

THESIS

ASSESSING THE EFFECTIVENESS OF THE AMERICA ON THE MOVE FAMILY
PROGRAM IN A REAL-LIFE SETTING THROUGH COLORADO EXTENSION

Submitted by

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ABSTRACT

ASSESSING THE EFFECTIVENESS OF THE AMERICA ON THE MOVE FAMILY PROGRAM IN A REAL-LIFE SETTING THROUGH COLORADO EXTENSION

Background: More than 30% of the U.S. adult population and 17% of children between the ages of 2-19 years are considered to be obese; representing 72 million adults and 12.5 million children [1, 2]. Although Colorado currently holds the leanest state in the nation status, with an obesity rate of 21% [3], the state is not exempt from increasing rates of obesity in its population. According to the Colorado Department of Public Health and Environment, more than 50% of the population is considered overweight and the percentage of obese adults has doubled since 1996 to 21.4% [4]. In addition, the state ranks 29th in the U.S. in childhood obesity, with one out of every eight children 2-14 years of age being obese, and an obesity rate of 14.2% for youth between the ages of 10-17 years [4-6]. Rural communities suffer from many of the same health challenges facing the rest of the country; however, differences in overweight and obesity may exist between rural and urban areas. In one study, the risk for becoming overweight or obese for children in rural communities was 25% higher as compared to their urban-living counterparts [7].

Significant challenges are associated with the large changes required to reverse overweight and obesity. An approach that is focused on prevention and based on small changes has been proposed. It is suggested that smaller changes may be more doable and sustainable to prevent weight gain from occurring initially or reducing further weight

gain in those who are currently overweight and obese [8-12]. The health-related consequences of obesity are numerous and of particular concern is the potential relationship between body-mass index (BMI) in adolescence and health complications in adulthood. One of the most significant predictors of obesity in children is the obesity status of their parents [13]. While heredity may be a contributing factor, evidence suggests that the influence of parents and the home environment play significant roles [13-21]. It is suggested that family-based approaches to treating and preventing obesity are not only efficacious, but may be a necessary component for success [22-26]. The America On the Move (AOM) Family program is one such approach. The AOM Program is a free, self-administered web-based program in which individuals learn to take control of their health through small sustainable changes in their diet and exercise routines and to manage their weight through energy balance [27].

Objective: The focus of this research study was to address phase three of the USDA funded grant, The America On the Move (AOM) Family Program for Weight Gain Prevention, in which the AOM Family Program was disseminated to families in Colorado through Extension in order to evaluate its usefulness for participating families.

Methods: Eleven Family and Consumer Science Extension agents recruited families from Colorado communities to participate in this study. Participating families were given the AOM Family Program Toolkit together with pedometers and were asked to follow the program over a six month period. Families provided self-reported baseline (month 1) and final (month 6) assessments that included height, weight and seven day step results in addition to pre- and post- questionnaires. Changes in step activity and weight status outcomes using BMI and BMI percentiles (BMIp) for adults and children,

respectively, were determined from baseline to final assessment. Additionally, feedback from the participants and the Extension agents was collected and relationships between behaviors and weight status outcomes were assessed.

Results: Thirty-six families from nine communities completed the study, including 50 adults and 55 children. At the end of the six month study the adults had achieved a statistically significant reduction in mean body weight and BMI and the children demonstrated no statistically significant changes in mean BMI percentile; consistent with the AOM Family Program objective of weight gain prevention. The majority of the participants (86%) rated the program as either good or better and would recommend it to others. In contrast, only half of the Extension agents rated the program as good and most would not continue to offer it in their communities without changes.

Conclusions: With further exploration and adjustments it is feasible that the AOM Family Program could become a valued tool in support of a more healthful lifestyle for families living in Colorado, with Extension serving as the conduit within their respective communities.

