enacting healthy behaviors in their children (perceived barriers), and concern over child weight status (perceived severity). Each of these concepts and their respective results will be discussed in detail under the applicable questions. The first focus was to determine how accurately parents classified child weight using three standard measures: Likert scale, written report of weight, and a pictorial scale. Prior to discussing the above-listed items, a descriptive analysis of recruitment results and participant characteristics will be presented.

Recruitment Results

Recruitment occurred at childcare and preschool facilities that children ages 2 to 5 attend. The four standalone preschools and 13 daycare facilities who host preschool as well as before/aftercare in Davis and Weber counties in Utah were sampled. The locations were chosen for their willingness to participate in the study and agreement to allow parents to be sampled. The goal was to have a purposive, non-probabilistic and convenience sample.

Sampling was done per facility preference. Five facilities wanted to send the materials home with children in their backpacks. Teachers then retrieved surveys and put them in a slot in a locked box for the investigator to pick up. The remaining locations had the investigator come to the facility during drop off and pick up times to ask parents if they would like to participate. Surveys were handed out to willing participants and returned to the facility by the parents. There was a locked box with a slot for parents to place completed consents and surveys in. The survey

period lasted for two weeks at each facility. In the last three days of the two-week period, the investigator returned to the facilities to obtain the heights and weights of children whose parents consented.

Between either the daycare sending surveys home with parents and the investigator handing out surveys, 415 surveys were distributed. A total of 198 of 415 surveys were returned making the response rate 47.7%. This response rate is consistent with the projected less than 50% return rate for surveys that are associated with unsolicited surveys with no face-to-face request (Polit & Beck, 2017). Response rates where the investigator spoke with individuals and asked if they would participate had higher response rates ranging from 71.4% to 77%. The number of returned surveys created an adequate sample of the target population to answer all questions as 169 was needed, according to the G*Power statistical power analyses performed prior to this study.

Of the 198 respondents, 179 submitted complete surveys. Five respondents did not supply income information with two writing a comment to the side of the question that this information was too personal, and one of those five also did not select their age range for the same reason. Fourteen other surveys did not provide how much they thought their child weighed in pounds (n = 4) or instead wrote comments like “unsure” or “?” (n = 10).

Participant Characteristics

This section details the descriptive statistics of the 198 parents and children. Each participating parent provided a written consent allowing for their participation in the survey and consent for their child to be weighed at the respective daycare or preschool facility. The child also was asked if they would be willing to have their weight and height measured, thus gaining assent. All children willingly complied with the weight and height collection. Weight was

determined using a digital scale. Children were asked to remove shoes and extra clothing, such as jackets. Scale calibration was performed each time using a 1-pound weight.
Height was measured using a stadiometer.

Participants included 180 mothers, 22 fathers, and 2 grandparents. Even though two grandparents were included as they were primary caregivers, the caregivers are referred to using parental or parents for simplicity and understanding in the remainder of this report.

The questionnaire asked demographic questions as well as questions regarding the child's health status and patterns relating to MD visits. Most parents (97.5%, n = 192) reported taking their child to a well-child visit each year, and 65.8% (n = 131) felt their child was healthier than other children. The sample of children also had few chronic illnesses with most (87.4%, n = 174) with none, 8.5% (n =17) with one, and 3.5% (n = 7) with two. Outside of regular well-child exams, 20.1% (n = 40) had no MD visits, 38.2% (n =76) saw a doctor once, 24.1% (n = 48) saw a doctor twice, and 17.1% (n = 34) saw a doctor three or more times. Parents were also asked if a health care provider had ever mentioned their child being overweight or obese. While 98.5% (n = 196) parents said no, 1% (n = 2) said yes and one parent did not answer (0.5%). The two parents who said yes had a child who was classified as obese based on CDC guidelines. According to the weight classifications of children, 37.2% (n =73) should have been told their child was either overweight or obese. Parents were also asked how likely they would be to do something about weight issues. Of the 198 total parents, 76.4% (n = 152) said they would be extremely likely and 17.6% (n = 35) were moderately likely to do something about their child's weight issues if a health care provider informed them there was a problem.

Participating children averaged 45.5 months (*SD* = 11.11) with a minimum age of 24 months and a maximum of 71 months. There were 100 boys and 98 girls. Table 2 describes the sample demographics of those parents and children who participated in the study.

Table 2

Enrollment Statistics of Parents and Children

Category	No. (*n* = 198)	%
	Parents	
Sex		
Male	22	11.1
Female	176	88.9
Age		
18-20	2	1.0
21-29	72	36.6
30-39	104	52.8
40-49	17	8.6
50-59	2	1.0
Ethnicity		
White	164	82.8
Black	6	3.0
American Indian	2	1.0
Asian	7	3.5
Native Hawaiian	1	0.5
Hispanic	12	6.1
Multiple races	6	3.0
Income		
0-$9,999	7	3.6
$10,000-$24,999	14	7.35
$25,000-$49,999	37	19.2
$50,000-$74,999	44	22.8
$75,000-$99,999	52	26.9
$100,000-$124,999	23	12.9
$125,000-$149,000	8	4.2
$150,000-$174,999	5	2.6
$175,000 and up	3	1.6

Education		
Less than high school	4	2.0
GED or high school	41	20.7
Some college or associates	82	41.4
Bachelor's degree	54	27.3
Graduate degree	17	8.6
	Children	
Sex		
Male	100	50.5
Female	98	49.5
Age		
2	31	15.7
3	58	29.4
4	87	44.2
5	22	11.2

The study sample included people from two counties in Utah who were recruited from daycare facilities with preschools or standalone preschools. Seven facilities were in Weber County and nine in Davis County. Table 3 compares key demographic features in this study's sample to the state and to the two counties where the daycare and preschool facilities were located. As the table demonstrates, these two counties have variations in key demographic features, such as education, income, and race.

Table 3

Comparison of Sample Income, Race, and Education to Two Counties and Overall State Data Using US Census Data

Demographic	Sample	Davis County	Weber County	Utah
Median household Income	$50,000 to $74,999	71,112	56,581	60,727
Bachelor's degree or higher	27.27	34.8	23	31.1
Race				
White	82.38	84.2	76.5	78.8
Hispanic	6.06	9.7	18.3	14.0
Asian	3.54	2	1.6	2.5
Black	3.03	1.4	1.7	1.4

American Indian/Alaskan Native	*1.0*	*0.7*	1.3	1.6
Multiple races	*3.0*	*2.6*	2.7	2.5

Note: Data are %, except income is $. Adapted from available statistics from the United States Census Bureau (2016). Http://www.census.gov/quickfacts/fact/table/UT,daviscounty, webercountyutah/RH1225216.

Income did have variability, but 68.9% of income for participants was between $25,000 and $99,999 (*n* = 133). Figure 3 visually shows the variability of overall income, which comprises a fairly uniform spread.

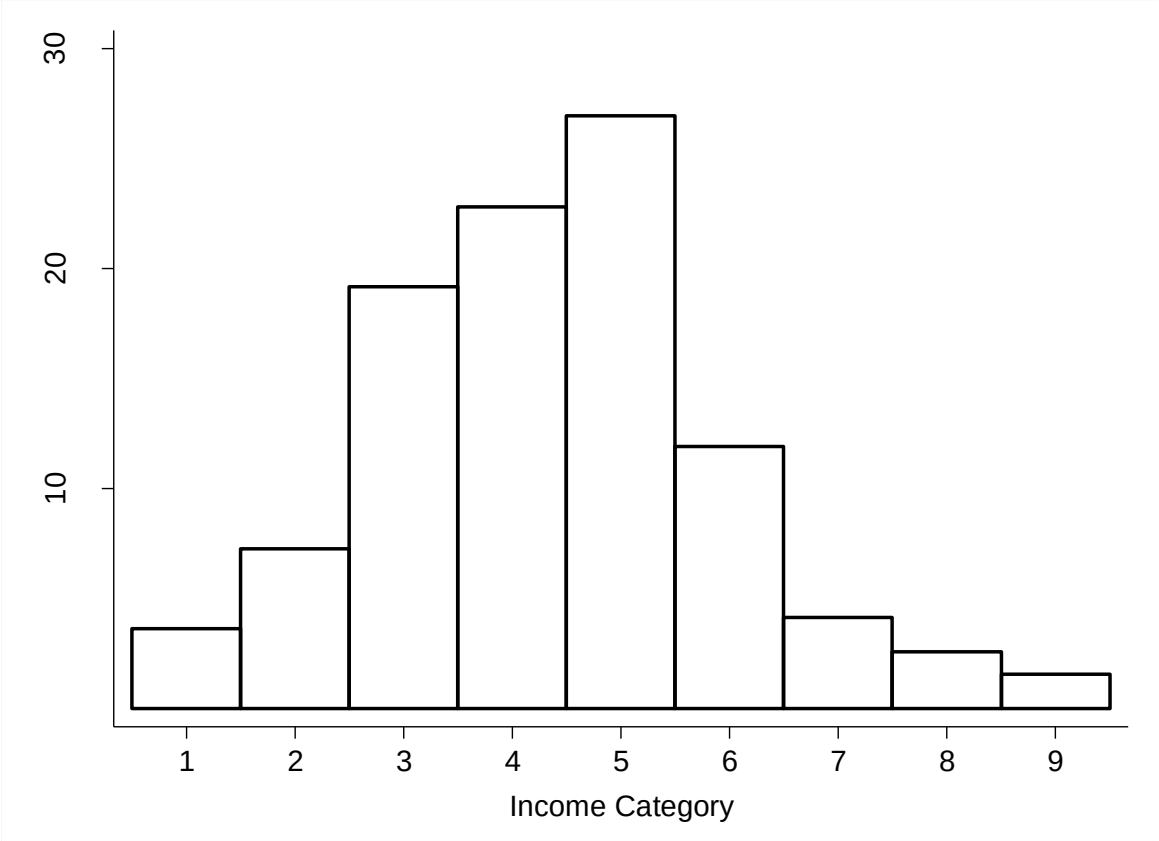


Figure 3. This bar chart displays of income variations of parental selected income category by the percent of 198 parent participants. Income categories started at 0-$9,999 (1) then increased by $14,999 through the last category selected of $175,000 and higher (9).

The sample included different levels of education. The largest proportion had some college/associates degree (*n* = 82, 41.4%). The second largest proportion held bachelor's

degrees (*n* = 54, 27.7%). The breakdown by education level was presented above in Table 1. Figure 4 presents how education differed with a visual representation.

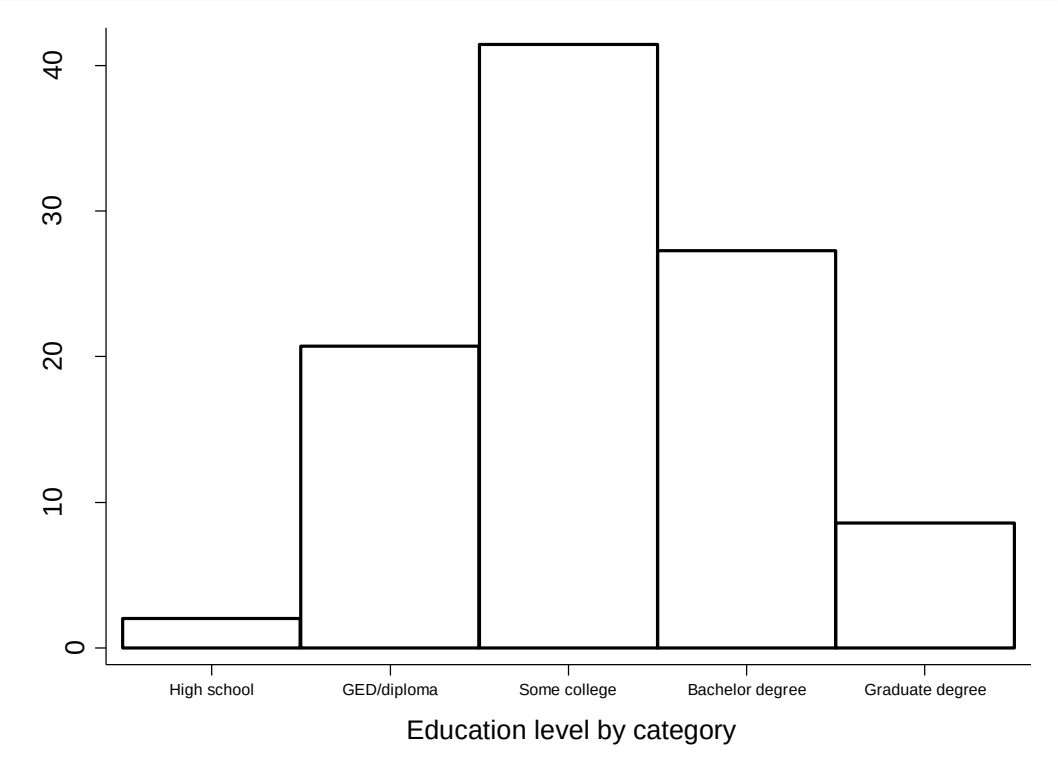


Figure 4. This bar chart displays education level display by category and percent selected by the participating 198 parents.

The total number of children in the household ranged from 1 to 9, though 2 children (*n* = 77, 38.9%) and 3 (*n* = 53, 26.8%) were the most common answers. Regarding age, most parents selected the category of 30 to 39 (*n* = 104, 52.7%). Parents were asked to report the child's age either in months or by including year and months (i.e. 2 years 3 months) because this was the information needed to determine accurate BMI for age/sex. The use of this reporting method increased the information available for describing child age. The average child age was 3.51 (*SD* = 0.88). Variations in child age in years by sex are depicted in Table 4.

Table 4

Description of Child Sex by Child Age Category in Years

		Age Category			
Sex	*N*	2	3	4	5
Male	100	18 (18.0)	24 (24.0)	44(44.0)	14 (14.0)
Female	98	13 (13.2)	34 (34.7)	43 (43.9)	8 (8.2)
Total	198	31 (15.7)	58 (29.3)	87 (43.9)	22 (11.1)

Note. Information is reported as number (%).

Information of both the parent and the child were collected in this study. While the parent height and weight were determined by self-report of participants, the investigator assessed all child heights and weights as previously described.

Average parental weight was 164.50 (*SD* = 39.89) pounds. The parental weight was self-reported in pounds and their height was self-reported in inches. The investigator used the self-reported weight and height to assign each parent a BMI {weight (kg) / [height (m)]^2} and assign a categorical label (underweight, healthy, overweight, and obese) based on CDC recommendations. Standard CDC weight categories rank adult weight as follows: 18.5 or less is underweight, between 18.5 and 24.9 is a healthy weight, 25 to 29.9 is overweight, and 30 or above is obese. The average weight and height converted to an average BMI of 27.20 (*SD* = 6.03), which is considered overweight by CDC guidelines. The parental BMI was examined more closely using percentile ranking to observe the range of BMI scores and to determine what CDC weight status category they would be considered. Median adult BMI was 25.8, which is considered healthy (25th percentile = 22.7, healthy; 75th percentile = 29.9, overweight). Figure 5 shows how BMI was distributed by parental age category.

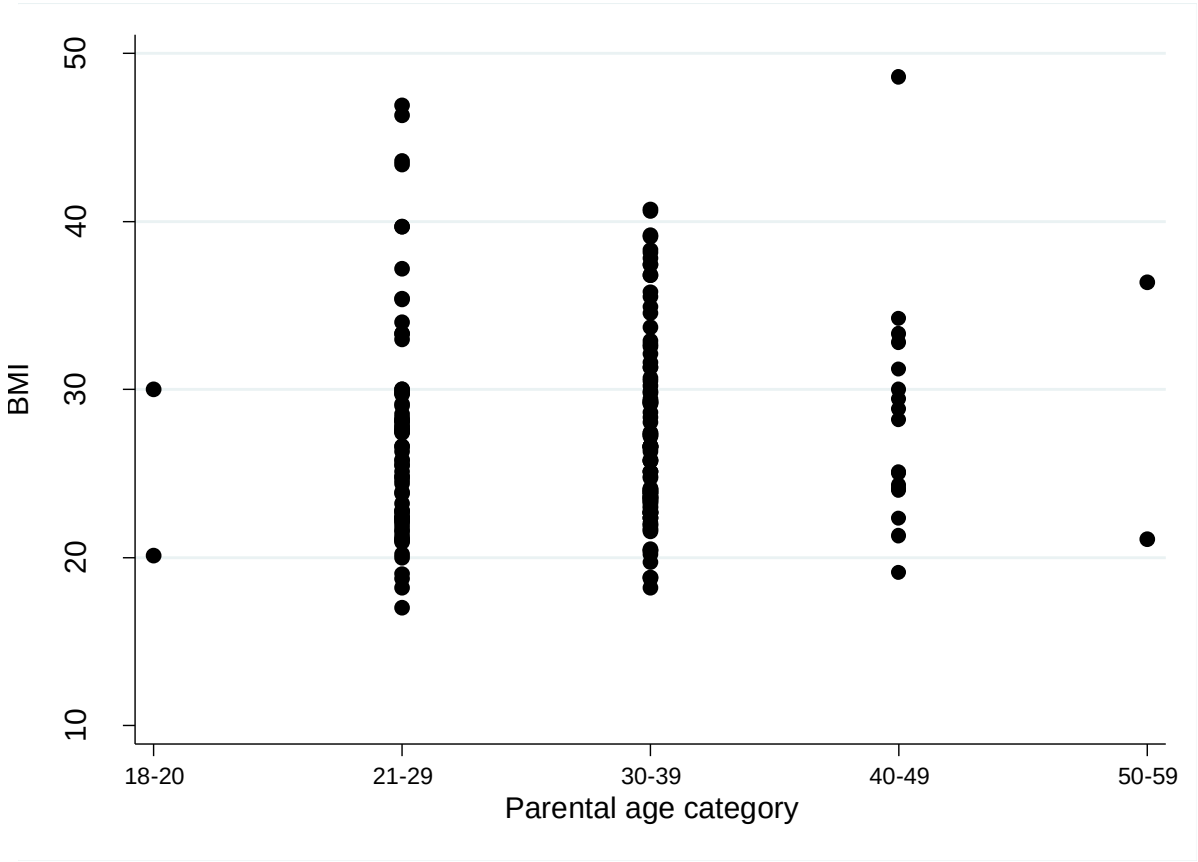


Figure 5. Changes in BMI with increase in age range category for the 198 parent participants.

The average child weight was 37.42 pounds (*SD* = 6.46). This translated to a BMI of 16.49 (*SD* =1.84). Unlike adult BMI, child BMI is sex and age-specific so it is not possible to categorize the average BMI as normal, overweight, or obese just by the numbers alone (CDC, 2018). However, the child BMI is reported with a corresponding percentile, which is used to classify the weight status of the child (CDC, 2018). A normal weight percentile is between 5 and 85 while less than 5 is underweight, overweight is between 85 and 95, and obese is greater than or equal to 95. In this study's sample, the average child BMI percentile was 61.75 (*SD* =30.77), which indicates a normal weight. Most children had a healthy weight (*n* = 118, 59.9%). The second highest number of children were classified as overweight (*n* = 47, 23.9%). To better

understand the child's weight distribution the range was explored, and the corresponding weight label was identified. Median child BMI was 16.3 (25^{th} BMI percentile = 15.1; 75^{th} BMI percentile = 17.6) and the corresponding weight percentile median was 70, which is considered healthy (25^{th} percentile = 34, which is a healthy weight and 75^{th} percentile = 90, which is overweight). Figure 6 shows how child BMI was distributed by child age in years.

