HEALTHY LIVING INTERVENTION FOR

FEMALE PRIMARY CAREGIVERS

OF INFANTS AND TODDLERS

By

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Abstract:
Background: Obesity has emerged as a significant health issue among both adults and youth in the United States. Nationally, 1 in 12 children aged 2-5 years are obese. Common recommendations to counter obesity in children include dietary modifications, increased physical activity, and decreased sedentary time, including screen time. One avenue to influence these behavioral targets in infant and toddler children may be to influence parent behavior. **Objective:** The principal aim of the present study was to determine the effects of a Healthy Living intervention on female primary caregivers' fruit and vegetable consumption, sugar-sweetened beverage consumption, physical activity level, and television viewing time. The effects of the intervention on self-efficacy and anthropometric outcomes were also examined. **Methods:** A quantitative, quasi-experimental, pretest/posttest, attention-placebo comparison design was used to evaluate intervention effectiveness. The Healthy Living treatment condition was compared to an early childhood education attention-placebo comparison condition. The Transtheoretical Model (TTM) served as the guiding framework for Healthy Living intervention development and implementation. Community lay advisors recruited participants and also delivered the treatment and attention-placebo comparison conditions. A total of 82 female primary caregivers were recruited for participation; 58 completed both the pretest and posttest assessment (26 were in the treatment condition and 32 were in the attention-placebo comparison condition). **Results:** There were no statistically significant between-group differences for any of the behavioral outcomes, self-efficacy, or anthropometric outcomes. Regardless of condition, female primary caregivers' mean sugar-sweetened beverage calorie consumption, $F(1, 53) = 6.62$, $p = .01$, and mean body mass index, $F(1, 43) = 4.06$, $p = .05$, decreased significantly form pretest to posttest. **Discussion:** Although this investigation suggests the Healthy Living treatment condition was no more effective than the attention-placebo comparison condition, findings do support the utility of the community lay advisor approach in recruiting and retaining hard-to-reach participants. This approach may also enhance participant self-efficacy; however, additional research is needed to examine this relationship.

Keywords: lay advisor, transtheoretical model, behavior change, self-efficacy, obesity

TABLE OF CONTENTS

Chapter Page

Chapter Page

Chapter Page

LIST OF TABLES

Table Page

Table Page

LIST OF FIGURES

Figure Page

CHAPTER I

INTRODUCTION

Since 1980, obesity rates among 2 to 19 year olds in the United States have more than tripled; 1 in 6 youth is obese. National Health and Nutrition Examination Survey (NHANES) data illustrate two potent trends (see Table 1). First, childhood obesity rates have increased in each age group across time. Second, although obesity rates were once similar regardless of age, the prevalence of obesity has nearly doubled in preschool-aged children, nearly tripled in school-aged children, and quadrupled in adolescents over three decades (Fryar, Carroll, & Ogden, 2014). Thus, children are not "growing out" of obesity. On the contrary, the incidence of overweight during infancy is associated with greater odds of obesity in childhood, adolescence, and adulthood (Baird et al., 2005).

Table 1

Childhood Obesity Prevalence by Age and Years

Age	Obesity Prevalence 1976-1980	Obesity Prevalence 2011-2012
2-5 year olds	5.0%	8.4%
6-11 year olds	6.5%	17.7%
12-19 year olds	5.0%	20.5%

Note. Data are from the National Health and Nutrition Examination Survey. Adapted from "Prevalence of overweight and obesity among children and adolescents: United States, 1963–1965 through 2011–2012," by C. D. Fryar, M. D. Carroll, and C. L. Odgen, 2014, *National Center for Health Statistics,* p. 5.

The NHANES data also revealed pronounced racial and ethnic disparities. Table 2 shows the distribution of childhood obesity in 2011-2012 by gender and race/ethnicity. Obesity disproportionately affected Hispanic and non-Hispanic Black youth compared to their non-Hispanic White and non-Hispanic Asian counterparts. Nearly 1 in 4 Hispanic boys, 1 in 5 Hispanic girls, and 1 in 5 non-Hispanic Black males and females were obese (Fryar et al., 2014). Disparate obesity rates among very young children are especially prominent. Nationally in 2011-2012, 1 in 12 preschoolers were obese (Fryar et al., 2014), but the Pediatric Nutrition Surveillance 2010 Report revealed 1 in 5 low-income American Indian/Alaska Native preschoolers and 1 in 6 low-income Hispanic preschoolers were obese (Dalenius, Borland, Smith, Polhamus, & Grummer-Strawn, 2012). The significance of income in addition to race should be noted. Evidence suggests a significant negative correlation between childhood weight and family income (Eagle et al., 2012; Singh, Kogan, Van Dyck, & Siahpush, 2008).

Table 2

Childhood Obesity Prevalence among Adolescents by Race/Ethnicity and Sex

Race/Ethnicity	Females 2-19 Years of Age	Males 2-19 Years of Age
Hispanic	20.6%	24.1%
Non-Hispanic Black	20.5%	19.9%
Non-Hispanic White	8.6%	12.6%
Non-Hispanic Asian	5.6%	11.5%
Overall Prevalence of Obesity Among 2-19 Year Olds by Sex	17.2%	16.7%

Note. Data are from the National Health and Nutrition Examination Survey. Adapted from "Prevalence of overweight and obesity among children and adolescents: United States, 1963–1965 through 2011–2012," by C. D. Fryar, M. D. Carroll, and C. L. Odgen, 2014, *National Center for Health Statistics,* p. 5.

Potential comorbid conditions among obese children are numerous and include: elevated blood pressure, dyslipidemia, type 2 diabetes, impaired glucose tolerance, insulin resistance, sleep apnea, asthma, nonalcoholic fatty liver disease, gall stones, gastro-esophageal reflux, and orthopedic problems (Barlow and the Expert Committee, 2007). Childhood obesity has also been correlated with attention deficit/hyperactivity disorder (Agranat-Meged et al., 2005) and

psychiatric disorders, including depression (Barlow and the Expert Committee, 2007). Severely obese children have reported a health-related quality of life comparable to that of children with cancer (Schwimmer, Burwinkle, & Varni, 2003).

Youth weight status is inversely related to academic performance (Shore et al. 2008; Taras & Potts-Datema, 2005). Obese youth have higher rates of school absenteeism compared to their healthy weight counterparts (Geier et al., 2007; Schwimmer et al., 2003; Shore et al., 2008). Further, obese adolescent girls are more likely to be held back a grade and to consider themselves poor students (Falkner et al., 2001). Aversive consequences in school also extend to peer interactions; overweight and obese children are more likely to be bullied (Janssen, Craig, Boyce, & Pickett, 2004; Lumeng et al., 2010) and are more likely to bully others (Janssen et al., 2004).

Parental overweight is a significant risk factor for obesity in young children (Acharya, Feese, Franklin, & Kabagambe, 2011; Agras, Hammer, McNicholas, & Kraemer, 2004; Janjua, Mahmood, Islam, & Goldenberg, 2012; Reilly et al., 2005). Children are more likely to be overweight or obese by 4 years of age if their mother is overweight or obese prior to pregnancy (Kitsantas & Gaffney, 2010). Intervention research indicates parental weight change predicts child weight change (Wrotniak, Epstein, Paluch, & Roemmich, 2004). This evidence underscores the influence parents have on their children's weight status. Parents are influential in three key ways: by role modeling behavior, by acting as the gatekeeper for food and beverages brought into the home, and by providing opportunities for physical activity (USDA & USDHHS, 2010). Effective interventions encouraging parents of young children to achieve or maintain a healthy weight and adopt healthy dietary and physical activity behaviors may be a necessary step in preventing childhood obesity.

Purpose of the Study

The principal aim of the present study was to determine the effects of a Healthy Living intervention on female primary caregivers' fruit and vegetable consumption, sugar-sweetened beverage consumption, physical activity level, and television viewing time. Self-efficacy, which

has been documented as an important antecedent to behavioral change (Abusabha & Achterberg, 1997; Ashford, Edmunds, & French, 2010), was also examined. Additionally, the impact of the intervention on female primary caregivers' weight status as well as their child's weight status was investigated. The overarching goal of the Healthy Living intervention was to influence female primary caregiver's behaviors so they: (a) model health-promoting behaviors, and (b) create an environment conducive to their children's adoption of the same health-promoting behaviors.

Study Design

Culturally diverse, low-income female primary caregivers of infants and toddlers were targeted as the agents of change. A quantitative, quasi-experimental, pretest/posttest, attention-placebo comparison design was used to evaluate intervention effectiveness. The treatment condition was compared to an early childhood education attention-placebo comparison condition.

Theoretical framework. The Transtheoretical Model (TTM) served as the guiding framework for intervention development and implementation. TTM consists of four core constructs: stages of change, processes of change, self-efficacy, and decisional balance. According to TTM, an individual moves through the following stages as he/she progresses toward behavior change: precontemplation (person is not considering a behavioral change in the foreseeable future), contemplation (person is considering behavior change in the distant future), preparation (person is considering change in the immediate future), action (person is currently making a behavioral change but has been doing so for less than six months), and maintenance (person is currently making a behavioral change and has sustained that change for more than six months) (Prochaska & Norcross, 2010; Prochaska, Redding, & Evers, 2008). Processes of change are covert and overt activities, such as consciousness raising, self-reevaluation, stimulus control, and helping relationships, which mediate stage progression. Decisional balance refers to the process whereby an individual weighs the pros and cons of behavior change. Self-efficacy is the confidence one has in his or her ability to make and sustain behavioral change; this includes the confidence to resist temptation back into an unhealthy behavior (Prochaska et al., 2008).

TTM was initially used for smoking cessation but has since been used to address a variety of behaviors, including dietary intake, exercise acquisition, and weight control (Prochaska et al., 1994). TTM has likewise been successfully used to address multiple weight management-related behaviors at once (Johnson et al., 2008), a consideration that was important given the multiple behavioral targets of the present intervention.

Community lay advisor approach. As a means to facilitate a culturally appropriate implementation and greater acceptance of the intervention, community lay advisors were trained to deliver the treatment and attention-placebo comparison conditions. Lay health advisors bring qualities of cultural and geographic understanding and community commitment (South, White, Branney, & Kinsella, 2013), and they share a common language with participants (Rhodes, Foley, Zometa, & Bloom, 2007). Whereas health education professionals might be viewed as "community outsiders," lay advisors are "insiders." Consequently, trust and rapport are often already present or easier to establish (Rhodes et al., 2007).

Specific Aims and Hypotheses

The following specific aims and corresponding hypotheses were evaluated:

Specific aim 1. To determine the effects of the Healthy Living intervention on female primary caregivers' fruit and vegetable consumption, sugar-sweetened beverage consumption, physical activity level, and television viewing time by comparing changes in participants' behaviors from pretest to posttest to the changes in behaviors of female primary caregivers who participated in an alternate early childhood education intervention.

> ***Hypothesis 1.*** Participants in the Healthy Living treatment condition will report greater increases in daily fruit and vegetable consumption than participants in the attention-placebo comparison condition.
>
> ***Hypothesis 2.*** Participants in the Healthy Living treatment condition will report greater reductions in daily sugar-sweetened beverage intake than participants in the attention-placebo comparison condition.

Hypothesis 3. Participants in the Healthy Living treatment condition will be more likely than participants in the attention-placebo comparison condition to maintain or achieve a physical activity level sufficient to meet the American College of Sports Medicine recommendation.

Hypothesis 4. Participants in the Healthy Living treatment condition will report greater reductions in daily television viewing time than participants in the attention-placebo comparison condition.

Specific aim 2. To determine the effects of the Healthy Living intervention on female primary caregivers' self-efficacy for consuming fruits and vegetables, limiting sugar-sweetened beverages, being physically active, and limiting television viewing time by comparing changes in participants' self-efficacy in the treatment intervention to changes in participants' self-efficacy in the alternate early childhood education intervention.

Hypothesis 5. At posttest, participants in the Healthy Living treatment condition will report greater confidence in their ability to eat fruits and vegetables than participants in the attention-placebo comparison condition.

Hypothesis 6. At posttest, participants in the Healthy Living treatment condition will report greater confidence in their ability to limit sugar-sweetened beverage intake than participants in the attention-placebo comparison condition.

Hypothesis 7. At posttest, participants in the Healthy Living treatment condition will report greater confidence in their ability to be physically active than participants in the attention-placebo comparison condition.

Hypothesis 8. At posttest, participants in the Healthy Living treatment condition will report greater confidence in their ability to limit television viewing than participants in the attention-placebo comparison condition.

Hypothesis 9. At posttest, participants in the Healthy Living treatment condition will report greater total self-efficacy than participants in the attention-placebo comparison condition.

Specific aim 3. To determine the effects of the Healthy Living intervention on female primary caregivers' body mass index.

Hypothesis 10. Participants in the Healthy Living treatment condition will have greater reductions in body mass index than participants in the attention-placebo comparison condition.

Specific aim 4. To determine the effects of the Healthy Living intervention on child weight status by comparing changes in the weight status of children whose female primary caregiver was in the treatment condition to changes in the weight status of children whose female primary caregiver was in the alternate early childhood education condition.

Hypothesis 11. Children whose female primary caregiver participated in the Healthy Living treatment condition will be more likely than children whose female primary caregiver participated in the attention-placebo comparison condition to maintain or achieve a non-overweight status.

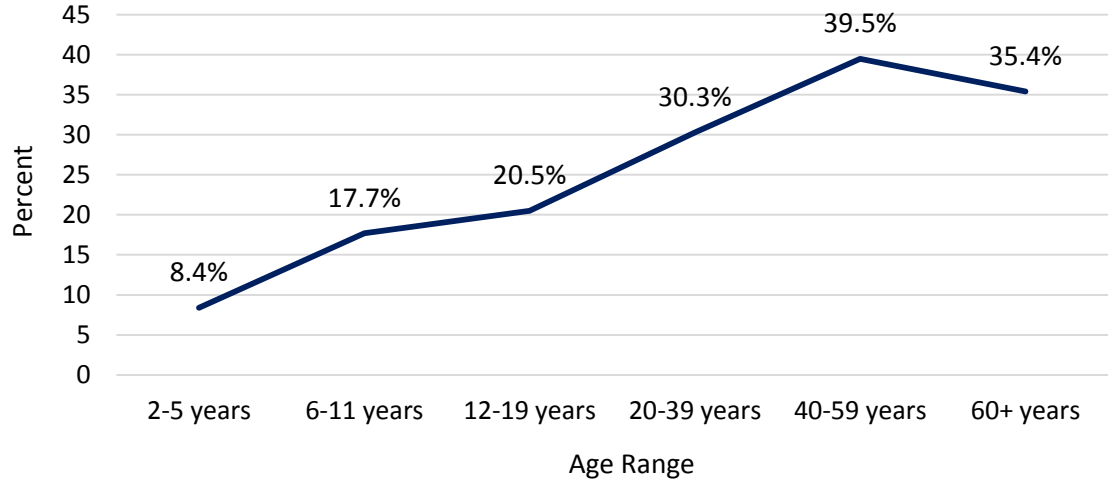
CHAPTER II

REVIEW OF LITERATURE

Beginning in early childhood and through emergence into adulthood, risk of obesity increases with age (Ogden, Carroll, Kit, & Flegal, 2014). This trend is displayed in Figure 1. According to a recent report from the Robert Wood Johnson Foundation (2013), obesity rates appear to be stabilizing in both children and adults. Stabilization is an accomplishment after years of trending upward. Nonetheless, stabilization is not the end goal. Instead, it is an encouraging first step in reversing a health issue that is often coupled with additional physical and mental health problems, among both adults (Jensen et al., 2013) and children (Barlow and the Expert Committee, 2007). To reverse the obesity epidemic, the Institute of Medicine advocates for prevention efforts aimed at infants, toddlers, and preschoolers (IOM, 2011). Professional organizations, such as the Academy of Nutrition and Dietetics, acknowledge the complexity of obesity and, therefore, recommend ecological approaches to prevent childhood obesity (Hoelscher, Kirk, Ritchie, & Cunningham-Sabo, 2013). The overarching aim of the present study was to influence female primary caregivers' dietary and physical activity behaviors, thus altering infants' and toddlers' home environment.

Figure 1

Percentage of the United States Population Who Are Obese by Age



Note. Data are from the 2011-2012 National Health and Nutrition Examination Survey. Adapted from "Prevalence of childhood and adult obesity in the United States, 2011-2012," by C. L. Ogden, M. D. Carroll, B. K. Kit, and K. M. Flegal, 2014, *The Journal of the American Medical Association, 311,* pp. 810-811. Copyright 2014 by the American Medical Association.

Defining and Assessing Obesity

Obesity, a term used to label excess body fat, is commonly assessed by calculating body mass index (BMI) and then comparing the BMI to clinical standards (CDC, 2013). BMI is a weight-to-height measurement in which weight in kilograms is divided by height in meters squared; thus, it is a representative measure of obesity, not a direct measure of body fat (CDC, 2015). BMI is also used to categorize children's weight status; however, an additional step is necessary because of children's growth patterns. In youth 2 years of age and older, weight status is determined by plotting BMI values on the Centers for Disease Control and Prevention's sex-specific BMI-for-age growth charts (CDC, 2013). Table 3 summarizes the current BMI classification criteria for adults and children over the age of 2 years (CDC, 2013). For children under the age of 2 years, weight-for-length measurements are used to determine weight status, as there are no BMI normative values for this age group. Those with weight-for-length values greater than the 95th percentile are classified as overweight (Barlow and the Expert Committee,

2007). Discussion of weight status in the current review of literature was based on the BMI cutoff points shown in Table 3.

Table 3

Weight Status Classification Criteria for Adults and Children

Weight Status Classification	Adult BMI (kg/m^2)	Child (2-19 years) BMI-for-age Percentile
Obese	≥ 30	≥ 95th percentile
Overweight	25-29.9	85th to < 95th percentile
Healthy Weight	18.5-24.9	5th to < 85th percentile
Underweight	< 18.5	< 5th percentile

Note. Adapted from "Overweight and obesity," by Centers for Disease Control and Prevention, 2013.

Etiology of Obesity

Obesity is multi-causal and complex. As summarized by Akabas, Lederman, and Moore (2012), individual factors contributing to weight status include behavioral, genetic, psychological and pharmacological influences. Community and demographic determinants of weight status include the built and social environments, media and advertising, socioeconomic status, and culture. Two primary behaviors contribute to weight status: dietary intake and physical activity (Akabas et al., 2012). Evidence suggests sleep debt may influence weight status as well (Bayon, Leger, Gomez-Merino, Vecchierini, & Chennaoui, 2014). All of these behavioral factors are amenable to change. Children's weight-related health behaviors are influenced by parenting styles and family characteristics, including their parents' weight status, dietary intake, and physical activity patterns. Parents also influence food availability and opportunities for and encouragement of physical activity (Akabas et al., 2012).

Parental Weight Status and Childhood Obesity

In a cohort of parent-child dyads followed from birth to age 9.5 years, parental overweight status was the strongest risk factor for child overweight status (Agras et al., 2004). Further, mothers' pre-pregnancy weight status has been positively associated with children's weight status. One study revealed that children were more likely to be overweight or obese by 4

years of age if their mothers were overweight or obese prior to pregnancy; this relationship was most prominent among Hispanic mothers and children (Kitsantas & Gaffney, 2010). In another study with low-income Black mother-child dyads, children were almost three times more likely to be obese at age 5 years if their mothers were overweight pre-pregnancy (Janjua et al., 2012). Cross-sectional research has yielded associations between children and primary caregiver weight status as well. Acharya and colleagues (2011) evaluated data from preschoolers enrolled in Head Start and their primary caregivers in Alabama and Texas. Participants were racially diverse, and most primary caregivers were female. Black and Hispanic children's standardized BMI scores were significantly correlated with primary caregivers' BMI values; however, this relationship was not observed in the White child-caregiver dyads.

Intervention research shows changes in parents' weight status predicts changes in children's weight status. Wrotniak et al. (2004) evaluated the impact of a family-based behavioral intervention on parents' and their school-aged children's BMI z-scores. All children were overweight or obese, but parental overweight was not a requirement for participation. Regardless of their weight status at baseline, parents were encouraged to increase physical activity and their fruit, vegetable and low-fat dairy intake. Changes in parents' BMI z-scores predicted changes in children's BMI z-scores while they were in treatment and at the two year follow-up.

Parental Influence on Children's Fruit and Vegetable Consumption

There is considerable evidence parents' fruit and vegetable intake is positively correlated with children's vegetable (Sweetman, McGown, Croker, & Cooke, 2011) and fruit intake, meaning parents who eat more fruits and vegetables have children who eat more fruits and vegetables (Cooke et al., 2003; Fisher, Mitchell, Smiciklas-Wright, & Birch, 2002; Jones, Steer, Rogers, & Emmett, 2010; Miller, Moore, & Kral, 2011). Parents influence their children's food preferences as well; for example, preschool-aged children enjoy the same vegetables their parents enjoy (Sweetman et al., 2011). Further, parental changes in fruit and vegetable intake predict child changes (Haire-Joshu et al., 2008). Parental consumption is related to the variety of fruits

and vegetables served to young children. In one longitudinal study, low-income African American adolescent mothers who ate at least five servings of fruits and vegetables per day were more likely to give their toddlers a variety of fruits and vegetables (Papas, Hurley, Quigg, Oberlander, & Black, 2009). Young children's fruit and vegetable intake increases when parents serve fruits and vegetables to them daily (Jones et al., 2010) and when more fruits and vegetables are available in the home (Bryant et al., 2011; Spurrier, Magarey, Golley, Curnow, & Sawyer, 2008). Children who are introduced to fruits at a younger age have higher intakes later in their childhood (Cooke et al., 2003).

Parental Influence on Children's Sugar-Sweetened Beverage Consumption

Parental soft drink consumption has been linked to children's sugar-sweetened beverage consumption, with parents who regularly consume soda having children who consume soda more regularly (Grimm, Harnack, & Story, 2004). Parents' sugar-sweetened beverage intake appears to influence their provision of sugar-sweetened beverages to children. For example, low-income African American adolescent mothers who drank two or more sodas per day were more likely to give their toddlers soda (Papas et al., 2009). Misconceptions about beverages may be an additional factor influencing family beverage consumption. In one study with Latino parents, participants regarded traditional drinks such as aguas frescas as healthy because they contain "natural" ingredients. Some parents expressed concern about tap water being unsafe, although they recognized water is healthy (Bogart et al., 2013). Further, among preschoolers, availability of sugar-sweetened beverages in the home is positively associated with sugar-sweetened beverage intake (Spurrier et al., 2008).

Parental Influence on Children's Activity Level

Young children's physical activity levels (Moore et al., 1991; Oliver, Schofield, & Schluter, 2010; Zecevic, Tremblay, Lovsin, & Michel, 2010) and outdoor playtime (Spurrier et al., 2008) positively correlate with their parents' activity levels; thus, active parents seem to have active children. Among school-aged children, a positive relationship between parents' moderate

to vigorous physical activity and school-aged children's moderate to vigorous physical activity has been observed (Fuemmeler, Anderson, & Mâsse, 2011). When both parents are active, the relationship between parent-child activity level is even stronger (Fuemmeler et al., 2011; Moore et al., 1991). Alderman, Benham-Deal, and Jenkins (2010) evaluated changes in the relationship between parent-child physical activity across ages; they found the association to be strongest in preschoolers. Their results also indicated parents of preschoolers spend more time participating in physical activity along with their children. Parents who provide support for physical activity, such as encouragement, monitoring, participation in activity with their children, or transportation to sites to be active, have more "highly active" preschoolers (Zecevic et al., 2010).

Parental Influence on Children's Screen Time

There is substantial evidence of a positive correlation between parental television viewing and child television viewing (Barradas, Fulton, Blanck, & Huhman, 2007; Bleakley, Jordan, & Hennessey, 2013; Davison, Francis, & Birch, 2005; Gorely, Marshall, & Biddle, 2004; Jago, Fox, Page, Brockman, & Thompson, 2010; Jago et al., 2012). In one study, researchers found the relationship between mother-child television viewing to be stronger than father-child television viewing. They also observed a positive association between parental television viewing and children's time spent using computers and electronic games (Jago et al., 2012). Family television viewing correlates significantly with children's increased television viewing as well (Bleakley et al., 2013; Cillero & Jago, 2010; Davison et al., 2005). Furthermore, parents influence their children's screen viewing behaviors via rule setting. The literature suggests when parents set rules limiting their children's television time, children watch less television (Barradas et al., 2007; Bleakley et al. 2013; Cillero & Jago, 2010; Davison et al., 2005). However, parents who themselves spend large amounts of time watching television may be less likely to limit their children's television viewing (Davison et al., 2005). Similarly, parents control access to television and other media equipment simply by the equipment they allow in their home. The number of televisions and other electronic entertainment systems, such as computers and electronic games,

in the home predicts children's time spent watching television and using computers and electronic games, respectively (Jago et al., 2012). Of the aforementioned factors, parental television viewing is the strongest predictor of television viewing in young children (Bleakley et al., 2013). Family co-viewing and rule setting are other significant predictors of young children's television viewing behavior (Cillero & Jago, 2010).