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CHAPTER ONE

INTRODUCTION

More than 30% of the U.S. adult population and 17% of children between the ages of 2-19 years are considered to be obese, having a body mass index (BMI) of 30 or higher; representing 72 million adults and 12.5 million children [1, 2]. From 1980 to 2000 the rate of obesity doubled for adults and tripled for children [28]. Comparing National Health and Nutrition Examination Survey (NHANES) data from 1976-1980 and 2007-2008 the rate of obesity among children 6-11 years increased from 6.5% to 19.6% and for children 12-19 years from 5% to 18.1%, respectively [3, 29, 30]. In 2010 no state had an obesity rate of less than 21%, 36 states had an obesity rate of 25% and 12 states had rates exceeding 30%, far surpassing the 15% goal established in the Healthy People 2010 initiative. [1, 31, 32].

Although Colorado currently holds the leanest state in the nation status, with an obesity rate of 21% [3], the state is not exempt from increasing rates of obesity in its population. According to the Colorado Department of Public Health and Environment, more than 50% of the population is considered overweight and the percentage of obese adults has doubled since 1996 to 21.4% [4]. In addition, the state ranks 29th in the U.S. in childhood obesity, with one out of every eight children age 2-14 being obese, and an obesity rate of 14.2% for youth between the ages of 10-17 years [4-6].

The health-related consequences of obesity are numerous and include, but are not limited to, coronary heart disease (CHD), stroke and high blood pressure, type 2 diabetes, cancer, liver and gallbladder disease as well as many other disorders including sleep apnea, degeneration of cartilage, reproductive complications and mental health

conditions [28]. Additionally, studies have indicated that obese children are more likely to become obese adults [13, 33, 34]. Of particular concern is the potential relationship between body-mass index (BMI) in adolescence and disorders in adulthood. Many factors have been implicated in the increased rates of obesity. According to the Center for Disease Control and Prevention (CDC) the environment, behavior and genetics all have a role in this complex health matter. Underlying the behavior and environmental factors are increased portion sizes, increased consumption of highly processed and energy dense foods, a more sedentary lifestyle, eating out rather than preparing meals at home, lack of access to and higher prices for more healthful food options and an infrastructure more conducive to driving than walking [2, 10, 28, 35, 36]. While rural communities suffer from many of the same health challenges facing the rest of the country, differences in overweight and obesity may exist between rural and urban areas. In one study, the risk for becoming overweight or obese for children in rural communities was 25% higher as compared to their urban-living counterparts [7].

Given the challenges associated with the large changes required to reverse overweight and obesity, an approach that is focused on prevention and based on small changes has been proposed. It is suggested that smaller changes may be more doable and sustainable to prevent weight gain from occurring initially or reducing further weight gain in currently overweight and obese populations [8-12]. Underlying a small change approach is the concept of the “energy gap”. The energy gap is defined by Hill and colleagues as “*the required change in energy expenditure relative to energy intake necessary to restore energy balance*”, p. 854 [10]. Or more simply put, the daily imbalance between energy intake and energy expenditure [12].

The energy gap provides insight into the rate at which the population is gaining weight and subsequently a quantifiable goal for closing this gap.

One of the most significant predictors of obesity in children is the obesity status of their parents [13]. While heredity may be a contributing factor, evidence suggests that the influence of parents and the home environment play significant roles [13-21]. Given the relationship between the home environment and obesity in children, the role of the family has been the basis for several studies. It is suggested that family-based approaches to treating and preventing obesity are not only efficacious but may be a necessary component for success [22-26]. The home environment has been identified as one of the most important conditions for affecting children's eating and physical activity behaviors as well as producing more sustainable results, particularly when the whole family is involved. Moreover, when a family-based approach is used and the parent is the sole agent of change, disordered eating and obesity may be prevented along with improvements in healthy lifestyle habits, self-esteem and body image [37].

The America On the Move (AOM) Family Program is a weight gain prevention program focused on improving the health and quality of life for individuals, families and communities through small, sustainable lifestyle changes. The purpose of this study is to assess the effectiveness of the AOM Family Program with families in Colorado Extension communities under real-life circumstances and evaluate its usefulness for both the agents and participating families alike.