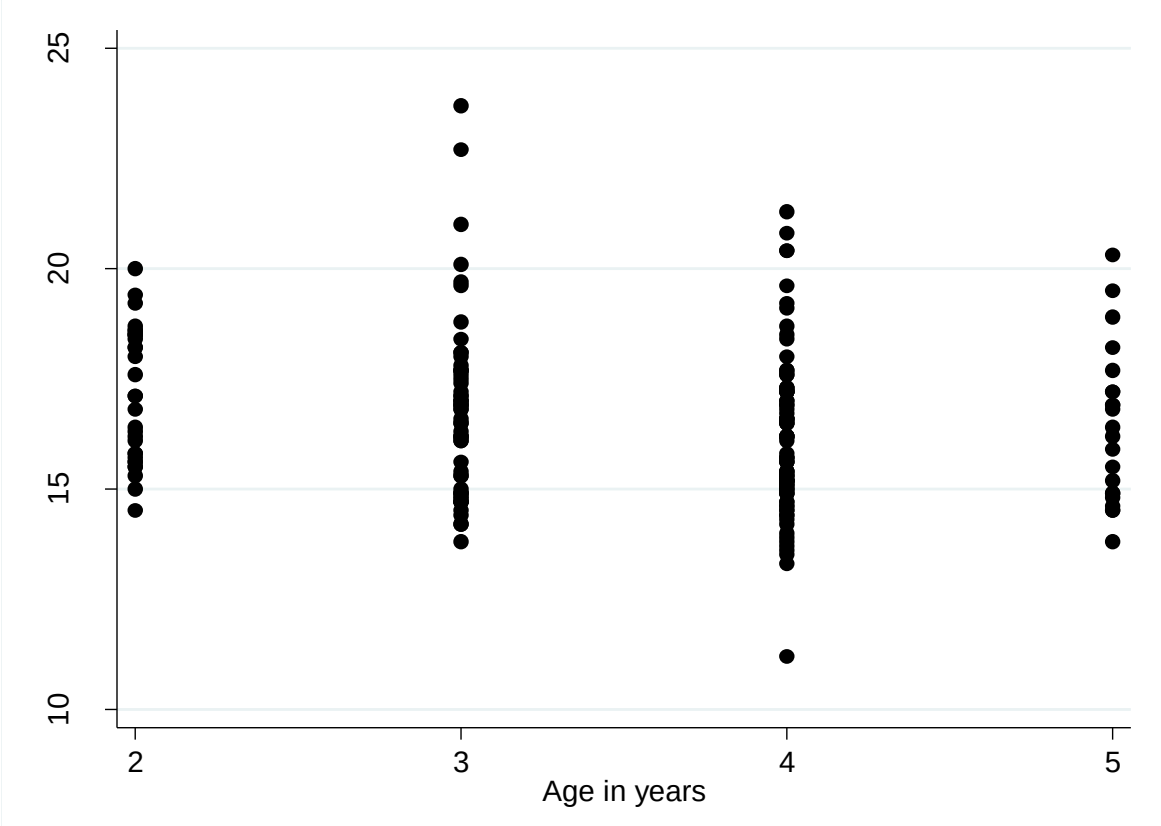


Figure 6. Changes in child BMI increase in age in years for the 197 child participants.

The actual weight category of participants as defined as underweight, healthy weight, overweight, and obese based on CDC guidelines are presented in Table 5. The largest subset of the sample was a healthy weight with 118 children (59.9%) and 86 adults (43.3%) meeting that classification.

Table 5

Actual Parent and Child Weight Frequencies and Percentages by Weight Category and by Sex

Category	Female	Male	Overall
Child	*Female (n = 97)*	*Male (n = 100)*	*Overall (n = 197)*
Underweight	3 (3.0)	3 (3.0)	6 (3.0)
Healthy weight	64 (66.0)	54 (54.0)	118 (60.0)
Overweight	20 (21)	27 (27.0)	47 (24.0)
Obese	10 (10.0)	16 (16.0)	26 (13.0)
Parent	*Female (n = 176)*	*Male (n = 22)*	*Overall (n = 198)*
Underweight	4 (0.02)	1 (0.05)	5 (0.03)
Healthy weight	88 (50)	10 (45.5)	98 (49.5)
Overweight	70 (39.8)	10 (45.5)	80 (40.4)
Obese	14 (0.08)	1 (0.05)	15 (7.6)

Note. Information is reported as number (%).
One child had a missing weight value.

Further analysis regarding demographic characteristic and their relationships to other study variables are addressed within the findings organized by the research questions.

Analysis of the Research Questions

This section describes each dissertation question. Stata 14.1 (Stata Corporation, College Station, TX, U.S.) and IBM SPSS Statistics 25 were used to analyze research data from the written surveys and investigator assessments. The CDC BMI Percentile Calculator for Child and Teens and Adult BMI Calculator (CDC, 2018) were used to determine BMI for adults and

children as well as percentile rank for children. The investigator then categorized both the parent and child weight into categories based on those results.

Research Question 1

What is the Parental Rate of Misclassification of Preschool Children as Determined by Three Methods of Parental Assessment of Child Weight (Coded as Correct/Incorrect) Compared to Actual Child Weight (Coded as Underweight, Healthy Weight, Overweight, or Obese)?

This question was answered by comparing the four-point classification of weight (underweight, healthy weight, overweight, and obese) of the child's actual weight to the same classifications as determined by parental report of the picture, the pound weight of the child, and Likert-scale rating.

For the Likert-scale method, parents were asked to classify their child's weight as very underweight, underweight, healthy weight, overweight, and obese. Most parents (n = 168, 84.9%) selected that their child was a healthy weight while only 10 (5.0%) described their child as overweight, 7 (3.5%) as very underweight, and 13 (6.5%) as underweight. The investigator combined the descriptions of very underweight and underweight into the underweight category to align parental reports with the four-point scale for analysis. Overall, 53.3% (n = 105) of parents accurately described their child's weight by selecting the appropriate Likert-scale response while 46.7% (n = 92) were incorrect. As child sex had previously been described as related to classification, the percent of correct classification was examined. Parents of boys were incorrect 54% (n = 54) and correct 46% (n = 46) with the Likert method. Meanwhile, parents of girls were incorrect 39.2% (n = 38) and correct 60.8% (n = 59). How child age affected classification with the Likert method was also examined. The highest percent of misclassification

at 42.4% (*n* = 39) of 92 total incorrect and correct classification at 45.7% (*n* = 48) of 105 total correct was seen at age 4.

Table 6 shows how the Likert rating relates to overall classification status. No parent labeled their child as obese, despite 26 of 198 children (13.1%) having that designation based on sex, height, and weight.

Table 6

Comparison of Parental Classification of 197 Children by Likert Description Versus Actual Weight Category

Weight category	Incorrect classification (*n* = 92)	Correct classification (*n =105)*
Underweight	4 (4.3)	2 (1.9)
Healthy weight	16 (17.4)	102 (97.1)
Overweight	46 (50)	1 (1)
Obese	26 (28.3)	0 (0)

Note. Information is reported as number (%). One child was missing weight/height information.

For the pound reporting method, parents were asked to write what they thought their child weighed in pounds. Using the child's investigator-measured height (inches) and the reported weight, the child's' BMI and BMI percentile were determined. The mean BMI by parent report was 15.8 (*SD* = 2.8) with a percentile rank of 46.26 (*SD* = 34.71), which falls in the healthy range. Meanwhile, actual child BMI was 16.5 (*SD* = 1.8) with a percentile rank of 61.8 (*SD* = 30.8), which is also in the healthy range. As reported earlier, 14 parents either did not know the weight (*n* = 10) or left it blank with no reason (*n* = 4). Therefore, for this portion of the analysis, the number was reduced (*n* = 184). The accuracy of weight was determined as correct if

the parent's written report of child weight was within two pounds of the child's actual weight. This criterion has been used by other researchers including Gordon and Mellor (2015). Using this method and the reduced sample (n = 184), the percent of correct classification was 50.3% (n = 92) and incorrect classification was 49.7% (n = 91).

Since the BMI healthy range spans across a large percentile range, this method of using within two-pounds does not capture if the parent sees their child as falling in a healthy-weight or other category. So, the parent reported weight was also used with the investigator-assessed height to determine where the child's BMI and percentile rank was with respect to weight category. This information was used to classify the child as underweight, healthy weight, overweight, or obese according to the weight the parent reported. Results showed reported weight placed 16.9% (n = 31) as underweight, 60.7% (n = 111) as healthy weight, 10.4% (n = 19) as overweight, and 12.0% (n = 22) as obese.

As child sex had previously been described as related to classification, the percent of correct classification was examined for the weight-reporting method. Parents of boys were incorrect 47.9% (n = 46) and correct 52.1% (n = 50) with the weight-reporting method. Meanwhile, parents of girls were incorrect 51.7% (n = 45) and correct 48.3% (n = 42). How child age affected classification with the Likert method was also examined. The highest percent of misclassification at 43.9% (n = 40) of 91 total incorrect and correct classification at 42.4% (n = 39) of 92 total correct was seen at age 4.

Results of how overall parent-reported categories relate to CDC classification categories are seen in Table 7.

Table 7

Comparison of Parental Classification Status of 183 Children Using Reported Weight in Pounds Versus Child's Actual Weight Category

Weight category	Incorrect classification (*n = 91)*	Correct classification (*n* = 92)
Underweight	27 (29.7)	4 (4.4)
Healthy weight	46 (50.5)	65 (70.7)
Overweight	9 (9.9)	10 (10.9)
Obese	9 (9.9)	13 (14.1)

Note. Information is reported as number (%).
One child weight had a missing weight value.

The last method of classification was using a pictorial scale that showed children ranging from very underweight to obese. Parents could choose from a picture showing a very underweight child, an underweight child, a slightly underweight child, a healthy weight child, a slightly overweight child, or an obese child. Most parents choose one of the underweight images as representing their child as follows: 10.6% very underweight (*n* = 21), 25.3% underweight (*n* = 50), 32.3% as slightly underweight (*n* = 64), 27.8 as healthy weight (*n* = 54), and 4.6 as overweight (*n* = 4.6). However, only six children or 3.0% were underweight.

As child sex had previously been described as related to classification, the percent of correct classification was examined for the pictorial method as well. Parents of boys were incorrect 58.0% (*n* = 58) and correct 42% (*n* = 42) with the pictorial method. Meanwhile, parents of girls were incorrect 70.1% (*n* = 68) and correct 29.9% (*n* = 29). How child age affected classification with the Likert method was also examined. The highest percent of misclassification

at 42.9% (*n* = 54) of 126 total incorrect and correct classification at 46.5% (*n* = 33) of 71 total correct was seen at age 4.

Overall, parents were mostly inaccurate with the pictorial method as 64% (*n* = 126) were incorrect and 36.0% (*n* =71) were correct. The breakdown of classification status by weight status using the pictorial scale is displayed in Table 8.

Table 8

Comparison of Parental Classification Status of 197 Children by Pictorial Method Versus Investigator-Assessed Weight Category

Weight category	Incorrect classification (*n = 126)*	Correct classification (*n* = 71)
Underweight	71 (35.9)	11 (28.9)
Healthy weight	118 (59.6)	23 (60.5)
Overweight	9 (4.6)	3 (7.9)
Obese	0 (0)	0 (0)

Note. Information is reported as number (%).
One child weight had a missing weight value.

Cohen's Kappa was used to determine the agreement between how parents perceived their child's weight using the three methods of classifications to the actual child weight status. Parents showed almost no agreement with either the pictorial method ($\kappa = -.028$, $p = .42$) or the Likert method ($\kappa = -.032$, $p = .37$). This shows the agreement between the parental judgment of their child's weight was not significantly better than an agreement by chance alone with both the Likert and pictorial method. There was slight agreement with the parent report of weight in pounds and the actual child weight ($\kappa = .21$, $p < .001$). For this method, parents were more accurate at judging their child's weight and could do so significantly better than chance alone.

Still, the degree of agreement beyond chance was only fair. Across the three methods, the accuracy of parents' assessments of child weight did not show substantial agreement with the investigator-assessed child weight categories.

Parents had the most trouble with correctly classifying overweight and obese children, which is illustrated in Table 9.

Table 9

The Agreement between Parent's Descriptions of the Child's Perceived Weight Status and the Child's Actual Weight Status Based on CDC Guidelines at Age 2 to 5

Parental report of weight status	Child's actual weight status, *n*			
	Underweight	Healthy	Overweight	Obese
Likert scale, (*n* = 198)				
Underweight	2	17	1	0
Healthy	4	98	45	21
Overweight	0	4	1	5
Obese	0	0	0	0
Weight in pounds, (n = 183)				
Underweight	2	24	4	1
Healthy	3	77	21	10
Overweight	0	4	9	6
Obese	1	2	10	9
Pictorial, (*n* = 198)				
Underweight	3	50	12	6
Healthy	3	64	31	19
Overweight	0	4	4	1
Obese	0	0	0	0

Even though parents could not correctly identify their child's weight accurately, they were better at gauging their own weight. Parents were asked to self-report weight and height, which was used to determine their associated BMI score. They were also asked to identify their weight status on a Likert scale. There was a moderate agreement between their BMI and the Likert description they selected ($\kappa = .43$, $p = .05$).

Research Question 2

Are parents better able to correctly classify child weight (coded as correct/incorrect) by identification with a categorical label on a Likert scale (underweight, healthy, overweight, or obese), by reporting an actual weight, or by selecting an image representing their child's weight?

The chi-square test of association was used to determine whether there was an association between whether parents were correct or incorrect in their assessment of their children compared to the child's actual weight for all three classification methods. The survey included 198 parents and their children. One child was not able to be weighed and 14 parents did not report an estimated weight for their child with the weight-reporting method. The Cramer's ϕ was statistically significant for two of the three methods. Cramer's $\phi = .82$ for the Likert method showed a large association ($p < .001$), while Cramer's $\phi = .49$ for the pictorial method was a medium association ($p < .001$). The weight-reporting method and actual child weight did not have a significant association, Cramer's $\phi = .18$ ($p = .114$), though it did show a small association.

The next evaluation was to use the chi-square test to determine how classification was associated with child sex. The chi-square test was statistically significant for the Likert classification method, $\chi^2(1, N = 197) = 3.74$, $p = .05$, but not for the pictorial method, $\chi^2(1, N = 197) = 3.52$, $p = .08$, or the weight-reporting method, $\chi^2(1, N = 183) = 0.44$, $p = .56$. The test showed that of all parental misclassification, 58% in the Likert method, 49.5% in the weight-reporting method, and 45.2% in the pictorial method was of preschool boys. This study showed that boys were 1.82 times more likely than girls to have their weight misclassified using the Likert method ($p = .04$).

Across all three methods, parents were less able to accurately identify children who were overweight and obese. This was seen most drastically with the pictorial and Likert methods. Only 9% (n = 4) of parents could correctly identify their child as overweight using a pictorial scale and only 2% (n = 1) using a Likert scale. Parents were most accurate across all weight statuses when asked to report the child's weight in pounds. Using a weight reporting classification, 40% (n = 19) of parents accurately identified the weight of their child when classified as overweight. Table 10 displays these numbers showcasing how incorrect and correct classification related to actual child weight status in each classification type.

Table 10

Chi-Squared Test to Determine the Association between Parental Classification Ability among Child Weight Categories

	Actual child weight status			
Classification status	Underweight	Healthy	Overweight	Obese
	Pictorial			
Correct (n = 71)	3	64	4	0
Incorrect (n = 126)	3	54	43	26
	Likert			
Correct (n = 105)	2	102	1	0
Incorrect (n = 92)	4	16	46	26
	Weight			
Correct (n = 92)	3	61	19	9
Incorrect (n = 91)	3	45	26	17

Parents had the most accuracy classifying child weight status by using the Likert scale at 53.3% and least accuracy with the ability to select the correct picture showing their child's weight at 35.9%. However, these overall statistics do not showcase the lower ability to correctly categorize children who are either overweight or obese. In the Likert method, the misclassification of overweight and obese youth accounts for 78.3% of the misclassification

while it accounts for 54.8% in the pictorial method and 47.3% in the weight-reporting method. Description of parental overall accuracy by each method is compared side-by-side in Table 11.

Table 11

Percent of Correct Versus Incorrect Classification by Assessment Method

Classification	Pictorial	Likert	Reported weight
Correct	35.9%	53.30%	50.27%
Incorrect	63.6%	46.70%	49.73%

A point biserial correlation between child weight and correct classification by Likert scale showed that as weight decreased parents' inaccuracy increased significantly, r_{pb} = -.18, 95% CI [.04, -.31], p = .011. A significant negative correlation was also found between parent-reported weight and actual child weight, r = -.15, p = .037, showing that as child weight decreased parents' accuracy in reporting weight increased. No significant correlation was found between child weight and parental correct classification of child weight by the pictorial method, r = -.08, p = .249.

The last component analyzed for this question were the relationships among the measures of classification. A chi-square test of association was used to determine whether there was an association between correct classification (0 = *incorrect*, 1 = *correct*) for each assessment method with correct classification based on the other assessment methods. For comparison of the weight-reporting classification method versus pictorial classification method, the chi-square test was statistically significant, $\chi^2(1, N = 183) = 14.49$, $p < .001$. The test showed that 78% (n = 71) of those who reported weight incorrectly in pounds also reported weight incorrectly via the pictorial method. Those who reported weight correctly in the pound classification method were

evenly spilt when using the pictorial classification method with 51% (n = 47) being incorrect and 49% (n = 45) being correct. Cramer's ϕ = .28 showed the association was medium sized. Comparing the weight-reporting classification method and the Likert scale method also revealed a statistically significant chi-square test, $\chi^2(1, N = 183) = 7.48$, $p = .006$. Of those who reported weight incorrectly with the weight-reporting method, 58.2% (n = 53) also reported weight incorrectly with the Likert method. The percentage of those who reported weight correctly with the weight-reporting method was split at 62% correct (n = 57) and 38% incorrect (n = 35) with the Likert method. Cramer's ϕ = .20 showed the association was medium sized. The chi-square test comparing the Likert classification method to the pictorial classification method was also statistically significant, $\chi^2(1, N = 197) = 43.43$, $p < .001$. The test showed that 88% (n = 81) of those who incorrectly classified their child's weight using the Likert method also incorrectly classified weight by the pictorial method. Differences were seen with those who reported weight correctly with the Likert method as 42.9% (n = 45) were incorrect on the pictorial method and 57.1% (n = 60) were correct. Cramer's ϕ = .47 showed the association was large.