Theoretical Framework: Transtheoretical Model

The Trantheoretical Model (TTM) is a behavior change model that draws from numerous therapeutic approaches, integrating the commonalities and strengths of each approach (Prochaska, 1984). TTM was first empirically evaluated with smokers; therefore, Prochaska (1984) described the Transtheoretical Model in the context of addiction. It has since been evaluated with a variety of different health behaviors, including acquisition behaviors, such as physical activity, as well as cessation behaviors like smoking (Prochaska et al., 1994). TTM is comprised of four core constructs: stages of change, processes of change, decisional balance, and self-efficacy (Prochaska et al., 2008).

Stages of change. The stages of change construct refers to where a person falls along the motivational continuum of behavior change. TTM includes six stages of change: precontemplation, contemplation, preparation, action, maintenance, and termination (Prochaska et al., 2008). A person in the precontemplation stage does not regard his/her behavior as problematic and is, therefore, not considering a behavioral change in the foreseeable future. Someone in the contemplation stage recognizes a problematic behavior and is considering a change; however, the individual has not taken any steps toward change (Prochaska & Norcross, 2010). This is sometimes quantified as the intent to make change within the next six months (Prochaska et al., 2008). In the preparation stage, a person is planning to make a change in the immediate future and has already taken some steps toward change (Prochaska & Norcross, 2010). This has been quantified as the intent to make change within the next month (Prochaska et al., 2008). An individual in the action stage is actively making a behavioral change, but has done so for six

months or less. A person in the maintenance stage has sustained a change in behavior for more than six months. TTM also accounts for the complexity of behavior change; thus, relapse prevention is incorporated into the model (Prochaska & Norcross, 2010). A sixth stage of change, termination, is also presented. An individual in this stage has no temptation to revert back to the health-compromising behavior and, thus, requires no relapse prevention measures (Prochaska & Norcross, 2010). This stage may be more of an "ideal" than a realistic goal for most health behaviors (Prochaska et al., 2008).

Processes of change. Prochaska and Norcross (2010) described the processes of change as "the covert and overt activities that people engage in to alter emotion, thinking, behavior, or relationships related to particular problems or patterns of living" (p. 489). Ten processes of change are most commonly included in the literature on TTM: consciousness raising, dramatic relief, self-reevaluation, environmental reevaluation, self-liberation, counterconditioning, stimulus control, contingency management, and helping relationships. Table 4 provides descriptions of each of these processes of change as well as intervention strategies that can be used for each (Prochaska et al., 2008).

The processes of change can be used to help move an individual through the stages of change; empirical evidence suggests certain processes are more effective in certain stages (Prochaska & Norcross, 2010). Thus, the processes of change can be systematically applied in health behavior interventions to inspire change (Prochaska et al., 2008). Table 5 illustrates the processes of change shown to facilitate progression to the next stage of change, as presented by Prochaska et al. (2008). This is a general representation of the processes involved in stage progression; for some health behaviors, fewer processes may be necessary to accomplish behavior change (Prochaska et al., 2008).

Table 4

Processes of Change Descriptions and Intervention Strategies

Processes of Change	Description	Intervention Strategies
Consciousness Raising	Finding and learning new facts, ideas and tips that support the healthy behavior change	feedback, confrontation, interpretation, media campaigns, bibliotherapy
Dramatic Relief	Experiencing the negative emotions (fear, anxiety, worry) that go along with unhealthy behavioral risks	role-playing, grieving, personal testimonies, health risk feedback, media campaigns
Environmental Reevaluation	Realizing the negative impact of the unhealthy behavior or the positive impact of the healthy behavior on one's proximal social and/or physical environment	empathy training, documentaries, testimonials, family interventions
Self-reevaluation	Realizing that the behavior change is an important part of one's identity as a person	values clarification, healthy role models, imagery
Self-liberation	Making a firm commitment to change	new year's resolutions, public testimonies, multiple rather than single choices
Social Liberation	Realizing that the social norms are changing in the direction of supporting the healthy behavior change	advocacy, empowerment procedures, policies that facilitate healthy behavior
Counterconditioning	Substitution of healthier alternative behaviors and cognitions for the unhealthy behavior	relaxation, assertion, desensitization, nicotine replacement, positive self-statements
Stimulus Control	Removing reminders or cues to engage in the unhealthy behavior and adding cues or reminders to engage in the healthy behavior	avoidance, environmental reengineering, self-help groups
Reinforcement Management	Increasing the rewards for positive behavior change and decreasing the rewards of the unhealthy behavior	contingency contracts, overt and covert reinforcements, incentives, group recognition
Helping Relationships	Seeking and using social support for the healthy behavior change	rapport building, therapeutic alliance, counselor calls, buddy systems

Note. Adapted from "The transtheoretical model and stages of change," by J. O. Prochaska, C. A. Redding, and K. E. Evers, 2008, In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice,* p. 99-102. Copyright 2008 by John Wiley & Sons, Inc.

Table 5

Processes of Change Used for Stage Progression

Precontemplation	Contemplation	Preparation	Action	Maintenance
Consciousness Raising				
Dramatic Relief				
Environmental Reevaluation				
	Self-Reevaluation			
		Self-liberation		
			Counterconditioning	
			Stimulus Control	
			Helping Relationships	
			Reinforcement Management	

Note. Adapted from "The transtheoretical model and stages of change," by J. O. Prochaska, C. A. Redding, and K. E. Evers, 2008, In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice,* p. 99-102. Copyright 2008 by John Wiley & Sons, Inc.

Decisional balance. Decisional balance is the process whereby an individual weighs the pros of behavior change as well as the cons of the change. A person in the precontemplation stage tends to perceive more cons than pros to change. As someone progresses through the stages, pros of change typically increase while cons tend to lessen (Prochaska et al., 2008). The crossover, whereby pros outweigh cons, varies by health behavior (Prochaska et al. 1994); however, pros are likely to outweigh cons by the action stage for numerous health behaviors (Prochaska et al., 2008). Prochaska and colleagues (1994) recommend the following when trying to facilitate stage progression: (a) focus on increasing the pros of behavior change to move a person from precontemplation to contemplation and (b) focus on decreasing the cons of behavior change when trying to move a person from contemplation toward action.

Self-efficacy. Self-efficacy can be separated into two components, confidence and temptation. Confidence refers to the self-confidence one has in his/her ability to make and maintain a behavioral change across a variety of situations. In contrast, temptation refers to the temptation a person has to revert back to unhealthy behaviors across a variety of situations, including positive social situations, craving, and situations that elicit emotional distress. High

confidence and low temptation results in high self-efficacy. Conversely, low confidence and high temptation yields low self-efficacy (Prochaska et al., 2008). A person in the later stages of change is more likely to have higher self-efficacy for behavior change than someone in earlier stages (Velicer et al., 2000).

Applications of TTM to Fruit and Vegetable Consumption

TTM can be used to stage an individual based on readiness to make changes to his/her fruit and vegetable intake because staging has been used to predict fruit and vegetable consumption (Van Duyn et al., 1998). Staging is usually based on a minimum consumption of five servings of fruits and vegetables, some have specified two servings of fruits and three servings of vegetables (Do et al., 2008), per day as the criterion to stage a person (Bawadia, Banks, Ammari, Tayyem, & Jebreen, 2012; Henry, Reimer, Smith, & Reicks, 2006). Basic staging criteria involve readiness to change consumption in six months, thirty days, period of changed behavior up to six months, or maintenance after six months (see Table 6; Bawadia et al., 2012; Henry et al., 2006).

TTM-based interventions among low-income adults have effectively increased fruit and vegetable consumption and expanded the variety of fruits and vegetables consumed (Do et al., 2008; Havas et al., 1998; Nitzke et al., 2007). One intervention, a collaborative endeavor between researchers and Cooperative Extension, consisted of a series of six stage-tailored mailings and two follow-up phone calls, typically from the Cooperative Extension paraprofessionals who recruited them; paraprofessionals provided additional explanations, education, and support during the calls (Do et al., 2008; Nitzke et al., 2004).

Table 6

Staging Criteria for Fruit and Vegetable Consumption

Stage of Change	Criterion
Precontemplation	No intention to increase fruit and vegetable intake to ≥ 5 servings per day.
Contemplation	Thinking about increasing intake to ≥ 5 servings per day within the next 6 months.
Preparation	Thinking about increasing intake to ≥ 5 servings per day within the next 30 days.
Action	Currently consuming ≥ 5 servings per day but have been doing so for 6 months or less.
Maintenance	Currently consuming ≥ 5 servings per day and have been doing so for more than 6 months.

Note. Staging criteria are based on two sources: (1) "Stage of change of 6 health-related behaviors among patients with type 2 diabetes," by H. A. Bawadia, A. D. Banks, F. Ammari, R. F. Tayyem, and S. Jebreena, 2012, *Primary Care Diabetes, 6, p. 320.* Copyright 2012 by Primary Care Diabetes Europe; and (2) "Associations of decisional balance, processes of change, and self-efficacy with stages of change for increased fruit and vegetable intake among low-income, African-American mothers," by H. Henry, K. Reimer, C. Smith, and M. Reicks, 2006, *Journal of the American Dietetic Association, 106*, p. 842. Copyright 2006 by the American Dietetic Association.

In a study of Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) participants, trained peer educators provided nutrition education to mothers of young children. Peer educators delivered a brief message to participants about increasing fruit and vegetable consumption upon enrollment in the study. The intent of this informational message was to move participants from precontemplation to contemplation. Participants then had an opportunity to attend three group-based discussion sessions taught by the peer educators. These sessions were designed to help participants continue to progress through the stages toward behavior change and, therefore, included skill building and social support. During the six-month intervention period, participants also received tailored materials via mail. Compared to women in a control condition, women who received the peer education significantly increased fruit and vegetable intake (Havas et al., 1998). Although this study increased fruit and vegetable consumption, nearly half (46%) failed to receive any group sessions; fewer than 1 in 5 (19%) attended all group sessions. Lack of transportation, work conflicts, and disinterest were barriers to

participation with low-income mothers of young children. Further, though more than half of participants (58%) and most peer educators were African American, only White participants reported statistically significant progression through the stages of change (Havas et al., 1998). Another potential limitation of this study is the restricted application of TTM. While participant mailings included stage-tailored materials, as constructed, the group-based sessions did not allow tailoring by individual. Rather they were developed to collectively move people through stages (Havas et al., 1998).

Applications of TTM to Sugar-Sweetened Beverage Consumption

The literature on TTM and sugar-sweetened beverage consumption is limited. Huffman and West (2007) used a TTM-based staging algorithm to evaluate college students' readiness to reduce their sugar-sweetened beverage intake; however, they did not quantify the expected reduction in consumption. In another study, participants were asked about their readiness to reduce their simple sugar intake. Again, reduction in consumption was not quantified. Further, sugar-sweetened beverage intake as well as other added dietary sugars were regarded as one behavior (Bawadi et al., 2012). In only one study was sugar-sweetened beverage consumption quantified for TTM; Cook and colleagues' criterion asked participants if they planned to reduce consumption to one liter or less of sugar-sweetened beverage per week (2013).

The time intervals for staging also differ across studies. Two studies used the standard TTM criteria of: no intent to change, intent to change in six months, intent to change in thirty days, period of changed behavior up to six months, or maintenance after six months (Bawadi et al., 2012; Cook et al., 2013). In the other study, contemplation and preparation were collapsed into one stage and the following staging criteria were used: no intent to change, intent to change in three months, currently making a change, or maintenance after six months (Huffman & West, 2007). The aforementioned studies are cross-sectional. There seems to be a lack of published studies describing TTM-based interventions to reduce sugar-sweetened beverage consumption;

thus, additional research is needed to determine the applicability of TTM for facilitating sugar-sweetened beverage behavior change.

Applications of TTM to Physical Activity

TTM has been widely used for stage-matched interventions to encourage exercise or physical activity acquisition (Spencer, Adams, Malone, Roy, & Yost, 2006). The criterion for what constitutes "acceptable levels of physical activity" differs across studies; the criterion for the frequency, duration, and intensity necessary to constitute behavior change often aligns with the current physical activity recommendations at the time of the study (Adams & White, 2003). In contrast, the time-based staging criteria for physical activity and exercise remain relatively consistent across the literature (Adams & White, 2003; Adams & White, 2005; Kim, 2007; Marshall & Biddle, 2001). Staging criteria for physical activity frequently involve no intent to become physically active, no current participation in physical activity but intent to increase physical activity within six months, current participation in irregular physical activity below a specific criterion level, period of changed behavior at a specified criterion level for up to six months, or maintenance after six months (Adams & White, 2003; Marshall & Biddle, 2001). Table 7 summarizes basic staging criteria for physical activity (Marshall & Biddle, 2001).

Table 7

Staging Criteria for Physical Activity

Stage of Change	Criterion
Precontemplation	No current participation in physical activity; no intention to become physically active.
Contemplation	No current participation in physical activity; intention to become more physically active within the next 6 months.
Preparation	Making some changes toward increasing physical activity but not meeting a criterion for physical activity.
Action	Meeting a criterion for physical activity but have been doing so for 6 months or less.
Maintenance	Meeting a criterion for physical activity and have been doing so for more than 6 months.

Note. Staging criteria are based on: "The transtheoretical model of behavior change: A meta-analysis of applications to physical activity and exercise," by S. J. Marshall and S. J. H. Biddle, 2001, *Annals of Behavioral Medicine, 23*, p. 229. Copyright 2001 by The Society of Behavioral Medicine.

Despite its widespread use in physical activity interventions, TTM is not without its criticisms. Adams and White (2003, 2005) acknowledged the short-term benefits of TTM-based interventions, but expressed marked concern about the sustainability of changes in physical activity levels. They remained unconvinced that stage-matched interventions were any more effective than control interventions in generating enduring changes in physical activity. Their skepticism was partially fueled by the scarcity of longer follow-up periods to assess activity maintenance. TTM-based studies have also been criticized for their incomplete application of TTM constructs. In their review of the literature on TTM-based interventions for physical activity, Hutchison, Breckon, and Johnston (2009) revealed that only seven of the 24 studies they included utilized all four core TTM constructs for intervention development.

The narrow application of TTM-based interventions to diverse populations is another important limitation. According to Spencer and colleagues (2006) the bulk of published studies on TTM-based physical activity interventions seem to include predominantly White, middle-class, and female participants. Retention is also problematic; several studies recruited representative samples but were unable to retain many of their non-White, male, and low-income participants for follow-up assessment (Adams & White, 2003). Even when studies specifically target underserved participants, interventions may not be effective (for example, Pekmezi, Barbera, Bodenlos, Jones, & Brantley, 2009). Pekmezi and colleagues (2009) evaluated the impact of a home-based physical activity intervention on low-income African American women's physical activity levels. Compared to an attention control condition, they found no significant changes in physical activity or stage progression among participants. However, it should be noted that "home-based" in the study simply meant participants received mailings and two telephone counseling sessions.

Applications of TTM to Television Viewing

Published studies on TTM and screen time are scant. Johnson et al. (2005) measured the impact of Healthy Habits, a campaign to reduce television viewing among families enrolled in the

Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). WIC staff were also surveyed. The theoretical underpinnings of Healthy Habits include TTM as well as social marketing and socio-ecological models. Healthy Habits appears to only employ the stages of change construct of TTM, as Johnson and colleagues refer to stage-tailored handouts and approaches with no mention of the other TTM constructs. WIC mothers and staff were asked to answer two questions regarding television viewing. One question queried about children's television viewing while the other asked participants if they watched television during meals. Participants were more likely to meet the recommendations of two hours or less of television viewing after six months of intervention; however, these results must be interpreted with caution. Researchers did not collect identifying information at baseline or after six months of intervention. Instead, cross-sectional samples were obtained at each time point. Further, no control or comparison group was used. Thus, a true intervention effect cannot be determined from the study (Johnson et al., 2005). More rigorous studies are needed to evaluate the effectiveness of TTM-based interventions on television viewing and other screen behaviors.

Community Lay Advisor Approach

The title of *community lay advisor* is often used interchangeably with other titles, such as community health advisor, lay health worker, peer educator, or promotora/promotore de salud (Durant et al., 2013; Johnson, Sharkey, Dean, St. John, & Castillo, 2013; Keller et al., 2011; Raphael, Rueda, Lion, & Giordano, 2013; Rhodes et al., 2007; South et al., 2013; Zoorob et al., 2013). Community lay advisors are individuals from the community who are recruited to assist with interventions, either in paid or volunteer positions (Raphael et al., 2013). Rhodes and colleagues (2007) described them as "community members whom others naturally turn to for advice, emotional support, and tangible aid" (p. 418). Community lay advisor involvement in health interventions is diverse and can range from participant recruitment to health referrals, case management, or direct education, just to name a few roles (South et al., 2013). They typically

receive informal training and support to deliver interventions, but may lack the formal educational preparation of professionals and paraprofessionals (Raphael et al., 2013; South et al., 2013).

The appeal of community lay advisors stems from all they contribute to health interventions. They have knowledge of and commitment to the community because they are typically residents themselves (South et al., 2013). As community insiders, they are able to foster trust and rapport with participants. They also have language and culture in common with participants (Rhodes et al., 2013). For these reasons, the community lay advisor approach has become a widely used method for interventions geared toward Latino and African American populations (Durant et al., 2013; Johnson et al., 2013; Keller et al., 2011; Rhodes et al., 2013; Williams et al., 2013; Zoorob et al., 2013). Importantly, the community lay advisor approach has demonstrated effectiveness in improving health behaviors, although more scholarly literature on intervention effectiveness is needed (Rhodes et al., 2013).

Rationale for the Current Study

As evidenced by the literature, parents have considerable influence on their children's weight status and their weight-related behaviors. Overweight or obese parents are more likely to have overweight or obese children (Acharya et al., 2011; Agras et al., 2004; Janjua et al., 2012; Kitsantas & Gaffney, 2010). Parents who eat more fruits and vegetables are more likely to have children who eat more fruits and vegetables (Cooke et al., 2003; Fisher et al., 2002; Jones et al., 2010; Miller et al., 2011; Sweetman et al., 2011). Parents who drink more sugary beverages are more likely to have children who drink more sugary beverages (Grimm et al., 2004). Physically active parents are more likely to have physically active children (Alderman et al., 2010; Fuemmeler et al., 2011; Moore et al., 1991; Oliver et al., 2010; Zecevic et al., 2010). Parents who watch abundant amounts of television are more likely to have children who participate in excessive screen viewing, including television (Barrada et al., 2007; Davison et al., 2005; Gorely et al., 2004; Jago et al., 2010; Jago et al., 2012). These associations are observed even among

very young children, underscoring the need for early intervention and providing cause to target parents as agents of behavioral change. Low-income and minority youth are disproportionately burdened by overweight and obesity (Dalenius et al., 2012; Fryar et al., 2014). Thus, interventions designed to influence low-income and minority infants' and toddlers' weight status via parental change are warranted.

CHAPTER III

METHODS

The present investigation was part of a larger study, *Minding the Gap*, which was a year-long pilot intervention designed to improve academic success among children of impoverished families who prefer to keep their children out of early childhood education programs. The focus of the current investigation was the health behaviors of the female primary caregivers. The primary goal was to evaluate the effectiveness of a Healthy Living intervention on female primary caregivers' fruit and vegetable consumption, sugar-sweetened beverage consumption, physical activity level, and television viewing time. The secondary purpose of this research was to explore the impact of the Healthy Living intervention on female primary caregivers' self-efficacy for the abovementioned health behaviors. The tertiary aim was to explore any intervention effects on the female primary caregivers' body mass index as well as the children's weight status. The *Minding the Gap* study was approved by the human subjects review board at Oklahoma State University (IRB # HE-14-2).

Research Design

The study used a quantitative, quasi-experimental, pretest/posttest, attention-placebo comparison design. Outcomes from the Healthy Living treatment condition were compared to the early childhood education attention-placebo comparison condition. The attention-placebo comparison condition helped reduce the threat to external validity by ensuring all participants received comparable time and attention (Melnyk & Morrison-Breedy, 2012). Data for the *Minding the Gap* project were collected at three time points: baseline, midpoint, and post-

intervention. At each time point, data were collected from both the female primary caregiver and her infant or toddler enrolled in the study. For the present investigation, the data for children was limited to anthropometric measurements, and baseline and midpoint outcomes were analyzed as pretest and posttest, respectively. Although the aim was to collect midpoint data after 6 months of intervention, the actual range was 6 to 9 months. The data collected post-intervention was analyzed and reported independently of the current study.

Lay Advisors

Lay advisors were hired to recruit participants and implement the treatment and attention-placebo comparison interventions. Female lay advisors were recruited from neighborhoods in Tulsa, Oklahoma. A *Minding the Gap* research team member who was actively engaged in the Latino community recruited bilingual (English and Spanish) lay advisors. Another *Minding the Gap* research team member collaborated with Educare, a local early childhood education program (Tulsa Educare, 2014), to identify English-speaking lay advisors. At the onset of the study, eight female lay advisors were recruited. Four lay advisors were allocated to deliver the Healthy Living intervention while the other four were allocated to deliver the attention-placebo comparison intervention. Two lay advisors for each condition (four total) were bilingual (English and Spanish). Lay advisors were allocated to either the Healthy Living or attention-placebo comparison condition based on preference or past experience. Although this method of allocation is less optimal than random assignment, lay advisor interest in and enthusiasm for their respective intervention curriculum was considered important for participant recruitment and retention and effective curricular implementation.

Lay advisor attrition. Three lay advisors, two from the Healthy Living condition and one from the attention-placebo comparison condition, opted not to continue in their role as lay advisor. Lay advisor attrition was chiefly because of schedule conflicts and difficulty recruiting participants. Consequently, one additional bilingual lay advisor was hired four months into the project to implement the Healthy Living intervention. She took over existing Healthy Living

participants (those who wanted to continue in the study despite a change in lay advisor) and also recruited additional participants from her own social network. Similarly, any participant in the attention-placebo comparison condition who wanted to continue with the study after her lay advisor dropped out was allocated to another lay advisor.

Lay advisor compensation. Lay advisors were paid $15 per hour for time spent on project-related activities; this included not only the time spent delivering lessons but also time spent on professional development activities. Lay advisors worked 15 to 20 hours per week, on average.

Lay advisor training. Lay advisors received a general orientation to the research study to discuss expectations and research protocol followed by curriculum training. Research team members provided the general orientation. Lay advisors were given an overview of the study and then research team members explained the lay advisor approach, confidentiality requirements, participant recruitment guidelines, data collection/record keeping protocol, and work and payment schedules. An Oklahoma Cooperative Extension Service staff member and members of the *Minding the Gap* research team led the training for the Healthy Living curriculum. Parents as Teachers trainers provided the training for the attention-placebo comparison curriculum, *Parents as Teachers Foundational Curriculum* (PAT, 2013). In addition to the initial trainings, lay advisors also received ongoing training and professional development in the form of both group and individual meetings. The lay advisor who was hired later into the project received individualized training on the Healthy Living curriculum and a one-on-one orientation to the research protocol and study expectations.

Capacity building and empowerment for the lay advisors was an important goal for the overall *Minding the Gap* project. To this end, lay advisors were given the opportunity to participate in training for both curricula. They were instructed to only utilize their designated curriculum when working with participants enrolled in the present study. During individual

meetings with lay advisors, research team members reviewed activities completed with participants to help confirm lay advisors were adhering to their designated curriculum.

Participants

Inclusion criteria for participation in the *Minding the Gap* study included: (a) the participants were required to be the mother or female primary caregiver of an infant or toddler who was between the ages of 2 to 30 months at recruitment, and (b) the female primary caregivers had to be at least 18 years of age. Female primary caregivers were defined as those individuals who cared for the child more than 50% of the time. Although not an exclusion criterion, lay advisors were encouraged to recruit women who had never participated in Oklahoma Cooperative Extension Service's Expanded Food and Nutrition Education Program (EFNEP) program. This recruitment effort best allowed the research team to test the effects of the Healthy Living treatment condition, and helped avoid duplication of services to broaden the overall reach of health education in these communities.

The recruitment goal for each lay advisor was 10 participants (13 maximum). Lay advisors were encouraged to recruit participants from their own social networks. This proved to be feasible for bilingual lay advisors, but was more challenging for English-speaking lay advisors. Accordingly, *Minding the Gap* research team members arranged recruitment opportunities at Educare sites and Emergency Infant Services, a local non-profit agency. Of the six lay advisors who completed the study, five met or exceeded the recruitment goal while one was only able to recruit five participants. Of the three lay advisors who elected to discontinue study participation, no one met the recruitment goal.