CHAPTER 2

REVIEW OF THE LITERATURE

Obesity Background

Obesity in the United States

More than 30% of the U.S. adult population and 17% of children between the ages of 2-19 years are considered to be obese, having a body mass index (BMI) of 30 or higher; representing 72 million adults and 12.5 million children [1, 2]. Thirty-four percent of adults are categorized as overweight and when combined with those in the obese category (34.4%), this constitutes nearly 70% of the U.S. adult population [1]. From 1980 to 2000 the rate of obesity doubled for adults and tripled for children [28]. Comparing National Health and Nutrition Examination Survey (NHANES) data from 1976-1980 and 2007-2008 the rate of obesity among children 6-11 years increased from 6.5% to 19.6% and for children 12-19 years from 5% to 18.1%, respectively [3, 29, 30]. While these rates appear to be leveling off, obesity continues to impact the country. In 2010 no state had an obesity rate of less than 21%, 36 states had an obesity rate of 25% and 12 states had rates exceeding 30%, which far exceeds the 15% goal established in the Healthy People 2010 initiative. [1, 31, 32].

Obesity in Colorado

Although Colorado currently holds the leanest state in the nation status, with an obesity rate of 21% [3], the state is not exempt from increasing rates of obesity in its population. According to the Colorado Department of Public Health and Environment, more than 50% of the population is considered overweight and the percentage of obese adults has doubled since 1996 to 21.4% [4]. Other data estimates the combined rates for

overweight and obese to be 56.2% [5]. In addition, the state ranks 29th in the U.S. in childhood obesity, with one out of every eight children age 2-14 being obese, and an obesity rate of 14.2% for youth between the ages of 10-17 years [4-6]. By the year 2016 Colorado has set goals to decrease the percentage of overweight and obese high school students to 17%; decrease the percentage of overweight or obese children aged 2-14 years to 20%; and decrease the percentage of overweight or obese adults to 50% [4].

Risk Factors Associated with Obesity

The health-related consequences of obesity are numerous and include, but are not limited to, coronary heart disease (CHD), stroke and high blood pressure, type 2 diabetes, cancer, liver and gallbladder disease as well as many other disorders including sleep apnea, degeneration of cartilage, reproductive complications and mental health conditions [28]. Additionally, studies have indicated that obese children are more likely to become obese adults [13, 33, 34]. A longitudinal study that evaluated the effect of early weight gain (0-5 years) as a contributor to childhood obesity found that most excess weight prior to puberty occurs before the age of 5 years and closely predicts weight at the age of 9 years [38]. Of particular concern is the potential relationship between body-mass index (BMI) in adolescence and health-related complications in adulthood. Recent studies have found a positive relationship between elevated adolescent BMI and coronary heart disease in adulthood [39, 40] and one such study estimates, based on current trends, that the rate of CHD will increase by 5-16% by 2035, with more than 100,000 excess cases [41].

Contributors to the Obesity Epidemic

Many factors have been implicated in the increased rates of obesity. According to the Center for Disease Control and Prevention (CDC) the environment, behavior and genetics all have a role in this complex health matter. Underlying the behavior and environmental factors are increased portion sizes, increased consumption of highly processed and energy dense foods, a more sedentary lifestyle, eating out rather than preparing meals at home, lack of access to and higher prices for more healthful food options and an infrastructure more conducive to driving than walking [2, 10, 28, 35, 36]. The factors involved are multifaceted and interrelated and an environment that encourages excess food intake and reduced physical activity are significant contributors [42]. Some have implicated the food industry and the increase in fast food establishments for providing easy access to highly processed, energy dense, nutrient poor and inexpensive food [43]. One estimate indicates that 25% of the energy consumed in the U.S. population comes from nutrient poor foods and 37% of added sugar from sugar sweetened carbonated drinks [44, 45]. Concern has also been raised over the increased rates of marketing and advertising, specifically to children. According to data provided by the CDC, \$1.6 billion per year is spent on marketing of foods and beverages to youth [2]. The decrease in physical activity has also been linked to multiple factors including the lack of a supportive physical infrastructure, such as access to sidewalks in neighborhoods, and the increased amount of screen time spent in front of the television and computer [2, 10, 46, 47]. While these examples are not exhaustive they provide visibility into the complex nature of this major public health problem.