Research Question 3

Does perceive severity, as measured separately by the Obesity Risk Knowledge Scale (ORK-10; Appendix B) and the Adolescent Obesity Risk Knowledge Scale (AORK, Appendix C), correlate to the accuracy of parental weight assessment (correct or incorrect) of the three, parental child weight assessment methods?

Both scales used, the AORK, and ORK-10, measure knowledge about the health risks associated with obesity using 10 true-false questions. As part of the analysis, the relationships between the two tests were explored. There was a significant correlation between total scores on

the ORK-10 and AORK tests, $r = .60$, $p < .001$. Figure 7 shows the positive linear relationship between the scores of the knowledge scales.

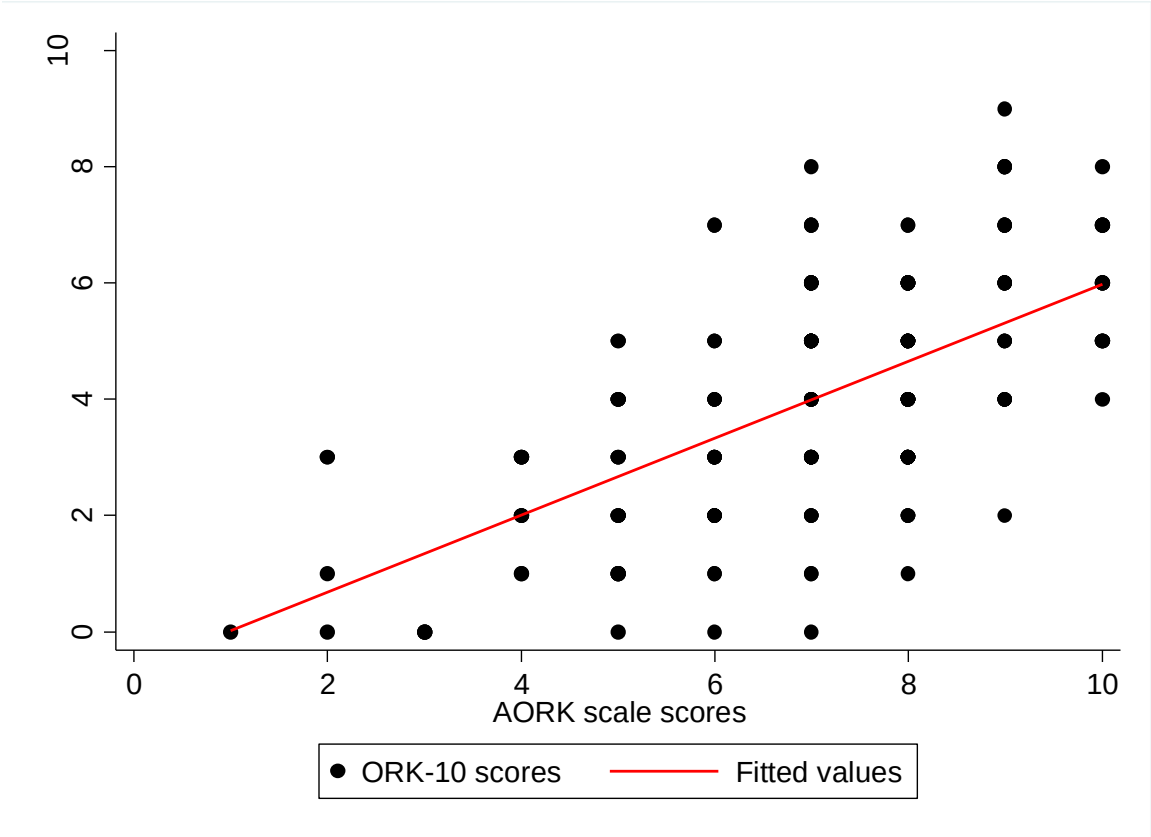


Figure 7. Correlation of ORK-10 scores and AORK scores on the knowledge scale for 198 participants.

Initial analysis of the AORK and ORK-10 scale results were conducted first to examine the mean and spread of scores. Participants scored higher on the AORK ($M = 7.03$; $SD = 1.83$) than the ORK-10 ($M = 4.01$; $SD = 1.97$). The stark difference in the total scores and the distribution of scores between the two knowledge tests is depicted in Table 12.

Table 12

Numeric Score at Four Percentiles for AORK and ORK-10 Tests

Percentile rank	ORK-10	AORK
1st	0	2
25th	3	6
50th	4	7
75th	5	8

Note: Quartile percentile ranks were determined based on the how 198 parents scored on the tests and where scores ranked.

Figure 8 and 9 shows a frequency distribution of the scores.

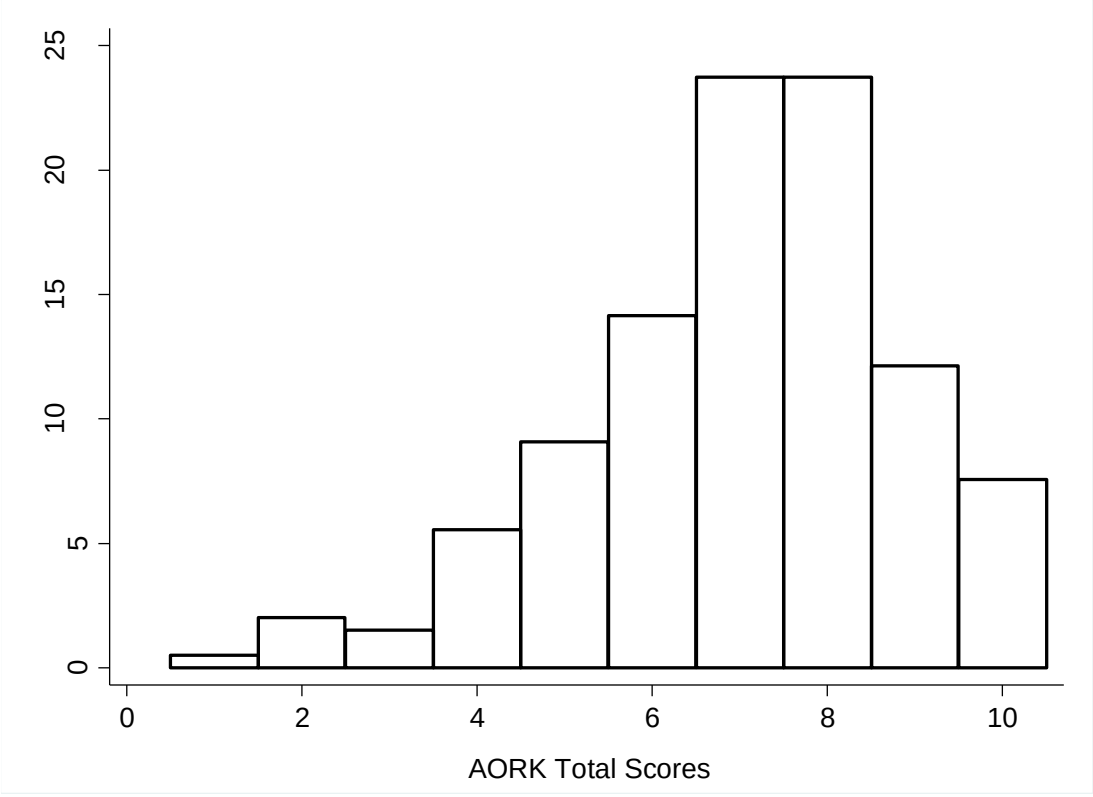


Figure 8. Histogram of 198 parent scores on the AORK scale that examines knowledge of obesity knowledge related to health risks. The histogram displays the percent of parents with each total score.

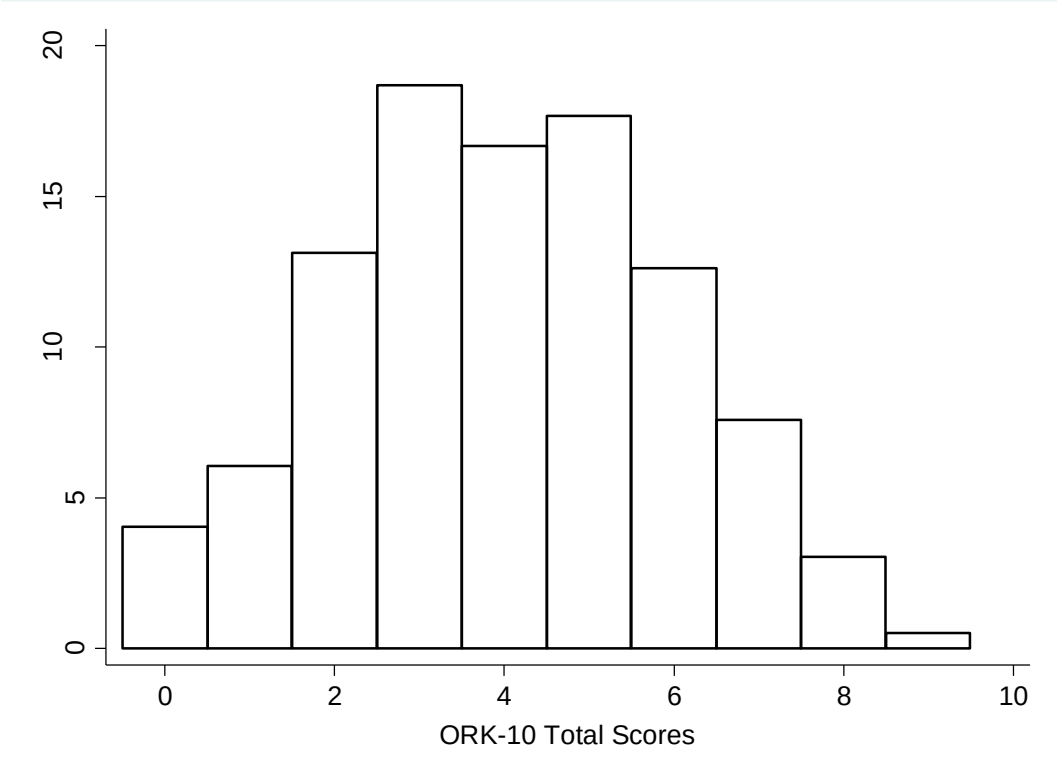


Figure 9. Display of 198 parent scores on the ORK-10 scale that examines knowledge of obesity knowledge related to health risks. The histogram displays the percent of parents meeting each total score.

Correlation between each type of knowledge test (AORK, ORK-10) and whether parents were correct or incorrect in classification was examined using the point-biserial method. A small, but significant relationship was found between the total score on the ORK-10 scale and parental ability to correctly classify child weight using the Likert scale, $r_{pb} = .17$, $p = .015$. This

relationship indicates a small tendency for higher ORK-10 scores to relate to accuracy in the classification of child weight. However, there was no statistical significance found with the total ORK-10 score and either pictorial classification, r_{pb} = .10, p = .16, or parental classification by report of child weight, r_{pb} = .07 p = .32. No significant relationships were found between the total AORK score and correct classification based on Likert classification, r_{pb} = -.03, p = .65, pictorial classification, r_{pb} = .02, p = .82, or classification by the report of weight, r_{pb} = .05, p = .48.

Research Question 4

Do the continuous ORK-10 scores predict correct parental child weight classification for the three methods of weight classification?

Multinomial regression was used to see if ORK-10 scores could predict the correct parental classification of child weight using the parent-report of weight method. Parental assessment of weight was coded into three categories (1 = *correct*, 2 = *underestimation*, 3 = *overestimation*). Correct classification was listed as the referent category. Of the 183 parents who provided a reported weight for their child, 91 were incorrect. This incorrect classification included 72 (39.3%) who underestimated child weight and 19 (10.4%) who overestimated their child's weight. The binary logistic regression was statistically significant, -2 Log Likelihood = 72.77, $\chi^2(2, n = 183) = .181$, p = .018. The Nagelkerke pseudo R^2 = .006 indicates the model accounted for 0.6% of the total variance in classification. Neither underestimation of child weight nor overestimation of child weight by parents proved to be statistically significantly predicted in the model. This model was able to predict underestimation correctly only 4.2% of the time, and no cases of overestimation were accurately predicted. Table 13 shows the

regression coefficients, the Wald tests, the odds ratios, and 95% confidence interval for the odds ratio for each predictor.

Table 13

Prediction Ability of ORK-10 Scores of Underestimation and Overestimation with the Pound-reporting Classification Method

Model	*B*	SE-*B*	Wald	*Df*	Exp (*B*)	95% CI Exp(*B*)
			Underestimation			
Intercept	0.072	0.358	0.041	1		
ORK-10	-0.081	0.082	0.966	1	0.922	[0.79, 1.08]
			Overestimation			
Intercept	-1.381	0.574	5.80*	1		
Ork-10	-0.049	0.131	0.140	1	0.952	[0.74, 1.23]

Note. Correct classification was the target outcome.
*$p < .05$

Neither the Likert method nor the pictorial method could be examined with multinomial regression as overestimation of child weight had too few values. With the Likert method, only one parent overestimated child weight (n = 1, 0.5%). The rest of the parents were either correct (n = 103, 52.3%) or underestimated child weight (n = 93, 47.2%). Meanwhile, there were 126 people who misclassified weight using the pictorial method. Of those who misclassified, 60.9% (n = 120) underestimated weight and 3.0% (n = 6) overestimated weight.

Therefore, binary logistic regression was used to predict parental accuracy in classification as (0 = *incorrect*, 1 = *correct*) with weight classification and their total ORK-10 score. The mean ORK-10 score for parents was M = 4.01 (SD = 1.97). Of the 197 parents who provided a Likert rating for their child, 92 (46.7%) were incorrect about their child's weight. The binary logistic regression was statistically significant, -2 Log Likelihood = 266.28, $\chi^2(5, n = 197) = .181$, $p = .017$. The Nagelkerke pseudo $R^2 = .040$ indicates the model accounted for 4% of the total variance in classification.

Table 14 presents the binary logistic regression coefficients, the Wald tests, the odds ratios, and 95% confidence interval for the odds ratio for the predictor ORK-10 scores. The Wald test showed that ORK-10 scores were a statistically significant predictor ($p = .017$) of correct classification. Parents who were correct in classification scored 0.181 higher than those who were incorrect. For every one-unit score increase in the ORK-10 score, parents were 1.2 times more likely to have a correct classification of weight.

Table 14

Predictors of Correct Classification Using the Parent Report of Child Weight with the Likert Scale

Model	*B*	SE-*B*	Wald	*Df*	Exp(*B*)	95% CI Exp(*B*)
Intercept	-0.592	0.334	3.15	1		
Total ORK-10	0.181	0.076	5.74*	1	1.198	[1.03, 1.39]

Note. Correct group was the target outcome. $^*p < .05$

No significance was found with the ORK-10 scores and pictorial parental classifications of correct and incorrect. The binary logistic regression had -2 Log Likelihood = 255.42, $\chi^2(5, n = 197) = .111$, $p = .148$. The Nagelkerke pseudo $R^2 = .015$ indicates the model accounted for 1.5% of the total variance in classification. Table 15 shows the binary logistic regression coefficients, the Wald tests, the odds ratios, and 95% confidence interval for the odds ratio for the predictor ORK-10 scores.

Table 15

Predictors of Correct Classification Using the Parent Report of Child Weight with the Pictorial Scale and ORK-10 Scores

Model	*B*	SE-*B*	Wald	*Df*	Exp(*B*)	95% CI Exp(*B*)
Intercept	-1.026	0.351	8.56	1		
Total ORK-10	0.111	0.077	2.088	1	1.12	[0.96, 1.30]

Note. Correct group was the target outcome.

Research Question 5

Do the continuous AORK scores predict parental child weight classification for the three methods of weight classification?

Binary logistic regression was used to determine the prediction ability of the AORK scores with both the Likert and pictorial classification of child weight as (0 = *incorrect*, 1 = *correct*) as well. No significance was found with the pictorial parental classifications of correct and incorrect and the total AORK scores. The binary logistic regression was had -2 Log Likelihood = 257.49, $\chi^2(5, n = 197) = .019$, $p = .818$. The Nagelkerke pseudo $R^2 = .00$ indicates the model accounted for no variance in classification. Table 16 shows the binary logistic

regression coefficients, the Wald tests, the odds ratios, and 95% confidence interval for the odds ratio for the predictor AORK scores.

Table 16

Predictors of Correct Classification Using the Parent Report of Child Weight with the Pictorial Scale and the AORK Scale

Model	*B*	SE-*B*	Wald	*Df*	Exp(*B*)	95% CI Exp(*B*)
Intercept	-0.116	0.567	0.042	1		
Total AORK	0.019	0.081	0.053	1	1.02	[0.87, 1.20]

Note. Correct group was the target outcome.

There was also no significance found with the ability of AORK scores to predict Likert classification (0 = *incorrect*, 1 = *correct*). The binary logistic regression was had -2 Log Likelihood = 272.04, $\chi^2(5, n = 197) = .035$, $p = .651$. The Nagelkerke pseudo $R^2 = .001$ indicates the model accounted for virtually no variance in classification. Table 17 shows the binary logistic regression coefficients, the Wald tests, the odds ratios, and 95% confidence interval for the odds ratio for the predictor AORK scores.

Table 17

Predictors of Correct Classification Using the Parent Report of Child Weight with the Likert Scale and the AORK Scale

Model	*B*	SE-*B*	Wald	*Df*	Exp(*B*)	95% CI Exp(*B*)
Intercept	-0.116	0.567	0.042	1		

Total AORK	0.035	0.078	0.205	1	1.036	[0.89, 1.21]

Note. Correct group was the target outcome.

Research Question 6

What are the associations of perceived susceptibility (as measured by two separate parental concern questions) and obesity exposure (as measured by one exposure question) to the parental classification of preschool child weight as measured by the accuracy of parental child weight assessment for all three assessment methods?

Parental concern over the future weight status of their child had a positive skew as 59% of parents (n = 118) selected being "unconcerned." This remained true even for parents with overweight children (n = 26, 22.0%) and obese children (n = 15, 12.7%). One parent of an overweight child and one parent of an obese child reported the highest rating of being "very concerned" about their child's future weight. The second most selected category was being "a little concerned" about their child's weight (n = 59), which was selected by 2 parents of underweight children, 37 parents of normal weight children, 15 parents of overweight children, and 5 parents of obese children. These first two categories comprised 89.4% of responses (n = 177) regarding the concern of their own child's future weight status. The trend of positively skewed data remained true even with overweight children, where 25 of 47 parents of overweight children reported being "unconcerned" about the future weight status of their children. Figure 10 visually depicts how parents of overweight children answered this question.