Intervention Group Procedure

Lay advisors recruited participants to one of two interventions. The Healthy Living treatment condition was meant to directly influence female primary caregivers' health behaviors whereas the attention-placebo comparison condition was intended to influence infant and toddler development. Lay advisors were to meet with participants in person two times per month,

providing a lesson from their designated curriculum and also offering social support and connecting participants to community resources as needed. The in-person visits were offered in the participants' homes or other mutually agreed upon locations, and were provided in the participants' preferred language, either Spanish or English. Lay advisors were asked to follow up with participants between visits via telephone, text, email, or other electronic means. In some cases, lay advisors saw participants in the community and were able to follow up through informal conversations. Lay advisors logged their activities and submitted the logs for recordkeeping and accountability. Though two in-person visits per month was the goal, this was not always achieved. Thus, number of in-person visits will be discussed in subsequent chapters.

Treatment condition. The Healthy Living intervention was developed to influence four weight-related behaviors: two dietary behaviors and two physical activity behaviors. These four behaviors were selected because they directly align with the 5-2-1-Almost None formula promoted by Nemours Health and Prevention Services (2010). This formula encourages children and families to eat at least five servings of fruits and vegetables each day (5), limit screen time to two hours or less each day (2), engage in at least one hour of physical activity each day (1), and eliminate or greatly reduce sugar sweetened beverage intake (almost none). Because of the empirical evidence linking parental health behaviors to child health behaviors, these four behaviors were deemed an important focus for female primary caregivers in the current study. The recommendations for female primary caregivers paralleled those of the 5-2-1-Almost None formula with one exception, physical activity. Minimum physical activity recommendations for adults differ from the youth recommendation of one hour. The American College of Sports Medicine (2014) recommends adults participate in moderate-intensity physical activity for at least 30 minutes five days per week or vigorous-intensity physical activity for at least 20 minutes three days per week. Accordingly, the Healthy Living intervention encouraged female primary caregivers to meet this threshold of physical activity at a minimum.

Lay advisors allocated to the Healthy Living intervention used an adapted version of the Expanded Food and Nutrition Education Program *Families Eating Smart and Moving More* (EFNEP–*FESMM*) curriculum, which is a research-based curriculum developed by North Carolina State University Extension. The curriculum was specifically developed for impoverished families with children to improve their health and nutrition behaviors (North Carolina State University, n.d.). The EFNEP–*FESMM* curriculum includes an introductory lesson, eight core lessons, and 12 additional lessons (see Table 8 for lesson titles).

Table 8

Expanded Food and Nutrition Education Program Families Eating Smart and Moving More (EFNEP–FESMM) Lesson Titles

Introductory and Core Lessons	Additional Lessons
1. Introduction to the Expanded Food and Nutrition Education Program (EFNEP)	10. Limit TV
2. MyPlate: Build a Healthy Plate and Be Active	11. Making Smart Beverage Choices
3. Fix it Safe	12. Choosing to Move More Throughout the Day
4. Choosing More Fruits and Vegetables	13. Smart Size Your Portions and Right Size You
5. Plan: Know What's for Dinner	14. Making Smart Lunch Choices
6. Shop: Get the Best for Less	15. Making Smart Choices When Eating Out
7. Fix it Fast, Eat at Home	16. Making Smart Choices When Eating Fast Food
8. Making Smart Breakfast Choices	17. Choose, Plan and Do for a Healthier You
9. Shop for Value, Check the Facts	18. Pregnancy
	19. Breastfeeding
	20. Infants
	21. Children

For the present study, the first 12 topics listed in Table 8 were prioritized. Per EFNEP–*FESMM* curriculum protocol, the introductory and core lessons were taught first. The EFNEP–*FESMM* lessons are typically 30 to 60 minutes in duration and are designed for group sessions, using PowerPoint as a visual aid. For the current study, lessons were adapted for one-on-one sessions without the use of computer technology and were broken into shorter lessons (see Table

9 for a list of the Healthy Living intervention lesson titles compared to original EFNEP–*FESMM* lesson titles).

Table 9

EFNEP–FESMM Lesson Titles and Healthy Living Lesson Titles

Original EFNEP–*FESMM* Lesson Titles	EFNEP–*FESMM* Lesson Titles Adapted for Healthy Living Intervention
Introduction to the Expanded Food and Nutrition Education Program (EFNEP)	Introduction to the Expanded Food and Nutrition Education Program (EFNEP)
MyPlate: Build a Healthy Plate and Be Active	MyPlate : Build a Healthy Plate – Focus on Fruits and Vegetables!
	MyPlate: Build a Healthy Plate – Focus on Grains, Dairy, & Protein!
	MyPlate: Build a Healthy Plate – Focus on Physical Activity!
Fix it Safe	Fix it Safe
Choosing More Fruits and Vegetables	Choosing More Fruits and Vegetables (Part 1) – Choose a Variety of Colors!
	Choosing More Fruits and Vegetables (Part 2) – Increasing Your Fruit and Vegetable Intake!
Plan: Know What's for Dinner	Plan: Know What's for Dinner
Shop: Get the Best for Less	Shop: Get the Best for Less (Part 1)
	Shop: Get the Best for Less (Part 2)
Fix it Fast, Eat at Home	Fix it Fast, Eat at Home
Making Smart Breakfast Choices	Making Smart Breakfast Choices
Shop for Value, Check the Facts	Shop for Value, Check the Facts (Part 1)
	Shop for Value, Check the Facts (Part 2)
Limit TV	Limit TV
Making Smart Beverage Choices	Making Smart Drink Choices (Part 1)
	Making Smart Drink Choices (Part 2)
Choosing to Move More Throughout the Day	Choosing to Move More Throughout the Day
Smart Size Your Portions and Right Size You	Smart Size Your Portions and Right Size You
Making Smart Lunch Choices	Making Smart Lunch Choices
Making Smart Choices When Eating Out	Making Smart Choices When Eating Out
Making Smart Choices When Eating Fast Food	Making Smart Choices When Eating Fast Food
Choose, Plan and Do for a Healthier You	Choose, Plan and Do for a Healthier You
Pregnancy	Pregnancy
Breastfeeding	Breastfeeding
Infants	Infants
Children	Children

Each lay advisor allocated to the Healthy Living curriculum was provided with a "toolkit" to use with lessons and while administering the 24-hour dietary recall, which is part of the EFNEP–*FESMM* curriculum. The toolkit included: a laminated Choose MyPlate icon (USDA, 2014); measuring cups; measuring spoons; two different size bowls, a container of sugar cubes to illustrate how much sugar is in beverages; a tennis ball to illustrate one medium-sized fruit; three dice to illustrate the serving size for 1.5 ounces of hard cheese; a pencil to illustrate the length of one ear of corn or one banana; a deck of cards to illustrate three ounces of meat or one slice of cake; and two exercise bands to use for physical activity breaks during lessons.

The Transtheoretical Model (TTM) was the guiding framework for Healthy Living intervention development and implementation; thus, the EFNEP–*FESMM* curriculum was further adapted to incorporate all TTM constructs. TTM consists of four core constructs: stages of change, processes of change, self-efficacy, and decisional balance. The stage construct acknowledges that an individual can be at different stages of change for any given health behavior. One may be in *precontemplation* where he or she is not considering change, *contemplation* where one is considering change in the foreseeable future (e.g., within the next six months), *preparation* where one is considering change in the immediate future (e.g., within the next month), *action* where one is currently making behavioral change, or *maintenance* where one has been making a behavioral change for six months or longer (Prochaska et al., 2008). Once a person's stage of change is identified, certain processes of change can be used to promote positive stage progression (Prochaska & Norcross, 2010). Decisional balance refers to the pros and cons of behavioral change. People in earlier stages of change tend to perceive more cons than pros to change (Prochaska et al., 2008). To encourage stage progression, Prochaska and colleagues (1994) recommend focusing on increasing the pros of behavior change to move people from precontemplation to contemplation and focusing on decreasing the cons of behavior change when trying to move people from contemplation toward action. Self-efficacy is a person's confidence in his/her ability to make and sustain change. An individual in the later stages of change is more

likely to have higher self-efficacy for behavior change than someone in earlier stages (Velicer et al., 2000).

For the Healthy Living intervention in the current study, the stages were collapsed into three stages of change. Stages included: (a) *precontemplation*, meaning the participant was not considering a change, (b) *contemplation/preparation*, meaning the participant was considering a change, and (c) *action/maintenance*, meaning the participant was currently performing the behavior. The EFNEP–*FESMM* lesson plans were color-coded with points of emphasis depending upon participants' stage of change. Red boxes were used to highlight information and activities that were salient to those in the precontemplation stage, as indicated by the TTM processes of change. Yellow boxes were used to highlight information and activities that were salient to those in the contemplation/preparation stage, as indicated by the TTM processes of change. Green boxes were used to highlight information and activities that were salient to those in the action/maintenance stage, as indicated by the TTM processes of change.

Lay advisors administered a Stages of Change questionnaire to assess participants' stage of change for each of the four target behaviors: fruit and vegetable intake, sugar-sweetened beverage intake, physical activity, and screen time (see Appendix B for Stages of Change Assessment). Lay advisors administered the staging questionnaire during their first visit and approximately every three months thereafter. Once a participant was staged, lay advisors could use the color-coded prompts within each lesson to stage-match the lesson plan to present to the participant. Stage-matched lesson plans employed appropriate processes of change, decisional balance strategies, and self-efficacy building strategies to facilitate stage progression. For example, a decisional balance worksheet was encouraged when a participant was in the precontemplation or contemplation/preparation stage for one of the target behaviors as a means to identify perceived pros and cons of behavior change and tailor lessons accordingly (see Appendix B for Decisional Balance Worksheet; adapted from ACSM, 2006). To enhance self-efficacy, lay advisors were encouraged to include experiential activities in their lessons. For instance, each

lesson plan included a brief physical activity break lay advisors could complete with the participants.

Lay advisors documented their activities during each lesson in a tracking log (see Appendix C for an example lesson tracking log). Research team members reviewed logs with lay advisors during individual meetings and mentored them throughout the *Minding the Gap* project to help ensure fidelity to the intervention protocol.

Attention-placebo comparison condition. The Parents as Teachers (PAT) *Foundational Curriculum* was used for the attention-placebo comparison condition. PAT is an internationally utilized, evidence-based early childhood education curriculum. PAT is grounded in the following theoretical framework: human ecology and family systems, developmental parenting, attribution theory, and empowerment and self-efficacy (PAT, 2013). Lay advisors received training on the PAT *Foundational Curriculum*, which includes modules for children from birth to 36 months. Because the PAT *Foundational Curriculum* includes modules on physical fitness and nutrition (PAT, 2013), these lessons were excluded from the attention-placebo comparison condition to prevent contamination effects.

Data Collection

Data were collected by trained research assistants (RAs) at pretest and posttest. Data collection interviews were administered in the participants' preferred language, Spanish or English. RAs secured consent from participants prior to pretest data collection (see Appendix A for informed consent document, which was also translated into Spanish). All measurement instruments were translated into Spanish, if a validated Spanish version was not available. Participants were compensated for completing pretest and posttest assessments but not for participating in the intervention itself. Participants received $20 for the pretest assessment and another $20 for the posttest assessment.

Confidentiality

Participants were assigned unique identification numbers. The list linking participant identification (PID) number with participant information was saved in an electronic file, which was stored on a password-protected, secure shared drive. Only authorized research team members had access to this document. Lists containing PIDs with participant names were kept separately from active participant files. RAs had the opportunity to match individuals' names and their PIDs during data collection only. RAs were required to return lists containing PIDs and participant names along with completed data files to the designated research team member within 24 to 48 hours of completing interviews. To further minimize breaches to confidentiality, RAs were (a) trained on the importance of confidentiality, including completing Collaborative Institutional Training Initiative (CITI) Human Subjects Research training (CITI Program at the University of Miami, n.d.), (b) required to sign a confidentiality agreement indicating their willingness to keep all information confidential, and (c) informed that purposeful breaches of confidentiality (e.g., copying a participant's survey responses in any way) would result in immediate dismissal from the project.

Measurement Instruments

Demographics. Using the Demographic Information Form (see Appendix A), RAs obtained the following demographic information from participants during the pretest assessment: age, place of birth, race, ethnicity, relationship to the child, whether they were the legal guardian (if not the biological mother), marital status, education level, employment status, number of jobs worked, usual number of hours worked per week, and work schedule (daytime or other). Participants were also asked additional family background questions, including questions about persons living in their household and governmental assistance. At posttest, RAs inquired if participants had any changes in family life (e.g., marriage) or employment status (e.g., new job), and if they had signed up for any government-sponsored programs since the onset of the study (e.g., Women, Infants, and Children).

Medical History Questionnaire. Using the Brief Medical History Questionnaire (see Appendix A), RAs inquired about participants' medical history at the pretest assessment. Participants indicated if they had ever been told by a physician they had any of the following conditions: heart disease, diabetes, high blood pressure, high cholesterol, or overweight or obesity. Participants were also asked if they were currently pregnant and if they were taking any medications that could either cause weight gain or weight loss; these questions were asked again at posttest.

Anthropometrics. Anthropometric data were collected for participants as well as the children at pretest and posttest. RAs collected height and weight measurements on participants and recumbent length and weight measurements on infant and toddler children during the pretest and posttest assessment.

Female primary caregiver anthropometrics. Participants were asked to remove their shoes prior to all measurements. RAs used a calibrated scale to weigh participants and a calibrated stadiometer to obtain their height. RAs recorded weight values in kilograms and height values in meters to the nearest 1/10 of a centimeter (CDC, 2011). (See Appendix A for the anthropometric script used by RAs).

The measured height and weight values were used to calculate body mass index (BMI). BMI does not directly measure body composition; however, it is regarded as an acceptable obesity screening measure for adults (CDC, n.d.). In contrast, using BMI for diagnostic purposes is not empirically supported (Romero-Corral et al., 2008). Although direct measures of body composition, such as the underwater weighing procedure, provide a more accurate assessment of excess body fat, such measures are typically restricted to laboratory settings and are, thus, not suitable in field research (Ocker & Melrose, 2008). In the present study, anthropometric data were collected in the field, not in a laboratory. Direct measures, such as skinfold measurements, can be used in the field; however, measurement error is a concern (Freedman & Sherry, 2009).

Furthermore, because BMI is widely used in research studies, direct comparisons between the outcomes of this study and the existing literature are possible.

Child anthropometrics. Prior to measurements, children were undressed to the diaper. RAs recorded weight values in kilograms and height and recumbent length values in centimeters to the nearest 1/10 of a centimeter (CDC, 2011). To obtain the children's recumbent length, RAs used a calibrated infantometer. At least two recumbent length measurements were collected; if the two measurements were not within 1/2 centimeter of each other, additional measurements were collected. To obtain children's weights, RAs used a calibrated scale. Infants were weighed with their female primary caregiver holding them. Then, the female primary caregiver was weighed without holding the infant. The difference between these two measurements was calculated to obtain infant weight (See Appendix A for the anthropometric script used by RAs).

For children 24 months or older at recruitment, the measured height and recumbent length values were used to calculate body mass index (BMI). The Centers for Disease Control and Prevention's *BMI Percentile Calculator for Child and Teen Metric Version* was used to determine BMI-for-age percentiles. Weight status was categorized as: obese ($\geq 95^{th}$ percentile), overweight (85^{th} to $< 95^{th}$ percentile), healthy weight (5^{th} percentile to $< 85^{th}$ percentile), or underweight ($< 5^{th}$ percentile) (CDC, 2015). As with adults, BMI is regarded as an acceptable obesity screening measure for children but should not be used as the sole diagnostic criteria (Barlow and the Expert Committee, 2007; CDC, 2015). In children, BMI is most useful for detecting true body fat in obese children, as it has a specificity of 95% and a sensitivity of 70-80%. It is less accurate in detecting true body fat for non-obese children (Freedman & Sherry, 2009). In the present study, detecting obesity at an early age was the primary concern; thus, this limitation was tolerable.

For children under 24 months at recruitment, the measured recumbent length and weight values were used to determine weight-for-length values. Specifically, the Centers for Disease Control and Prevention's (2010) *Data Table of Infant Weight-for-length Charts* was used to

determine weight-for-length percentiles. Children's weight status was categorized as: overweight (> 95th percentile) or non-overweight (≤ 95th percentile). In the absence of BMI normative values for children under age 2 years, weight-for-length values serve as an alternative to BMI-for-age values (Barlow and the Expert Committee, 2007). To maintain consistency from pretest to posttest, weight-for-length growth charts were used to classify weight status for children who were under 24 months at recruitment but over 24 months post-intervention. The weight-for-length charts are appropriate for children up to 36 months (CDC, 2010).

Fruit and Vegetable All-Day Screener. The National Cancer Institute Fruit and Vegetable All-Day Screener (FVS) (see Appendix A) was used to measure fruit and vegetable consumption at pretest and posttest. The FVS is a 19-item, self-report questionnaire that measures both frequency and quantity of fruits, 100% fruit juices, and vegetables consumed over the past month. This screener includes specific questions about: 100% fruit juice; fruits; lettuce salad; French fries or fried potatoes; other white potatoes (baked, boiled, or mashed); cooked dried beans; all other vegetables (excluding those already mentioned); tomato sauces; and vegetable soup. On the last question, respondents indicate how often they have eaten a mixture that includes vegetables (e.g., sandwiches, casseroles, tacos); however, this final question does not ask about quantity and is also not included in the scoring protocol (National Cancer Institute [NCI], 2013).

Psychometric properties of the FVS. Thompson et al. (2002) compared the FVS to four 24-hour dietary recalls, administered on nonconsecutive days and including weekend and weekdays. The correlation coefficient between the screener and the multiple 24-hour dietary recalls was .66 for men and .51 for women. The FVS underestimated median fruit and vegetable intake in men with median servings per day estimated at 5.0 compared to 5.8. In women, the FVS overestimated median fruit and vegetable intake, with median servings per day estimated at 5.0 compared to 4.2. Greene et al. (2008) also compared the FVS to multiple 24-hour dietary recalls; however, they recruited more ethnically diverse participants as well as a greater percentage of participants with a high school education or less. Their participants were recruited from

intervention trials at multiple sites. For women, outcomes from the FVS significantly correlated ($p < 0.05$) with the 24-hour dietary recalls at all sites (Pearson R^2 ranged from .43 to .63). For men, the two measures were significantly correlated at all but one site (Pearson R^2 ranged from .31 to .47). The FVS overestimated mean fruit and vegetable intake for women at all sites and for men at two of four sites. The average overestimation was 2.11 servings for women and 1.76 servings for men.

Peterson et al. (2008) reported on the changes in fruit and vegetable consumption from baseline to follow-up for those participants completing the abovementioned intervention trials. The over-reporting of fruit and vegetable consumption was present from baseline to post-intervention. On average, women overestimated by 1.42 servings per day at baseline and 1.59 servings per day at follow-up. Men overestimated by 1.27 servings per day at baseline and 0.68 servings per day at follow-up. They also found discrepancies between the FVS and the multiple 24-hour dietary recalls in detecting intervention effects. The FVS revealed statistically significant differences between the intervention and control groups but the 24-hour dietary recalls did not (Peterson et al., 2008). Despite these limitations, the FVS has been widely used in intervention research with diverse participants (Yaroch et al., 2008). These limitations were considered when interpreting results and forming conclusions in the present study.

BEVQ-15. To assess changes in participants' sugar-sweetened beverage consumption, RAs administered the BEVQ-15 (see Appendix A) at pretest and posttest. This brief, self-report questionnaire measures both the frequency and quantity of habitual beverage consumption for 15 different sweetened and unsweetened beverage categories. For each type of beverage, respondents indicate "how often" they consume these given the following options: never or less than one time per week; one time per week; two to three times per week; four to six times per week; one time per day; two times per day; or three or more times per day. To measure quantity of beverages consumed, respondents indicate "how much each time" given the following options: less than six ounces (3/4 cup); eight ounces (1 cup); 12 ounces (1 ½ cups); 16 ounces (2 cups); or

more than 20 ounces (2 ½ cups). The beverage categories are: water; 100% fruit juice; sweetened juice beverage/drink; whole milk; reduced fat milk; low fat/fat free milk; regular soft drinks; diet soft drinks and other artificially sweetened drinks; sweetened tea; tea or coffee with added cream and/or sugar; tea or coffee without cream or regular sugar; beers, ales or wine coolers; hard liquor; wine; and energy and sports drinks. The BEVQ-15 also includes an "other" category to capture any unlisted beverages. It is suitable for low-literacy participants and can be completed in less than three minutes (Hedrick et al., 2012). The BEVQ-15 has also been shown to detect changes in total beverage energy intake over time (Hedrick et al., 2013), which was an important consideration for the present intervention study.

Psychometric properties of the BEVQ-15. Hedrick et al. (2012) evaluated test-retest reliability for all items on the BEVQ-15 and for the outcomes of kilocalories and grams. Pearson bivariate correlations between the first and second measurements were statistically significant for all 15 items, and for the outcomes for all beverages except one (R^2 ranged from .52 to .95, $p <$ .001). For energy drinks, kilocalorie and gram correlations between the first and second measurement were non-significant ($R^2 = .22$, $p = .08$); however, Hedrick et al. concluded the absolute differences in these outcomes were minimal (4 ± 7 kilocalories, 9 ± 16 grams). To assess validity, BEVQ-15 outcomes were compared to three 24-hour dietary recalls. Significant correlations were detected between the 24-hour dietary recalls and the BEVQ-15 for kilocalories from sugar-sweetened beverages (Spearman's $R^2 = .69$, $p < .001$) and total beverage energy (Spearman's $R^2 = .59$, $p < .001$). All beverage categories except whole milk correlated with the three 24-hour dietary recalls at an alpha level of < .05. Because sugar-sweetened beverages were the focal beverages in the present study, the non-significant correlation for whole milk was not of concern.

International Physical Activity Questionnaire. The International Physical Activity Questionnaire (IPAQ) short last 7 day telephone format (see Appendix A) was used to measure participant's physical activity at pretest and posttest. The IPAQ short format is a 7-item self-

report questionnaire that enquires about: frequency and duration of vigorous-intensity physical activities; frequency and duration of moderate intensity physical activities; frequency and duration of walking; and time spent sitting on a weekday. Respondents are asked to answer based on their activity levels for the last seven days. Both telephone and self-administered questionnaires are available (IPAQ, n.d.). Because RAs administered the IPAQ in a personal interview format in the present study, the telephone version (see Appendix A) was used to measure physical activity at pretest and posttest. Others have used the telephone version in personal interviews (Craig et al., 2003). It was not necessary to translate the IPAQ into Spanish for the current study, as the IPAQ is available online in several different languages (IPAQ, n.d.).

Psychometric properties of the IPAQ short format. Craig et al. (2003) evaluated the psychometric properties of the IPAQ short format, telephone version. They found the test-retest reliability for total physical activity acceptable (Spearman's $R^2 = .74$). Test-retest reliability was also evaluated for the categorical variable of greater than 150 minutes of physical activity per week; the percent agreement was .86 and .81 for the two data collection sites in which the IPAQ short format, telephone version was administered. To determine criterion validity, IPAQ outcomes were compared to accelerometry outcomes (Computer Science and Application's Inc. model 7164 accelerometer). Fair to moderate agreement was observed between accelerometer and IPAQ measures (Spearman's $R^2 = .30$). From their analyses, Craig et al. concluded the IPAQ is "at least as good as other established self-report physical activity measures" (p. 1388). However, researchers have expressed concern about using the IPAQ for intervention studies because its ability to detect program changes has not been established (Bauman et al., 2009). Another consideration is that the IPAQ short form was developed to measure physical activity categorically, not as a continuous measure (Bauman et al., 2009); consequently, physical activity data collected in the current study was analyzed as categorical data only.

Sedentary Behavior Questionnaire. To measure television viewing time, RAs administered the Sedentary Behavior Questionnaire (SBQ) (see Appendix A) at pretest and

posttest. The SBQ is an 18-item self-report questionnaire that measures nine sedentary behaviors "on a typical weekday" and the same nine sedentary behaviors "on a typical weekend day." Respondents list their frequency for each behavior using the following options: none; 15 minutes or less; 30 minutes; one hour; two hours; three hours; four hours; five hours; or six hours or more. The sedentary behaviors measured are: watching television (including videos on DVD/VCR); playing computer or video games; sitting listening to music on the radio, tapes, or CDs; sitting and talking on the phone; doing paperwork or computer work (office work, emails, paying bills, etc.); sitting reading a book or magazine; playing a musical instrument; doing artwork or crafts; and sitting and driving in a car, bus, or train (Rosenberg et al., 2010). The "sitting and talking on the phone" item was modified to account for the versatile use of cell phones; the item was changed to "sitting and talking, texting, or playing games on the phone" (see Appendix A for the adapted SBQ).