Obesity in Rural Communities

While rural communities suffer from many of the same health challenges facing the rest of the country, differences in overweight and obesity may be different between rural and urban areas. Twenty percent of the U.S. population resides in non-metropolitan areas and based on region-specific data published in 2003 in the Rural Healthy People 2010 Companion Document, both children and adults in this population suffer from greater rates of obesity as compared to the rest of the country [48]. National studies using NHANES data as well as the 2003 National Survey of Children's Health support these findings [7, 49-51]. In one study, the risk for becoming overweight or obese for children in rural communities was 25% higher as compared to their urban-living counterparts [7]. Overall, this population may be at a greater risk due to the unique cultural, economic, social and geographic characteristics that are associated with rural living such as lower-incomes, less education, reduced access to healthcare and an older population [48]. In particular, higher dietary fat and caloric intake, greater amount of time spent watching television, lack of access to nutrition education and dissemination of information as well as a lower frequency of exercise have been cited as contributing to these differences, although much variability exists in the literature [7, 48-52]. In a study looking specifically at children using NHANES data, Davis et al. identified three significant factors contributing to obesity in children in rural areas: race, meeting physical activity recommendations and electronic entertainment use greater than two hours per day [49].

Small Change Approach for the Prevention of Obesity

Background

At a time when nearly 70% of the American population is either overweight or obese the commercial weight loss industry is recognizing record-breaking revenues. In 2010 the total U.S. weight loss market had revenues of \$60.9 billion, up 3.2% from 2008 [53]. In spite of the investments being made by consumers in an attempt to lose weight, the majority of Americans still remain overweight or obese. Based on the most positive data regarding weight loss success rates and maintenance, only 16-20% of individuals who have lost at least 10% of their weight have kept it off for at least one year [54, 55]. According to data collected from the National Weight Control Registry (NWCR), the behaviors most associated with maintaining weight loss include consuming a low-calorie, low-fat diet and engaging in high levels of activity, representing approximately one hour or more of moderate to high intensity activity per day; far above the current recommendations of 150 minutes of activity per week for adults [55-57]. Participants that reported weight regain (> 2.3 kg) indicated significant decreases in physical activity, increased calories from fat and decreased dietary restraint; suggesting the difficulties that may be associated with maintaining major lifestyle changes and healthy habits necessary for long-term weight loss success [10, 11, 55]. Given the challenges associated with the large changes required to reverse overweight and obesity, an approach that is focused on prevention and based on small changes has been proposed. It is suggested that smaller changes may be more doable and sustainable to prevent weight gain from occurring initially or reducing further weight gain in currently overweight and obese populations. [8-12]

The Energy Gap

Underlying a small change approach is the concept of the “energy gap”. The energy gap is defined by Hill and colleagues as “*the required change in energy expenditure relative to energy intake necessary to restore energy balance*”, p. 854 [10]. Or more simply put, the daily imbalance between energy intake and energy expenditure [12]. The energy gap provides insight into the rate at which the population is gaining weight and subsequently a quantifiable goal for closing this gap. Several studies suggest that the annual rate of weight gain in both the U.S. and abroad has been slight, at less than two pounds per year [8-10, 12, 58]. However, there is variation in the literature, particularly regarding the positive energy gap responsible for these gains and the upward trends in obesity [59-63]. In a study published in 2003, using the Coronary Artery Risk Development in Young Adults (CARDIA) and NHANES data, it was determined that the average weight gain for subjects 20-40 years of age was 14-16 pounds over eight years, from which an average annual rate of weight gain was estimated at approximately 1.8 to 2.0 pounds per year. It was proposed that a 100 kcal reduction in daily energy intake, increase in energy expenditure or some combination thereof would have been sufficient to close the energy gap and prevent this weight gain in 90% of the adult population [10]. A counterfactual approach was used to estimate weight gain and the associated energy gap for U.S. children using NHANES data from 1988-1994 and 1999-2002. It was estimated that the boys and girls who were 2 to 7 years of age from 1984-1994 gained an excess of 0.43 kg per year over the 10 year period. The estimated reduction in energy gap required to prevent this gain in weight was equivalent to 110-165 kcal per day. Conversely, in already overweight children the energy gap was quite larger; ranging from