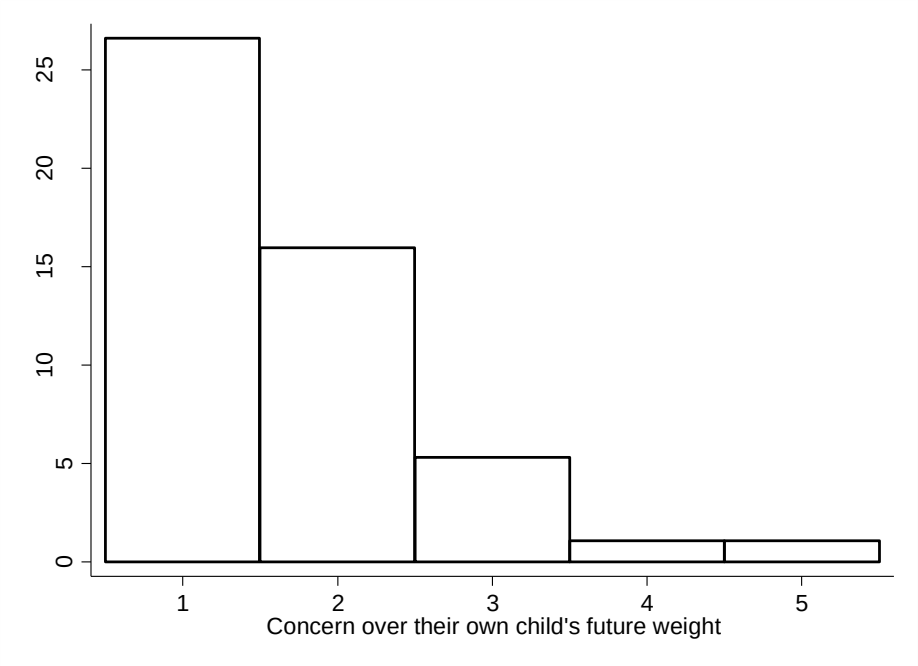


Figure 10. This bar chart shows the level of concern the 47 parents of overweight children have regarding their child's future weight status. The concern level ranges from unconcerned (1) to very concerned (5). Most parents were either unconcerned (1) or a little concerned (2) regarding the future weight status of their already overweight child.

The answers for concern over children's future weight status in the nation were more evenly spread with 28.8% (n = 57) parents selecting being "concerned," which was option three of five in the Likert scale. The remaining choices comprised "unconcerned" at 10.1% (n = 20), "a little concerned" at 24.2% (n = 48), "fairly concerned" at 18.7% (n = 37) and being "very concerned" at 18.2% (n = 36). This pattern of equal spread remained true for parents of healthy weight children. Parents of overweight children had a negative skew to how they answered this question as displayed in Figure 11. Parents of 14 of the 47 overweight children (38.9%) reported being "very concerned" with the children in the nation's future weight while only 6 (12.7%) reported being "unconcerned."

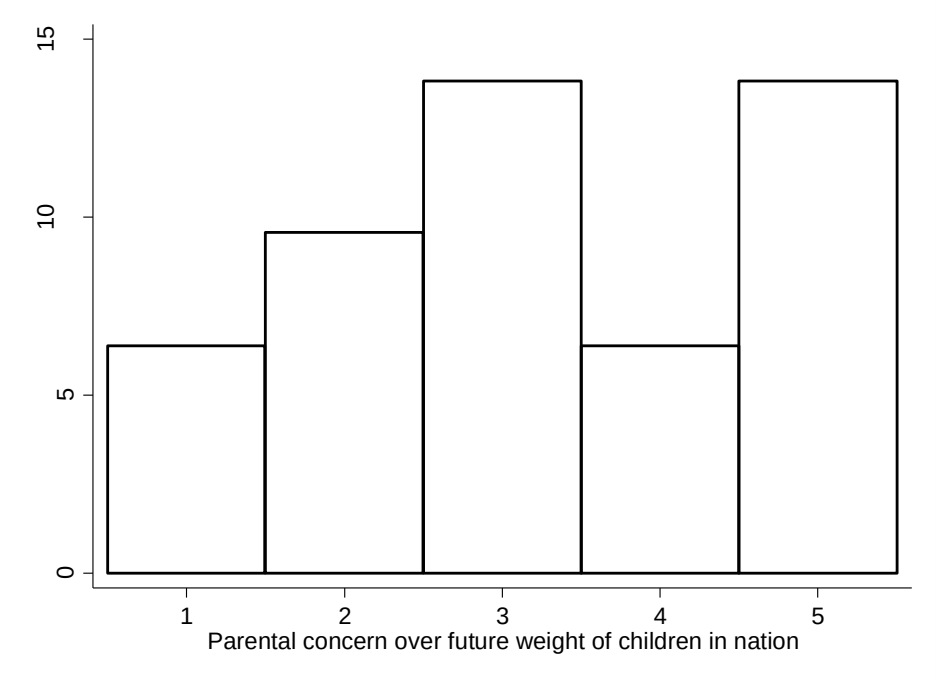


Figure 11. This histogram shows the level of concern that 47 parents of overweight children have with the number of children in the nation's future weight status. The concern for children in the nation had more variability than that of their own child. This shows that most parents were either concerned (3) or very concerned (5). The concern level ranges from unconcerned (1) to very concerned (5).

How concerned parents were with the weight of their own child versus the weight of children in the nation was compared to parent ability to classify weight using the three methods. Cramer's ϕ was used to determine the level of association between the reported levels of concern expressed with each classification method. No association was found between either the level of concern of their own child's future or concern over the future weight of children in the nation by any classification method. Using parent report of pounds, the result was Cramer's ϕ = .12, p = .582, for their own child and Cramer's ϕ = .15, p = .416 for children in the nation. The Likert

classification method had a Cramer's ϕ = .14, p = .390, for their own child and Cramer's ϕ = .08**,** p = .885, for children in the nation. Lastly, the pictorial classification method had a Cramer's ϕ = .10, p = .724, for their own child and Cramer's ϕ = .17, p = .208, for children in the nation. Table 18 shows the breakdown of both concern for one's own child and concern regarding the weight of children in the nation is broken down by correct and incorrect classification status for all three methods.

Table 18

Comparison of Concern of Weight of Own Child versus National Weight of Children by Classification Status

Level of Concern	Method and Classification Status			
	Pictorial Method			
	Correct (n = 105)		Incorrect (*n* = 92)	
	Own Child	*Nation*	*Own child*	*Nation*
Unconcerned	40	7	77	13
A little concerned	22	15	38	33
Concerned	5	21	6	36
Fairly concerned	1	19	3	18
Very concerned	3	9	2	26
	Likert Method			
	Correct (n = 71)		Incorrect (*n* = 126)	
	Own child	*Nation*	*Own Child*	*Nation*
Unconcerned	62	7	55	11
A little concerned	34	15	26	22
Concerned	3	21	8	24
Fairly concerned	3	19	1	18
Very concerned	3	9	2	17
	Weight Method			
	Correct (n = 92)		*Incorrect (n = 92)*	
	Own child	*Nation*	*Own child*	*Nation*
Unconcerned	57	12	54	8
A little concerned	28	26	24	20
Concerned	3	27	8	25
Fairly concerned	2	12	2	20
Very Concerned	2	15	3	18

Parents were also asked about whether they had a family history of overweight as well as of obesity. If parents reported yes, then they were determined to have exposure to either overweight or obesity. More people had exposure to overweight at 74.2% (n = 147) than obesity at 41.9% (n = 83). The family history of depression, diabetes, hypertension, hyperlipidemia, and heart disease was also assessed with parents selecting yes or no for each disease. Each person could have a minimum of 0 diseases and a maximum of 5. The mean was 2.33 (SD = 1.62). The most commonly reported disease was diabetes (n = 113, 57.1%) followed by depression (n = 105, 53.0%), hypertension (n = 111, 56.1%), hyperlipidemia (n = 76, 38.4%), and heart disease (n = 71, 35.9%). Cramer's ϕ was used to test the correlation between the number of diagnoses in the family history to the level of concern for one's own child and children in the nation. This was significant for concern of one's own child, $\phi = .20$, $p = .021$, showing a moderate relationship. This showed 65.9% (n = 83) of the 126 parents who reported no concern over the weight of their own child had zero of the five diagnoses in their family history. No correlation was identified with concern ratings regarding children's weight status at the national level, $\phi = .11$, $p = .84$.

In addition to examining concern overweight, this study explored exposure to both a family history of overweight status and a family history of obesity status. The majority of participants (74.2%, n = 147) had exposure to a family history overweight status while a smaller number (40.4%, n = 80) had exposure to a family history obesity status. Exposure to overweight history was associated with exposure to obesity history. Of the 147 who had had a family history of overweight status, 54.4% also had a family history of obesity exposure. The chi-square was statistically significant, $\chi^2 (1, N = 198) = 46.57$, $p < .001$.

A chi-square test of association was conducted to determine whether exposure to a family history of overweight status (0 = *no exposure*, 1= *exposure)* was associated to classification

ability (0 = *incorrect*, 1= *correct*) for each of the three classification methods. The chi-square tests for all three methods were not statistically significant. With the weight-reporting method, 68.1% (n = 62) of those who misclassified child weight reported exposure to overweight status in their family while 78.3% (n = 72) of those who correctly reported weight had a family history of overweight status. The chi-square was not statistically significant, χ^2 (1, N = 183) = 2.39, p = .122. For the Likert classification method, 78.3% (n = 72) of those who misclassified their child's weight had a family history of overweight status versus 70.5% (n = 74) who correctly classified their child's weight and had a family history of overweight status. The chi-square was not statistically significant, χ^2(1, N = 197) = 1.55, p = .213. With the pictorial method, 71.4% (n = 90) of those who misclassified child weight had a family history of overweight status versus 78.9% (n = 56) who correctly classified their child's weight who also had a family history of overweight status. The chi-square was not statistically significant, χ^2 (1, N = 197) = 1.31, p < .252.

A chi-square test of association was also conducted to determine whether exposure to a family history of obese status (0 = *no exposure*, 1= *exposure)* was associated to classification ability (0 = *incorrect*, 1= *correct*) for each of the three classification methods. The only method that had significance in the association was with the pictorial classification method and obesity exposure. This showed that 34.9% (n = 44) of those who misclassified their child's weight had a family history of obesity exposure versus 49.3% (n = 35) who correctly classified weight having a family history of obesity exposure. The chi-square was statistically significant, χ^2(1, N = 197) = 3.91, p = .048. With the weight-reporting method, 67% (n = 61) of those who misclassified child weight had exposure to obesity while 44.6% (n = 41) who correctly classified weight had exposure to obesity. The chi-square test was not statistically significant, χ^2(1, N = 183) = 2.394,

p = .122. Using the Likert reporting method, 63% (n = 58) of those who misclassified child weight had exposure to obesity while 42.8% (n = 45) who correctly classified weight had exposure to obesity. The chi-square was not statistically significant $\chi^2(1, N = 197) = .711$, p = .399.

Research Question 7

Do perceived barriers as measured by Parental Self-Efficacy for Promoting Healthy Physical Activity and Dietary Behaviors in Children Scale (PSEPAD, Appendix A) correlate with and predict the parental classification of preschool child weight status as measured by the accuracy of parental assessment for all three assessment methods?

The PSEPAD scale has 16 items that assess promoting healthy dietary behaviors, limit setting for unhealthy dietary and physical activity behaviors in children and promoting healthy physical activity behaviors in children (Bohman, Ghaderi, & Rasmussen, 2013). The total score possible is 160 as parents are asked to select a rating from 1 to 10 scoring their confidence in the performing the various measures. A higher score indicates increased self-efficacy for controlling child behaviors. The mean of PSEPAD scores was 125 (SD = 20.71) with a total possible of 160. The scores varied from a low of 63 to a high of 160 (25^{th} percentile = 113; 75^{th} percentile = 140). The skew of the scale was -0.59 and the kurtosis was 2.92. The histogram visually depicts the negative skew of the scores in Figure 12.

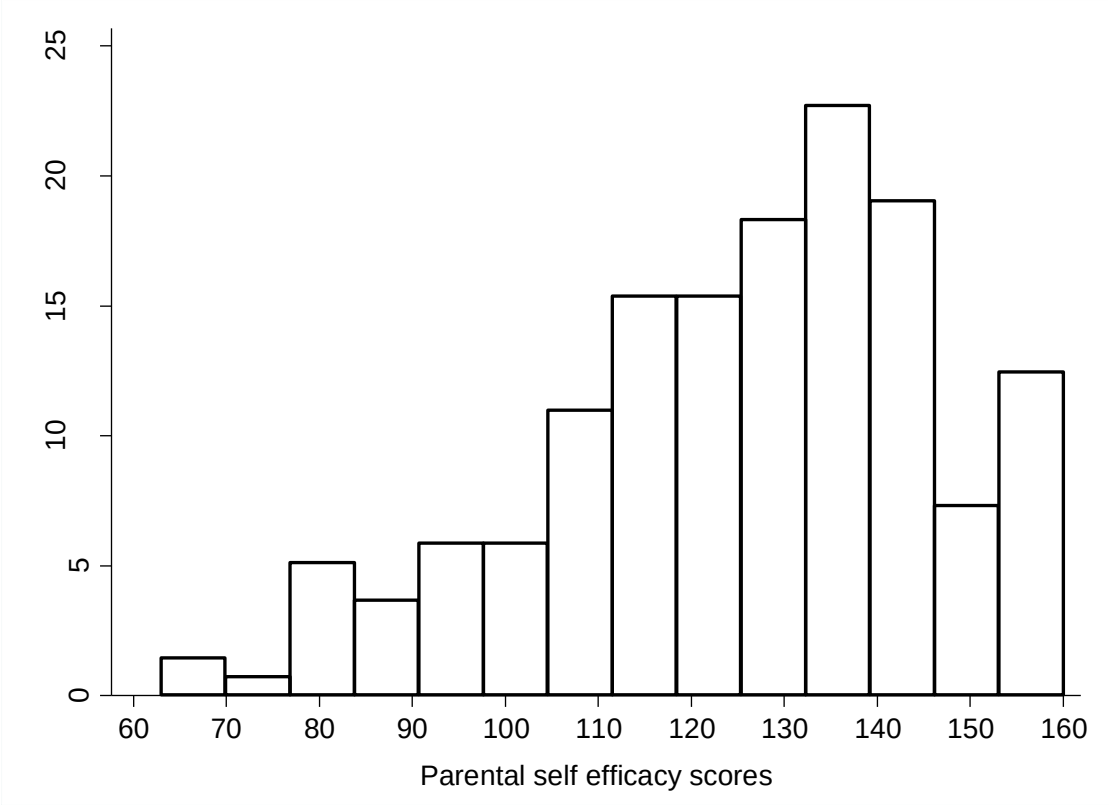


Figure 12. Histogram displaying parental self-efficacy scores from PSEPAD scale of parental self-efficacy regarding the ability to institute health behaviors relating to items like diet and exercise in young children. Parents could select a score from 0, equating to no efficacy, to 10, equating to excellent efficacy, across a total of 16 questions.

A point-biserial correlation was also used to examine the relationships. No significant correlations were found between the total PSEPAD score and correct or incorrect parental child weight classification by any method. Correlation of parent weight report as correct and incorrect compared to total PSE was not statistically significant, r_{pb} = -.00, p = .98, as was classification by pictorial method, r_{pb} = .06, p = .43. This shows there were no significant correlations between parental self-efficacy scores and correct classification of their child's weight. Of the three methods, the highest correlation was identified between the correct classification by Likert

description and total PSE score, r_{pb} = .11, p = .12, but the relationship was not statistically significant.

There was also no significance found for the ability of PSEPAD scores to predict Likert classification as (0 = *incorrect*, 1 = *correct*). The binary logistic regression had -2 Log Likelihood = 268.21, $\chi^2(8, n = 197) = 0.011$, p = .117. The Nagelkerke pseudo R^2 = .017, indicating the model accounted for virtually no variance in classification. Table 19 shows the binary logistic regression coefficients, the Wald tests, the odds ratio, and 95% confidence interval for the odds ratio for the predictor PSE scores and Likert classification.

Table 19

Predictors of Correct Classification Using the Parent Report of Child Weight with the Likert Scale and Parental Self-Efficacy

Model	*B*	SE-*B*	Wald	*Df*	Exp(*B*)	95% CI Exp(*B*)
Intercept	-1.24	0.890	1.93	1		
Total PSE	0.01	0.007	2.46	1	1.01	[0.99, 1.03]

Note. Correct group was the target outcome.

There was also no statistical significance found for the ability of PSEPAD scores to predict pictorial classification as (0 = *incorrect*, 1 = *correct*). The binary logistic regression had -2 Log Likelihood = 256.02, $\chi^2(8, n = 197) = 0.006$, p = .432. The Nagelkerke pseudo R^2 = .004, indicating the model accounted for no variance in classification. Table 20 shows the binary logistic regression coefficients, the Wald tests, the odds ratio, and 95% confidence interval for the odds ratio for the PSEPAD predictor scores.

Table 20

Predictors of Correct Classification Using the Parent Report of Child Weight with the Pictorial Scale and Parental Self-Efficacy

Model	*B*	SE-*B*	Wald	*Df*	Exp(*B*)	95% CI Exp(*B*)
Intercept	-1.29	0.930	1.91	1		
PSE total	0.006	0.007	0.618	1	1.01	[0.99, 1.02]

Note. Correct group was the target outcome.

Multinomial regression was used to determine if the PSEPAD scores could predict correct parental classification of child weight by the parent report of weight method. Parental assessment of weight was coded into three categories (1 = *correct*, 2 = *underestimation*, 3 = *overestimation*). Correct classification was listed as the referent category. Of the 183 parents who provided a reported weight for their child, 92 (50.5%) were correct and 90 were incorrect. This incorrect classification included 71 (39%) who underestimated child weight and 21 (10.4%) who overestimated their child's weight. The multinomial logistic regression was not statistically significant, -2 Log Likelihood = 213.82, $\chi^2(2, n = 182) = 1.02$, $p = .60$. The Nagelkerke pseudo $R^2 = .007$, indicating the model accounted for less than 1% of the variance in classification.

Table 21

Predictors of Correct Classification Using the Parent Report of Child Weight and PSEPAD Scores

Model	*B*	SE-*B*	Wald	*Df*	Exp(*B*)	95% CI Exp(*B*)
Intercept	-0.431	0.966	0.200	1		

Underestimation	0.001	0.008	0.033	1	1.00	[0.99, 1.02]
Intercept	-0.283	1.42	0.040	1		
Overestimation	-0.011	0.012	0.835	1	0.99	[0.97, 1.01]

Note. Correct classification was the target outcome group.

Research Question 8

If sample size allows, does the weighted combination of parental self-efficacy gauged by the PSEPAD score and knowledge of obesity health risks (based on the ORK-10) predict the accuracy of parental classification (correct/incorrect) for all three assessment methods (Likert, visual, and reported weight)?

A multiple binomial logistic regression with two predictors of the binomial outcome of correct or incorrect was performed to determine if PSEPAD and ORK-10 total scores could predict parental classification (0 = *incorrect*, 1 = *correct*). Table 22 shows regression coefficients, Wald tests, the odds ratio, and the 95% confidence interval for regression coefficients for each predictor. The logistic regression was statistically significant, -2 Log Likelihood = 239.86, $\chi^2(1, n = 197) = 5.30$, $p = .021$. The Nagelkerke pseudo $R^2 = .034$, indicating the model accounted for 3.4% of the variance in classification. The Wald test showed that the ORK-10 score was a statistically significant ($p = .011$) predictor for correct classification of child weight by Likert classification. For every one unit increase in the ORK-10 score, parents were 0.82 times as likely to correctly predict their child's weight when controlling for the PSE score. Meanwhile, the Wald test approached significance for PSEPAD to be a predictor of correct classification ($p = .07$). This showed that for every unit increase in the ORK-10 score,

parents were 0.987 times more likely to correctly predict their child's weight when controlling for the PSEPAD score.