Psychometric properties of the SBQ. Rosenberg et al. (2010) examined the SBQ's psychometric properties in a sample of overweight adults. Test-retest reliability for all items ranged from moderate to excellent based on Landis and Koch's benchmarks. Intraclass correlation coefficients ranged from .64 to .90 for weekdays and from .51 to .93 for weekend days. For the screen behaviors of television, computer games, and telephone, reliability was almost perfect for the weekdays (intraclass correlation coeefficients were .86, .83, and .81 respectively) and substantial to almost perfect for weekend days (.83, .81, and .73 respectively). To examine validity, Rosenberg et al. compared SBQ outcomes to seven-day accelerometer outcomes and to the IPAQ's time spent sitting domain. When SBQ outcomes were compared to accelerometer outcomes, the SBQ appeared to be more valid for measuring women's sedentary behavior than men's. For men, no SBQ scores were significantly correlated with accelerometer outcomes; however, for women, SBQ scores were significantly correlated with accelerometer outcomes for television (partial $r = .12$, $p = .04$), office/paper work (partial $r = .17$, $p = .002$), playing a musical instrument (partial $r = .26$, $p = .00$), and total weekend sedentary behaviors

(partial r = .18, p = .002). When SBQ outcomes were evaluated against the IPAQ sitting time measure, more associations were observed. For women, the IPAQ total sitting time measure was significantly correlated with SBQ outcomes for television (partial r = .26, p = .00), talking on the telephone (partial r = .12, p = .03), office/paper work (partial r = .33, p = .00), reading (partial r = .11, p = .05), weekday sedentary behavior (partial r = .21, p = .00), weekend sedentary behavior (partial r = .36, p = .00), and total sedentary behavior (partial r = .28, p = .00). For men, the IPAQ total sitting time measure was significantly correlated with SBQ outcomes for television (partial r = .20, p = .00), listening to music (partial r = .11, p = .04), talking on the phone (partial r = .17, p = .001), office/paper work (partial r = .31, p = .00), sitting driving a car (partial r = .19, p = .00), weekday sedentary behavior (partial r = .24, p = .00), weekend sedentary behavior (partial r = .38, p = .00), and total sedentary behavior (partial r = .31, p = .00).

Although the SBQ's reliability is a strength, its low validity is a noteworthy limitation. When Rosenberg et al. (2010) evaluated the SBQ against accelerometer outcomes, they compared energy expenditure to SBQ outcomes. It is possible that participants could meet physical activity recommendations while also participating in large amounts of screen time. For the present study, two distinct behaviors, physical activity and screen time, were of interest, not energy expenditure *per se*.

Self-Efficacy Questionnaire. The self-efficacy questionnaire (SEQ) (see Appendix A) was constructed specifically for the current study to measure participants' confidence, under specific conditions, in eating fruits and vegetables, limiting sugar-sweetened beverages, being physically active, and limiting television viewing time. Existing self-efficacy instruments were consulted to create the SEQ (Henry et al., 2006; University of Glasgow Social and Public Health Sciences Unit, n.d.). The SEQ includes nine items to measure fruit and vegetable self-efficacy (Henry et al., 2006), six items to measure sugar-sweetened beverage self-efficacy, seven items to measure physical activity self-efficacy (University of Glasgow Social and Public Health Sciences

Unit, n.d.), and three items to measure television viewing self-efficacy. The SEQ uses a 5-point scale. For each item, participants were asked to rate their confidence given the following response choices: I'm sure I can't; I probably can't; maybe/don't know; I probably can; or I'm sure I can. The SEQ was administered at pretest to measure participants' baseline self-efficacy. The initial intent was to also administer the SEQ at posttest to assess any intervention effects on self-efficacy. A preliminary analysis of baseline self-efficacy indicated participants reported high self-efficacy prior to the intervention (discussed in detail in Chapter 4). This prompted the creation of a retrospective self-efficacy questionnaire in an effort to measure additional gains in self-efficacy at posttest which might have otherwise been lost due to a ceiling effect.

Retrospective Self-Efficacy Questionnaire. The Retrospective Self-Efficacy Questionnaire (RSEQ) (see Appendix A) was administered at posttest to measure participants' self-efficacy following the intervention. The items on the RSEQ paralleled the SEQ. However, a 3-point scale was used. Specifically, participants were prompted to think about their confidence before starting the *Minding the Gap* program, to think about their confidence after participating in the program, and then to indicate whether they felt more confident, less confident, or about the same level of confidence after participating in the intervention.

Data Analysis

IBM SPSS statistics software (version 21.0 for Windows) was used to conduct statistical analyses. An a priori alpha level of $\leq .05$ was set for all analyses. Statistical analysis procedures as well as pertinent data cleaning information for each outcome are detailed next.

Participant demographics. Because participants were not randomly assigned to condition, an independent samples t-test was conducted to explore any differences in mean age between all participants in the treatment and comparison condition at pretest. At posttest, the independent samples t-test was repeated, but only participants who completed both pretest and posttest assessments were included in the second analysis. The other demographic variables were categorical; therefore, Pearson's chi-square analyses were used to examine between-group

differences. As with age, pretest analyses included all participants; posttest analyses were restricted to those completing both the pretest and posttest assessment. This pretest/posttest inclusion procedure allowed for examination of any demographic differences at the onset of the study as well as consideration of any demographic differences in participant retention. To avoid cell sizes of less than five which would compromise the accuracy of the chi-square tests (Field, 2013), data were collapsed to two levels for birth country, marital status, and educational attainment. The demographic characteristics of those who dropped out of the study were also examined. Cell frequencies were insufficient to conduct robust Pearson chi-square analyses on attrition demographics. Chi-square test statistics and p-values are presented in Chapter IV, but outcomes are interpreted prudently given this limitation.

Hypothesis 1. To examine the effect of the Healthy Living intervention on female primary caregivers' change in fruit and vegetable consumption, a 2 x 2 mixed factorial analysis of variance (ANOVA) was used to evaluate between-group differences in daily servings of fruits and vegetables as well as any within-group change from pretest to posttest.

During data cleaning, if both frequency and quantity were missing and most other items from the FVS were recorded, missing data were recoded to zero (NCI, 2013). If a frequency value was recorded but quantity was missing, these data were coded as missing data and the participant was excluded from analyses for fruit and vegetable consumption. Once data were cleaned, the scoring protocol described by NCI (2013) was followed to calculate mean fruit and vegetable servings per day. Two options for scoring servings are offered in NCI protocol, the "1992-2004 definition of Pyramid servings" and the "2005 MyPyramid definitions of fruit and vegetable cup equivalents" (NCI, 2013); the latter was used for the current investigation.

Hypothesis 2. A 2 x 2 mixed factorial ANOVA was used to evaluate the impact of the Healthy Living intervention on female primary caregivers' change in sugar-sweetened beverage calorie intake. This design allowed for between-group differences and within-group change in sugar-sweetened beverage intake to be investigated.

Consistent with data cleaning procedures used for the FVS, if both frequency and quantity were missing and other items from the BEVQ-15 were recorded, missing data were recoded to zero. If a frequency value was recorded but quantity was missing, these data were coded as missing data and the participant was excluded from analyses for sugar-sweetened beverage calorie intake. After data were cleaned, Hedrick et al.'s (2012) scoring instructions were followed to calculate participants' average daily caloric intake from sugar-sweetened beverages.

Hypothesis 3. Physical activity data collected in the current study were analyzed as categorical data only (Bauman et al., 2009). Using IPAQ scoring protocol (IPAQ, n.d.), participants' activity levels were categorized as (1) low level of physical activity, (2) moderate level of physical activity, and (3) high level of physical activity. These data were further collapsed into two categories due to low cell frequencies, whereby the moderate and high categories were combined; two categories resulted: (1) does not meet the ACSM physical activity recommendation, or (2) meets the ACSM physical activity recommendation. A three-way hierarchical loglinear model was used to evaluate associations among physical activity and condition at pre-test and posttest.

Per IPAQ data cleaning protocol, all physical activity duration values were converted into minutes. When participants reported duration in total minutes per week rather than minutes per day, their duration was divided by 7 to calculate an average daily duration. In instances where participants reported a duration of more than three hours for walking, moderate-intensity activity, or vigorous-intensity activity, data were truncated to 180 minutes (IPAQ, n.d.). When both frequency and duration data were missing for a given item (e.g., walking) but other items were complete, the missing data were recoded to zero. IPAQ (n.d.) recommends missing data be excluded from analysis. Given the relatively small sample size, however, recoding to zero allowed data to be salvaged and was consistent with how missing data from other instruments was handled. Once extreme values were truncated and missing values recoded to zero, the IPAQ

scoring protocol was followed exactly as described by IPAQ (n.d.) to categorize participants' physical activity level as low, moderate, or high.

Hypothesis 4. A 2 x 2 mixed factorial ANOVA was used to evaluate the impact of the Healthy Living intervention on female primary caregivers' change in daily television viewing minutes. This design allowed for between-group differences and within-group change in television viewing time to be investigated.

Data cleaning was not necessary for the television viewing items, as there were no missing data for participants who completed pretest and posttest assessments. It was necessary, however, to recode responses to a minute scale because some response choices on the SBQ are in hours. Because of their categorical nature, a response of "15 minutes or less" was recoded to 15 minutes and a response of "6 hours or more" was recoded to 360 minutes. The SBQ measures weekday television viewing and weekend television viewing separately; therefore, the following equation was used to compute average daily television viewing minutes: [(weekday television viewing minutes x 5) + (weekend television viewing minutes x 2)]/7.

Hypotheses 5, 6, 7, 8, and 9. The RSEQ is comprised of three categorical response choices for each item: less confident, about the same confidence, or more confidence. A self-efficacy subscale for each health behavior was created by calculating an average for each behavior. This resulted in four self-efficacy subscales: self-efficacy subscale for eating fruits and vegetables, self-efficacy subscale for limiting sugar-sweetened beverages, self-efficacy subscale for being physically active, and self-efficacy subscale for limiting television viewing time. A total self-efficacy scale score was calculated by computing an average of all 25 items on the RSEQ. Independent samples t-tests were conducted to investigate between-group differences on each of the self-efficacy subscales and total self-efficacy. Cronbach's alpha was used to measure the internal consistency of the SEQ and RSEQ scales and subscales.

Hypothesis 10. A 2 x 2 mixed factorial ANOVA was used to evaluate between-group differences in female primary caregivers' BMI change as well as any within-group change from

pretest to posttest. Participants who reported being pregnant at either pretest or posttest were excluded from the analysis.

Prior to calculating BMI, any anthropometric data not recorded in metric units were converted. When a participant's height was measured at both pretest and posttest, an average of the two was calculated and used for pretest and posttest BMI calculations. When height was measured during one assessment but not the other, that single measurement was used to calculate BMI at both pretest and posttest. Participants were all over the age of 18 and growth would not be expected. If a participant's height and/or weight was missing, their BMI could not be calculated and they were excluded from analyses.

Hypothesis 11. A three-way hierarchical loglinear model was used to evaluate associations among child weight status and condition at pre-test and posttest.

Any child's anthropometric data not recorded in metric units during data collection were converted during data cleaning. When infants or toddlers were weighed with their caregiver holding them, the child's weight was calculated by subtracting the female primary caregiver's weight from the female primary caregiver's weight while holding the child. If either height and/or weight data were missing, children were excluded from analysis, as it was not possible to determine weight-for-length percentiles or BMI-for age percentiles with missing anthropometric data. Two children were excluded from analysis because their posttest height was obviously inaccurate. For children who were under 2 years of age at pretest, the CDC's (2010) *Data Table of Infant Weight-for-length Charts* was used to determine weight-for-length percentiles. If children were at or above the 95th percentile, they were categorized as overweight; all others were categorized as non-overweight. For children 2 years of age or older at pretest, the CDC's (2015) *BMI Percentile Calculator for Child and Teen Metric Version* was used to determine BMI category. To allow for consistent comparison, children with a BMI-for-age at or above the 85th percentile were categorized as overweight and all others were categorized as non-overweight. In

other words, the overweight and obese weight status categories for children 2 years of age and older were collapsed into one category, overweight.

CHAPTER IV

RESULTS

Participant Demographics

A total of 82 female primary caregivers were recruited for participation in the *Minding the Gap* study. Participant demographics are displayed in Table 10. Participants were predominantly mothers (n = 80), but two grandmothers were recruited. The median age was 28 years (interquartile range = 9). One participant's age was undisclosed. The majority identified as Hispanic/Latina (n = 57) and spoke Spanish (n = 53). Most were either born in Mexico (n = 43) or the United States (n = 30); other birthplaces included Guatemala (n = 2), Honduras (n = 2), Puerto Rico (n = 1), India (n = 1), and Bermuda (n = 1). One participant's birthplace was undisclosed and another indicated she was born outside the United States but did not specify the country. Nearly half of the female primary caregivers did not complete high school (n = 40). Seventy percent were either married (n = 29) or living as married (n = 28); one participant's marital status was undisclosed. Almost 60% of participants were not employed outside the home (n = 48); one participant's employment status was undisclosed.

Thirty-six (44%) female primary caregivers were recruited for the Healthy Living condition and 46 (56%) were recruited for the Parents as Teachers attention-placebo comparison condition. Of the initial participants, 58 (71%) completed the posttest assessment; 26 (45%) were Healthy Living participants and 32 (55%) were Parents as Teachers participants.

Table 10

Demographics of Female Primary Caregivers Recruited for Participation

Variable		
Age in Years		
N	81	
M (*SD*)	28.9 (5.9)	
Mdn	28.0	
Range	19-45	
Variable	**%**	***N***
Ethnicity		
Hispanic/Latina – All Races	69.5%	57
Non-Hispanic – All Races	30.5%	25
Spanish Speaking		
Yes	64.6%	53
No	35.4%	29
Birth Country		
United States	37.0%	30
Mexico	53.1%	43
Other	9.9%	8
Marital Status		
Married	35.8%	29
Living as Married	34.6%	28
Widowed/Separated/Divorced	6.2%	5
Never Married	23.5%	19
Educational Attainment		
Less Than High School	48.8%	40
High School Graduate or GED	18.3%	15
Some Trade or Technical School	8.5%	7
Some 4-Year College Work	7.3%	6
Trade or Technical School Graduate	8.5%	7
4-Year College Graduate	7.3%	6
Post-Graduate Training	1.2%	1
Employment Status		
Employed	40.7%	33
Unemployed	59.3%	48
Relationship to Child		
Mother	97.6%	80
Grandmother	2.4%	2

Participant demographics by condition. Bivariate results at pretest (see Table 11) revealed participants in the Healthy Living condition were significantly different from participants in the Parents as Teachers attention-placebo comparison condition on one demographic variable, educational attainment. At pretest, significantly more female primary caregivers in the Healthy Living condition had not received a high school diploma or an equivalent certificate, χ^2 (1, N = 82) = 8.22, p = .004. One other demographic variable, ethnicity, was approaching statistical significance, χ^2 (1, N = 82) = 3.69, p = .055. Nearly 81% (n = 29) of Healthy Living participants identified as Hispanic/Latina compared to 61% (n = 28) of Parents as Teachers participants.

Table 11

Demographics of Female Primary Caregivers by Condition at Pretest

Variable	HL		PAT		t	p
Age in Years						
n	36		45		0.82	.41
M (*SD*)	28.3 (6.2)		29.4 (5.7)			
Mdn	27.5		28.0			
Range	19-45		20-45			
	HL		**PAT**			
Variable	**%**	***n***	**%**	***n***	χ^2	***p***
Ethnicity						
Hispanic – All Races	80.6%	29	60.9%	28	3.69	.06
Non-Hispanic – All Races	19.4%	7	39.1%	18		
Birth Country						
United States	27.8%	10	43.5%	20	2.15	.14
Outside the United States	72.2%	26	56.5%	26		
Marital Status						
Married or Living as Married	72.2%	26	68.9%	31	0.11	.74
Single/Widowed/Separated/Divorced	27.8%	10	31.1%	14		
Educational Attainment						
Less Than High School	66.7%	24	34.8%	16	8.22	**.004**
High School Graduate or More	33.3%	12	65.2%	30		
Employment Status						
Employed	30.6%	11	48.9%	22	2.78	.10
Unemployed	69.4%	25	51.1%	23		

Note. Significant p-values are in boldface. HL = Healthy Living; PAT = Parents as Teachers.

Retention demographics. At posttest, all between-group demographic differences were non-significant (see Table 12). Retention differences between the treatment and attention-placebo comparison conditions explained why group demographics were statistically similar at posttest despite the pretest differences. There was minimal fluctuation from pretest to posttest in the percentage of Healthy Living participants who had not received a high school diploma or an equivalent certificate (67% at pretest compared to 65% at posttest) or who identified as Hispanic/Latina (81% at both pretest and posttest). In contrast, there was greater fluctuation in the percentage of Parents as Teachers participants who indicated they had not received a high school diploma or an equivalent certificate (35% at pretest compared to 41% at posttest) and who identified as Hispanic/Latina (61% at pretest compared to 72% at posttest). Lay advisors for the Parents as Teachers condition appeared more successful in retaining participants with lower educational attainment and who identified as Hispanic/Latina.

Attrition demographics. The demographic characteristics of those who dropped out of the study are presented in Table 13. Pearson chi-square statistics and p-values are presented for the categorical demographic variables; however, insufficient cell frequencies precluded a robust analysis. For this reason, the apparent between-group differences in ethnicity and educational attainment were not described as statistically significant. These outcomes did, however, lend further support for the participant retention discussion above, as between-group differences in relative frequencies were especially pronounced for ethnicity and educational attainment.

Table 12

Demographics of Female Primary Caregivers by Condition at Posttest

Variable	HL		PAT		*t*	*p*
Age in Years						
n	26		31		0.89	.38
M (*SD*)	28.2 (6.2)		29.55 (5.4)			
Mdn	27.0		30.0			
Range	19-45		20-38			
	HL		**PAT**			
Variable	**%**	***n***	**%**	***n***	χ^2	***p***
Ethnicity						
Hispanic – All Races	80.8%	21	71.9%	23	0.62	.43
Non-Hispanic – All Races	19.2%	5	28.1%	9		
Birth Country						
United States	23.1%	6	31.3%	10	0.48	.49
Outside the United States	76.9%	20	68.8%	22		
Marital Status						
Married or Living as Married	76.9%	20	80.6%	25	0.12	.73
Single/Widowed/Separated/Divorced	23.1%	6	19.4%	6		
Educational Attainment						
Less Than High School	65.4%	17	40.6%	13	3.52	.06
High School Graduate or More	34.6%	9	59.4%	19		
Employment Status						
Employed	61.5%	16	41.9%	13	2.17	.14
Unemployed	38.5%	10	58.1%	18		

Note. HL = Healthy Living; PAT = Parents as Teachers.

Table 13

Demographics of Female Primary Caregivers Who Dropped Out of the Study by Condition

Variable	HL		PAT		*t*	*p*
Age in Years						
n	10		14		0.16	.87
M (*SD*)	28.7 (6.4)		29.1 (6.7)			
Mdn	30.0		26.5			
Range	19-39		22-45			
	HL		**PAT**			
Variable	**%**	***n***	**%**	***n***	χ^2	***p***
Ethnicity						
Hispanic – All Races	80.0%	8	35.7%	5	4.61	.03*
Non-Hispanic – All Races	20.0%	2	64.3%	9		
Birth Country						
United States	40.0%	4	71.4%	10	2.37	.12*
Outside the United States	60.0%	6	28.6%	4		
Marital Status						
Married or Living as Married	60.0%	6	42.9%	6	0.69	.41*
Single/Widowed/Separated/Divorced	40.0%	4	57.1%	8		
Educational Attainment						
Less Than High School	70.0%	7	21.4%	3	5.66	.02*
High School Graduate or More	30.0%	3	78.6%	11		
Employment Status						
Employed	10.0%	1	28.6%	4	1.22	.27*
Unemployed	90.0%	9	71.4%	10		

Note. HL = Healthy Living; PAT = Parents as Teachers.

*Denotes insufficient cell frequency to conduct a robust chi-square analysis.

Programs and Services

At the onset of the study, most participants indicated they or their families participated in government-sponsored programs or services. Table 14, which includes all participants who were recruited into the study (*n* = 82), shows the frequencies and relative frequencies of programs and services received by female primary caregivers or their families by condition at pretest. Female primary caregivers who reported participating in "other" programs or services named the following: Educare (*n* = 3), Healthy Start (*n* = 1), Medicaid (*n* = 2), Medical (*n* = 6), SoonerCare (*n* = 7), and Social Security (*n* = 1). Participants were also asked if they had ever participated in Oklahoma Cooperative Extension Service's *Fresh Start* nutrition program or another nutrition or healthy living program. Ten participants indicated they had (3 in the Healthy Living treatment condition and 7 in the Parents as Teachers attention-placebo comparison condition).

In Table 15, only data for participants who completed both the pretest and posttest assessment are included. Female primary caregivers who reported participating in "other" programs or services named the following: Healthy Start (*n* = 1), Medicaid (*n* = 2), Medical (*n* = 4), and SoonerCare (*n* = 4). Of note, over three-quarters of all participants (*n* = 46, 79%) who completed both the pretest and posttest assessment reported they were participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) or Commodity Supplemental Food Program (CSFP) upon entering the study. Three Healthy Living participants and six Parents as Teachers participants reported prior participation in Oklahoma Cooperative Extension Service's *Fresh Start* nutrition program or another nutrition or healthy living program.

At posttest, female primary caregivers were asked if they had starting participating in any government-sponsored programs since the onset of the study. Ten participants total, four from the Healthy Living treatment condition and six from the Parents as Teachers attention-placebo comparison condition, indicated they had signed up for additional programs. Healthy Living participants named WIC (*n* = 3) and Supplemental Nutrition Assistance Program (SNAP) (*n* = 1). Parents as Teachers participants also named WIC (*n* = 4) and SNAP (*n* = 1).

Table 14

Frequencies and Relative Frequencies of Programs and Services Received by Female Primary Caregivers or Their Families at Pretest (All Participants Included)

	HL		PAT	
Program or Service	***f***	**%**	***f***	**%**
Child Nutrition (Reduced or Free School Lunch/Breakfast)	2	5.6%	4	8.7%
Food Distribution Program on Indian Reservations (FDPIR)	1	2.8%	0	0.0%
Supplemental Nutrition Assistance Program (SNAP)	9	25%	9	19.6%
Head Start	2	5.6%	0	0.0%
Temporary Assistance for Needy Families (TANF)	1	2.8%	0	0.0%
Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)/ Commodity Supplemental Food Program (CSFP)	28	77.8%	32	69.6%
Government Housing Assistance	1	2.8%	4	8.7%
Other	11	30.6%	10	21.7%
None	5	13.9%	10	21.7%

Note. HL = Healthy Living; PAT = Parents as Teachers. Table 14 includes data from all participants who were recruited for participation in the study.

Table 15

Frequencies and Relative Frequencies of Programs and Services Received by Female Primary Caregivers or Their Families by Condition at Pretest (Only Those Who Completed Study Included)

	HL		PAT	
Program or Service	***f***	**%**	***f***	**%**
Child Nutrition (Reduced or Free School Lunch/Breakfast)	1	3.8%	3	9.4%
Food Distribution Program on Indian Reservations (FDPIR)	0	0.0%	0	0.0%
Supplemental Nutrition Assistance Program (SNAP)	6	23.1%	4	12.5%
Head Start	2	7.7%	0	0.0%
Temporary Assistance for Needy Families (TANF)	1	3.8%	0	0.0%
Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)/ Commodity Supplemental Food Program (CSFP)	22	84.6%	24	75.0%
Government Housing Assistance	1	3.8%	1	3.1%
Other	8	30.8%	4	12.5%
None	3	11.5%	7	21.9%

Note. HL = Healthy Living; PAT = Parents as Teachers. Table 15 includes only participants who completed pretest and posttest assessment.

Intervention Visits

The mean (*SD*) number of lay advisor visits for all participants who completed the posttest assessment ($N = 58$) was 9.3 (4.3) visits. The between-group difference in the number of visits received from pretest to posttest was not statistically significant (see Table 16).

Table 16

Number of Lay Advisor Visits by Condition

Variable	HL	PAT	*t*	*p*
Number of Visits				
n	26	32	0.20	.84
M (*SD*)	9.4 (4.6)	9.2 (4.1)		
Mdn	10	10		
Range	2-17	2-16		

Note. HL = Healthy Living; PAT = Parents as Teachers.

Fruit and Vegetable Consumption Outcomes

Hypothesis 1. Participants in the Healthy Living treatment condition will report greater increases in daily fruit and vegetable consumption than participants in the attention-placebo comparison condition.

Hypothesis 1 was evaluated using a 2 x 2 mixed factorial ANOVA, which included one between-subjects variable (treatment or attention-placebo comparison condition) and one within-subjects variable (mean daily fruit and vegetable intake at pretest and posttest). The interaction effect between condition and mean daily servings of fruits and vegetables was not statistically significant, $F(1, 51) = 0.63$, $p = .43$ Main effects were likewise non-significant, indicating there was no between-group difference in average daily fruit and vegetable consumption, $F(1, 51) = 1.97$, $p = .17$, and participant changes in fruit and vegetable intake from pretest to posttest were non-significant, $F(1, 51) = 0.004$, $p = .95$. Thus, hypothesis 1 was not supported. Table 17 shows mean daily servings of fruits and vegetables by condition and time as well as mean change from pretest to posttest.