678 to 1,017 kcal per day [12]. In an ongoing study in Germany based on longitudinal data from the Kiel Obesity Prevention Study (KOPS), which is focused on the prevention of obesity in children, it was estimated that the energy gap necessary to prevent obesity in children was in the range of 46-72 kcal per day [64].

Brown et al. assessed the five year weight gain of 8,071 middle aged women using data from the Australian Longitudinal Study on Women's Health and estimated their average annual weight gain at 0.5 kg per year, suggesting an extremely small energy gap of 10 kcal per day [8]. Similar results were found in a recent study of adults using German population-based data over 17 years, that determined that the average weight gain for men and women in this population was 0.22 kg and 0.32 kg per year, respectively; translating into an estimated energy gap of only 24 kcal per day [58].

Other studies have cited energy gaps that are much larger than those mentioned above, primarily due to differing calculation and design methods [60, 63, 65]. In order to ascertain the effectiveness of various small lifestyle changes in the prevention of weight gain, the focus of the following section will be limited to research involving small changes in energy intake and expenditure, and in most cases are associated with an approximate energy gap in the range of 100 – 200 kcal per day.

Energy Intake and Energy Expenditure

Several studies focusing on small changes as a strategy in the prevention of overweight and obesity with respect to energy intake, energy expenditure or both have been conducted with promising if not conclusive outcomes.

Energy Intake

Studies in the area of energy intake have looked at varying populations including children, young adults and adults and include a range of factors such as portion-controlled snacks, soda consumption, and behavioral educational strategies.

In a small randomized two-period crossover design including 59 adult participants the effect of reduced portion sizes and energy intake were considered. Standard-sized snack packages were assigned in one week and 100 kcal portion-controlled snacks in an alternating week. The key findings suggest that reduced portion sizes resulted in an average reduction of 120 kcal per day. Furthermore, after exposure to the small portion snacks, the subjects ate less even when the standard amounts were available, suggesting that reduced portion sizes can occur without portion-controlled packaging [66].

A large study in England evaluated the effectiveness of school-based educational programs focused on reducing carbonated drinks and the prevention of weight gain in children [67]. A cluster randomized controlled trial over a one year period with 644 children, 7-11 years of age, from six different schools was conducted. At 12 months the number of children in the control group that were considered overweight or obese had increased by 7.5% and the intervention group had reduced slightly by 0.2%.

Unfortunately, a three year follow up failed to show sustained results [9].

Rolls et al. considered portion size and energy density in a small crossover study conducted with 24 women between the ages of 19 to 45 years that found reducing energy density and the portion size of the food offered led to significant reductions in energy intake. A 25% decrease in portion size led to a reduction in total calories consumed in the amount of 231 kcal per day, and a similar decrease in energy density led to even

greater reductions in daily calorie consumption. In both cases, the subjects did not report any difference in hunger or satiety over a two day period suggesting that slight modifications in these two factors may be an effective means of reducing overall energy intake. It was also noted that differences in portion size were more detectable to the subjects than were changes in energy density [68].

Another study assessed the effect of energy density and portion size of snacks on energy intake, but they did so in pre-school aged children in a 2x2 crossover with 17 subjects. As in the previous study, changes in energy density and portion size did not affect overall hunger or satiety ratings. However, energy density effect was not statistically significant, but the portion size effect was; suggesting that there is greater energy intake when portion sizes are large, regardless of energy density [69].

Energy Expenditure

Studies that have focused on changing sedentary behavior through small changes often focus on increasing daily steps. Hill and colleagues proposed that walking one mile per day, approximately 2,000-2,500 additional steps, may be another sufficient way to close the 100 kcal energy gap [9, 10]. Sedentary behavior, which is typically associated with daily screen time has been linked to a less healthful diet [46], and one study found that a one hour increase in television viewing was associated with an increase in energy intake in the amount of 106 kcal [70]. Strategies such as the use of pedometers to reduce sedentary behavior to promote physical activity by increasing daily steps have been an area of exploration.