Table 22

Binary Logistic Regression Results of Multiple Predictors of Correct Classification of Child Weight with Likert Classification by Parents

Model	*B*	SE-*B*	Wald	*Df*	Exp(*B*)	95% CI Exp(*B*)
Intercept	2.26	1.001	5.09*	1		
PSE	-0.013	0.007	3.215	1	0.987	[0.97, 1.00]
ORK-10	-0.195	0.077	6.444*	1	0.822	[0.71, 0.96]

Note. Correct classification was the target outcome group.
*$p < .05$

Correct classification was not able to be predicted by either of the other two methods of child weight classification. The combined effect of PSEPAD and ORK-10 to predict correct classification of child weight had no significant prediction ability with the parental report of child weight or with pictorial classification. The multiple logistic regression for pictorial classification was not statistically significant, -2 Log Likelihood = 243.95, $\chi^2(1, n = 196) = 3.56$, $p = .059$. The Nagelkerke pseudo $R^2 = .021$, indicating the model accounted for 2.1% variance in classification. The logistic regression for report of weight was also not statistically significant, -2 Log Likelihood = 232.5, $\chi^2(1, n = 182) = 0.147$, $p = .702$. The Nagelkerke pseudo $R^2 = .034$, indicating the model accounted for 3.4% variance in classification. The logistic regression coefficients, Wald tests, the odds ratio, and the 95% confidence interval for the odds ratio for

each predictor is identified in Table 23 and Table 24 for the child weight method and pictorial method of classification.

Table 23

Binary Logistic Regression Results of Multiple Predictors of Correct Classification of Child Weight with Report of Child Weight by Parents

Model	*B*	SE-*B*	Wald	*Df*	Exp(*B*)	95% CI Exp(*B*)
Intercept	0.376	0.981	0.146	1		
PSEPAD	-0.001	0.007	0.008	1	0.999	[0.99, 1.01]
ORK-10	-0.081	0.007	0.008	1	0.922	[0.79, 1.07]

Note. Correct classification was the target outcome group.

Table 24

Multiple Regression Results of Predictors of Correct Classification of Child Weight with Pictorial Classification by Parents

Model	*B*	SE-*B*	Wald	*Df*	Exp(*B*)	95% CI Exp(*B*)
Intercept	1.89	1.02	3.41	1		
PSEPAD	-0.007	0.007	0.836	1	0.993	[0.98, 1.01]
ORK-10	-0.117	0.077	2.294	1	0.889	[0.76, 1.04]

Note. Correct classification was the target outcome group.

As the sample size was larger than originally predicted, an additional test was able to be done. Earlier results of this study showed that child sex and obesity exposure were potentially

influential in parental classification. Previous research has also shown that parental age can affect classification. Given these items, a logistical regression analysis was performed to see how child sex, obesity exposure, parental age, ORK-10 knowledge scores, and parental self-efficacy affected correct classification.

A multiple binary logistic regression with five predictors of the binomial outcome of correct or incorrect was performed to determine if these combined factors could predict parental classification (0 = *incorrect*, 1 = *correct*). The logistic regression was statistically significant, -2 Log Likelihood = 251.83, $\chi^2(5, n = 197) = 17.625$, $p = .003$. The Nagelkerke pseudo $R^2 = .115$, indicating the model accounted for 11.5% of the variance in classification.

The Wald test showed that the ORK-10 score, the parental self-efficacy (PSEPAD) score, and child sex were also significant predictors for correct classification of child weight by Likert classification. For every one unit increase in the ORK-10 score, parents were 1.26 times as likely to correctly predict their child's weight when controlling for the PSEPAD score, obesity exposure, child sex, and parental age. Meanwhile, the Wald test also confirmed the PSEPAD score to be a predictor of correct classification. This showed that for every unit increase in the PSEPAD score, parents were 1.016 more likely to correctly predict their child's weight when controlling for the other factors. Table 25 shows regression coefficients, Wald tests, the odds ratio, and the 95% confidence interval for regression coefficients for each predictor.

Table 25

Binary Logistic Regression Results of Multiple Predictors of Correct Classification of Child Weight with Likert Classification by Parents

Model	*B*	SE-*B*	Wald	*Df*	Exp(*B*)	95% CI Exp(*B*)
Intercept	-3.917	1.342	8.512**	1		
Child Sex	0.723	0.303	5.676*	1	2.061	[1.14, 3.74]
PSEPAD	0.016	0.008	4.566*	1	1.016	[1.001, 1.032]
ORK-10	0.229	0.083	7.625**	1	0.822	[0.71, 0.96]
OE	0.217	0.313	0.480	1	1.243	[0.672. 2.296]
Age	-0.028	0.234	0.015	1	0.972	[0.614, 1.538]

Note. Correct classification was the target outcome group.
OE equals obesity exposure.
Age is parental age.
*$p < .05$, **$p < .01$

Correct classification was not able to be predicted by either of the other two methods of child weight classification. The combined effect of PSE, ORK-10, child sex, obesity exposure, and parental age to predict correct classification of child weight had no significant prediction ability with the parental report of child weight or with pictorial classification. The multiple logistic regression for pictorial classification was not statistically significant, -2 Log Likelihood = 245.56, $\chi^2(1, n = 196) = 12.493$, $p = .131$. The Nagelkerke pseudo $R^2 = 0.07$, indicating the model accounted for 7% variance in classification. The logistic regression for report of weight was also not statistically significant, -2 Log Likelihood = 247.68, $\chi^2(1, n = 182) = 3.27$ $p = .671$.

The Nagelkerke pseudo R^2 = .023, indicating the model accounted for 2.3% variance in classification. The logistic regression coefficients, Wald tests, the odds ratio, and the 95% confidence interval for the odds ratio for each predictor is identified in Table 27 and Table 28 for the child weight method and pictorial method of classification.

Table 27

Binary Logistic Regression Results of Multiple Predictors of Correct Classification of Child Weight with Weight-Reporting Classification by Parents

Model	*B*	SE-*B*	Wald	*Df*	Exp(*B*)	95% CI Exp(*B*)
Intercept	-0.063	1.292	0.002	1		
Child sex	-0.166	0.301	0.303	1	0.847	[0.469, 1.530]
PSE	0.001	0.007	0.012	1	1.001	[0.986, 1.015]
ORK-10	0.064	0.083	0.583	1	1.066	[0.905, 1.254]
OE	0.449	0.314	2.050	1	1.567	[0.847, 2.898]
Age	-0.069	0.245	0.080	1	0.933	[0.577, 1.509]

Note. Correct classification was the target outcome group.
OE equals obesity exposure.

Table 28

Binary Logistic Regression Results of Multiple Predictors of Correct Classification of Child Weight with Pictorial Classification by Parents

Model	*B*	SE-*B*	Wald	*Df*	Exp(*B*)	95% CI Exp(*B*)
Intercept	-0.063	1.292	0.002	1		
Child sex	-0.166	0.301	0.303	1	0.847	[0.469, 1.53]
PSE	0.001	.007	0.012	1	1.001	[0.986, 1.015]
ORK-10	0.064	0.083	0.583	1	1.066	[0.905, 1.254]
OE	0.449	0.314	2.050	1	1.567	[0.847, 2.898]
Age	-0.063	0.245	0.080	1	0.933	[0.577, 1.509]

Note. Correct classification was the target outcome group.
OE equals obesity exposure.

Conclusion

This chapter described study recruitment and participant demographics, explained analyses performed for each question. Conclusions of this dissertation study will be summarized in Chapter 5.

Chapter Five

The purpose of this dissertation was to examine potential moderating factors for correct and incorrect parental child weight classification in preschool children. Gaining an understanding of modifiable factors that may influence the correct and incorrect classification of child weight can lead to tailored interventions that address these factors and improve parental recognition of weight deviations and willingness to intervene. The factors examined in this investigation were based on components of the Health Belief Model (HBM), which has been used in past research to understand how health beliefs and decision-making processes inspire behavior changes (Dedeli & Fadiloglu, 2011). This chapter summarizes the conclusions of this dissertation study and discusses the findings in relation to the literature and theoretical foundation of the research. The study's implications, strengths, and limitations, and recommendations for future research will be included in the concluding portion of the chapter.

Aim and Research Questions

The aim of this descriptive, correlational, cross-sectional study of parental classification of child weight was to investigate parent's ability to recognize correct weight status and identify if components of the HBM model were predictive of correct classification. The questions guiding this study were:

1. What is the parental rate of misclassification of preschool children as determined by three methods of parental assessment of child weight (coded as correct/incorrect) compared to actual child weight (coded as underweight, healthy weight, overweight, or obese)?
2. Are parents better able to correctly classify child weight scale (coded as correct/incorrect) by identification with a categorical label on a Likert scale

(underweight, healthy weight, overweight, obese), by reporting an actual weight, or by selecting an image representing their child's weight?

3. Does perceived severity as measured separately by the Obesity Risk Knowledge Scale (ORK-10; Appendix B) and the Adolescent Obesity Risk Knowledge Scale (AORK, Appendix C) correlate to the accuracy of parental child weight assessment (correct or incorrect) of the three, parental child weight assessment methods?
4. Do the continuous ORK-10 scores predict parental child weight classification for the three methods of weight classification?
5. Do the continuous AORK scores predict parental child weight classification for the three methods of weight classification?
6. What are the associations of perceived susceptibility (as measured by two separate parental concern questions) and obesity exposure (as measured by one exposure question) to the parental classification of preschool child weight as measured by the accuracy of parental child weight assessment for all three assessment methods?
7. Do perceived barriers as measured by Parental Self-Efficacy for Promoting Healthy Physical Activity and Dietary Behaviors in Children Scale (PSEPAD, Appendix A) correlate with and predict the parental classification of preschool child weight status as measured by the accuracy of parental assessment for all three assessment methods?
8. If sample size allows, does the weighted combination of parental self-efficacy gauged by the PSEPAD score and knowledge of obesity health risks (based on the ORK-10) predict the accuracy of parental classification (correct/incorrect) for all three assessment methods (Likert, visual, and reported weight)?

Sample and Generalizability

Research participant characteristics were thoroughly described in Chapter 4. The following discussion compares the characteristics of the research sample with the characteristics of the population and of other misclassification research. The participants were all caregivers of children ages 2 to 5 years old and their respective child. The sample included 16 sites in Weber and Davis Counties in Utah with sites providing daycare/preschool as well as standalone preschools. This was done to obtain as diverse a sample as possible.

Gender

This sample consisted of mostly mothers (n = 176, 88.8%). Involvement of fathers was slightly higher than other research on parental misclassification (n = 20, 10.1%). This rate of father involvement is higher than Jones et al. (2011) who had a 0.01% rate of father participation and lower than Hearst et al. (2011) who had a sample including 20% fathers. Either fathers or mothers could participate, and the researcher approached either parent that dropped off or picked up the respective children. As this was a convenience sampling, the mix of participants was dependent on who received the survey and whether they choose to participate.

Each classification method had varying levels of accuracy for mothers and fathers. For the Likert method, 57% (n = 12) of fathers were inaccurate while 45.5% (n = 80) of mothers were inaccurate. Both fathers at 66.7% (n = 14) and mothers at 63.6% (n = 112) were more inaccurate with the pictorial method. With the last method of weight-reporting, 55.6% (n = 10) of fathers and 49.1% (n = 81) were inaccurate. This study found no significant difference in father versus mother classification ability.

Regarding child gender, the sample had equal numbers of boys and girls (n = 99). However, one of the preschool boys could not be weighed due to irregular attendance at the

daycare. This study did show that boys were 1.74 times more likely than girls to have their weight misclassified using the Likert method (p = .05). This evaluation was not part of the primary purpose of the dissertation study, but it does confirm previous findings that show parents are more likely to see their sons as normal or underweight and perceive increased weight as normal (Brann 2011; De La O et al., 2009; Hearst et al., 2011; Wald et al., 2007).

Education

This sample included a majority of participants who had at least some college (41.4%, n = 82), a bachelor's degree (27.1%, n = 54), or higher (8.5%, n = 17). The remaining parents had less than a high school education (2.02%, n = 4) or a GED or high school diploma was larger (35.9%, n = 41). The 27.1% of participants in this study who had a bachelor's degree is similar to the 31.1% average seen overall in Utah (USCB, 2016). The rates of education are also similar to those reported in other misclassification research. For example, Meredith-Jones et al. (2016) had 41% (n = 448) of participants with a university degree and 28% (n = 297) completing secondary education or other tertiary qualification.

Income

Participants had a normal distribution with few people falling at either end of the reported amounts. The three highest income ranges were reported at $25,000 to $49,999 (19.2%, n = 37), $25,000-$49,999 (22.1%, n =44), and $50,000-$74,999 (26.1%, n = 52). The state average is $60,727 (USCB, 2016). Given the average rates reported for the two counties surveyed – Davis at $71,112 and Weber at $56,581 (USCB, 2016) – and the larger sample being from Davis County for this dissertation, the income levels are not surprising. Including both counties in the sample allowed for the inclusion of more parents with varied socioeconomic class.

Race

Most participants were white (82.4%, *n* = 164). However, the sample did include a mix of other races that mirror the local population. This includes small percentages of Hispanic (6.1%, *n* =12, black (3.0%, *n* = 6), and multiple races (3.0%, *n* = 6). Given the state's demographic makeup, the number of minorities included in this study was not unexpected. The percentage of each race represented in the study is similar to the state and county make-ups where daycares and preschools were located. Studies done in more diverse areas reported an increased variation of participant race/ethnicity, such as Miller et al. (2016) that had only 39% white, 14% black, 42% Hispanic, and 5% other individuals represented.

Parent Weight

The average parent BMI was 27.20 (*SD* = 6.03), which is considered overweight by CDC guidelines. The median BMI percentile was 25.8, which is also considered overweight, while the 75th BMI percentile was 29.9, which is obese. This shows nearly half of the parents in this study sample were overweight (40.4%, *n* = 80) or obese (7.6%, *n* = 15). However, this rate is lower than or roughly equal to other reported studies. For example, Hudson et al. (2012) reported that 50.4% of participating mothers and 75.3% of fathers were overweight or obese versus this study's 47.7% and 50% respective figures. Meanwhile, Miller et al. (2015) had a similar parental BMI to this study with an average of 27.75 (*SD* = 6.23). As Utah ranks 47 of 51 for the rate of obesity in the United States (Trust for America's Health, 2016), the lower figures for obese and overweight adults in this study are not surprising.

Overall Sampling

Despite the similar sample characteristics and the robust response to the survey, selection bias is a risk with convenience sampling. While this sample sought to include preschoolers in

standalone centers as well as daycares to overcome this, there is a chance that some people who opt not to do preschool or choose to homeschool were missed. The demographic representativeness of this sample compared to the state and counties represented does bode well for the generalizability of the results to this area. Given Utah's lower rates of obesity/overweight and limited racial/ethnic diversity, the results may not generalize well to the national population. Lastly, while it is common for misclassification research to focus on the maternal perspective, this sample does not accurately represent a combined parental perspective or the paternal perspective due to limited father involvement.

Interpretation of Findings Related to Research Questions

How the findings relate to the specific research questions will be described in this section. Questions one and two will be discussed together due to their interrelated nature. However, all further questions will be described in separate sections.

Questions One and Two

This first section discusses the results from the first two dissertation study questions. What is the parental rate of misclassification of preschool children as determined by three methods of parental assessment of child weight (coded as correct/incorrect) compared to actual child weight (coded as underweight, healthy weight, overweight, or obese)? Are parents better able to correctly classify child weight scale (coded as correct/incorrect) by identification with a categorical label on a Likert scale (underweight, healthy weight, overweight, obese), by reporting an actual weight, or by selecting an image representing their child's weight?

This was the first study identified that has compared all three types of commonly used methods to assess parental classification ability in children. One goal was to identify if one of these methods was most accurate regarding parental classification. Misclassification research has

focused on using the Likert method where parents select a written description that most resembles their child, pictorial method where parents selected the image that most resembles their child, and a method where parents report the child's weight in pounds. When looking at just the observed, overall percent of correct versus incorrect responses regarding child weight status, parents had the most accuracy with the Likert method at 53.3% and least accuracy of 35.9% with the ability to select the correct picture showing their child's weight. This dissertation's findings of inaccurate classification for each method – Likert at 46.7%, pictorial at 63.6%, and weight-reporting method at 49.7% – were higher than other findings in the United States, including Peracetic et al. (2012) at 30% and Vuorela et al. (2010) at 31%.

This study's Kappa findings also confirmed that accurate parental perception of child weight was poor, especially by the pictorial method and the Likert method. The low kappa values indicated that parental judgment of weight was not significantly improved over that of mere chance. Meanwhile, parents had a slight agreement between reported weight in pounds and actual child weight category. Parental ability to classify by the weight-reporting method appeared better than the Likert or pictorial method, but this agreement may not accurately reflect parental ability to recognize abnormal weight patterns and may not accurately represent if parents had knowledge of the weight or if they weighed the child before answering. This is discussed further below.

Likert Method. Having parents select written descriptions of their child's weight is the most widely used method to classify parental perception of child weight status. Meredith-Jones, Williams, and Taylor (2016) most recently used this method in New Zealand to understand how 1,093 children were viewed by their parents. Using the Kappa method to test agreement, they found that parents of preschool children had fair agreement ($\kappa = .35$, 95% CI [0.32, 0.39]). Their

result showed more agreement between parental perception and actual child weight, though it was still low. This study's results show that the level of agreement between actual child weight and parental report of child weight was poor ($\kappa = -.03$) when using the Likert Method. These results indicated parents do not identify accurate child weight well using this method, and this was true especially in overweight and obese categories. In this study, 66 children who were overweight or obese were labeled as healthy weight by their parents. This accounted for 78.3% of the misclassification found in this study. This was consistent with other findings using the Likert method for classification that showed parents of overweight and obese children were highly inaccurate with classification (Hudson et al., 2012; Nemecek, Sebelefsky, Woditschka, & Voitl, 2017; Robinson & Sutin, 2016).

Pictorial Method. Miller et al. (2015) found that caregivers generally rated their own child as looking like the one in the middle of the scale. Their results showed a modest correlation between the child's measured BMI percentile and the selected picture ($r = .59$). This dissertation study found that 27.2% ($n = 54$) of parents selected the middle child while more parents (35.9%, $n = 71$) favored the underweight end of the spectrum. These parents selected an image of very underweight or underweight to represent their child. There was almost no agreement ($\kappa = -.03$) between the actual child weight and the selected image.