Table 17

Mean (SD) daily servings of fruits and vegetables at pretest and posttest by condition, and mean change (SD) in daily servings of fruits and vegetables (posttest minus pretest)

Variable		HL	PAT
		n = 22	*n = 31*
Daily Servings of Fruits and Vegetables	Pretest	4.5 (2.0)	3.6 (1.9)
	Posttest	4.2 (2.5)	3.8 (2.3)
	Change	-0.3 (2.7)	0.3 (2.5)

Note. HL = Healthy Living; PAT = Parents as Teachers.

Sugar-Sweetened Beverage Consumption Outcomes

Hypothesis 2. Participants in the Healthy Living treatment condition will report greater reductions in daily sugar-sweetened beverage intake than participants in the attention-placebo comparison condition.

Hypothesis 2 was evaluated using a 2 x 2 mixed factorial ANOVA, which included one between-subjects variable (treatment or attention-placebo comparison condition) and one within-subjects variable (mean daily calories from sugar-sweetened beverages at pretest and posttest). The interaction effect between condition and mean daily calories from sugar-sweetened beverages was non-significant, $F(1, 53) = 0.002$, $p = .97$. The main effect of condition was also non-significant, $F(1, 53) = 0.07$, $p = .80$. Hypothesis 2 was, therefore, not supported. In contrast, the within-subject change in mean daily calories from sugar-sweetened beverages from pretest to posttest was statistically significant, $F(1, 53) = 6.62$, $p = .01$. Regardless of condition, participants reported drinking significantly fewer daily calories from sugar-sweetened beverages at posttest compared to pretest. Mean daily calories from sugar-sweetened beverages by condition and time as well as mean change from pretest to posttest are presented in Table 18.

Table 18

Mean (SD) daily calories from sugar-sweetened beverages (SSBs) at pretest and posttest by condition, and mean change (SD) in daily calories from SSBs (posttest minus pretest)

Variable		HL	PAT
		n = 25	*n = 30*
Daily Sugar-Sweetened Beverage Calories	Pretest	140.5 (214.9)	148.6 (177.3)
	Posttest	78.4 (111.2)	88.7 (103.0)
	Change	-62.1 (194.0)	-59.9 (157.8)

Note. HL = Healthy Living; PAT = Parents as Teachers.

Physical Activity Outcomes

Hypothesis 3. Participants in the Healthy Living treatment condition will be more likely than participants in the attention-placebo comparison condition to maintain or achieve a physical activity level sufficient to meet the American College of Sports Medicine recommendation.

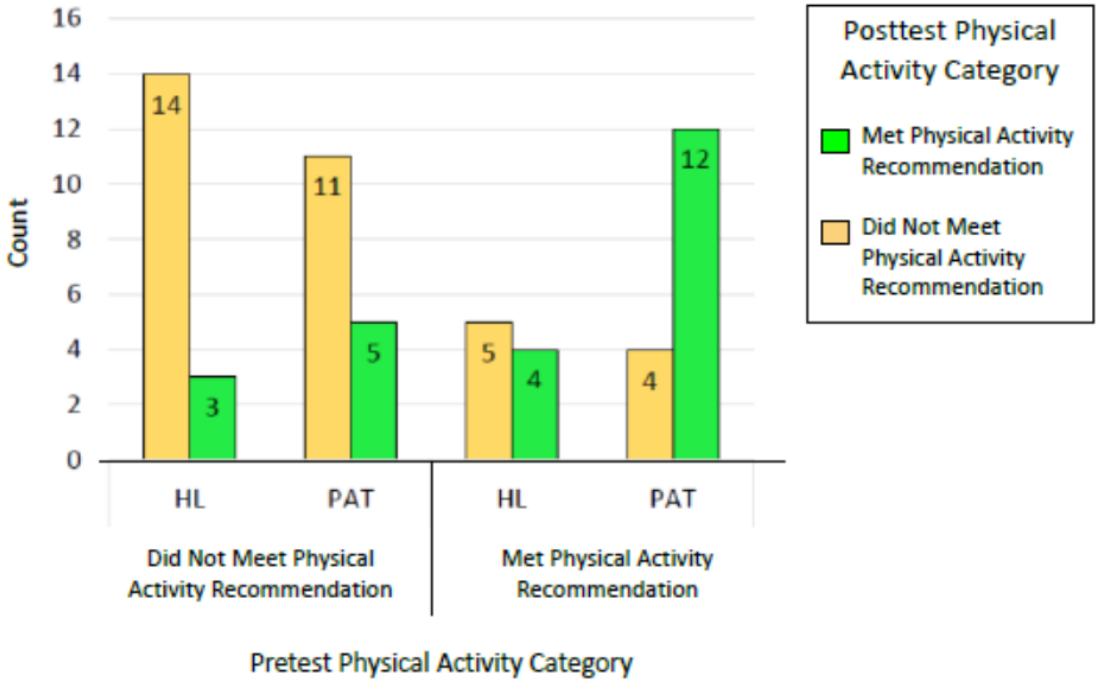
Hypothesis 3 was evaluated using hierarchical loglinear analysis. All effects were retained in the three-way loglinear analysis, as indicated by the likelihood ratio of this model, $\chi^2(0, N = 58) = 0$, $p = 1$. The three-way effects (condition x physical activity category at pretest x physical activity category at posttest) were non-significant, $\chi^2(1, N = 58) = 0.01$, $p = .92$. Two-way effects were statistically significant $\chi^2(4, N = 58) = 14.61$, $p = .006$, indicating that removing the two-way effects would significantly change the fit of the model. To determine which two-way association(s) was significant, separate Pearson chi-square analyses were performed. The chi-square tests revealed there was a significant association between physical activity category at pretest compared to physical activity category at posttest, $\chi^2(1, N = 58) = 11.11$, $p = .001$. The other two-way associations (physical activity at pretest x condition and physical activity category at posttest x condition) were non-significant.

To further examine the significant two-way interaction, a histogram was created to illustrate the change in physical activity category from pretest to posttest. As shown in Figure 2, a greater percentage (15.4%, $n = 4$) of Healthy Living participants moved in the undesirable

direction of meeting the ACSM recommendation at pretest to not meeting the recommendation at posttest; 11.5% (n = 3) of Healthy Living participants moved in the opposite, desirable direction of not meeting to meeting the physical activity recommendation. This pattern was not mirrored by the Parents as Teachers participants. Instead, a greater percentage (15.6%, n =5) moved in the desirable direction of not meeting to meeting the physical activity recommendation; 12.5% (n = 4) moved in the undesirable direction. Figure 2 also illustrates differences between conditions on maintaining physical activity from pretest to posttest. A greater percentage of Parents as Teachers participants (37.5%, n = 12) were able to maintain physical activity sufficient to meet the ACSM recommendation. In comparison, only 19.2% (n = 5) of the Healthy Living participants who reported meeting ACSM recommendations at pretest also reported meeting the recommendation at posttest. It appears the treatment condition had an adverse effect on *reported* physical activity levels. Accordingly, hypothesis 3 was not supported. Table 19 shows frequencies and relative frequencies of participants meeting the ACSM recommendation for physical activity by condition at each time point.

Figure 2

Change in Participant Physical Activity Category from Pretest to Posttest



Note. HL = Healthy Living; PAT = Parents as Teachers; ACSM = American College of Sports Medicine. Participants who were categorized as moderately or highly active per the International Physical Activity Questionnaire short format scoring protocol were considered to be meeting ACSM guidelines.

Table 19

Frequencies and Relative Frequencies of Female Primary Caregivers Meeting the ACSM Recommendation for Physical Activity by Condition and Time

	Met ACSM	HL		PAT	
Time Point	**Recommendation**	***f***	**%**	***f***	**%**
Pretest	Yes	9	34.6%	16	50.0%
	No	17	65.4%	16	50.0%
Posttest	Yes	8	30.8%	17	53.1%
	No	18	69.2%	15	46.9%

Note. HL = Healthy Living; PAT = Parents as Teachers; ACSM = American College of Sports Medicine. Participants who were categorized as moderately or highly active per the International Physical Activity Questionnaire short format scoring protocol were considered to be meeting the ACSM recommendation.

Television Viewing Outcomes

Hypothesis 4. Participants in the Healthy Living treatment condition will report greater reductions in daily television viewing time than participants in the attention-placebo comparison condition.

Hypothesis 4 was evaluated using a 2 x 2 mixed factorial ANOVA, which included one between-subjects variable (treatment or attention-placebo comparison condition) and one within-subjects variable (mean daily television viewing minutes at pretest and posttest). The interaction effect between condition and mean daily television viewing time was not statistically significant, $F(1, 56) = 0.08$, $p = .78$. Main effects were non-significant as well, indicating there was no between-group difference in average daily television viewing time, $F(1, 56) = 0.15$, $p = .70$, and participant's television viewing time was similar from pretest to posttest, $F(1, 56) = 0.41$, $p = .52$. Hypothesis 4 was not supported. Table 20 shows mean daily minutes of television viewing by condition and time as well as mean change from pretest to posttest.

Table 20

Mean (SD) daily minutes of television viewing at pretest and posttest by condition, and mean change (SD) in daily minutes of television viewing (posttest minus pretest)

Variable		HL	PAT
		n = 26	*n = 32*
Daily Minutes of Television Viewing	Pretest	100.8 (96.8)	112.1 (90.7)
	Posttest	113.0 (84.0)	116.9 (85.8)
	Change	12.2 (96.6)	4.8 (102.5)

Note. HL = Healthy Living; PAT = Parents as Teachers.

Self-Efficacy Outcomes

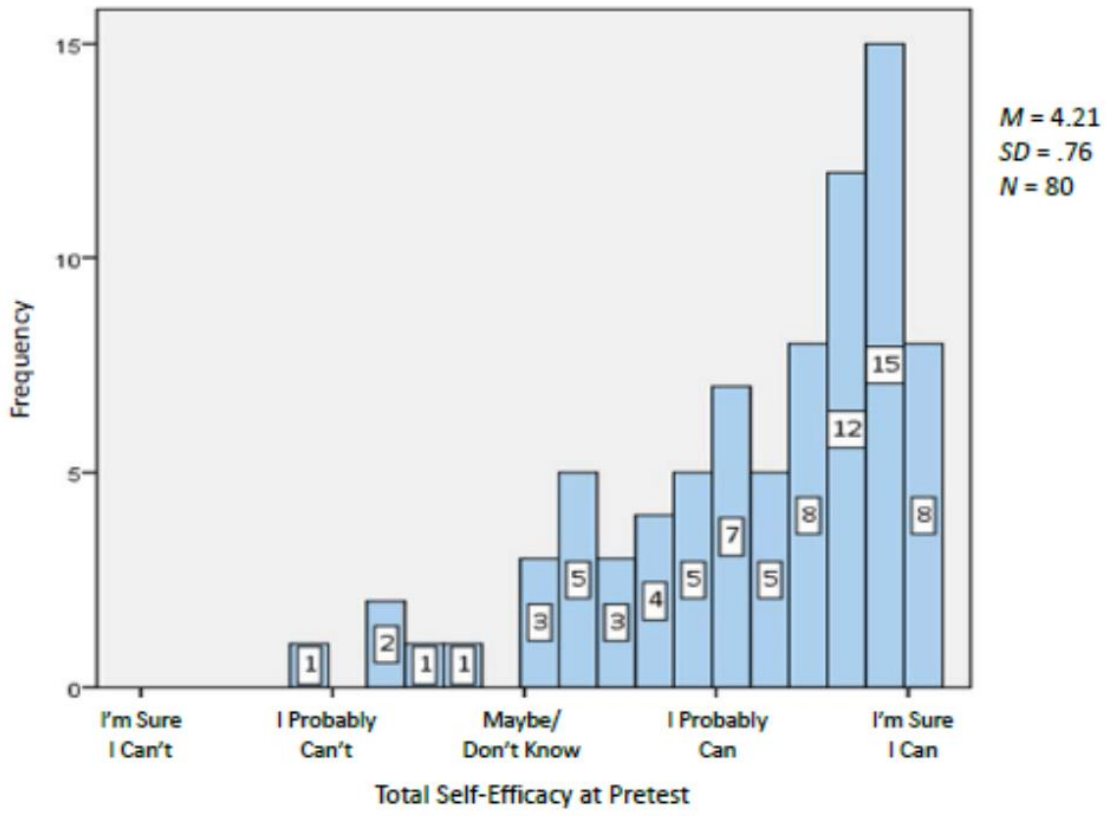
Reliability analysis for the Self-Efficacy Questionnaire. The Self-Efficacy Questionnaire (SEQ) is a 25-item scale to measure participant self-efficacy. The fruit and vegetable self-efficacy subscale consists of nine items, the sugar-sweetened beverage subscale consists of six items, the physical activity subscale consists of seven items, and the television viewing self-efficacy subscale consists of three items. The overall SEQ scale had good internal consistency (Cronbach's $\alpha = .91$). Internal consistency was acceptable for the fruit and vegetable subscale (Cronbach's $\alpha = .84$), sugar-sweetened beverage subscale (Cronbach's $\alpha = .85$), and physical activity subscale (Cronbach's $\alpha = .93$); however, internal consistency was poorer for the television viewing subscale (Cronbach's $\alpha = .62$).

Reliability analysis for the Retrospective Self-Efficacy Questionnaire. The Retrospective Self-Efficacy Questionnaire (RSEQ) is also a 25-item scale to measure participant's self-efficacy. It is fundamentally the same questionnaire as the SEQ except response choices differ. Participants were asked to recall their confidence prior to the intervention and then indicate whether their confidence had increased, was about the same, or had decreased since starting the program. Internal consistency for the overall RSEQ scale (Cronbach's $\alpha = .92$) and all subscales (Cronbach's α ranged from .79 to .92) was acceptable.

Baseline self-efficacy and justification for development of the RSEQ. The SEQ is a 5-point scale where 1 is indicative of low self-efficacy and 5 is indicative of high self-efficacy. Preliminary analysis of baseline data indicated participants entered the *Minding the Gap* study with a relatively high self-efficacy ($M = 4.21$, $SD = 0.76$). Figure 3 illustrates the skewedness of reported self-efficacy at pretest. The RSEQ was developed in response to these preliminary findings to help capture additional gains in participant self-efficacy that would have been unmeasurable had the SEQ been used at posttest.

Figure 3

Participants' Total Self-Efficacy at Pretest



Hypothesis 5. At posttest, participants in the Healthy Living treatment condition will report greater confidence in their ability to eat fruits and vegetables than participants in the attention-placebo comparison condition.

A fruit and vegetable self-efficacy subscale was calculated by averaging the nine self-efficacy items pertaining to fruit and vegetable consumption. Self-efficacy items were coded as: 1 = a decrease in confidence; 2 = no change in confidence, and 3 = an increase in confidence. Thus, a self-efficacy subscale value greater than 2 was indicative of improved confidence. An independent samples t-test, using the fruit and vegetable self-efficacy subscale value as the dependent variable and condition (Healthy Living or Parents as Teachers) as the independent variable was conducted to evaluate Hypothesis 5. Healthy Living participants had a mean (*SD*) fruit and vegetable self-efficacy subscale value of 2.7 (0.4) while Parents as Teachers participants had a mean subscale value of 2.4 (0.5). The difference between these means was non-significant, indicating participants in the treatment and attention-placebo comparison conditions experienced statistically similar increases in their confidence to increase fruit and vegetable intake, $t(56) = 1.82$, $p = .07$. Hypothesis 5 was not supported. Table 21 shows frequencies and relative frequencies for each item from the fruit and vegetable self-efficacy subscale by condition.

Table 21

Frequencies and Relative Frequencies of Female Primary Caregivers' Self-Efficacy for Consuming Fruits and Vegetables by Condition

	HL		PAT	
Item	***f***	**%**	***f***	**%**
I can have fruits and vegetables when I am in a rush.				
I Am More Confident Now	24	92.3%	21	65.6%
My Confidence is About the Same	2	7.7%	9	28.1%
I Am Less Confident Now	0	0.0%	2	6.3%
I can eat fruit as part of lunch most days.				
I Am More Confident Now	19	73.1%	15	46.9%
My Confidence is About the Same	4	15.4%	14	43.8%
I Am Less Confident Now	3	11.5%	3	9.4%
I can have fruits and vegetables when I am feeling tired.				
I Am More Confident Now	22	84.6%	17	53.1%
My Confidence is About the Same	1	3.8%	13	40.6%
I Am Less Confident Now	3	11.5%	2	6.3%
I can get fruit when eating away from home.				
I Am More Confident Now	20	76.9%	18	56.3%
My Confidence is About the Same	4	15.4%	10	31.3%
I Am Less Confident Now	2	7.7%	4	12.5%
I can have extra vegetables at dinner.				
I Am More Confident Now	18	69.2%	18	56.3%
My Confidence is About the Same	6	23.1%	12	37.5%
I Am Less Confident Now	2	7.7%	2	6.3%
I can have a vegetable for dinner most days.				
I Am More Confident Now	14	53.8%	15	46.9%
My Confidence is About the Same	8	30.8%	13	40.6%
I Am Less Confident Now	4	15.4%	4	12.5%
I can eat five servings of fruits and vegetables most days.				
I Am More Confident Now	16	61.5%	11	34.4%
My Confidence is About the Same	7	26.9%	16	50.0%
I Am Less Confident Now	3	11.5%	5	15.6%
I can order at least one vegetable dish at a restaurant.				
I Am More Confident Now	23	88.5%	19	59.4%
My Confidence is About the Same	2	7.7%	11	34.4%
I Am Less Confident Now	1	3.8%	2	6.3%
I can eat other fruits and vegetables when my favorites are not available.				
I Am More Confident Now	20	76.9%	19	59.4%
My Confidence is About the Same	2	7.7%	12	37.5%
I Am Less Confident Now	4	15.4%	1	3.1%

Note. HL = Healthy Living; PAT = Parents as Teachers.

Hypothesis 6. At posttest, participants in the Healthy Living treatment condition will report greater confidence in their ability to limit sugar-sweetened beverage intake than participants in the attention-placebo comparison condition.

A sugar-sweetened beverage self-efficacy subscale was calculated by averaging the six self-efficacy items pertaining to sugar-sweetened beverage consumption. Self-efficacy items were coded as: 1 = a decrease in confidence; 2 = no change in confidence, and 3 = an increase in confidence. Thus, a self-efficacy subscale value greater than 2 was indicative of improved confidence. An independent samples t-test, using the sugar-sweetened beverage self-efficacy subscale value as the dependent variable and condition (Healthy Living or Parents as Teachers) as the independent variable was conducted to evaluate Hypothesis 6. Healthy Living participants had a mean (*SD*) sugar-sweetened beverage self-efficacy scale value of 2.8 (0.4) while Parents as Teachers participants had a mean scale value of 2.7 (0.4). The difference between these means was non-significant, indicating the treatment and attention-placebo comparison conditions experienced statistically similar increases in their confidence to limit sugar-sweetened beverage intake, $t(56) = 0.97$, $p = .34$. Hypothesis 6 was not supported. Table 22 shows frequencies and relative frequencies for each item from the sugar-sweetened beverage self-efficacy subscale by condition.

Table 22

Frequencies and Relative Frequencies of Female Primary Caregivers' Self-Efficacy for Limiting Sugar-Sweetened Beverage Intake by Condition

	HL		PAT	
Item	***f***	**%**	***f***	**%**
I can avoid sugary drinks when I am feeling tired.				
I Am More Confident Now	20	76.9%	23	71.9%
My Confidence is About the Same	6	23.1%	9	28.1%
I Am Less Confident Now	0	0.0%	0	0.0%
I can refuse sugary drinks when they are offered to me.				
I Am More Confident Now	21	80.8%	23	71.9%
My Confidence is About the Same	4	15.4%	8	25.0%
I Am Less Confident Now	1	3.8%	1	3.1%
I can avoid sugary drinks with my meals.				
I Am More Confident Now	21	80.8%	26	81.3%
My Confidence is About the Same	5	19.2%	5	15.6%
I Am Less Confident Now	0	0.0%	1	3.1%
I can avoid sugary drinks when dining at a restaurant.				
I Am More Confident Now	21	80.8%	20	62.5%
My Confidence is About the Same	5	19.2%	12	37.5%
I Am Less Confident Now	0	0.0%	0	0.0%
I can choose unsweetened drinks instead of sugary drinks.				
I Am More Confident Now	22	84.6%	21	65.6%
My Confidence is About the Same	4	15.4%	8	25.0%
I Am Less Confident Now	0	0.0%	3	9.4%
I can limit my sugary drinks to no more than 8 ounces per day.				
I Am More Confident Now	18	69.2%	22	68.8%
My Confidence is About the Same	6	23.1%	9	28.1%
I Am Less Confident Now	2	7.7%	1	3.1%

Note. HL = Healthy Living; PAT = Parents as Teachers.

Hypothesis 7. At posttest, participants in the Healthy Living treatment condition will report greater confidence in their ability to be physically active than participants in the attention-placebo comparison condition.

A physical activity self-efficacy subscale was calculated by averaging the seven self-efficacy items pertaining to physical activity. Self-efficacy items were coded as: 1 = a decrease in confidence; 2 = no change in confidence, and 3 = an increase in confidence. Thus, a self-efficacy subscale value greater than 2 was indicative of improved confidence. Hypothesis 7 was evaluated using an independent samples t-test, where the physical activity self-efficacy scale value was the dependent variable and condition (Healthy Living or Parents as Teachers) was the independent variable. Healthy Living participants had a mean (*SD*) physical activity self-efficacy subscale value of 2.3 (0.6) while Parents as Teachers participants had a mean subscale value of 2.4 (0.6). The difference between these means was non-significant, indicating participants in the treatment and attention-placebo comparison conditions experienced statistically similar increases in their confidence to be physically active, $t(56) = -0.94$, $p = .35$. Hypothesis 7 was not supported. Table 23 shows frequencies and relative frequencies for each item from the physical activity self-efficacy subscale by condition.

Table 23

Frequencies and Relative Frequencies of Female Primary Caregivers' Self-Efficacy for Being Physically Active by Condition

	HL		PAT	
Item	***f***	**%**	***f***	**%**
I can be physically active no matter how busy my day is.				
I Am More Confident Now	14	53.8%	15	46.9%
My Confidence is About the Same	9	34.6%	15	46.9%
I Am Less Confident Now	3	11.5%	2	6.3%
I can be physically active even if I feel tired.				
I Am More Confident Now	12	46.2%	16	50%
My Confidence is About the Same	7	26.9%	12	37.5%
I Am Less Confident Now	7	26.9%	4	12.5%
I can be physically active even if it is very hot or cold outside.				
I Am More Confident Now	11	42.3%	17	53.1%
My Confidence is About the Same	8	30.8%	12	37.5%
I Am Less Confident Now	7	26.9%	3	9.4%
I can be physically active even if I have to stay at home.				
I Am More Confident Now	13	50.0%	19	59.4%
My Confidence is About the Same	9	34.6%	11	34.4%
I Am Less Confident Now	4	15.4%	2	6.3%
I can be physically active when I have no one to do it with.				
I Am More Confident Now	12	46.2%	13	40.6%
My Confidence is About the Same	10	38.5%	16	50.0%
I Am Less Confident Now	4	15.4%	3	9.4%
I can be physically active even when I would rather be doing something else				
I Am More Confident Now	10	38.5%	15	46.9%
My Confidence is About the Same	10	38.5%	15	46.9%
I Am Less Confident Now	6	23.1%	2	6.3%
I can be physically active instead of watching TV.				
I Am More Confident Now	12	46.2%	19	59.4%
My Confidence is About the Same	10	38.5%	8	25.0%
I Am Less Confident Now	4	15.4%	5	15.6%

Note. HL = Healthy Living; PAT = Parents as Teachers.

Hypothesis 8. At posttest, participants in the Healthy Living treatment condition will report greater confidence in their ability to limit television viewing than participants in the attention-placebo comparison condition.

A television viewing self-efficacy subscale was calculated by averaging the three self-efficacy items pertaining to limiting television viewing time. Self-efficacy items were coded as: 1 = a decrease in confidence; 2 = no change in confidence, and 3 = an increase in confidence. Thus, a self-efficacy subscale value greater than 2 was indicative of improved confidence. Hypothesis 8 was evaluated using an independent samples t-test, where the television viewing self-efficacy subscale value was the dependent variable and condition (Healthy Living or Parents as Teachers) was the independent variable. Healthy Living participants had a mean (*SD*) television viewing self-efficacy subscale value of 2.7 (0.4) whereas Parents as Teachers participants had a mean subscale value of 2.6 (0.5). The difference between these means was non-significant, indicating participants in the treatment and attention-placebo comparison conditions experienced statistically similar increases in their confidence to limit television viewing time, $t(56) = 0.62$, $p = .54$. Hypothesis 8 was not supported. Table 24 shows frequencies and relative frequencies for each item from the television viewing self-efficacy scale by condition.