Two separate meta-analyses addressed pedometer use in conjunction with increased physical activity and weight loss. In the first, a systematic review of 26 studies

was conducted, consisting of eight randomized controlled trials (RCT) and 18 observational studies, with a total of 2,767 participants [71]. The objective of this study was to evaluate the association of pedometer use with physical activity and health outcomes among outpatient adults. The participant's mean age was 49 years, and 85% were women. The mean intervention length of the studies was 18 weeks. The study concluded that pedometer use significantly increases physical activity in the form of average steps taken. RCT study participants had an average daily increase of 2,491 steps, and the subjects in the observational studies had an average daily increase of 2,183 steps. The combined data for all of the studies showed a 0.38 reduction in BMI, although total reductions in BMI do not appear to be fully attributed to the pedometer use, and other behaviors might have changed including increased activity not recorded and reduced energy intake [71].

The relationship between physical activity and pedometer use with a focus on weight loss was the subject of another meta-analysis study [72]. The analysis included nine studies (six of which were included in Bravata's work [71]), with a median intervention length of 16 weeks, and a total of 307 participants, 73% of which were female. The authors concluded that the effect of pedometer use on weight loss was only modest. Average steps across the studies increased from slightly below 2,000 steps per day to more than 4,000 steps per day, with a mean weight change of -1.27 kg, an average loss of 0.05 kg per week [72].

While the authors of these two pedometer studies interpret their findings differently in terms of impact, both studies are consistent with the necessary small changes previously put forth for the prevention of weight gain [10].

The use of motivational messaging has also been considered to promote small changes in physical activity. Dolan et al. sought to evaluate the effectiveness of motivational signs prompting stair usage over taking the escalator in pedestrian commuter settings [73]. This observational study recorded approximately 45,000 observations over an average of 15 weeks. The mean increase in overall stair usage was 2.8%, +/-2.4%; with effects for females being double that (4.8%) as compared to the men (2.4%). The authors extrapolated that this increase in usage would result in weight loss and/or prevention in weight gain in the amount of 300g (0.66 pounds) per person per year [73].

Energy Intake and Energy Expenditure

The small change interventions that have been considered up to this point have looked at either energy intake or energy expenditure in isolation; however, further insights have been gathered from research that has taken a combined approach.

A randomized 16 week pilot study compared both large and small change approaches to weight gain prevention in 52 young adults, ranging from 18-35 years of age, of whom 98% were female. The small change group was asked to reduce overall energy balance by 200 kcal per day by making small dietary changes such as substituting diet soda for regular soda and increasing steps by 2,000 steps per day in addition to regularly self-monitoring changes in weight. The large change group was asked to make much more significant reductions in calories and increases in physical activity. The results found that both approaches were effective at addressing weight gain prevention in the short-term [74].

In a three week intervention based on the America On the Move (AOM) Program (see later section for program overview) activity and energy intake levels were compared in 116 healthy adults, who ranged in age from 18 – 60 years [75]. Subjects were provided pedometers and were instructed to increase steps by 500 steps per week above their baseline and given tips how to reduce calories by 100 kcal per day. The outcome of this study demonstrated higher steps per day (an average 1,454 steps per day above baseline) during the intervention week, along with reduced energy intake when the tips were used (average meal size of 489 kcal during intervention versus 559 kcal). This study also provided encouraging results for the use of messaging as a strategy to reduce energy intake over the short-term [75].