Weight Method. Gordon and Mellor (2015) used parent-reported weight as a means to gauge accuracy in child weight classification. They considered it correct if the response was within two pounds of the actual child weight. Their results showed that parent-reported weight was within two pounds of the child's actual weight for just under 60% of children. The Gordon and Mellor study had parents fill out a survey in a waiting room at the doctor's office. The parent's report of weight was compared to medical records of weight done on the same day as

the survey. They found 22% of parents of 3- to 5-year-old children underestimated their child's weight by at least two pounds. This dissertation study showed that 36.2% (n = 72) underestimated child weight.

Gordon and Mellor (2015) did not have a comparable measure for how reported weight compared to weight categories of underweight, healthy weight, overweight, or obese. Meanwhile, this dissertation study took the reported weights and actual height measurements to determine where the child would fall on the CDC percentile rankings. With this method of comparison, parents had higher agreement with 50.3% describing accurate weight. The Kappa test also showed a slight agreement between actual child weight and parental report of child weight (κ = .21). Further, parents were asked to write how much the child weighed in pounds, but there was no instruction for parents not to weigh the child before answering or question that asked if they had done so. This means this finding may not accurately reflect if parents knew the weight. Further, this finding showed that parents can indicate a correct weight, but it did not show if parents correctly recognized if the weight was healthy or not.

Significance of findings. This was the first study that examined all three types of classification methods that have been identified in the literature. The Likert method had the most accuracy regarding weight classification at 53.3%, but the report of weight method was second at 50.27%. Whether this difference was statistically significant was not evaluated. The pictorial method was last at 35.9% correct classifications. However, when looking at how much of the percent of misclassification was influenced by misclassifying overweight and obese children, the numbers changed. With the Likert method, 78.3% of the misclassifications were due to misclassification of overweight and obese preschoolers. Misclassification of overweight and obese preschoolers was 54.8% for the pictorial method, and 47.3% for the weight-reporting

method. This finding showed that parents are likely to misclassify the weight of overweight and obese children. However, parents were least likely do so when applying the weight-reporting method. Nevertheless, it was found that misclassifying the child weight in any of the three categories significantly increased the odds of misclassifying weight in the other two categories. The largest association was seen between the Likert method and the pictorial method with a Cramer's $\phi = .47$.

Both the pictorial method and the Likert method required parents to make a judgment about the size of their child. The pound-reporting method simply asked them to supply a number. So, while the parent had to describe the child visually as overweight or underweight with the pictorial method or select a comparably written description with the Likert method, the weight method just asked for a number. It was not determined if parents connected the number to a particular weight classification status, such as healthy weight or overweight, or if parents in this study provided a number after weighing the child themselves. It could be that the total percentage of parents who were accurate in reporting weight, were accurate only because they weighed their child after taking the survey home. The percentage of accurate classifications in this study when applying this method was higher than was found by Gordon and Mellor (2015). Gordon and Mellor performed a waiting room survey where parents filled out the survey while waiting. In the present study, parents were allowed to take the survey home. Consequently, it is likely that some of the parents in this study weighed their child before answering the question.

This study's findings support the idea that parents are better able to correctly classify child weight when using either the Likert method or the child-weight reporting method than they were when using the pictorial method, and that parents were more accurate at identifying the child weight classification of overweight and obese children when using the child-weight

reporting method. However, this finding might have been due to some parents having had knowledge of actual child weight and it did not indicate whether they understood the child's weight status. The Likert and pictorial methods gave visual or descriptive clues to weight status, so they might be better methods to gauge parental misclassifications. Nevertheless, in this study, the Likert method was slightly better in overall accuracy, but the parents were shown to classify child weight best for overweight and obese children when using the weight reporting method.

Question Three

Does perceived severity as measured separately by the Obesity Risk Knowledge Scale (ORK-10; Appendix B) and the Adolescent Obesity Risk Knowledge Scale (AORK, Appendix C) correlate to the accuracy of parental child weight assessment (correct or incorrect) of the three, parental child weight assessment methods? The ORK-10 and AORK total scores were positively correlated (r = .60). Participants scored higher on the AORK (M = 7.03; SD =1.83) than the ORK-10 (M =4.01; SD = 1.97). The ORK-10 mean was similar to that of Swift, Glazebrook, & Macdonald (2006) who performed initial testing of this scale in a non-expert sample (M = 3.81; SD = 1.77). The mean for the AORK was higher than results found in the original validation study (M = 5.89; SD = 2.07), but their sample focused on adolescents with a mean age of 12.9 while this study looked at adults (Rutkowski & Connelly, 2016). Rutkowski & Connelly (2011) previously evaluated the ORK-10 with a dyad of 94 adolescents and their parents with similar scores for adults (M = 5.54; SD = 1.84) to the present study. This showed that this study's sample performed as expected on the knowledge scales. This study also found that the score on the ORK-10 scale did have a small, positive relationship with the parental ability to classify weight using the Likert scale. No significant relationship was identified with

the ORK-10 scale and pictorial or weight-reporting classification methods or between the AORK and Likert, pictorial, or weight-reporting classification methods.

Significance of findings. While comparable studies have used the ORK-10 and AORK scales as described above, no study was identified that looked at parental classification ability related to their knowledge of obesity health risks. This study showed a small, but significant relationship between the total ORK-10 score and parental ability to classify child weight using the Likert scale. At least one study examined a parallel concept with similar results. Berenson et al. (2016) looked at health-risk knowledge in pregnant women and their ability to classify their own weight. The results of Berenson et al. (2016) showed that 51% of the women had low obesity risk knowledge and 31% of them misclassified their own body weight. Therefore, this dissertation's finding that parents with lower ORK-10 scores were more likely to misclassify child weight appears congruent. However, knowledge was not shown to be related to child weight classification for the other reporting methods or based on the AORK scores.

A more significant finding relates to the fact that both parental perceptions of accurate child weight and ORK-10 knowledge scores were consistently low. The inaccuracy was also largely related to parents of overweight and obese children who viewed their child as normal or even underweight. Inability to perceive a child's overweight and obese status and identify how extra weight causes potential health risks are linked to less inclination to encourage healthy nutrition and physical activity (Taschamler et al., 2010). Therefore, this dissertation's finding that parents displayed low knowledge of risk and poor recognition of abnormal weights represents a barrier to preventing and decreasing childhood obesity levels.

This study showed the Likert scale proved slightly more accurate regarding parental perception. Given that the Likert scale proved most accurate, the link between knowledge and

classification via the Likert method could be important for framing future research. The overall low score on the ORK-10 showed that parents' knowledge relating to obesity health risks could be improved substantially. If the relationship between knowledge and Likert classification is supported by other research, then improving knowledge might also lead to an improvement in child weight classification with this method.

Knowledge of obesity health risks should be considered when addressing body weight in young children. It is a logical step to include obesity health risks assessments at physician offices and public health centers. Given that most parents reported taking their child to their well-child visits each year and would be willing to intervene if a problem was noted, a quick knowledge assessment could be a starting point for conversations about how child weight can affect future health status. Improvements in knowledge have already been linked to better intervention outcomes with studies like Mazloomy-Mahmoodabad et al. (2017) where adolescent participants were found to have a significant decrease in mean weight, BMI, and waist circumference, as well as increased knowledge six weeks after the intervention, ended.

This was the first study identified that explored the connection of knowledge of health risks to the parental perception of weight, and it revealed an important link. Knowledge is a factor that can be modified through intervention. Future research needs to explore how knowledge of health risks can be improved in parents, especially in those who already have overweight and obese child. Changes in knowledge of health risks could result in improved awareness of healthy weight and a better understanding of how weight affects long-term health in children. This is something that can be explored with future research.

Question Four

Do the continuous ORK-10 scores predict parental child weight classification for the three methods of weight classification? The ORK-10 score was found to be a statistically significant predictor of correct classification with the Likert method. For every one-unit score increase in the ORK-10 scores, parents were 1.2 times more likely to have a correct classification of weight. However, neither the pictorial method nor the weight-reporting method could predict parental accuracy in classification.

Significance of findings. As described earlier, the Likert method was the most accurate in determining classification accuracy. Therefore, given the predictive ability of ORK-10 scores and the low scores observed, knowledge could be an underexplored factor that can improve classification and serve as a talking point to discuss child weight between health providers and parents. Helping parents understanding how weight is related to the future health of young children is something that could be incorporated into well-child visits each year. This appears to be especially important for parents who already have an overweight or obese child given the inaccurate perceptions identified in this study. Future research should focus on not only creating a prevention message to use for the general population, but also on creating a focused message geared toward parents who already have an overweight or obese child. Parents may need to perceive their child at risk for health concerns to have a cue to action and change, which is an important part of the HBM. Creating an intervention and gauging its effectiveness to improve knowledge and see how this corresponds to a willingness to change should be explored in future research.

Question Five

Do the continuous AORK scores predict parental child weight classification for the three methods of weight classification? The AORK scores did not have any significant prediction ability with any of the three classification methods of pictorial, weight-reporting, or Likert. This question was examined as obesity risk knowledge has been posited as an important factor to spur behavior change, though limited research has examined what is known about the risks and its long-term effects (Rutkowski & Connelly, 2011). This study showed that parents were better able to accurately answer questions on the AORK scale versus the ORK-10. However, the AORK scale did not prove to have significant relationships.

Significance of findings. Based on these findings, the AORK scale may not be the best tool to evaluate the relation of parental knowledge and their child weight classification ability. These results could be related to the scale's internal consistency. The AORK scale had a Cronbach's alpha of .68 when it was developed, which is lower than the usual criterion of .70 for an adequate alpha score (Polit & Beck, 2017). Higher values of Cronbach's alpha show better improved internal consistency on a scale (Polit & Beck, 2017).

This dissertation study provided new information about the predictive validity of this measure to gauge knowledge in adults in relation to actual child weight classifications. Given the clustering of means at the high end and non-significant predictive ability, it appears this scale is not well-suited for understanding factors that contribute to parental child weight misclassifications.

Question Six

What are the associations of perceived susceptibility (as measured by two separate parental concern questions) and obesity exposure (as measured by one exposure question) to the

parental classification of preschool child weight as measured by the accuracy of parental child weight assessment for all three assessment methods? This study revealed that regardless of the child's current weight status, parents were largely unconcerned about the child's future weight. The results showed 89.4% of parents either reported being "unconcerned" or "a little concerned" about their child's future weight. Parents concern over the future weight status of children in the nation was evenly spread across the five possible categories with the highest result of 24.2% for "a little concerned." However, this study did not show any significant relationship between the level of concern of parents over the future weight of either their own child or children in the nation with classification ability by any method. In contrast, Almoosawi et al. (2016) found that parents who did not correctly classify their child's weight status nevertheless had a higher chance of being concerned about their child's future weight. In addition, Parkinson et al. (2011) found that 46% of mothers were concerned about their child becoming overweight in the future, and concern was correlated to all of the overweight measures including BMI, skinfold score, and waist circumference. The results of the present study did not support the findings of these other recent investigations. Concern was not found to be related to child weight misclassification.

Both of the two identified studies that looked at the relationship of concern and parental classification of child weight were conducted in the United Kingdom with larger sample sizes. It could be that a difference in concern exists solely because of population differences. Obesity prevalence was 39.8% and affected 93.3 million US adults from 2015 to 2016 (CDC, 2017). The United Kingdom of Great Britain and Northern Ireland, where the two comparison studies were conducted, had obesity rates of 26.9% in 2008 (WHO, 2013) versus 33.7% in the United States in 2008 (CDC, 2017). These weight differences could change views on current and future weight status and its importance.

This current dissertation study also sought to better understand the connection of exposure to overweight and obesity status and classification ability. Most of this sample reported having family members who would be considered overweight at 74.2%, while fewer reported obesity in the family (41.9%). Having a family history of overweight status did not prove significant to the ability to correctly classify child weight. In fact, no significant relationship was found between overweight history and any of the three classification methods. Likewise, having a family history of obesity exposure had no significant relationship to correct weight classification using the Likert or weight-reporting method. However, with the pictorial method, parents who had obesity exposure had a significantly higher chance of correctly classifying weight.

Significance of findings. This study's findings mirrored others where parents had little to no concern over their child being overweight or obese (Adams et al., 2005; Eckstein et al., 2006; He & Evans, 2007). A previous review posited that a large amount of misclassification may be linked to a distorted parental understanding of what an overweight child looks like due to popular media only using severely obese children as examples (Lundhal et al., 2014). This same concept could explain why parents are not concerned with their child's weight status. If they only view higher weights as a problem, then their view of when to be concerned as well as what is an abnormal weight could be distorted. This study showed that parents who identified overweight family members in their family history had no better perception of weight than others. It was only when people identified obesity in their family history that perception improved. Parents who had a family history of obesity were found to classify weight more accurately via the pictorial method in this dissertation study. This finding is important because it showed that only large variations from normal weight are linked to changes in perception, and this was only seen

when parents selected weight representations on a visual scale. It could mean that parents with that exposure to obesity have a more accurate visual template than the generalized misrepresentations seen in mainstream media and society.

However, if parents only can identify abnormal weight when they are exposed to extremes in their family, it can be problematic for prevention and intervention strategies. This could mean that parents may not notice a weight problem in their child or be motivated to do something until it becomes extreme.

Further, if children's parents do not accurately perceive weight, it could have an effect on the child as well. Children themselves could experience distortion in how they view weight, further perpetuating the problem. There is evidence that multi-level modeling can affect how children even see themselves if they are exposed to overweight and obesity in both their home and their school environment (Maximova, McGrath, Barnett, O'Loughlin, Paradis, & Lambert, 2008). Children who see overweight and obese people in their environment regularly thus can develop inaccurate perceptions of what constitutes appropriate weight (Maximova et al., 2008). If children themselves are inaccurate, then the problem becomes compounded and intervention/prevention success could be negatively impacted. This last idea was not explored in this dissertation study, but examining concern of both the parent and the child as well as their perceptions may provide important results with future research.

Question Seven

Do perceived barriers as measured by Parental Self-Efficacy for Promoting Healthy Physical Activity and Dietary Behaviors in Children Scale (PSEPAD, Appendix A) correlate with and predict the parental classification of preschool child weight status as measured by the accuracy of parental assessment for all three assessment methods? The PSEPAD scale

covered parent self-efficacy for both dietary and physical activity (Bohman et al., 2013). Previous use of this scale did not include reporting of comparable total scores. However, this dissertation study found parents had a negative skew with scores at the 25th percentile equaling 113 and at the 75th percentile equaling 140. The mean was 125 (*SD* = 20.71). The point-biserial correlation showed that there was no statistically significant relationship between parental classification ability in any of the three methods and parental self-efficacy scores. The PSEPAD score did not predict correct classification based on any of the three methods.

Garrett-Wright (2011) also looked at self-efficacy, though she used the Parenting Sense of Competence Scale that is more generic to the ability to handle child problems. Similar to her findings, this dissertation study found parents had a high level of perceived efficacy. Garrett-Wright (2011) did not find any significant relationship between parental self-efficacy and parental ability to correctly classify weight. However, she did note a problem of a low Cronbach's alpha at .53, which she felt limited the validity of her findings. Further, the scale she used was a more general tool. This dissertation study used a tailored self-efficacy tool to pinpoint efficacy for behaviors known to influence obesity. Even so, the findings of the current study were in concert with the findings of Garrett-Wright (2011). Self-efficacy was not related to parental child weight misclassification.

Significance of findings. This study and the student by Garrett-Wright (2011) did not find a relationship between self-efficacy and classification. It may be that self-efficacy is not important in classification. However, future research could still look at whether it might be used to tailor appropriate interventions to impact weight issues instead. After all, the connection of parental self-efficacy and healthy behaviors like eating fruits and vegetables and increased physical activity in children has been well-established (Campbell et al., 2010; Loprinzi et al.,

2013; Ice et al., 2014; Parekh et al., 2018; Wright et al., 2014; Xu et al., 2015; Xu et al., 2014). Two studies showed lower parental self-efficacy scores were related to higher body mass index in children (Ice et al., 2014; Ekim et al., 2016). Hence, although this study did not confirm parental self-efficacy being significantly related to parental child weight misclassifications, other research has found it is related to actual child weight.

Question Eight

Does the weighted combination of parental self-efficacy gauged by the PSEPAD score and knowledge of obesity health risks (based on the ORK-10) predict the accuracy of parental classification (correct/incorrect) for all three assessment methods (Likert, visual, and reported weight)? The ORK-10 scale remained a statistically significant predictor for correct classification using the Likert method. For every one unit increase in the ORK-10 score, parents were 0.82 times as likely to predict their child's weight when controlling for the PSEPAD score. Correct classification could not be predicted for either of the other two methods of child weight classification. However, given the earlier results regarding the Likert's improved ability to detect classification and the ORK-10's previous association to correct classification, this result was not surprising. This finding showed that the proposed relationship between accurate parental perceptions of the child's body weight and their knowledge is a plausible connection. However, parental self-efficacy had no significant relationship. Both knowledge and self-efficacy are considered part of the Health Belief Model (HBM) that was used to frame this study. While knowledge may be related to parental ability to perceive child weight using the ORK-10 scale, the tool used for self-efficacy was not statistically related when ORK-10 scores were held constant.

However, the relationships of both ORK-10 and PSE scores were strengthened when examined with known affecting factors like obesity exposure, child sex, and parental age. In fact, both the ORK-10 and PSE scores were found to be significant when compared to classification by the Likert method. Child sex also retained significance in the final model.

The information provided may still be useful for framing interventions as it identifies parental efficacy toward healthy behaviors in children that can combat obesity or overweight issues.

Significance of findings. The finding shows that obesity risk knowledge as well as PSEPAD scores have a connection with the ability to classify weight by Likert method. These results, however, were not true of either the pictorial method or the weight-reporting method. This could be because the parents were evenly split in their ability to correctly classify weight by the weight-reported method. As noted earlier, this result may not be related to parents actually understanding what the weight meant or even to whether the parents knew the weight without weighing the child. Meanwhile, with the pictorial method, parents were largely inaccurate at identifying weight with most parents choosing underweight images of their children that did not correspond to actual child weight.

The combined model provided new information about the connections between variables that warrants further exploration. The proposed model in this study showed only direct effects of the HBM principles. However, it is clear that this is not accurate. This study's results show an indirect, partially mediating effect of perceived barriers (self-efficacy) through severity (knowledge) on parent's ability to assess child weight accurately. Further, child sex acts a mediator that suppresses part of the ORK-10 effect and is unrelated to its acting as a suppressor of the variance of the PSEPAD's relationship to Likert accuracy. Both barriers and severity were

found to be significantly related to parental classification ability by the Likert method. It is therefore important to further explore these connections with additional research. As these components are integral in the HBM model, finding a way to incorporate these items into intervention and prevention strategies and gauge their impact on child weight/parental awareness is something that should be explored.

Further, given the Likert method having the most accuracy by percentages obtained, the results of this dissertation and the connections among classification ability, PSEPAD score, and ORK-10 scores is important. Both knowledge and PSEPAD scores are easy, quickly testable measures. These items are also grounded in HBM principles that suggest perceived severity, which was linked to knowledge in this study, and perceived barriers, which was linked to efficacy in this study, are important components needed for health behavior change. The link established through this study with perceived severity and perceived barriers to appropriate recognition suggests that these items are also related to the ability to recognize a problem as demonstrated by correct classification of weight.