Table 24

Frequencies and Relative Frequencies of Female Primary Caregivers' Self-Efficacy for Limiting Television Viewing by Condition

	HL		PAT	
Item	***f***	**%**	***f***	**%**
I can limit watching TV to 2 hours or less on weekdays.				
I Am More Confident Now	17	65.4%	20	62.5%
My Confidence is About the Same	7	26.9%	10	31.3%
I Am Less Confident Now	2	7.7%	2	6.3%
I can limit watching TV to 2 hours or less on weekend days.				
I Am More Confident Now	19	73.1%	20	62.5%
My Confidence is About the Same	6	23.1%	10	31.3%
I Am Less Confident Now	1	3.8%	2	6.3%
I can find other ways to relax besides watching TV.				
I Am More Confident Now	21	80.8%	24	75.0%
My Confidence is About the Same	5	19.2%	7	21.9%
I Am Less Confident Now	0	0.0%	1	3.1%

Note. HL = Healthy Living; PAT = Parents as Teachers.

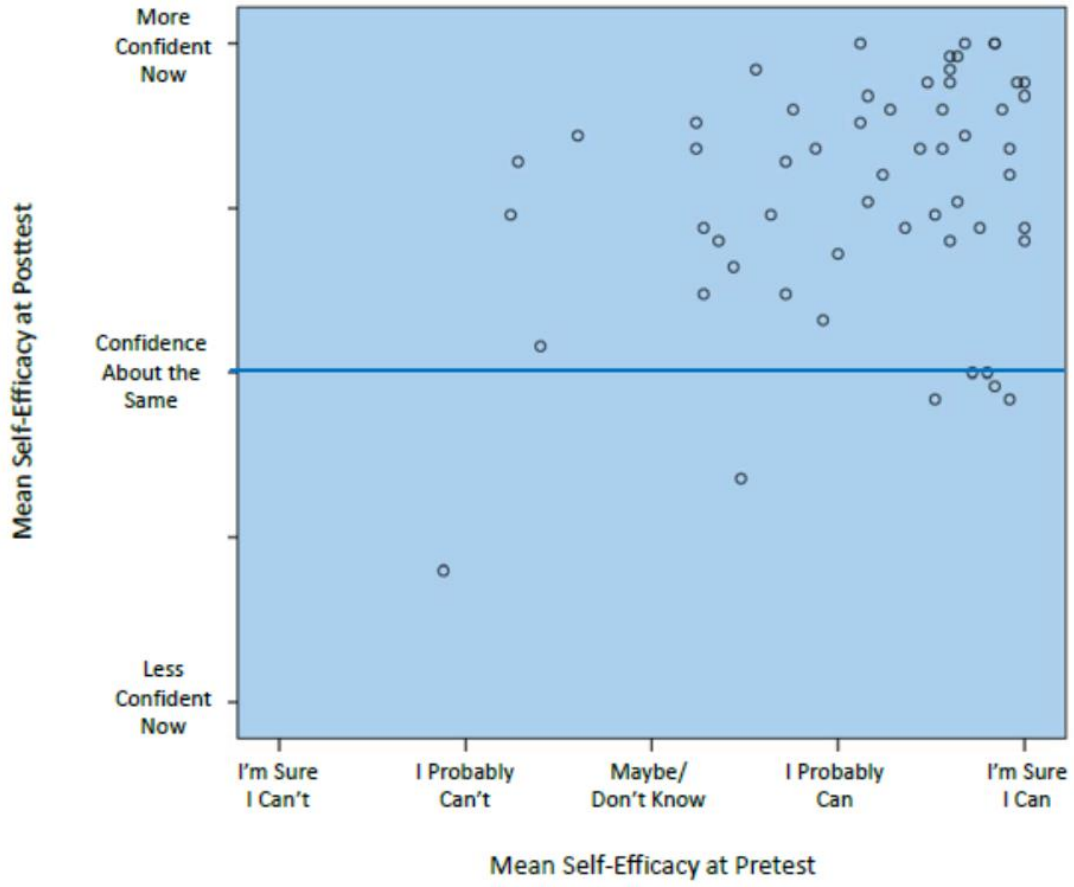
Hypothesis 9. At posttest, participants in the Healthy Living treatment condition will report greater total self-efficacy than participants in the attention-placebo comparison condition.

A total self-efficacy scale was computed by averaging all 25-items on the RSEQ. Self-efficacy items were coded as: 1 = a decrease in confidence; 2 = no change in confidence, and 3 = an increase in confidence. Thus, a self-efficacy scale value greater than 2 was indicative of improved confidence. An independent samples t-test, using the mean total self-efficacy scale value as the dependent variable and condition (Healthy Living or Parents as Teachers) as the independent variable was conducted to evaluate Hypothesis 9. Healthy Living participants had a mean (*SD*) total self-efficacy scale value of 2.6 (0.38) while Parents as Teachers participants had a mean scale value of 2.5 (0.36). The difference between these means was non-significant, indicating participants in the treatment and attention-placebo comparison conditions experienced statistically similar increases in their confidence to increase fruit and vegetable intake, $t(56) = 0.71$, $p = .48$. Hypothesis 9 was not supported. It appears participation in the current study,

regardless of condition, positively influenced participants' reported self-efficacy. Further, self-efficacy at pretest was significantly associated with self-efficacy at posttest (Pearson R^2 = .31, p = .02). This relationship is illustrated in Figure 4.

Figure 4

Scatterplot of Participants' Mean Total Self-Efficacy at Pretest Compared to Mean Total Self-Efficacy at Posttest



Female Primary Caregiver Body Mass Index Outcomes

Hypothesis 10. Participants in the Healthy Living treatment condition will have greater reductions in body mass index than participants in the attention-placebo comparison condition.

Hypothesis 10 was evaluated using a 2 x 2 mixed factorial ANOVA, which included one between-subjects variable (treatment or attention-placebo comparison condition) and one within-subjects variable (BMI at pretest and posttest). Participants who were pregnant at either pretest or posttest were excluded from analysis. The interaction effect between condition and body mass index was non-significant, $F(1, 43) = 0.38$, $p = .54$. The main effect of condition was also non-significant, $F(1, 43) = 3.16$, $p = .082$, indicating change in body mass index was statistically similar between participants in the treatment and comparison conditions. Hypothesis 10 was not supported. In contrast, the within-subject change in body mass index from pretest to posttest was significant, $F(1, 43) = 4.06$, $p = .05$. Mean body mass index decreased significantly from pretest to posttest, regardless of condition. Table 25 shows Mean BMI values by condition and time as well as mean change from pretest to posttest. Table 26 summarizes female primary caregivers' weight status at pretest and posttest.

Table 25

Mean (SD) body mass index (BMI) at pretest and posttest by condition, and mean change (SD) in BMI (posttest minus pretest)

Variable		HL	PAT
		n = 19	*n = 26*
Body Mass Index	Pretest	31.4 (6.8)	28.2 (4.9)
	Posttest	30.4 (5.9)	27.7 (5.2)
	Change	-1.0 (3.6)	-0.6 (1.6)

Note. HL = Healthy Living; PAT = Parents as Teachers. Participants who reported being pregnant at either pretest or posttest were excluded from analyses.

Table 26

Frequencies and Relative Frequencies of Female Primary Caregivers' Weight Status by Condition and Time

Time Point	Weight Status	HL		PAT	
		f	%	*f*	%
Pretest	Healthy Weight	3	15.8%	9	34.6%
	Overweight	6	31.6%	6	23.1%
	Obese	10	52.6%	11	42.3%
Posttest	Healthy Weight	5	26.3%	8	30.8%
	Overweight	4	21.1%	9	34.6%
	Obese	10	52.6%	9	34.6%

Note. HL = Healthy Living; PAT = Parents as Teachers. Healty weight = body mass index from 18.5-24.9 kg/m^2; Overweight = body mass index from 25-29.9 kg/m^2; Obese = body mass index ≥ 30 kg/m^2. Participants who reported being pregnant at either pretest or posttest were excluded from analyses.

The potential influence of medications on weight loss and weight gain was also taken into account. At pretest, three participants in the Healthy Living condition and three participants in the attention-placebo comparison condition reported taking medications that could promote weight gain; whereas one participant in each condition reported taking medication that could promote weight loss. At posttest, one participant in the Healthy Living treatment condition and two participants in the attention-placebo comparison condition reported taking medication which could lead to weight gain; one participant in the Healthy Living treatment intervention was unsure if her medication might promote weight gain. While no Healthy Living participants reported taking medications that might result in weight loss at posttest, two participants in the attention-placebo comparison condition reported taking medications that might result in weight loss.

Child Weight Status Outcomes

Hypothesis 11. Children whose female primary caregiver participated in the Healthy Living treatment condition will be more likely than children whose female primary caregiver participated in the attention-placebo comparison condition to maintain or achieve a non-overweight status.

Hypothesis 11 was evaluated using hierarchical loglinear analysis. All effects were retained in the three-way loglinear analysis, as indicated by the likelihood ratio of this model, $\chi^2(0, N = 48) = 0, p = 1$.The three-way interaction (condition x child weight status at pretest x child weight status at posttest) was statistically significant, $\chi^2(1, N = 48) = 4.08, p = .04$. Looking at frequencies and relative frequencies (see Table 27), there was no aggregate change in weight status from pretest to posttest for either condition. However, further exploration of these data indicate there was movement from one category to the other at the individual child level. This fluctuation is illustrated in Figure 5. One child from the Healthy Living treatment condition who was not overweight at pretest was overweight at posttest. Another child who was overweight at pretest moved into the non-overweight category at posttest. Figure 5 also shows a similar occurrence for the Parents as Teachers condition. Three children who were categorized as non-overweight at pretest were overweight at posttest while three additional children who were overweight at pretest were no longer overweight at posttest. Hypothesis 11 was, therefore, not supported by these outcomes.

Table 27

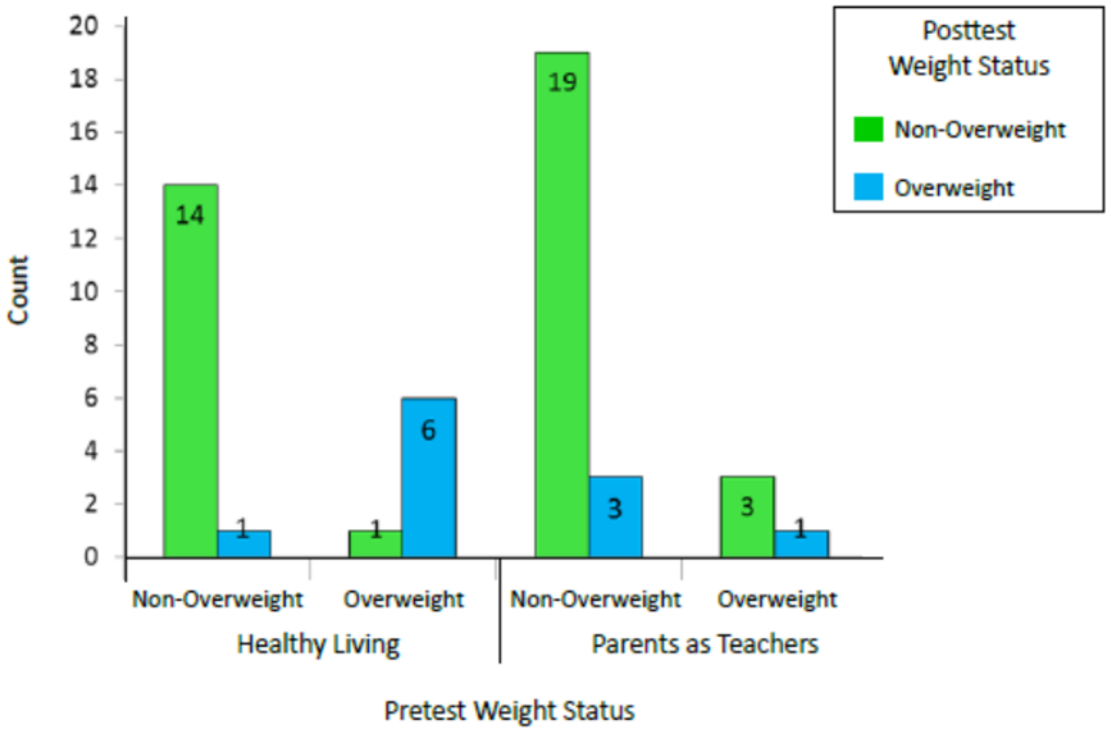
Frequencies and Relative Frequencies of Child Weight Status by Condition and Time

Time Point	Weight Status	HL		PAT	
		f	%	*f*	%
Pretest	Non-overweight	15	68.2%	22	84.6%
	Overweight	7	31.8%	4	15.4%
Posttest	Non-overweight	15	68.2%	22	84.6%
	Overweight	7	31.8%	4	15.4%

Note. HL = Healthy Living; PAT = Parents as Teachers. Overweight = children under 24 months who were ≥ 95th weight-for-length percentile or children 24 months or older who were ≥ 85th body mass index-for-age percentile; Non-overweight = all children who did not meet the overweight criteria.

Figure 5

Change in Child Weight Status from Pretest to Posttest



Note. HL = Healthy Living; PAT = Parents as Teachers. Overweight = children under 24 months who were ≥ 95th weight-for-length percentile or children 24 months or older who were ≥ 85th body mass index-for-age percentile; Non-overweight = all children who did not meet the overweight criteria.

CHAPTER V

DISCUSSION

The current investigation examined the effects of a Healthy Living intervention on female primary caregivers' fruit and vegetable consumption, sugar-sweetened beverage consumption, physical activity level, and television viewing time. The theoretical construct of self-efficacy for the abovementioned behaviors was also examined as a mechanism by which the Healthy Living intervention acted on female primary caregivers. The final aims were to examine the effects of behaviors stemming from the Healthy Living intervention on female primary caregivers' body mass index and the children's weight status, respectively. Outcomes for participants in the Healthy Living treatment condition were compared to outcomes for participants in the Parents as Teachers attention-placebo comparison condition. Results indicated the treatment condition was no more effective than the attention-placebo comparison condition on behavioral outcomes, self-efficacy, or anthropometrics.

Discussion of Key Findings

The mean daily caloric intake from sugar-sweetened beverages decreased by nearly half from pretest to posttest regardless of condition. This is a somewhat perplexing finding, as participants in the Parents as Teachers attention-placebo comparison condition would not be expected to decrease sugar-sweetened beverage consumption. This may be explained, in part, by the small sample size; though, cross-contamination is also a possibility. Participants in the Healthy Living treatment condition may have shared knowledge gained with others in their social network. If members of their social network were also participating in the *Minding the Gap* study

as Parents as Teachers participants, study outcomes could have been impacted. Further, the majority of participants in both conditions reported participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) program. Perhaps participants learned about sugar-sweetened beverages through WIC education. Moreover, lay advisors were cross-trained in both curricula and instructed to limit their planned lessons with *Minding the Gap* participants to their designated curriculum. The Parents as Teachers curriculum includes health-related lessons; therefore, Parents as Teachers lay advisors were asked to omit these lessons to avoid contamination. It is possible one or more lay advisors allocated to the Parents as Teachers condition shared information about sugar-sweetened beverages with their participants. With such a small cadre of lay advisors in the current study, any such contamination across conditions could greatly influence outcomes. Although researchers understand the implications of contamination on empirical findings, it may be difficult for lay advisors to appreciate the importance of adhering to research design (Anliker et al., 1999). The *Minding the Gap* lay advisors were, after all, employed to *help* female primary caregivers. Withholding knowledge may seem contrary to this intent.

For physical activity, there was an interaction effect across time but in an unexpected and undesirable direction for those in the Healthy Living treatment condition. There was minimal change from pretest to posttest in the overall percentage of participants who indicated they engaged in physical activity sufficient to meet ACSM recommendations, yet there was notable fluctuation at the individual level. One plausible explanation for this is that participants in the Healthy Living treatment condition experienced an increase in knowledge, meaning they learned what constitutes moderate and vigorous physical activity via the Healthy Living curriculum. Increased knowledge could result in more accurate reporting of physical activity at posttest; however, pretest reports would likely be overestimated and any resultant intervention effects would be undetected. This concern is supported by a recent review of literature on the International Physical Activity Questionnaire (IPAQ) short form's validity. The review indicated

the IPAQ short form overestimated physical activity by 84%, on average, when compared to objective measures (Lee, Macfarlane, Lam, & Stewart, 2011). Evidence likewise suggests the Spanish version of the IPAQ short form has poor validity for measuring moderate to vigorous physical activity in Mexican participants (Medina, Barquera, & Janssen, 2013). This is an important consideration given that the majority of *Minding the Gap* participants were born in Mexico.

Female primary caregivers' body mass index (BMI) decreased significantly from pretest to posttest. Reductions in BMI across time may be explained by a loss of pregnancy weight as well as reductions in sugar-sweetened beverage calories. It is not surprising that no between-group anthropometric differences were observed because the treatment and attention-placebo comparison conditions did not differ significantly on the weight-related behavioral outcomes. Further, it may take longer than six to nine months (the posttest data collection time frame for the current investigation) to detect between-group differences on anthropometric outcomes. Johnson et al. (2008), for example, did not observe significant weight change between treatment and control groups in their TTM-based, multiple behavior study until 24 months. Consequently, a longitudinal follow-up is needed to examine long-term effects of the *Minding the Gap* study.

Lay Advisor Approach

Though the utility of the Healthy Living intervention to impact behavior change, self-efficacy, and weight status is unsubstantiated, the utility of the lay advisor approach, particularly among Latina lay advisors and participants, is supported in several ways. First, lay advisors were highly effective in recruiting hard-to-reach, socially disadvantaged participants. Almost half the female primary caregivers in the *Minding the Gap* study had not received a high school diploma or an equivalent certificate, and the majority were Hispanic/Latina, born outside the United States, and not employed. Lay advisors appear to have overcome many common recruitment barriers, such as mistrust or uncertainty about research, fear of authority, and low health literacy (Bonevski et al., 2014). Second, lay advisors were successful in retaining nearly 3 out of 4

participants from pretest to posttest. Lay advisors' retention success may be due to shared language, cultural commonalities, and a resultant trust and rapport (Rhodes et al., 2013). In addition, retention was likely aided by the flexibility offered by lay advisors. Lay advisors avoided potential retention barriers by delivering one-on-one, tailored lessons on days and at times convenient for participants. They met with participants in their own homes or other preferred locations, thus avoiding transportation and childcare barriers (Bonevski et al., 2014). Third, the lay advisor approach appears to have increased participants' self-efficacy. Participants reported greater total self-efficacy after participating in the *Minding the Gap* study regardless of the condition they received. Additional research with a comparison group that receives no intervention is needed to confirm the enhanced self-efficacy reported in the current investigation resulted from lay advisor/intervention influence and not some other factor, such as participation in another nutrition/health program (e.g., WIC) or social desirability bias. Alternatively, a social desirability scale could be included as a measure in subsequent studies (van de Mortel, 2008).

Theoretical Framework

The Transtheoretical Model (TTM) guided development and implementation of the Healthy Living intervention; however, the specific aims of the present investigation centered on behavior change, weight status, and only one TTM construct, self-efficacy. With such a keen focus on behavior change, important information about the other TTM constructs, particularly participants' stages of change, remains unknown. If TTM worked as intended, participants may have experienced stage progression for the health behaviors, yet they may not have reached the action stage by posttest.

It is also important to note that TTM was used imperfectly in the current study. Prochaska and Norcross (2010) describe five key stages of change individuals move through to achieve behavior change; however, for the Healthy Living intervention, stages of change were collapsed into three stages: *precontemplation* (person is not considering a behavioral change), *contemplation/preparation* (person is considering a behavioral change), and *action/maintenance*

(person is currently making a behavioral change). This was a pragmatic decision to make staging four health behaviors more manageable for lay advisors; however, collapsing stages was possibly too much deviation from the original TTM stage construct to elicit behavior change. Alternatively, it may have been more effective to collapse the precontemplation and contemplation stages into one stage, leaving preparation as its own stand-alone stage.

Study Limitations

Sampling limitations. Small sample size precluded robust statistical analyses in some instances; this was especially problematic for chi-square analyses. Additionally, only female primary caregivers with young children were recruited for participation in this study, and the majority identified as Hispanic/Latina, were born outside the United States, and had low educational attainment. As such, *Minding the Gap* participants were not a representative sample.

Non-randomization. Neither participants nor lay advisors were randomly assigned to condition. Instead, a quasi-experimental design was used, which introduces the possibility of selection bias. Lay advisors may have been more likely to recruit participants whom they deemed a better match for their respective intervention or participants may have been more likely to self-select into a condition that better matched their interests and needs. Results, therefore, cannot be generalized.

Attrition. Each hypothesis was evaluated including only participants who completed both pretest and posttest assessments. The possibility of attrition bias must be considered. Perhaps Healthy Living participants who were not succeeding with behavior change, who had lower self-efficacy, or who did not experience improvements in BMI were more likely to drop out of the study. In contrast, perhaps Healthy Living participants who were successfully changing target behaviors, who had high self-efficacy, or who experienced improvements in BMI dropped out of the study because they no longer perceived a need for study involvement. Parents as Teachers participants may have dropped out for similar reasons.

Self-report measures. The current investigation included self-report measures for fruit and vegetable consumption, sugar-sweetened beverage consumption, physical activity, television viewing, and self-efficacy. This not only introduces opportunity for social desirability bias, but also inadvertent under-reporting or over-reporting due to recall bias. Additionally, Healthy Living participants may have reported nutrition behaviors more accurately at posttest because of an increase in knowledge about portion sizes and because of a heightened awareness of and concern for dietary intake. Healthy Living participants may have reported their physical activity and television viewing behaviors more accurately at posttest for similar reasons. While improved knowledge was a desired outcome of the Healthy Living intervention, such outcomes could have concealed intervention effects. Multiple 24-hour dietary recalls would have been more ideal to evaluate nutrition behaviors in the current study. However, the burden would have been too great on participants who were already asked to complete numerous assessments as part of the larger *Minding the Gap* project. Likewise, accelerometers would have provided more accurate physical activity data, but this measurement protocol was also not feasible for the current study.

Anthropometric measurement limitations. Research assistants received training on accurately measuring weight, height, and recumbent length measurements. The measurement protocol was also included in writing in both the pretest and posttest data collection interview packets. Despite these safeguards, measurement error may have occurred. Measurement accuracy is especially important for children (Barlow and the Expert Committee, 2007); however, it can be difficult to obtain accurate recumbent lengths for infants. In addition, BMI, sex-specific BMI-for-age-percentiles, and sex-specific weight-for-length percentiles were used as screening measures for obesity. These are not direct measures of body composition and, thus, must be interpreted prudently (Barlow and the Expert Committee, 2007; CDC, 2015).

Intervention fidelity. The *Minding the Gap* study was a year-long intervention. For the current investigation, midpoint data was described as posttest data. Per intervention protocol, lay advisors were to meet with participants two times per month. If this had been achieved, each

participant would have received 12 lessons after six months of intervention; the mean number of lay advisor visits was 9.3 (*SD* = 4.3). Therefore, on average, participants received a less intensive intervention than was planned. The number of lay advisor visits in the present investigation ranged from two to 17 visits. This can be explained by differences in data collection intervals. The planned midpoint data collection time point was six months after the onset of the intervention. The actual midpoint data collection time point ranged from six to nine months after the onset of the intervention. This resulted in some participants receiving a more intensive intervention than was planned. Despite these limitations, the Healthy Living treatment condition and the Parents as Teachers attention-placebo comparison condition deviated in a similar pattern.

Cross-contamination. As discussed previously, contamination is suspected. Lay advisors were trained on both the Healthy Living and Parents as Teachers curriculum, but instructed to only use their assigned curriculum with *Minding the Gap* participants. Cross-training was advantageous for lay advisor empowerment and capacity building, but it may have resulted in contamination across conditions. Contamination may have also occurred at the participant level. It is possible participants were influenced by outside programs, such as WIC, or Healthy Living participants may have interacted with Parents as Teachers participants, sharing knowledge gained from their respective curriculum. Social network analysis was not performed as a part of the current investigation but is recommended in future investigations to examine the inter-connectedness of participants (Scott, 2013).

Theoretical measurement limitations. Though the Healthy Living intervention incorporated all TTM constructs, only the self-efficacy construct was formally measured in the *Minding the Gap* study. It would have been advantageous to formally measure the other TTM constructs (i.e., stages of change, processes of change, and decisional balance) to help explain why behavior change was not significantly impacted by the Healthy Living condition. In addition, the TTM stages of change were collapsed from five stages into three stages; this modification may have influenced study outcomes.