Lutes et al. conducted a four month adult-focused study on the Aspiring for Lifelong Health (ASPIRE) program, focused on small cumulative changes in nutrition and activity. Participants in the ASPIRE group were compared to a standard educational-based program using the U.S. Department of Agriculture's nutrition and physical activity program and to an ASPIRE waitlist control group that used neither option [76]. The study involved 59 overweight or obese sedentary adults who were randomized into the three different groups. The ASPIRE group was instructed to make one small change in diet and one small change in physical activity weekly (e.g. weekly step counts). Ultimately, the ASPIRE group lost significantly more weight than the standard and control groups (-4.4 kg vs. -1.1 kg and +0.1kg, respectively). These small changes resulted in weight loss, reduced adiposity markers and were sustained over three months [76].

Families have also been the subjects of small change interventions. Rodearmel, et al. conducted two different studies based on the America On the Move program with

families that had at least one child between 7 – 13 years of age who was either overweight or at risk for overweight. Experimental group families were asked to make two small lifestyle changes in both diet and physical activity [77, 78]. Both interventions demonstrated positive results. In the first study, involving 105 families [77], the experimental group was instructed to increase steps by 2,000 steps per day along with consuming cereal for both breakfast and as a snack (eating breakfast may be associated with weight loss and serve as a replacement for less healthful snacks). The intervention lasted 13 weeks. Both the control and experimental groups were given pedometers, and the control group was asked to maintain normal activity. The intervention resulted in increased steps and cereal consumption and had a significant effect on BMI-for-age and percentage body fat for the target children as well as for weight, BMI and percentage of body fat for the parents; with the greatest positive effects seen in the mothers and daughters. However, the self-reported energy intake for both groups did not go down and the control groups did not increase their daily steps in spite of being given pedometers. The second study, lasting six months, included 192 families [78]. Once again the experimental groups were asked to increase daily steps by 2,000 and to make one small dietary change: replace dietary sugar with a non-caloric sweetener in an amount equivalent to 100 kcal per day. Both the experimental and control groups had significant decreases in BMI for age. However, the experimental group had a significantly higher percentage of children who maintained or reduced their BMI for age and a significantly lower proportion of children who increased their BMI for age. No significant weight gain was seen in parents of either group [78].

In a more involved household obesity prevention program, French and colleagues conducted a one year long family intervention in the home environment with 90 families [79]. The intervention group received six months of face-to-face group sessions, monthly newsletters and home-based activities with modest recommendations for changes in dietary and physical activity behaviors. Families were instructed to set individual as well as household goals that were to be defined, tracked and posted in the home on a goal sheet. Incentives for completed activities were provided. Television limiting devices were attached to every TV in the household. Key findings included no changes in household BMI z-scores; significant reductions in the frequency of consumption of sweets and snack foods; significantly decreased household TV viewing hours; significantly increased physical activity in adults and no significant changes in physical activity observed in the adolescents.

Although there is variation in the data, it is clear that a body of evidence is mounting that indicate small changes in either energy intake, increased physical activity or a combination of both may be an effective strategy to reduce or prevent weight gain in the short term. Further studies are needed in order to ascertain whether these results can be extended to the greater population and sustained over the long-term.

Role of the Family

The Home Environment

One of the most significant predictors of obesity in children is the obesity status of their parents [13]. Whitaker, et al. found that obesity in childhood is an important risk factor for adult-obesity regardless of whether or not parents were obese. However, if parents were obese the risk of obesity in adulthood more than doubled in both obese and

non-obese children under the age of 10 years [13]. While heredity may be a contributing factor, there is evidence to suggest that the influence of parents and the home environment play significant roles [13-21]. In a six year follow-up study it was demonstrated that parents providing an obesigenic environment (high dietary intake and low physical activity) had daughters with higher BMI's at ages 5-7 years that persisted through age 11 than girls from non-obesigenic families. Additionally, these same girls at ages 9 and 11 years had a higher percentage of body fat, a greater percentage of dietary fat intake and increased television viewing as compared to girls in the non-obesigenic families [14]. In a separate study done by the same researchers a direct association was seen between the amount of time daughters spent viewing television in excess of current recommendations with the amount of time parent's spent viewing television; a contributing factor linked to sedentary behavior [15]. Based on these outcomes, it was concluded that parental behaviors form the family environment and contribute to similarities in risk factors associated with obesity [14, 15].