Health care providers must be aware of not only the child's weight, but also factors that affect recognition and understanding of what weight means. Both the PSEPAD and the ORK-10 may provide a useful tool when crafting interventions or prevention strategies as the PSEPAD shows how confident parents are with specific behaviors that support healthy weight and the ORK-10 shows how much knowledge parents have of how weight relates to health risks. This is something that could be looked at in future research to see if the scale can help provide useful information to frame intervention or prevention efforts.

Limitations

The use of a convenience sample limits the generalizability as parents who agreed to participate may have different sentiments about weight in preschool children than those who did participate. Reasons for not participating were not tracked for the 217 people who did not return surveys. Most of these non-returned surveys resulted when surveys were sent home with children and parents were asked to return if they were willing to participate. Therefore, why they chose not to participate could not be identified. The participants in this sample also were mostly white females with at least some college. Also, while the racial and ethnic composition was similar to that of Utah and the areas where sampling occurred, it is not comparable to other areas. This study also focused on parents of preschool children only so the results may not represent parents of infants or adolescents. These findings affect the ability to generalize results, and, therefore, they cannot be said to apply to all or even most parents of preschool children.

The study design a descriptive, cross-sectional approach was also limiting as it looked at weight and opinions only at one point in time. Looking at misclassification at just one point may not be representative of the fluid nature of thinking and perception. The impact of life events and experiences, as well as changes in knowledge and health, could vary over time and thus affect perception. Given the limited findings regarding how the HBM model relates to the perception of child weight, the cross-sectional approach was appropriate. However, it does still carry limitations that need to be acknowledged.

There is also a concern regarding a parental report of weight. The study questionnaire asked parents to report the weight of their preschool child in pounds. There was not a statement that asked parents to report this without actually weighing their child. Also, there was not a question that asked if the parents did weigh their child prior to answering this item. This means

that accuracy or inaccuracy in the parent report of weight cannot be separated from whether the parent used a scale or not. It could be that the large percentage of parents who were accurate in reporting weight, were accurate only because they actually weighed their child.

Theoretical Implications

The Health Belief Model (HBM) provided the theoretical framework for this study. The HBM has successfully been used to understand how health beliefs and decision-making processes inspire behavior changes (Dedeli & Fadiloglu, 2011). It was therefore theorized that the three most influential components of this model – perceived susceptibility, perceived barriers, and perceived severity – may be linked to parental ability to correctly classify weight as well. As these components have been linked to successful change, the theory was they might be modifiable factors affecting classification ability that could lead to future intervention and prevention strategies. This theoretical foundation was useful in understanding this study's results and future implications.

Findings in this study relating to perceived barriers as examined through the PSEPAD and perceived severity as examined by the ORK-10 show a significant relationship to parental classification with the Likert method. Further the results of low ORK-10 scores and moderate PSEPAD scores are below optimal thresholds and thus have potential for improvement. This study offers new information that shows that parents have the most accuracy with classifying weight using the Likert method. Findings related to the predictive ability of the ORK-10 scale and PSEPAD with the Likert method of classification also show that perceived barriers and perceived severity from the HBM may be important for understanding parental perceptions of child weight. ORK-10 knowledge and PSEPAD identification of efficacy toward promoting

healthy behaviors can also provide information about modifiable factors that can be used to frame future interventions.

This study's findings link these two HBM components to classification ability, but future research could identify how they also relate to change. Susceptibility has previously been connected to the readiness for change in the HBM while barriers have been linked to inhibiting actions (Dedeli & Fadiloglu, 2011). Interventions could be created to target improved knowledge and improved efficacy relating to specific behaviors that affect healthy weight. It is plausible to conclude that increased knowledge and parental self-efficacy toward healthy behaviors may improve the accuracy of how parents perceive child weight and health.

This study also showed that concern as a measure of perceived susceptibility was not linked to classification ability. Parents in this sample were unconcerned about their child's future weight, despite the fact that 36.9% of children were already overweight or obese, and that weight issues were common in the reported family histories. So, while this component of the HBM was not connected to classification, it is still of interest. In the very least, these findings should be concerning for health care providers because many parents showed a general lack of awareness about their child's accurate weight. Further, if parents do not recognize weight is a problem, the likelihood of them acting on the child's behalf is not good.

While not part of the three examined components of the HBM, there was also an important finding regarding parental health behaviors. Parents reported attending yearly well-child checks and noted they would be willing to intervene if a health provider told them that their child had a weight problem. These findings coupled with the lack of concern suggest child weight is an important concept that should be discussed with parents. Considering the reported willingness to intervene and the regular visits for check-ups, it is also very concerning that only

two parents reported being notified by a healthcare provider that their child had an issue with weight. This is not in line with the number of overweight and obese children in the sample. Given that most parents reported taking their child to the yearly appointment, more parents should have been told of abnormal weights.

If parents are supportive of being told their child has weight issues and would be inclined to intervene as this study's findings suggest, then communication needs to be improved between health care providers and parents. This finding points to the need for nurses or other healthcare providers to talk to parents about their child's weight and tell them when a weight problem may be developing. Given varied efficacy levels toward promoting healthy behaviors and limited knowledge of weight-related health risks, it is important to gauge how parents fare in these categories. It may be important to intervene relating to these items for parents to understand why child weight is important and how they can affect it. Addressing weight issues requires that providers can discuss issues openly and honestly with parents and that there be a collaborative approach to take action on behalf of children. Parents must perceive that a child has a problem and identify the risks associated with weight.

Recommendations for Future Research

This study showed that parents mostly had a lack of concern about their child's future weight, regardless if the child was currently overweight/obese or healthy weight. This study showed 59.6% (n = 118) had no concern over the future weight of their child and that there was no association between concern and correct classification by any method. This contradicts earlier research where concern was linked to classification (Almoosawi et al., 2016; Regber et al., 2012). This study was not able to understand why concern was different from previous findings. It would be helpful to know if parental beliefs, such as thinking the child would grow out of

weight issues or that a heavier weight was healthier, are part of the lack of concern or if there are other factors affecting the level of concern.

In this study, concern was used as a measure for perceived susceptibility. While no connections were found between concern and weight classification, there may be other measures for perceived susceptibility that are important in classification. As mentioned above, parental beliefs about child weight and children growing out of issues may be important to consider. Future research should explore other measures for perceived susceptibility to see if there are connections. It could also be that the lack of concern, although not relevant to classification, may be something of importance in an intervention study. An approach to better understand concern could involve the use of quantitative methods, such as questionnaires and investigator-assessed child height/weight, coupled with qualitative interviews or focus groups to probe further into why parents are not concerned about their child's weight.

As this study showed that PSEPAD and ORK-10 scale scores are significantly related to parental classification ability, future research should focus on creating interventions to address these factors. It would be important to see if improvements in these scores correlate to improved awareness of child weight and if targeting these items can improve actual child weight or engagement in healthy behaviors.

Implications for Nursing Practice

Considering the known, significant consequences for childhood obesity, teaching children and parents' habits for healthy lifestyles is imperative and can help minimize the risks associated with increased weight (Bridger, 2009). Health teaching is recognized to help people understand influential behaviors and replace them, when necessary, with new, more appropriate behaviors (Mazloomy-Mahmoodabad et al., 2017). In the preschool population, parental

recognition of child body weight is imperative to inspire behavior modifications in the home (Eckstein et al., 2006). This study corroborated previous findings showing that parents have a difficult time identifying appropriate body weight in their children, and that this problem is significantly exacerbated when the child is overweight or obese (Chaparro et al., 2011; Hudson et al., 2009; Maynard et al., 2003). Research has shown that a parent's perception of weight status can influence both parents and their child's healthy behaviors (Leary et al., 2014).

Nurses are in a strategic position to intervene and help parents more accurately understand the child's weight and any parental perceptions of what constitutes appropriate weigh for their child. As parents in this study report going to regular child checkups, there is an avenue where weight can be discussed. Weight should be part of the conversation when discussing the child's current and future health. This new finding that parents would be inclined to do something if their child was overweight or obese is important as it shows a willingness to listen. If a weight problem is developing in a preschool child, parents need to understand this and be given resources to address this. At this age, it is not about drastic dieting or exercise, but changing what habits, tastes, and activities the child is being exposed to create a healthier environment.

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Appendix A

PSEAD Scale

Please answer how confident you are that you can …

1. How confident you are that you can promote healthy eating habits for your child?
2. How confident you are that you can arrange eating regular meals together in the family?
3. How confident you are that you can restrict consumption of soft drinks by your child to no more than twice a week?
4. How confident you are that you can make possible for your child to eat meals according to the plate model?
5. How confident you are that you can have your child eat fruit and vegetables every day?
6. How confident you are that you can prevent your child from snacking between meals?
7. How confident you are that you can limit visits at fast-food restaurants to maximally 1-2 times a month?
8. How confident you are that you can get your child engaged in physical play indoors and outdoors?
9. How confident you are that you can prevent your child from snacking between meals?
10. How confident you are that you can arrange opportunities for you and your child to be physically active together, for example, play outdoors?
11. How confident you are that you can set limits for your child in everyday life, for example, the number of servings of ice cream per week or the duration your child may watch tv?
12. How confident you are that you can influence diet and physical activity routines?
13. How confident you are that you can set limits at visits at grandparents or other relatives, for example, about eating candy?
14. How confident you are that you can set limits for your child if it is influenced by advertisement for unhealthy food and heavily insists that you buy something he or she has seen on tv?

15. How confident you are that you can set limits against negative influence from your child's peers, for example, peers who may eat cookies in front of the tv at dinner time?
16. How confident you are that you can resist your child's nagging, for example, about frequently buying candy, ice cream, cookies, etc.?

Appendix B

Ork-10 Scale

1. A person with a “beer-belly” shaped stomach has an increased risk of getting diabetes.
2. Obesity increases the risk of getting bowel cancer.
3. An obese person who gets diabetes needs to lose at least 40% of their body weight for clear health benefits.
4. Obese people can expect to live as long as non-obese people.
5. Obesity increases the risk of getting breast cancer after menopause.
6. Obesity is more a risk to health for people from South Asia (e.g. India and Pakistan) than it is for White Europeans.
7. There is no major health benefit if an obese person who gets diabetes loses weight.
8. Obesity does not increase the risk of developing high blood pressure.
9. It is better for a person’s health to have fat around the hips and thighs than around the stomach and waist.
10. Obesity increases the risk of food allergy**.**

Appendix C

AORK Scale

1. A person who has diabetes can sometimes get better by losing weight.
2. Obese people have more of a chance of getting stomach cancer.
3. It is less of a health problem when a person has fat around the stomach and waist than if someone has fat around the hips and thighs.
4. When parents are obese, it is more likely that their children will become obese.
5. On average, obese people do not live as long as people with normal weight.
6. Obesity increases the risk of getting breast cancer in women.
7. “Being obese” and “being fat” mean different things.
8. Drinking one soda every day is something that can contribute to a person becoming obese.
9. Obesity can often cause problems with your heart.
10. Being fat when you are in middle school is less of a problem because it is easy for teenagers to lose weight.

Appendix D

Relationship of Early Childhood and Family Health Questionnaire

questions to HBM components

Table 2: Relationship of Early Childhood and Family Health Questionnaire questions to HBM and Variables			
Knowledge			
Parent	*Child*	*Family*	*Category of HBM*
AORK/ORK-10 Knowledge Scale (20 questions)			
"A person who has diabetes can sometimes get better by losing weight." True False Don't Know	N/A	N/A	Perceived Severity
"Obese people have more of a chance of getting stomach cancer." True False Don't Know	N/A	N/A	Perceived Severity
"It is less of a health problem when a person has fat around the stomach and waist than someone who has fat around the hips and thighs." True False Don't Know	N/A	N/A	Perceived Severity
"When parents are obese, it is more likely that their children will become obese." True False Don't Know	N/A	N/A	Perceived Severity
"On average, obese people do not live as long as people with normal weight." True False Don't Know	N/A	N/A	Perceived Severity
"Obesity increases the risk of getting breast cancer in women." True False Don't Know	N/A	N/A	Perceived Severity
"'Being obese' and 'being fat' mean different things." True False Don't Know	N/A	N/A	Perceived Severity
"Drinking one soda every day is something that can contribute to a person becoming obese." True False Don't Know	N/A	N/A	Perceived Severity

"Obesity can often cause problems with your heart." True False Don't Know	N/A	N/A	Perceived Severity
"Being fat when you are in middle school is less of a problem because it is easy for teenagers to lose weight." True False Don't Know	N/A	N/A	Perceived Severity
"Obesity increases the risk of getting bowel cancer." True False Don't Know	N/A	N/A	Perceived Severity
"An obese person who gets diabetes needs to lose at least 40% of their body weight for clear health benefits." True False Don't Know	N/A	N/A	Perceived Severity
"Obese people can expect to live as long as non-obese people." True False Don't Know	N/A	N/A	Perceived Severity
"Obesity is more of a risk to health for people from South Asia (e.g. India and Pakistan) than it is for White Europeans." True False Don't Know	N/A	N/A	Perceived Severity
"Obesity increases the risk of getting breast cancer after menopause." True False Don't Know	N/A	N/A	Perceived Severity
"Obesity does not increase the risk of developing high blood pressure." True False Don't Know	N/A	N/A	Perceived Severity
"There is no major health benefit if an obese person who gets diabetes loses weight." True False Don't Know	N/A	N/A	Perceived Severity
"Obesity does not increase the risk of developing high blood pressure." True False Don't Know	N/A	N/A	Perceived Severity

"It is better for a person's health to have fat around the hips and thighs than around the stomach and waist." True False Don't Know "Obesity increases the risk of getting a food allergy." True False Don't Know	N/A	N/A	Perceived Severity
Self-efficacy			
PSEAD scale (16 questions)			
Parent	*Child*	*Family*	*Category of HBM*
Please answer how confident you are that you can … 0 is not confident at all and 10 is extremely confident			Perceived barriers Perceived barriers
How confident you are that you can promote healthy eating habits for your child? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers
How confident you are that you can arrange eating regular meals together in the family? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers
How confident you are that you can restrict consumption of soft drinks by your child to no more than twice a week? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers Perceived barriers
How confident you are that you can make possible for your child to eat meals according to the plate model? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers
How confident you are that you can have your child eat fruit and vegetables every day? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers
How confident you are that you can prevent your child from snacking between meals? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers
	N/A	N/A	Perceived barriers

How confident you are that you can limit visits at fast-food restaurants to maximally 1-2 times a month? 0 1 2 3 4 5 6 7 8 9 10			
How confident you are that you can get your child engaged in physical play indoors and outdoors? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers
How confident you are that you can prevent your child from snacking between meals? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers
How confident you are that you can arrange opportunities for you and your child to be physically active together, for example, play outdoors? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers
How confident you are that you can set limits for your child in everyday life, for example, the number of servings of ice cream per week or the duration your child may watch tv? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers
How confident you are that you can influence diet and physical activity routines? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers
How confident you are that you can set limits at visits at grandparents or other relatives, for example, about eating candy? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers
How confident you are that you can set limits for your child if it is influenced by advertisement for unhealthy food and heavily insists that you buy something he or she has seen on tv? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers
How confident you are that you can set limits against negative influence from your	N/A	N/A	Perceived barriers

child's peers, for example, peers who may eat cookies in front of the tv at dinner time? 0 1 2 3 4 5 6 7 8 9 10 How confident you are that you can resist your child's nagging, for example, about frequently buying candy, ice cream, cookies, etc.? 0 1 2 3 4 5 6 7 8 9 10	N/A	N/A	Perceived barriers
Concern			
Parent	*Child*	*Family*	*Category of HBM*
N/A	"How concerned are you that your child will become overweight in the future?" Unconcerned A little concerned Concerned Fairly concerned Very Concerned	N/A	Perceived Susceptibility
N/A	Are you concerned about the number of overweight children in the nation? Unconcerned A little concerned Concerned Fairly concerned Very Concerned	N/A	Perceived Susceptibility
N/A	"If a medical professional told you your child is overweight, how concerned would you be?" Not at all concerned Slightly concerned Somewhat concerned	N/A	Perceived Susceptibility

	Moderately concerned Extremely concerned		
	"If a medical professional told you your child is obese, how concerned would you be?" Not at all concerned Slightly concerned Somewhat concerned Moderately concerned Extremely concerned		Perceived Susceptibility
	"How likely would you be to do something about it?" Not likely Slightly likely Somewhat likely Moderately likely Extremely likely		Perceived Susceptibility
Weight			
Parent	*Child*	*Family*	*Category of HBM*
"How much do you weight?" "How tall are you?"	"How much does your child weight?"	N/A	N/A
"How do you describe yourself in terms of weight?" Underweight Healthy Weight Overweight Obese	How do you describe your child in terms of weight? Underweight Healthy weight Overweight Obese	Would you consider one or more of your family members as overweight? Yes No	N/A

N/A N/A N/A N/A	N/A “Which picture best represents your child? Please circle one.” “Do you feel losing weight could improve or eliminate any of these health conditions for your child?” Yes No How much control do you feel you have over a child’s weight in the 2- to 5-year-old age group? No control Slight control Some control Moderate control Extreme control	“Would you consider one or more of your family members as obese?” Yes No N/A N/A	N/A N/A Benefits Perceived barriers
Health			
Parent	*Child*	*Family*	*Category of HBM*
“Do you have an annual check-up?” Yes No	“Do you take your child to an annual check-up?”	N/A	Health Value

	Yes No		
"How many times have you been to the doctor for yourself over the past 12 months?" None One Two Three or more	"How many times have you taken this child to the MD over the past 12 months?" None One Two Three or more	N/A	Health Value
"Do you seem to be less healthy than other adults you know?" Yes No	"My child seems to be less healthy than other children I know." Yes No	N/A	Perceived Susceptibility
"Do you seem to be healthier than other adults you know?" Yes No	"My child seems to be healthier than other children I know?" Yes No	N/A	Perceived Susceptibility
"Do you have a diagnosis of any of these diseases?" Depression Diabetes Heart disease Hypertension Hyperlipidemia	N/A	"Do you have a family history of any of these diseases?" Depression Diabetes Heart disease Hypertension Hyperlipidemia	Perceived Susceptibility
"Do you have any other chronic health conditions?" Yes No	"Does your child have any chronic health conditions?" Yes No	N/A	Perceived susceptibility

		"Do you feel that weight is related to improving or eliminating any of these conditions?" Yes No	N/A
"If yes, what conditions do you have? Please list any conditions that have been diagnosed by an MD and/or that the child is being treated for."	"If yes, what conditions does your child have? Please list any conditions that have been diagnosed by an MD and/or that the child is being treated for."		
"Do you feel losing weight could improve or eliminate any of these health conditions?" Yes No	"Do you feel losing weight could improve or eliminate any of these health conditions for your child?" Yes No	N/A	Benefit
Exposure			
Parent	*Child*	*Family*	*Category of HBM*
N/A	N/A	"Has anyone in your family had any of health issues related to obesity?" Yes No	Perceived Susceptibility
N/A			
N/A	"Has a health care provider ever mentioned concern about your child being overweight or obese?"	Please list any obesity-related illnesses you or anyone in your family has had? N/A	Perceived Susceptibility
Demographic factors			

Parent	*Child*	*Family*	*Category of HBM*
"Which category below includes your age?" 18-20 21-29 30-39 40-49 50-59 60 or older	"How old is your child?"	N/A	N/A
"What is your gender? Male Female Other	"What is your child's gender?" Male Female Other	N/A	N/A
"Please select your race/ethnicity." White Black or African-American American Indian or Alaskan Native Asian Native Hawaiian or other Pacific Islander From multiple races Other race/ethnicity, please specify	"Please select your child's race/ethnicity." White Black and African American Asian Native Hawaiian or other Pacific Islander From multiple races Some other race, please specify	N/A	N/A
"How much total combined money did all members of your household earn last year?" 0-$9,999 $10,000 to $24,999 $25,000 to $49,999 $50,000 to $74,999 $100,000 to $124,999 $125,000 to $149,999 $150,000 to $174,999 $200,000 or more	N/A	N/A	N/A
"What is your education level?" Less than high school degree High school or equivalent (i.e. GED) Some college but no degree	N/A	N/A	N/A

Bachelor's degree Graduate degree (masters or Ph.D.) N/A	N/A	"How many children are your household?"	N/A
Role			
Parent	*Child*	*Family*	*Category of HBM*
"What is your family role?" Mother Father Grandparent Relative Legal Guardian Other, please list	N/A	N/A	N/A

Appendix E

Early Childhood and Family Health Questionnaire

Idaho State University

Parents:

Volunteers wanted for a research study

We would like to hear from parents of 2- to 5-year-old children to learn more about childhood health, weight, and its relationship to families.