Recommendations for Future Research

The *Minding the Gap* study was a pilot study with a modest number of lay advisors and participants. This study needs to be replicated on a larger scale to ensure it is adequately powered to conduct robust statistical analyses. A few other modifications should be considered. In addition to an attention-placebo comparison condition, a comparison condition that receives no intervention and thus no lay advisor attention/support is needed. This design coupled with an instrument to measure contamination would help determine if outcomes are indeed influenced by the lay advisor approach. Instruments should be included to formally measure all constructs of the Transtheoretical Model (i.e., stages of change, self-efficacy, decisional balance, and processes of change). Three-day dietary recalls or the Automated Self-Administered 24-hour Dietary Recall System (NCI Division of Cancer Control and Population Sciences, n.d.) should be considered as a supplement or replacement for food and beverage frequency questionnaires. Accelerometers should be considered as a supplement or replacement for self-report instruments to measure physical activity. Additional body composition measurements, such as skinfold measurements and waist and hip circumference measurements, should be obtained for female primary caregivers.

Aside from the abovementioned modifications to methodology, a longitudinal follow-up with female primary caregivers and participating children is needed. Such follow-up will allow researchers to investigate any long-term effects on female primary caregivers' self-efficacy, health behaviors and anthropometrics. Child anthropometrics as well as their nutrition, physical activity, and screen time behaviors can also be examined to evaluate any long-term intervention influence on the children. In addition, it would be informative to inquire if female primary caregivers remain in contact with their lay advisors. The lay advisor approach itself can be considered a "helping relationship," which is a TTM process of change shown to be especially important to facilitate stage progression from the action stage to the maintenance stage (Prochaska et al., 2008).

Scholars may also need to expand their research on health behavior theory. The Transtheoretical Model is an intrapersonal theory, and its constructs address important motivational and psychological aspects that correlate with a person's health behavior (Glanz, Rimer, & Viswanath, 2008). Nevertheless, researchers may need to look to interpersonal theories, such as the Social Cognitive Theory, or behavior-specific ecological models to inform intervention development (Glanz et al., 2008). As Bandura (2004) eloquently summarized: "Human health is a social matter, not just an individual one. A comprehensive approach to health promotion also requires changing the practices of social systems that have widespread effects on human health" (p. 143).

Summary

Obesity has emerged as a significant health issue among both adults and children in the United States (Fryar et al., 2014; Ogden et al., 2014). Common recommendations to counter obesity include dietary modifications, increased physical activity, and decreased sedentary time, including screen time. The 5-2-1-Almost None formula advocated by Nemours Health and Prevention Services (2010) encourages children to consume five servings of fruits and vegetables daily (5), limit screen time to two hours or less each day (2), engage in one hour of physical activity daily (1), and greatly limit daily sugar-sweetened beverage consumption (almost none). One avenue to reach these behavioral targets in children may be to influence parent behavior.

The Healthy Living treatment intervention, which was guided by the Transtheoretical Model, was developed to influence behaviors that align with the 5-2-1-Almost None formula. The current investigation compared the treatment condition to an attention-placebo comparison conditon. It was posited the Healthy Living treatment intervention would significantly increase fruit and vegetable consumption and physical activity levels and significantly decrease sugar-sweetened beverage consumption and television viewing time. Female primary caregivers' body mass index and the children's weight status were also examined. Findings indicated the Healthy Living treatment condition did not differ significantly from the attention-placebo comparison

condition for any of these outcomes. Despite the lack of support for these hypotheses, which centered on between-group differences, there were significant changes observed across time for the total sample. Self-efficacy improved, mean sugar-sweetened beverage consumption decreased, and mean body mass index decreased. Further research is needed to explain these changes. Findings likewise support the lay advisor approach as an effective model for recruitng and retaining hard-to-reach participants. The lay advisor approach may also increase participant self-efficacy regardless of intervention received; however, additional research is also needed to understand this relationship.

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APPENDIX A

INFORMED CONSENT AND MEASUREMENT INSTRUMENTS

Informed Consent for Parent/Legal Guardian and Child Participation
Oklahoma State University
Minding the Gap Research Study

INTRODUCTION
You and your child are invited to be in a study. You and your child do not have to be in this study. You can choose not to participate or quit participating at any time without penalty. This information sheet explains the research study you have been invited to join. Please read it before deciding whether you want to be in the study.

WHY IS THIS RESEARCH STUDY BEING DONE?
"Lay advisors" are community members who are trained to help others. This research study will use lay advisors to help mothers with young children. We want to know if lay advisors can help improve children's kindergarten readiness. We also want to know if lay advisors can help families live more healthy lifestyles.

WHAT WILL I HAVE TO DO?
The study lasts about 12 months. Being in the study involves two main activities. First, you will be asked to complete three interviews. During these interviews I will ask you questions about different parts of your daily life. I will ask you basic questions about you and your family. I will ask questions about how you parent. I will ask you questions about how your child is developing. I will ask you questions about your health habits like how often you are active and the types of food and drinks you take in. I will write down the answer you give to each question. You can skip any question you are not comfortable answering. The first interview will be today. It will take about 80 minutes to complete. The second interview will take place in about six months from today. This second interview will take about 30 minutes to complete. The third interview will take place in about 12 months, and it will take about 80 minutes.

The second main activity of being in the study is regular meetings with a lay advisor. The lay advisors have been trained to deliver one of two programs. The first program focuses on early childhood education. The second program focuses on healthy living. Your lay advisor will deliver to you the:

_____ Early childhood education program. This program focuses on normal child development, and ways to help get your child ready for kindergarten.

_____ Healthy living program. This program focuses on simple ways to help keep you and your family healthy.

You will have bi-weekly face-to-face visits with your lay advisor. Each visit will be about one hour. You can arrange the day, time and location for these face-to-face visits. During the face-to-face visits your lay advisor will give you information and activities based on your program. Between each visit your lay advisor will ask you to practice the activities given to you during your last visit. Your lay advisor will call you on the weeks you do not have a face-to-face visit to check in on your progress and answer questions you may have. We expect that you will have the same lay advisor for the whole study.

WHAT WILL MY CHILD HAVE TO DO?
Your child's development will be assessed, no matter which program you receive. Your child will be assessed as part of the interview today, and again in 12 months. The interviewer has been trained. The interviewer will work with you and your child to determine your child's abilities. The interviewer cannot give you your child's results right away. A doctor from the study will contact you within two weeks if your child's results are lower than expected. Your lay advisor will give you your child's results from both assessments after the study is over.

If you are in the early childhood education program we recommend that your child be present during the face-to-face lay advisor visits. It would be best if you scheduled your face-to-face visits with the lay advisor during times you child is awake and not tired. However, your child does not need to be present during these visits with your lay advisor.

If you are in the healthy living program your child may be present during the face-to-face lay advisor visits, but it is not required.

WHAT ARE THE RISKS?
This study has few risks beyond that of your day-to-day life. It is possible that some of the activities in the program may be difficult for you or your child. By difficult we mean you may feel awkward or uncomfortable as you try new activities. Or, you or your child may become frustrated. The interviewers and lay advisors will do their best to ensure your and your child's comfort while in the study. Please let your lay advisor or a member of the research staff know if you have any difficulties or have any questions at any point.

HOW WILL THIS BENEFIT ME?
Participant families will receive valuable information and counseling on topics which may include early childhood development, diet and nutrition, and physical health and well-being.

WILL I BE COMPENSATED FOR DOING THIS?
You will be paid $20 for completing the baseline (initial) interview, and another $20 for completing the midpoint interview. You will be paid $30 for completing the 12 month interview. You will not receive any compensation for the visits with your lay advisors.

WHAT ARE MY RIGHTS AS A PARTICIPANT?
Your participation and your child's participation in this study are voluntary. You can choose not to participate or quit the study at any time without penalty. If you stop participating you will not receive compensation for interviews you do not complete.

HOW WILL MY PRIVATE INFORMATION BE HANDLED?
We will not share any of your private information with people outside of this study. Only persons coordinating or doing the interviews will know who you are and how to contact you. Information that identifies you and your child will not be recorded in the form we will use to collect family information. Instead, we will assign you and your child a number to keep your private information secret. Results from this study may be presented at professional conferences, in book chapters, or in academic journals, but any written results will discuss group findings, not names or information that can identify you or your child.

Situations that Require Investigators to Break Confidentiality
However, there are two situations where state law requires that we break confidentiality. The two

situations are 1) if we suspect child abuse or neglect; 2) if you or your child tells us of intentions to harm self or others. In these cases, we are required by law to report information about the situation to appropriate agencies.

WHOM DO I CALL IF I HAVE QUESTIONS?
For questions about the research study or in the event of a research-related injury, contact:

Dr. Joseph (Joe) Grzywacz (Gree-votch) at 918-594-8440.
Oklahoma State University in Tulsa

The Institutional Review Board (IRB) is a group of people who review research studies. If you have questions about your rights as a research volunteer, you may contact the Oklahoma State University IRB:

Chair, Dr. Shelia Kennison
219 Cordell North, Stillwater, OK 74078
405-744-3377
irb@okstate.edu

CONSENT TO PARTICIPATE
I have read and fully understood this consent form. I sign it freely and willingly. I understand what it means to be a participant in this study. Also, as a parent or legal guardian, I authorize my child to participate in the described research study. A copy of this form has been given to me. I may choose not to participate or to withdraw my consent and stop participation or my child's at any time without penalty.

_____ _____
Signature of parent/legal guardian **(Mark an X)** Date

I certify that I have personally explained this document before requesting that the participant to sign it.

_____ _____
Signature of the researcher Date

For more information about the study, please contact:

PRINCIPAL INVESTIGATOR
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DEMOGRAPHIC INFORMATION FORM

PERSONAL BACKGROUND INFORMATION

I am going to ask you some questions about different areas of your life, such as the kind of work you do, about your living arrangements, and your health. It will take about ____minutes to complete the interview. Let's start with some basic questions about you and where you're from.

1. How old are you? (In what year were you born? _____)

   ____ ____ years

   88 _____ DK

   99 _____ REF

2. Where were you born?

   1 _____ United States

   2 _____ Other, SPECIFY _____

   88 _____ DK

   99 _____ REF

3. What racial group would you say you belong to?

   1 _____ White

   2 _____ Black, African American or Negro

   3 _____ American Indian or Alaska Native

   4 _____ Asian

   5 _____ Other, SPECIFY _____

   6 _____ Mixed, SPECIFY _____

   88 _____ DK

   99 _____ REF

4. Do you classify yourself has Hispanic or Latino?

   0 _____ No

   1 _____ Yes

   88 _____ DK

   99 _____ REF

5. What is your relationship to the child participating in the Minding the Gap project?

1 _____ Mother

2 _____ Grandmother

3 _____ Aunt

4 _____ Other, DESCRIBE_____

88 _____ DK

99 _____ REF

4. *If response to question 5 is something other than "mother" ask, "*Are you the legal guardian of the child participating in the Minding the Gap project?

0 _____ No

1 _____ Yes

88 _____ DK

99 _____ REF

5. What is your marital status?

1 _____ Never Married

2 _____ Married

3 _____ Living as married

4 _____ Widowed/ Separated/ Divorced

88 _____ DK

99 _____ REF

6. What is the highest grade of school or year of college you completed? (DO NOT READ LIST)

INTERVIEWER: IF R SAYS 2, 3, 4, OR 5 YEARS OF COLLEGE, PROBE, Did you receive a degree?

1 ____ Some high school: *Specify what grade was completed*_____

2 ____ General Equivalence Degree (GED) or high school equivalent

3 ____ High school graduate

4 ____ Some trade or technical school

5 ____ Trade or technical school graduate

6 ____ Some 4-year college work

7 ____ 4 Year college graduate

8 ____ Post-graduate training

88 ____ DK

99 ____ REF

7. Are you currently employed? *If No, skip to next section, Family Background Information.*

0 ____ No

1 ____ Yes

88 ____ DK

99 ____ REF

8. If yes, how many jobs do you have?

1 ____ 1 job

2 ____ 2 jobs

3 ____ >2 jobs

88 ____ DK

99 ____ REF

9. How many hours per week do you usually work?

____ ____ hours

88 ____ DK

99 ____ REF

10. On your job {or on any of your jobs}, do you usually work a daytime schedule or some other schedule?

1 ____ Daytime schedule (Anytime between 6 A.M. to 6 P.M.)

2 ____ Some other schedule

88 ____ DK

99 ____ REF

FAMILY BACKGROUND INFORMATION

1. If married, does your husband live in your household? If not married, go to question 2.

1 _____ Yes

0 _____ No

88 _____ DK

99 _____ REF

2. Does the biological father of your child(ren) under the age of 3 live in your household?

1 _____ Yes

0 _____ No

88 _____ DK

99 _____ REF

3. Including yourself, how many people live in your household?

____ people

88 ____ DK

99 ____ REF

4. Including yourself, how many adults live in your household?

____ adults

88 ____ DK

99 ____ REF

5. How many children live in your household? List ages.

____ children. Ages (separated by commas)_____

88 ____ DK

99 ____ REF

6. How many of the children living with you are not yet old enough to go to school?

____ children

88 ____ DK

99 ____ REF

7. How many of the children living with you are old enough to go to school?

____ children

88 ____ DK

99 ____ REF

8. In what programs do you or your family currently participate? (Check all that apply)

____ Child Nutrition (reduced/free school lunch/breakfast)

____ FDPIR (Commodities on Indian Reservations)

____ SNAP (Food Stamps)

____ Head Start

____ TANF (Federal assistance program)

____ WIC/SCFP

____ Government housing assistance

____ Other, *describe:*_____

____ None

9. Have you ever participated in OSU Extension's Fresh Start Program or another nutrition or healthy living program?

0 ____ No

1 ____ Yes

88 ____ DK

99 ____ REF

BRIEF MEDICAL HISTORY QUESTIONNAIRE

Now, I'm going to ask you a few questions about your medical history.

1. Have you ever been told by a doctor that you have heart disease?

   0 ____ No
   1 ____ Yes
   88 ____ DK
   99 ____ REF

2. Have you ever been told by a doctor that you have diabetes?

   0 ____ No
   1 ____ Yes
   88 ____ DK
   99 ____ REF

3. Have you ever been told by a doctor that you have high blood pressure?

   0 ____ No
   1 ____ Yes
   88 ____ DK
   99 ____ REF

4. Have you ever been told by a doctor that you have high cholesterol?

   0 ____ No
   1 ____ Yes
   88 ____ DK
   99 ____ REF

5. Have you ever been told by a doctor that you are overweight or obese?

   0 ____ No
   1 ____ Yes
   88 ____ DK
   99 ____ REF

6. Are you currently pregnant?

   0 ____ No
   1 ____ Yes
   88 ____ DK
   99 ____ REF

7. Are you currently breastfeeding?

   0 ____ No
   1 ____ Yes
   88 ____ DK
   99 ____ REF

8. Are you currently taking any medications that might cause you to gain weight?

   0 ____ No
   1 ____ Yes
   88 ____ DK
   99 ____ REF

9. Are you currently taking any medications that might cause you to lose weight?

   0 ____ No
   1 ____ Yes
   88 ____ DK
   99 ____ REF

Mother and Child Height and Weight Instructions

Height and Weight Measurement Instructions for Mother and Weight for Child

Ask participants to please remove their shoes prior to all measurements. Use the calibrated scale provided to weigh participants and the calibrated stadiometer to obtain their height. Please record all weight values in kilograms and all height and values in meters to the nearest 1/10 of a centimeter. To obtain child's weight, weigh the mother holding her child and then subtract the weight of the mother alone to calculate the weight of the child.

A.) Mother's Height (in cm): _____

B.) Mother's Weight holding child (in kg):_____

C.) Mother's Weight without child (in kg): _____

Height Measurement Script and Instructions for Child

"Ok, now we'd like you to help us get {CHILD'S NAME}'s measurements. Babies often don't like this, so we'd like you to help while we get the measurements. We'll do this on the table so that we can stand on either side of {CHILD'S NAME}. [IF NO TABLE IS AVAILABLE, SAY *"we'll do this on the mat since we're already set up here"*]. *First, I'd like you to undress {CHILD'S NAME}. Please take off all clothing, including socks, but leave {his/her} diaper on."*

WIPE DOWN STADIOMETER WHILE GIVING THESE INSTRUCTIONS: *"I'll use this to measure {CHILD'S NAME}'s length. We're going to need to measure {CHILD'S NAME} at least twice to make sure we get the best measurements."*

GESTURE TO MOTHER AND HELP HER PLACE THE BABY ON THE STADIOMETER AS YOU EXPLAIN: *"Please place {CHILD'S NAME} on {his/her} back on this part, with {his/her} head on this side. I need to make sure {he/she} is looking straight up. Your job is to make sure {his/her} back and legs are not arched or bent. If {he/she} moves or arches {his/her} back, just let me know. Make sure {CHILD'S NAME} is safe while I read the measurement."*

READ MEASUREMENT.

"Ok, now please, pick up {CHILD'S NAME}, then place {him/her} back down so I can get a second measurement."

READ MEASUREMENT. YOU MUST HAVE TWO MEASUREMENTS WITHIN ½ CENTIMETER TO MOVE TO THE WEIGHT TASK.

IF FIRST TWO MEASUREMENTS ARE NOT WITHIN ½ CM: *"I need to measure {CHILD'S NAME} again to double check, since the first two measurements were not close together. Please pick {him/her} up, then place {him/her} down again like you did before."*

D) Child's Weight: Measure B (Mother with child)
- Measure C (Mother without child)___

= _____ (in kg)

F.) Child's Height (in cm): _____

NCI All-Day Fruit and Vegetable Screener

INSTRUCTIONS:

- Think about what you usually at last month.
- Please think about all the fruits and vegetables that you ate last month. Include those that were:
  - Raw and cooked,
  - Eaten as snacks and at meals,
  - Eaten at home and away from home (restaurants, friends, take-out), and
  - Eaten alone and mixed with other foods.
- Report how many times per month, week, or day you ate each food, and if you ate it, how much you usually had.
- If you mark "Never" for a question, follow the "Go to" instruction.
- Choose the best answer for each question. Mark only one response for each question.

1. Over the last month, how many times per month, week, or day did you drink **100% juice** such as orange, apple, grape, or grapefruit juice? **Do not count** fruit drinks like Kool-Aid, lemonade, Hi-C, cranberry juice drink, Tang, and Twister. Include juice you drank at all mealtimes and between meals.

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 2)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

1a. Each time you drank **100% juice**, how much did you usually drink?

○	○	○	○
Less than ¾ cup (less than 6 ounces)	¾ to 1 ¼ cup (6 to 10 ounces)	1 ¼ to 2 cups (10 to 16 ounces)	More than 2 cups (more than 16 ounces)

2. Over the last month, how many times per month, week or day did you eat **fruit**? Count any kind of fruit—fresh, canned, and frozen. **Do not count** juices. Include fruit you ate at all mealtimes and for snacks.

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 3)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

2a. Each time you ate **fruit**, how much did you usually eat?

○	○	○	○
Less than 1 medium fruit	1 medium fruit	2 medium fruits	More than 2 medium fruits

OR

○	○	○	○
Less than ½ cup	About ½ cup	About 1 cup	More than 1 cup

3. Over the last month, how often did you eat **lettuce salad (with or without other vegetables)**?

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 4)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

3a. Each time you ate **lettuce salad**, how much did you usually eat?

○	○	○	○
About ½ cup	About 1 cup	About 2 cups	More than 2 cups

4. Over the last month, how often did you eat **French fries or fried potatoes**?

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 5)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

4a. Each time you ate **French fries** or **fried potatoes**, how much did you usually eat?

○	○	○	○
Small order or less (About 1 cup or less)	Medium order (About 1 ½ cups)	Large order (About 2 cups)	Super Size order or more (About 3 cups or more)

5. Over the last month, how often did you eat **other white potatoes**? Count **baked, boiled**, and **mashed potatoes, potato salad**, and **white potatoes that were not fried.**

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 6)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

5a. Each time you ate **these potatoes**, how much did you usually eat?

○	○	○	○
1 small potato or less (⅝ cup or less)	1 medium potato (⅝ to 1 cup)	1 large potato (1 to 1 ½ cups)	2 medium potatoes or more (1 ½ cups or more)

6. Over the last month, how often did you eat **cooked dried beans**? Count **baked beans, bean soup, refried beans, pork and beans** and **other bean dishes**.

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 7)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

6a. Each time you ate **these beans**, how much did you usually eat?

○	○	○	○
Less than ½ cup	½ to 1 cup	1 to 1½ cups	More than 1½ cups

7. Over the last month, how often did you eat **other vegetables**?

DO NOT COUNT: • Lettuce salads • White potatoes • Cooked dried beans • Rice
• Vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc.

COUNT: • All other vegetables—raw, cooked, canned, and frozen

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 8)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

7a. Each of these times that you ate **other vegetables**, how much did you usually eat?

○	○	○	○
Less than ½ cup	½ to 1 cup	1 to 2 cups	More than 2 cups

8. Over the last month, how often did you eat **tomato sauce**? Include tomato sauce on pasta or macaroni, rice, pizza and other dishes.

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 9)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

8a. Each time you ate **tomato sauce**, how much did you usually eat?

○	○	○	○
About ¼ cup	About ½ cup	About 1 cup	More than 1 cup

9. Over the last month, how often did you eat **vegetable soups**? Include tomato soup, gazpacho, beef with vegetable soup, minestrone soup, and other soups made with vegetables.

○	○	○	○	○	○	○	○	○	○
Never (Go to Question 10)	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

9a. Each time you ate **vegetable soup**, how much did you usually eat?

○	○	○	○
Less than 1 cup	1 to 2 cups	2 to 3 cups	More than 3 cups

10. Over the last month, how often did you eat **mixtures that included vegetables**? Count such foods as sandwiches, casseroles, stews, stir-fry, omelets, and tacos.

O	O	O	O	O	O	O	O	O	O
Never	1-3 times last month	1-2 times per week	3-4 times per week	5-6 times per week	1 time per day	2 times per day	3 times per day	4 times per day	5 or more times per day

Source: National Cancer Institute, 2013.

Beverage Questionnaire (BEVQ-15)

Instructions:
In the past month, please indicate your response for each beverage type by marking an "X" in the bubble for "how often" and "how much each time".

1. Indicate how often you drank the following beverages, for example, if you drank 5 glasses of water per week, mark 4-6 times per week.
2. Indicate the approximate amount of beverage you drank each time, for example, if you drank 1 cup of water each time, mark 1 cup under "how much each time".
3. Do not count beverages used in cooking or other preparations, such as milk in cereal.
4. Count milk added to tea and coffee in the *tea/coffee with cream beverage category* **NOT** in the milk categories.

Participant ID _____

Date _____

	HOW OFTEN (MARK ONE)							HOW MUCH EACH TIME (MARK ONE)				
Type of Beverage	**Never or less than 1 time per week (go to next beverage)**	**1 time per week**	**2-3 times per week**	**4-6 times per week**	**1 time per day**	**2+ times per day**	**3+ times per day**	**Less than 6 fl oz (3/4 cup)**	**8 fl oz (1 cup)**	**12 fl oz (1 1/2 cups)**	**16 fl oz (2 cups)**	**More than 20 fl oz (2 1/2 cups)**
Water	o	o	o	o	o	o	o	o	o	o	o	o
100% Fruit Juice	o	o	o	o	o	o	o	o	o	o	o	o
Sweetened Juice Beverage/ Drink (fruit ades, lemonade, punch, Sunny Delight)	o	o	o	o	o	o	o	o	o	o	o	o
Whole Milk	o	o	o	o	o	o	o	o	o	o	o	o
Reduced Fat Milk (2%)	o	o	o	o	o	o	o	o	o	o	o	o
Low Fat/Fat Free Milk (Skim, 1%, Buttermilk, Soymilk)	o	o	o	o	o	o	o	o	o	o	o	o
Soft Drinks, Regular	o	o	o	o	o	o	o	o	o	o	o	o
Diet Soft Drinks/Artificially Sweetened Drinks (Crystal Light)	o	o	o	o	o	o	o	o	o	o	o	o
Sweetened Tea	o	o	o	o	o	o	o	o	o	o	o	o
Tea or Coffee, with cream and/or sugar (includes non-dairy creamer)	o	o	o	o	o	o	o	o	o	o	o	o
Tea or Coffee, black, with/ without artificial sweetener (no cream or sugar)	o	o	o	o	o	o	o	o	o	o	o	o
Beer, Ales, Wine Coolers, Non-alcoholic or Light Beer	o	o	o	o	o	o	o	o	o	o	o	o
Hard Liquor (shots, rum, tequila, etc.)	o	o	o	o	o	o	o	o	o	o	o	o
Wine (red or white)	o	o	o	o	o	o	o	o	o	o	o	o
Energy & Sports Drinks (Red Bull, Rockstar, Gatorade, Powerade, etc.)	o	o	o	o	o	o	o	o	o	o	o	o
Other (list):	o	o	o	o	o	o	o	o	o	o	o	o

Source: Hedrick et al., 2012

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE
(August 2002)

SHORT LAST 7 DAYS TELEPHONE FORMAT

For use with Young and Middle-aged Adults (15-69 years)

The International Physical Activity Questionnaires (IPAQ) comprises a set of 4 questionnaires. Long (5 activity domains asked independently) and short (4 generic items) versions for use by either telephone or self-administered methods are available. The purpose of the questionnaires is to provide common instruments that can be used to obtain internationally comparable data on health–related physical activity.