Any legal guardian who is 18 years or older and has a child between 2 and 5 can participate in this child health study. We want to hear from mothers, fathers, and others who fill this important role in a child's life.

As part of this survey, you would complete a written questionnaire that will take roughly 10 to 20 minutes to complete. We are also asking your permission to weigh your children and measure their height at the daycare or school they are attending.

Only one child in a family and one caregiver may participate.

This study will allow for increased knowledge that will provide information to pinpoint barriers to healthy weight and lifestyle and eventually help tailor effective interventions in the 2- to 5-year-old population.

Your time and help would be greatly appreciated. We are also entering all participants into a drawing to receive $50 gift card to Amazon as a small thank you for your help.

This research is being conducted by Tanna Woods, RN, MSN who is a Ph.D. candidate in nursing at Idaho State University. You may reach her by calling 801-725-3183 or by emailing her at woodtann@isu.edu for any additional questions or information.

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Consent Form

Dear Parent or Guardian:

Hello, you are receiving this because you have a child who is between 2 and 5 years old. I am a registered nurse in Utah who is working on research approved by Idaho State University. I am exploring issues related to childhood health. For this research, I need to ask parents to participate in a written survey that any legal guardian who is 18 or older can fill out. I am also asking your permission to weigh and measure your child's height.

The weight and height measurement will occur at the daycare or school your child attends. I would ensure that one of the day care workers are with your child when this occurs. I would also make sure that your child was ok with being weighed and measured too.

This information is needed as part of the Early Childhood and Family Health Questionnaire that you are being asked to fill out. The purpose of this survey is to gain insight into childhood health issues. It is our hope that this survey will contribute to better understanding of childhood health, weight issues, and knowledge of disease risk so more effective prevention and intervention programs can be created.

The child's weight and height will be anonymous. The child's name will not be reported on any findings. The results of both the parental survey and child height and weight will be reported in the aggregate, meaning that results are general and not identifiable to any one individual. Collection of the name of the child is necessary for the researcher to ensure the correct child is paired with the correct parent for analysis. Once the parent survey and child height and weight information are obtained, the investigator will assign a unique identifier and remove all names. Use of unique identifiers assigned by the investigator will ensure the privacy of this information.

Consent and participation of both the parent and child are voluntary and either the parent or child may withdraw at any time. There is no reward for participating or consequences for not participating.

There are two copies of this letter. Keep one copy for your records and return the other signed copy to your child's school or daycare. If you agree to allow your child to participate, please sign below. Thank you in advance for your cooperation and support.

For further information about this research, please contact Tanna Woods at 801-725-3183, email: wood.tann@isu.edu. If you have questions about your rights as a research participant, contact the Idaho State University Human Subjects Committee/IRB at 208-282-2179

Parents Signature: _____

Parent Name: _____ (Please print)

Child's Name: _____ (Please print)

Date: _____

Do you want to be included in a drawing for a $50 Amazon gift card after study completion? The winners will be selected from participants in a drawing at the end of the study and the gift cards will be given to the daycare facility to distribute to the appropriate winners.

Please circle **Yes** or **No** if you want to be included.

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Consent Form

Dear Parent or Guardian:

Hello, you are receiving this because you have a child who is between 2 and 5 years old. I am a registered nurse in Utah who is working on research approved by Idaho State University. I am exploring issues related to childhood health. For this research, I need to ask parents to participate in a written survey that any legal guardian who is 18 or older can fill out. I am also asking your permission to weigh and measure your child's height.

The weight and height measurement will occur at the daycare or school your child attends. I would ensure that one of the day care workers are with your child when this occurs. I would also make sure that your child was ok with being weighed and measured too.

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Parents Signature: _____

Parent Name: _____ (Please print)

Child's Name: _____ (Please print)

Date: _____

Do you want to be included in a drawing for a $50 Amazon gift card after study completion? The winners will be selected from participants in a drawing at the end of the study and the gift cards will be given to the daycare facility to distribute to the appropriate winners.

Please circle **Yes** or **No** if you want to be in

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Early Childhood and Family Health Questionnaire

1. **Do you have a child who is preschool age (2-5 years old)?**

   Yes

   No

2. **Is this your only child in this age range?**

   Yes

   No

3. **If no, how many children do you have between the ages of 2 to 5?**

4. **Please list the initials and last two digits of the year this child was born. This information will be kept confidential and only be used to ensure the right child is linked to this survey.**

5. **Does your child have a diagnosed issue with their pituitary, thyroid, or other condition that affects their weight?**

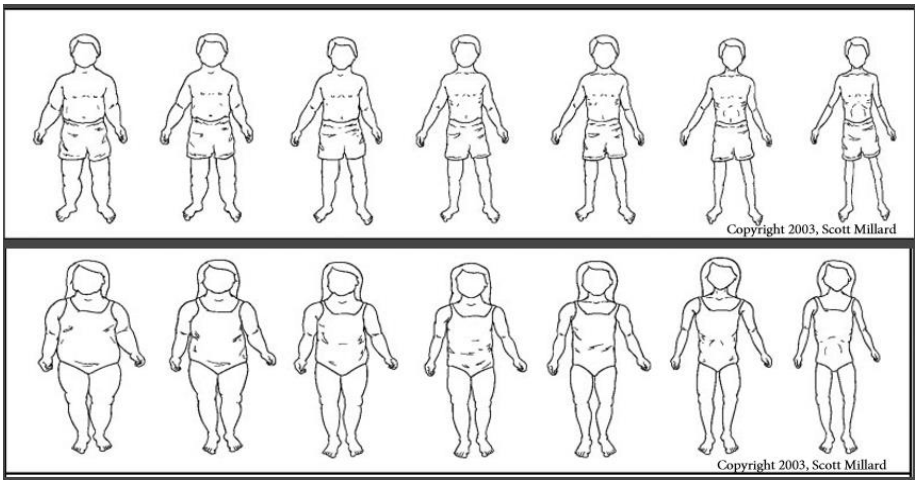
   Yes

   No

Please select only one of the children in this age range to answer the following questions. All survey answers are confidential.

6. **How much does your child weigh in pounds?**

7. **Which picture best represents your child? Please circle one.**



8. **How old is your child (Example: 2 years 3 months or 27 months)?**

9. **What is your child's gender?**

   Male

   Female

10. **Please select your child's race/ethnicity.**

    White

    Black or African-American

    American Indian or Alaskan Native

    Asian

    Native Hawaiian or Pacific Islander

    From multiple races

    Other ethnicity race, please specify

11. **How do you describe your child in terms of weight right now?**

    Very Underweight

    Underweight

    Healthy weight

    Overweight

    Obese

12. **How concerned are you that your child will become overweight in the future?**

    Unconcerned

    A little concerned

    Concerned

    Fairly concerned

    Very Concerned

13. **Are you concerned about the number of overweight children in the nation?**

    Unconcerned

    A little concerned

    Concerned

    Fairly concerned

    Very Concerned

14. My child seems to be healthier than other children I know?

Yes

No

15. **Do you take your child to an annual check-up?**

Yes

No

16. **Does your child have any chronic health conditions?**

Yes

No

17. If yes, what conditions does your child have? Please list any conditions that have been diagnosed by an MD and/or that the child is being treated for.

18. Do you feel losing weight could improve or eliminate any of these health conditions for your child?

Yes

No

19. How many times have you taken this child to the MD over the past 12 months (Excluding well-child visits)?

None

One

Two

Three or more

20. **Has a health care provider ever mentioned concern about your child being overweight or obese?**

Yes

No

21. **If a medical professional told you your child is overweight, how concerned would you be?**

Not at all concerned

Slightly concerned

Somewhat concerned

Moderately concerned

Extremely concerned

22. **If a medical professional told your child is obese, how concerned would you be?**

Not at all concerned

Slightly concerned

Somewhat concerned

Moderately concerned

Extremely concerned

23. **How likely would you be to do something about it?**

Not likely

Slightly likely

Somewhat likely

Moderately likely

Extremely likely

24. **How much control do you feel you have over a child's weight in the 2- to 5-year-old age group?**

No control

Slight control

Some control

Moderate control

Extreme control

The following questions apply to the parent of this child who is completing this survey. All survey answers are confidential.

25. **Which category below includes your age?**

18-20

21-29

30-39

40-49

50-59

60 or older

26. **What is your gender?**

Male

Female

27. Please select your race/ethnicity.

White

Black or African-American

American Indian or Alaskan Native

Asian

Native Hawaiian or other Pacific Islander

From multiple races

Hispanic

Other race/ethnicity, please specify

28. What is your family role?

Mother

Father

Grandparent

Relative

Other, please list

29. How much do you weigh in pounds?

30. How tall are you (example 5 feet 2 inches)?

31. How much total combined money did all members of your household earn last year?

0- $9,999

$10,000 to $24,999

$25,000 to $49,999

$50,000 to $74,999

$75,000 to $99,999

$100,000 to $124,999

$125,000 to $149,999

$150,000 to $174,999

$200,000 and up

32. What is your education level?

Less than high school degree

High school or equivalent (i.e. GED)

Some college but no degree

Bachelor's degree

Graduate degree (masters or Ph.D.)

33. How many children are in your household?

34. How do you describe yourself in terms of weight?

Underweight

Healthy weight

Overweight

Obese

35. Please circle any of these diagnoses you have?

Depression	Yes	No
Diabetes	Yes	No
Heart disease	Yes	No
Hypertension (high blood pressure)	Yes	No
Hyperlipidemia (high cholesterol)	Yes	No

36. Do you have any other chronic health conditions?

Yes

No

37. If yes, what conditions do you have? Please list any conditions that have been diagnosed by an MD and/or that you are being treated for.

38. Do you feel losing weight could improve or eliminate any of these health conditions?

Yes

No

39. Do you seem to be less healthy than other adults you know?

Yes

No

40. **How many times have you been to the doctor for yourself over the past 12 months?**

    None

    One

    Two

    Three or more

Please answer the following questions and consider your immediate family, including siblings, parents, and grandparents.

41. **Would you consider one or more of your family members as overweight?**

    Yes

    No

42. **Would you consider one or more of your family members as obese?**

    Yes

    No

43. **Please circle any of these diseases that you have a family history of.**

Depression	Yes	No
Diabetes	Yes	No
Heart disease	Yes	No
Hypertension (high blood pressure)	Yes	No
Hyperlipidemia (high cholesterol)	Yes	No

44. **Do you feel that weight is related to improving or eliminating any of these conditions?**

    Yes

    No

45. **Has anyone in the family had any of health issues related to obesity?**

    Yes

    No

46. **Please list any obesity-related illnesses you or anyone in your family has had?**

For this next section of questions, please select True or False to answer the question. If you do not know the answer, please select Don't Know.

1. **A person who has diabetes can sometimes get better by losing weight.**

   True False Don't Know

2. **Obese people have more of a chance of getting stomach cancer.**

   True False Don't Know

3. **It is less of a health problem when a person has fat around the stomach and waist than someone who has fat around the hips and thighs.**

   True False Don't Know

4. **When parents are obese, it is more likely that their children will become obese.**

   True False Don't Know

5. **On average, obese people do not live as long as people with normal weight.**

   True False Don't Know

6. **Obesity increases the risk of getting breast cancer in women.**

   True False Don't Know

7. **"Being obese" and "being fat" mean different things.**

   True False Don't Know

8. **Drinking one soda every day is something that can contribute to a person becoming obese.**

   True False Don't Know

9. **Obesity can often cause problems with your heart.**

   True False Don't Know

10. **Being fat when you are in middle school is less of a problem because it is easy for teenagers to lose weight.**

    True False Don't Know

11. **Obesity increases the risk of getting bowel cancer.**

    True False Don't Know

12. **An obese person who gets diabetes needs to lose at least 40% of their body weight for clear health benefits**

    True False Don't Know

13. **Obese people can expect to live as long as non-obese people**

    True False Don't Know

14. Obesity is more of a risk to health for people from South Asia (e.g. India and Pakistan) than it is for White Europeans

True False Don't Know

15. Obesity increases the risk of getting breast cancer after menopause.

True False Don't Know

16. Obesity does not increase the risk of developing high blood pressure

True False Don't Know

17. There is no major health benefit if an obese person who gets diabetes loses weight

True False Don't Know

18. A person with a "beer-belly" shaped stomach has an increased risk of getting diabetes.

True False Don't Know

19. It is better for a person's health to have fat around the hips and thighs than around the stomach and waist.

True False Don't Know

20. Obesity increases the risk of getting a food allergy

True False Don't Know

Use the following guide in answering how confident you are that you can …

0 = not at all

2 = to a very low degree

4 = to some degree

6 = to quite a degree

8 = to a high degree

10 to a very high degree

1. How confident you are that you can promote healthy eating habits for your child?

0 1 2 3 4 5 6 7 8 9 10

2. How confident you are that you can arrange eating regular meals together in the family?

0 1 2 3 4 5 6 7 8 9 10

3. How confident you are that you can restrict consumption of soft drinks by your child to no more than twice a week?

0 1 2 3 4 5 6 7 8 9 10

4. How confident you are that you can make possible for your child to eat meals according to the plate model?

0 1 2 3 4 5 6 7 8 9 10

5. How confident you are that you can have your child eat fruit and vegetables every day?

0 1 2 3 4 5 6 7 8 9 10

6. How confident you are that you can prevent your child from snacking between meals?

0 1 2 3 4 5 6 7 8 9 10

7. How confident you are that you can limit visits at fast-food restaurants to maximally 1-2 times a month?

0 1 2 3 4 5 6 7 8 9 10

8. How confident you are that you can get your child engaged in physical play indoors and outdoors?

0 1 2 3 4 5 6 7 8 9 10

9. How confident you are that you can limit your child's inactivity in front of the computer or TV?

0 1 2 3 4 5 6 7 8 9 10

10. How confident are you that you can arrange opportunities for you and your child to be physically active together, for example, play outdoors?

0 1 2 3 4 5 6 7 8 9 10

11. How confident you are that you can set limits for your child in everyday life, for example, the number of servings of ice cream per week or the duration your child may watch TV?

0 1 2 3 4 5 6 7 8 9 10

12. How confident you are that you can influence diet and physical activity routines at preschool?

0 1 2 3 4 5 6 7 8 9 10

13. How confident you are that you can set limits at visits at grandparents or other relatives, for example, about eating candy?

0 1 2 3 4 5 6 7 8 9 10

14. How confident you are that you can set limits for your child if it is influenced by advertisement for unhealthy food and heavily insists that you buy something he or she has seen on TV?

0 1 2 3 4 5 6 7 8 9 10

15. How confident you are that you can set limits against negative influence from your child's peers, for example, peers who may eat cookies in front of the TV at dinner time?

0 1 2 3 4 5 6 7 8 9 10

16. How confident you are that you can resist your child's nagging, for example, about frequently buying candy, ice cream, cookies, etc.?

0 1 2 3 4 5 6 7 8 9 10

Future Research

Would you be interested in participating in future studies related to this study? If so, please list a contact phone number and email. This is completely voluntary.

Appendix F

Idaho State University

Parents:

Volunteers wanted for a research study

We would like to hear from parents of 2- to 5-year-old children to learn more about childhood health, weight, and its relationship to families.

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Your time and help would be greatly appreciated. We are also entering all participants into a drawing to receive $50 gift card to Amazon as a small thank you for your help.

This research is being conducted by Tanna Woods, RN, MSN who is a Ph.D. candidate in nursing at Idaho State University. You may reach her by calling 801-725-3183 or by emailing her at woodtann@isu.edu for any additional questions or information.

Appendix G

Consent Form

Dear Parent or Guardian:

Hello, you are receiving this because you have a child who is between 2 and 5 years old. I am a registered nurse in Utah who is working on research approved by Idaho State University. I am exploring issues related to childhood health. For this research, I need to ask parents to participate in a written survey that any legal guardian who is 18 or older can fill out. I am also asking your permission to weigh and measure your child's height.

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The child's weight and height will be anonymous. The child's name will not be reported on any findings. The results of both the parental survey and child height and weight will be reported in the aggregate, meaning that results are general and not identifiable to any one individual. Collection of the name of the child is necessary for the researcher to ensure the correct child is paired with the correct parent for analysis. Once the parent survey and child height and weight information are obtained, the investigator will assign a unique identifier and remove all names. Use of unique identifiers assigned by the investigator will ensure the privacy of this information.

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For further information about this research, please contact Tanna Woods at 801-725-3183, email: wood.tann@isu.edu. If you have questions about your rights as a research participant, contact the Idaho State University Human Subjects Committee/IRB at 208-282-2179

Parents Signature: _____

Parent Name: _____ (Please print)

Child's Name: _____ (Please print)

Date: _____

Do you want to be included in a drawing for a $50 Amazon gift card after study completion? The winners will be selected from participants in a drawing at the end of the study and the gift cards will be given to the daycare facility to distribute to the appropriate winners.

Please circle **Yes** or **No** if you want to be in

Appendix H

Child Data Form

Date of weight: _____

Child weight: _____ Please circle if this is in KG or Pounds.

Child height: _____Please circle if this is in CM or Inches.

Child gender: Male or Female

Child unique identifier: _____