Background on IPAQ

The development of an international measure for physical activity started in Geneva in 1998 and was followed by extensive reliability and validity testing undertaken across 12 countries (14 sites) during 2000. The final results suggest that these measures have acceptable measurement properties for use in many settings and in different languages, and are suitable for national population-based prevalence studies of participation in physical activity.

Using IPAQ

Use of the IPAQ instruments for monitoring and research purposes is encouraged. It is recommended that no changes be made to the order or wording of the questions as this will affect the psychometric properties of the instruments.

Translation from English and Cultural Adaptation

Translation from English is supported to facilitate worldwide use of IPAQ. Information on the availability of IPAQ in different languages can be obtained at www.ipaq.ki.se. If a new translation is undertaken we highly recommend using the prescribed back translation methods available on the IPAQ website. If possible please consider making your translated version of IPAQ available to others by contributing it to the IPAQ website. Further details on translation and cultural adaptation can be downloaded from the website.

Data Entry and Coding

Attached to the response categories for each question are suggested variable names and valid ranges to assist in data management and interviewer training. We recommend that the actual response provided by each respondent is recorded. For example, "120 minutes" is recorded in the minutes response space. "Two hours" should be recorded as "2" in the hours column. A response of "one and a half hours" should be recorded as either "1" in hour column and "30" in minutes column.

Further Developments of IPAQ

International collaboration on IPAQ is on-going and an *International Physical Activity Prevalence Study* is in progress. For further information see the IPAQ website.

More Information

More detailed information on the IPAQ process and the research methods used in the development of IPAQ instruments is available at www.ipaq.ki.se and Booth, M.L. (2000). Assessment of Physical Activity: An International Perspective. Research Quarterly for Exercise and Sport, 71 (2): s114-20. Other scientific publications and presentations on the use of IPAQ are summarized on the website.

Short Last 7 Days Telephone IPAQ

READ: I am going to ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

READ: Now, think about all the *vigorous* activities which take *hard physical effort* that you did in the last 7 days. Vigorous activities make you breathe much harder than normal and may include heavy lifting, digging, aerobics, or fast bicycling. Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities?

   _____ Days per week [VDAY; Range 0-7, 8,9]
   8. Don't Know/Not Sure
   9. Refused

   [**Interviewer clarification**: Think only about those physical activities that you do for at least 10 minutes at a time.]

   [**Interviewer note**: If respondent answers zero, refuses or does not know, skip to Question 3]

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

   __ __ Hours per day [VDHRS; Range: 0-16]
   __ __ __ Minutes per day [VDMIN; Range: 0-960, 998, 999]
   998. Don't Know/Not Sure
   999. Refused

   [**Interviewer clarification**: Think only about those physical activities you do for at least 10 minutes at a time.]

   [**Interviewer probe**: An average time for one of the days on which you do vigorous activity is being sought. If the respondent can't answer because the pattern of time spent varies widely from day to day, ask: "How much time in total would you spend **over the last 7 days** doing vigorous physical activities?"

   __ __ Hours per week [VWHRS; Range: 0-112]
   __ __ __ __Minutes per week [VWMIN; Range: 0-6720, 9998, 9999]
   9998. Don't Know/Not Sure
   9999. Refused

READ: Now think about activities which take *moderate physical effort* that you did in the last 7 days. Moderate physical activities make you breathe somewhat harder than normal and may include carrying light loads, bicycling at a regular pace, or doubles tennis. Do not include walking. Again, think about only those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities?

____ Days per week [MDAY; Range: 0-7, 8, 9]
8. Don't Know/Not Sure
9. Refused

[**Interviewer clarification**: Think only about those physical activities that you do for at least 10 minutes at a time]

[**Interviewer Note**: *If respondent answers zero*, refuses or does not know, skip to Question 5]

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

__ __ Hours per day [MDHRS; Range: 0-16]
__ __ __ Minutes per day [MDMIN; Range: 0-960, 998, 999]
998. Don't Know/Not Sure
999. Refused

[**Interviewer clarification**: Think only about those physical activities that you do for at least 10 minutes at a time.]

[**Interviewer probe**: An average time for one of the days on which you do moderate activity is being sought. If the respondent can't answer because the pattern of time spent varies widely from day to day, or includes time spent in multiple jobs, ask: "What is the total amount of time you spent over the **last 7 days** doing moderate physical activities?"

__ __ __ Hours per week [MWHRS; Range: 0-112]
__ __ __ __Minutes per week [MWMIN; Range: 0-6720, 9998, 9999]
9998. Don't Know/Not Sure
9999. Refused

READ: Now think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

____ Days per week [WDAY; Range: 0-7, 8, 9]
8. Don't Know/Not Sure
9. Refused

[**Interviewer clarification**: Think only about the walking that you do for at least 10 minutes at a time.]

[**Interviewer Note**: *If respondent answers zero*, refuses or does not know, skip to Question 7]

6. How much time did you usually spend **walking** on one of those days?

__ __ Hours per day [WDHRS; Range: 0-16]
__ __ __ Minutes per day [WDMIN; Range: 0-960, 998, 999]
998. Don't Know/Not Sure
999. Refused

[**Interviewer probe**: An average time for one of the days on which you walk is being sought. If the respondent can't answer because the pattern of time spent varies widely from day to day, ask: "What is the total amount of time you spent walking over **the last 7 days**?"

__ __ __ Hours per week [WWHRS; Range: 0-112]
__ __ __ __Minutes per week [WWMIN; Range: 0-6720, 9998, 9999]
9998. Don't Know/Not Sure
9999. Refused

READ: Now think about the time you spent sitting on week days during the last 7 days. Include time spent at work, at home, while doing course work, and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television.

7. During the last 7 days, how much time did you usually spend ***sitting*** on a **week day**?

__ __ Hours per weekday [SDHRS; 0-16]
__ __ __ Minutes per weekday [SDMIN; Range: 0-960, 998, 999]
998. Don't Know/Not Sure
999. Refused

[**Interviewer clarification**: Include time spent lying down (awake) as well as sitting]

[**Interviewer probe**: An average time per day spent sitting is being sought. If the respondent can't answer because the pattern of time spent varies widely from day to day, ask: "What is the total amount of time you spent *sitting* last **Wednesday**?"

__ __ Hours on Wednesday [SWHRS; Range 0-16]
__ __ __ Minutes on Wednesday [SWMIN; Range: 0-960, 998, 999]
998. Don't Know/Not Sure
999. Refused

Source: International Physical Activity Questionnaire, n.d.

Sedentary Behavior Questionnaire

SEDENTARY BEHAVIOR: Weekday									
On a typical WEEKDAY, how much time do you spend (from when you wake up until you go to bed) doing the following?									
	None	15 min. or less	30 min.	1 hr	2 hrs	3 hrs	4 hrs	5 hrs	6 hrs or more
1. Watching television (including videos on VCR/DVD).	O	O	O	O	O	O	O	O	O
2. Playing computer or video games.	O	O	O	O	O	O	O	O	O
3. Sitting listening to music on radio, tapes, or CDs.	O	O	O	O	O	O	O	O	O
4. Sitting and talking, texting, or playing games on the phone.	O	O	O	O	O	O	O	O	O
5. Doing paperwork or computer work (office work, emails, paying bills, etc.)	O	O	O	O	O	O	O	O	O
6. Sitting reading a book or magazine.	O	O	O	O	O	O	O	O	O
7. Playing a musical instrument.	O	O	O	O	O	O	O	O	O
8. Doing artwork or crafts.	O	O	O	O	O	O	O	O	O
9. Sitting and driving in a car, bus, or train.	O	O	O	O	O	O	O	O	O

SEDENTARY BEHAVIOR: Weekend Day									
On a typical WEEKEND DAY, how much time do you spend (from when you wake up until you go to bed) doing the following?									
	None	15 min. or less	30 min.	1 hr	2 hrs	3 hrs	4 hrs	5 hrs	6 hrs or more
1. Watching television (including videos on VCR/DVD).	O	O	O	O	O	O	O	O	O
2. Playing computer or video games.	O	O	O	O	O	O	O	O	O
3. Sitting listening to music on radio, tapes, or CDs.	O	O	O	O	O	O	O	O	O
4. Sitting and talking, texting, or playing games on the phone.	O	O	O	O	O	O	O	O	O
5. Doing paperwork or computer work (office work, emails, paying bills, etc.)	O	O	O	O	O	O	O	O	O
6. Sitting reading a book or magazine.	O	O	O	O	O	O	O	O	O
7. Playing a musical instrument.	O	O	O	O	O	O	O	O	O
8. Doing artwork or crafts.	O	O	O	O	O	O	O	O	O
9. Sitting and driving in a car, bus, or train.	O	O	O	O	O	O	O	O	O

Note. Adapted from "Sedentary Behavior Questionnaire," by PACE, University of California, San Diego.

SELF-EFFICACY QUESTIONNAIRE

INSTRUCTIONS: For each statement below, Rate HOW SURE you are that you can do the following things.

Whether you do these things or not, please rate how confident you are that you could really motivate yourself to do things like these consistently, for at least six months.

Check one box for each question.

Physical Activity Self-Efficacy	I'm Sure I Can't	I Probably Can't	Maybe/ Don't Know	I Probably Can	I'm Sure I Can
1. I can be physically active no matter how busy my day is.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
2. I can be physically active even if I feel tired.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
3. I can be physically active even if it is very hot or cold outside.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
4. I can be physically active even if I have to stay at home.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
5. I can be physically active when I have no one to do it with.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
6. I can be physically active even when I would rather be doing something else.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
7. I can be physically active instead of watching TV.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Screen Time Self-Efficacy	**I'm Sure I Can't**	**I Probably Can't**	**Maybe/ Don't Know**	**I Probably Can**	**I'm Sure I Can**
8. I can limit watching TV to 2 hours or less on weekdays.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
9. I can limit watching TV to 2 hours or less on weekend days.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
10. I can find other ways to relax besides watching TV.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Fruit and Vegetable Self-Efficacy	I'm Sure I Can't	I Probably Can't	Maybe/ Don't Know	I Probably Can	I'm Sure I Can
11. I can have fruits and vegetables when I am in a rush.	1☐	2☐	3☐	4☐	5☐
12. I can eat fruit as part of lunch most days.	1☐	2☐	3☐	4☐	5☐
13. I can have fruits and vegetables when I am feeling tired.	1☐	2☐	3☐	4☐	5☐
14. I can get fruit when eating away from home.	1☐	2☐	3☐	4☐	5☐
15. I can have extra vegetables at dinner.	1☐	2☐	3☐	4☐	5☐
16. I can have a vegetable for dinner most days.	1☐	2☐	3☐	4☐	5☐
17. I can eat five servings of fruits and vegetables most days.	1☐	2☐	3☐	4☐	5☐
18. I can order at least one vegetable dish at a restaurant.	1☐	2☐	3☐	4☐	5☐
19. I can eat other fruits and vegetables when my favorites are not available.	1☐	2☐	3☐	4☐	5☐
Sugar-Sweetened Beverage Self-Efficacy	**I'm Sure I Can't**	**I Probably Can't**	**Maybe/ Don't Know**	**I Probably Can**	**I'm Sure I Can**
20. I can avoid sugary drinks when I am feeling tired.	1☐	2☐	3☐	4☐	5☐
21. I can refuse sugary drinks when they are offered to me.	1☐	2☐	3☐	4☐	5☐
22. I can avoid sugary drinks with my meals.	1☐	2☐	3☐	4☐	5☐
23. I can avoid sugary drinks when dining at a restaurant.	1☐	2☐	3☐	4☐	5☐
24. I can choose unsweetened drinks instead of sugary drinks.	1☐	2☐	3☐	4☐	5☐
25. I can limit my sugary drinks to no more than 8 ounces per day.	1☐	2☐	3☐	4☐	5☐

Note. The items for the Self-Efficacy Questionnaire were based on two sources: (1) "Associations of decisional balance, processes of change, and self-efficacy with stages of change for increased fruit and vegetable intake among low-income, African-American mothers," by H. Henry, K. Reimer, C. Smith, and M. Reicks, 2006, *Journal of the American Dietetic Association, 106*, p. 846. Copyright 2006 by the American Dietetic Association; and (2) "DEAL – physical activity self-efficacy form – DASH," by University of Glasgow Social and Public Health Sciences Unit, n.d.

RETROSPECTIVE SELF-EFFICACY QUESTIONNAIRE

INSTRUCTIONS: The next set of questions is about whether your confidence to make decisions about your physical activity and diet has changed in the last six months.

I will read several statements. For each statement, think about your confidence BEFORE you started the *Minding the Gap* program. Then, think about your confidence NOW. Then, tell me if:

- **you are more confident today in comparison to when you started the program.**
- **you are less confident today in comparison to when you started the program.**
- **your confidence is about the same.**

Physical Activity Self-Efficacy	I Am More Confident Now	My Confidence is About the Same	I Am Less Confident Now
1. I can be physically active no matter how busy my day is.	1 ☐	2 ☐	3 ☐
2. I can be physically active even if I feel tired.	1 ☐	2 ☐	3 ☐
3. I can be physically active even if it is very hot or cold outside.	1 ☐	2 ☐	3 ☐
4. I can be physically active even if I have to stay at home.	1 ☐	2 ☐	3 ☐
5. I can be physically active when I have no one to do it with.	1 ☐	2 ☐	3 ☐
6. I can be physically active even when I would rather be doing something else.	1 ☐	2 ☐	3 ☐
7. I can be physically active instead of watching TV.	1 ☐	2 ☐	3 ☐
Screen Time Self-Efficacy	**I Am More Confident Now**	**My Confidence is About the Same**	**I Am Less Confident Now**
8. I can limit watching TV to 2 hours or less on weekdays.	1 ☐	2 ☐	3 ☐
9. I can limit watching TV to 2 hours or less on weekend days.	1 ☐	2 ☐	3 ☐
10. I can find other ways to relax besides watching TV.	1 ☐	2 ☐	3 ☐

Fruit and Vegetable Self-Efficacy	I Am More Confident Now	My Confidence is About the Same	I Am Less Confident Now
11. I can have fruits and vegetables when I am in a rush.	1 ☐	2 ☐	3 ☐
12. I can eat fruit as part of lunch most days.	1 ☐	2 ☐	3 ☐
13. I can have fruits and vegetables when I am feeling tired.	1 ☐	2 ☐	3 ☐
14. I can get fruit when eating away from home.	1 ☐	2 ☐	3 ☐
15. I can have extra vegetables at dinner.	1 ☐	2 ☐	3 ☐
16. I can have a vegetable for dinner most days.	1 ☐	2 ☐	3 ☐
17. I can eat five servings of fruits and vegetables most days.	1 ☐	2 ☐	3 ☐
18. I can order at least one vegetable dish at a restaurant.	1 ☐	2 ☐	3 ☐
19. I can eat other fruits and vegetables when my favorites are not available.	1 ☐	2 ☐	3 ☐
Sugar-Sweetened Beverage Self-Efficacy	**I Am More Confident Now**	**My Confidence is About the Same**	**I Am Less Confident Now**
20. I can avoid sugary drinks when I am feeling tired.	1 ☐	2 ☐	3 ☐
21. I can refuse sugary drinks when they are offered to me.	1 ☐	2 ☐	3 ☐
22. I can avoid sugary drinks with my meals.	1 ☐	2 ☐	3 ☐
23. I can avoid sugary drinks when dining at a restaurant.	1 ☐	2 ☐	3 ☐
24. I can choose unsweetened drinks instead of sugary drinks.	1 ☐	2 ☐	3 ☐
25. I can limit my sugary drinks to no more than 8 ounces per day.	1 ☐	2 ☐	3 ☐

Note. The items for the Retrospective Self-Efficacy Questionnaire were based on two sources: (1) "Associations of decisional balance, processes of change, and self-efficacy with stages of change for increased fruit and vegetable intake among low-income, African-American mothers," by H. Henry, K. Reimer, C. Smith, and M. Reicks, 2006, *Journal of the American Dietetic Association, 106*, p. 846. Copyright 2006 by the American Dietetic Association; and (2) "DEAL – physical activity self-efficacy form – DASH," by University of Glasgow Social and Public Health Sciences Unit, n.d.

APPENDIX B

EFNEP–*FESMM* CURRICULUM SUPPLEMENTS

Stages of Change Assessment

Participant: _____ **Date:** _____

PHYSICAL ACTIVITY:

Physical activity includes activities such as walking briskly, jogging, bicycling, swimming, or any other activity in which the exertion is at least as intense as these activities.

For activity to be regular, it must add up to a total of 30 minutes or more per day and be done at least 5 days per week. For example, you could take one 30-minute walk or take three 10-minute walks for a daily total of 30 minutes.

Do you currently engage in regular physically active?

- ☐ NO, and I do NOT intend to in the next 6 months.
- ☐ NO, but I intend to in the next 6 months.
- ☐ NO, but I intend to in the next 30 days.
- ☐ YES, I have been for LESS than 6 months.
- ☐ YES, I have been for MORE than 6 months.

SCREEN TIME:

Screen time includes watching television and movies, working or playing on a computer, playing video games, and text messaging.

Do you currently limit your screen time to 2 hours or LESS each day?

- ☐ NO, and I do NOT intend to in the next 6 months.
- ☐ NO, but I intend to in the next 6 months.
- ☐ NO, but I intend to in the next 30 days.
- ☐ YES, I have been for LESS than 6 months.
- ☐ YES, I have been for MORE than 6 months.

EATING FRUITS AND VEGETABLES:

A serving of fruit or vegetables is ½ cup.

Do you currently eat at least 5 servings (2 ½ cups) of fruit and/or vegetables each day?

- ☐ NO, and I do NOT intend to in the next 6 months.
- ☐ NO, but I intend to in the next 6 months.
- ☐ NO, but I intend to in the next 30 days.
- ☐ YES, I have been for LESS than 6 months.
- ☐ YES, I have been for MORE than 6 months.

DRINKING SUGARY DRINKS:

Many drinks have added sugar. These include regular soft drinks, sweet tea, sweetened coffee, energy drinks, sports drinks, lemonade, Kool-Aid and fruit drinks.

Do you currently limit your sugary drinks to 8 ounces or LESS each day?

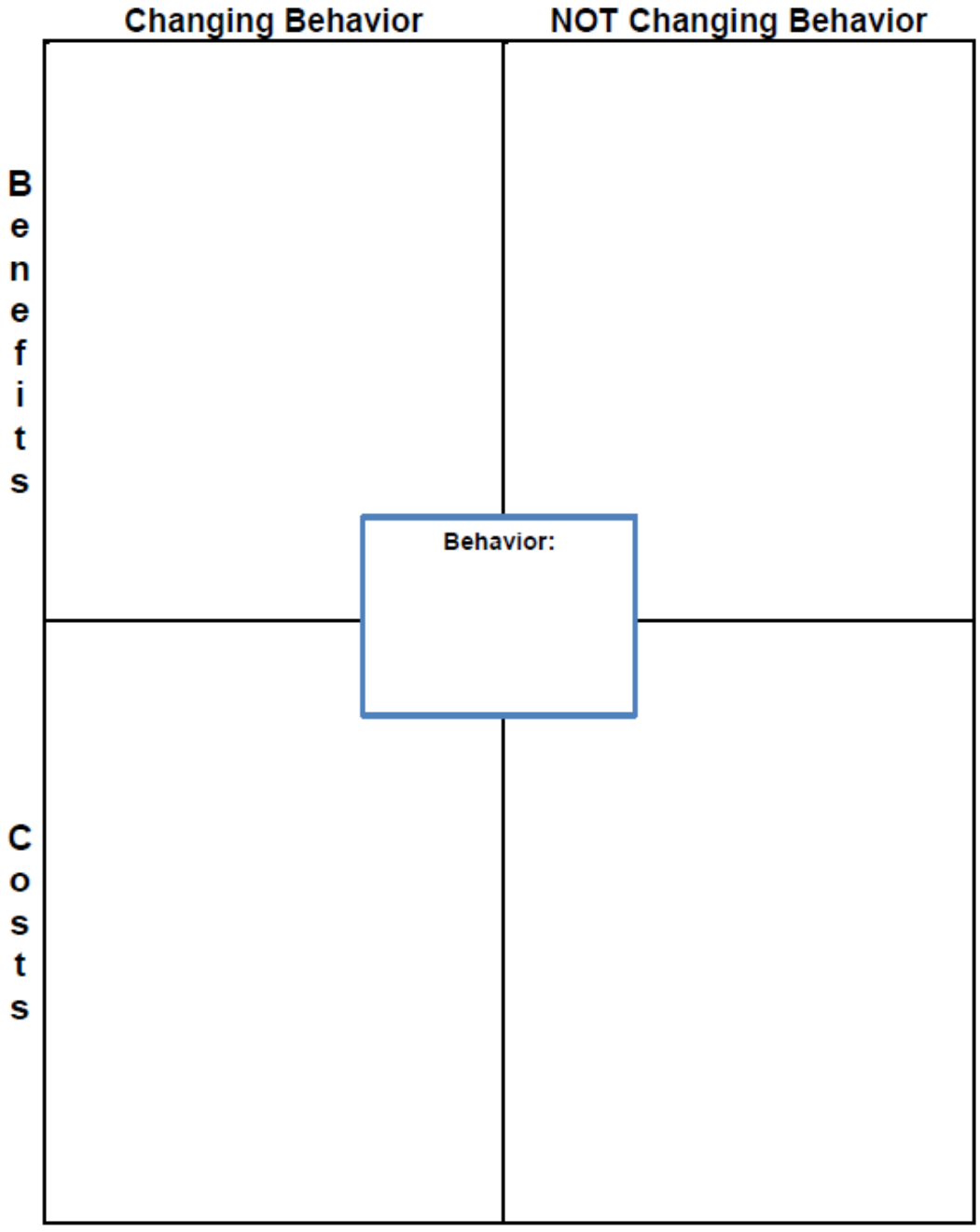
- ☐ NO, and I do NOT intend to in the next 6 months.
- ☐ NO, but I intend to in the next 6 months.
- ☐ NO, but I intend to in the next 30 days.
- ☐ YES, I have been for LESS than 6 months.
- ☐ YES, I have been for MORE than 6 months.

SCORING:

- answered with 1st choice: stage = Precontemplation
- answered with 2nd choice: stage = Contemplation
- answered with 3rd choice: stage = Preparation
- answered with 4th choice: stage = Action
- answered with 5th choice : stage = Maintenance

DECISIONAL BALANCE WORKSHEET

Participant's Name: _____ **Date:** _____



Note. Decisional Balance Worksheet was adapted from "Decisional Balance," by the American College of Sports Medicine, 2006. Copyright 2006 by MyExercisePlan.com.

APPENDIX C

HEALTHY LIVING TRACKING LOGS

Participant's Name: _____ Lesson Tracking Log

LESSON #	LESSON TITLE	SESSION DATE(S)	OBJECTIVES MET	COMMENTS: Are expected for each lesson and could include justification for teaching this particular lesson, personal notes, need to reteach the lesson a second time, comments and reactions from the participant, type of physical activity completed, type of food demonstration or food tasting completed, decisional balance worksheet completed, etc.
2	**MyPlate: Build a Healthy Plate – Focus on Fruits & Vegetables!**		☐ Completed EFNEP Behavior Checklist ☐ Introduced MyPlate and discussed fruits & vegetables ☐ Offered a "Moving More" physical activity break ▪ Completed a physical activity break ☐ Yes ☐ No ☐ Offered Easy Fruit Salad recipe ▪ Arranged fruit salad demo or tasting ☐ Yes ☐ No Demo/tasting date: _____ Demo Completed: ☐ Yes ☐ No	

Lesson Tracking Log for All Participants

	Teach These Lessons First						Teach These Lessons Together and In This Order							
Participant	Lesson 1: Introduction to EFNEP	Lesson 2: MyPlate – Focus on Fruits and Vegetables!	Lesson 3: MyPlate – Focus on Grains, Dairy, & Protein!	Lesson 4: MyPlate – Focus on Physical Activity!	Choosing More Fruits and Vegetables (Part 1)	Choosing More Fruits and Vegetables (Part 2)	Plan: Know What's for Dinner	Shop: Get the Best for Less (Part 1)	Shop: Get the Best for Less (Part 2)	Fix it Fast, Eat at Home	Fix it Safe	Making Smart Breakfast Choices	Shop for Value, Check the Facts (Part 1)	Shop for Value, Check the Facts (Part 2)

	Teach These Lessons First (In the order participant prefers)												
Participant	Limit TV	Choosing to Move More Through the Day	Making Smart Drink Choices – Part 1	Making Smart Drink Choices – Part 2	Smart-size Your Portions and Right-size You	Children	Infants	Making Smart Lunch Choices	Making Smart Choices When Eating Fast Food	Making Smart Choices When Eating Out	Choose, Plan, and Do for a Healthier You	Pregnancy	Breastfeeding

VITA

Kerry D. Morgan

Candidate for the Degree of

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