In a systematic review of parental influences on children's physical activity a significant positive correlation was found between parental support and child physical activity. However, the relationship between the parent's actual physical activity levels and the child's were mixed [80]. Timperio et al. examined the association between family physical activity and sedentary environment with changes in BMI over a three year period in children between 10-12 years of age [81]. A reduction in BMI was seen in girls with siblings that participated in physical activity at least three times per week and with the number of physical activity equipment items available in the home. Conversely,

boys had an increase in BMI associated with the availability of equipment that could be used for sedentary behavior.

Cameron and colleagues demonstrated an association between obesity-related behaviors of school-aged children and their mothers [82]. The authors found that a clustering of health behaviors such as sedentary behavior, poor diet and lack of physical activity exist between children and their mothers. Specifically, the clustering patterns revealed a low intake of fruit and vegetables with the lowest levels of physical activity and a high consumption of energy dense food and drinks. It was concluded that the home environment has a significant influence on eating and activity behaviors, and modeling of sedentary behavior and the child's eating environment are of particular importance.

In the report prepared by The Institute of Medicine (IOM) Committee on Prevention of Obesity in Children and Youth, *Preventing Childhood Obesity: Health in the Balance*, the family is named as a key target for obesity interventions:

“Parents are the policy makers for the home....The family is thus an appropriate and important target for interventions designed to prevent obesity in children through increasing physical activity levels and promoting healthful eating behaviors.” [83]

Family-Based Approach to Obesity Treatment and Prevention

Given the relationship between the home environment and obesity in children, the role of the family has been the basis for several studies. It is suggested that family-based approaches to treating and preventing obesity are not only efficacious, but may be a necessary component for success [22-26]. In general, family involvement is defined either as having at least one parent and/or guardian involved in one aspect of treatment and/or programs that focus on changing the behavior of multiple family members beyond

the obese-affected child [84-86]. Kirk et al. outlined success factors related to the treatment of child obesity as follows: reduced energy intake while maintaining adequate nutrition; increased energy expenditure through physical movement and less sedentary behavior; actively engaging parents and primary caretakers as agents of change; and finally, facilitating a supportive family environment [24]. In a 25 year follow-up study, Epstein et al. sought to determine whether current obesigenic conditions may have affected past efficacy of family-based programs. The researchers performed a comparison study using contemporary measures and analytical techniques to evaluate programs that were initiated 20-25 years ago to current programs through 24-month follow-up as well as reanalyzing 10-year old research results. The authors concluded that family-based behavioral methods do replicate over the 25 year period with no differences in z-BMI change between the old and contemporary studies [23]. A meta-analysis also purports the effectiveness of family-based interventions. In this study, the researchers evaluated 16 studies, including family-based, other-treatments and controls. It was determined that the family-based programs had the largest and most reliable effects that were maintained during the follow-up periods as compared to the other-treatment and control groups. Amongst the possible reasons for success as cited by the authors were parent modeling and parental control over food purchasing, meal planning and feeding-based decisions. However, a clear understanding as to the exact parental influences that were adjusted to produce these outcomes is not known and further research was called for [86].

A small-change approach used in two family-based studies, as cited previously in the Small-Change Approach section, found positive outcomes amongst family members

when programs were delivered to both parents and children, with the greatest impact seen in mothers and daughters [77, 79].

Wrotniak et al. conducted a family-based study in which both the parent and child received concurrent treatment. One hundred and forty-two families with at least one participating parent and one 8-12 year old child with a BMI greater than the 85th percentile were asked to participate in one of three family-based weight control programs that addressed changing eating and activity patterns and the home environment [87]. Significant correlations were seen between changes in the child and parent z-BMI scores, with the parent's change being a significant predictor of the child's z-BMI change both at six and 24 months, thus indicating that the parent's weight change is related to the child's weight change [87].

Community and Other Family-Based Programs

The effectiveness of family-based programs delivered through other methods such as the internet or in conjunction with community programs has also been the focus of research efforts. While most of the previous studies cited involved some level of in-person sessions with participants, two small studies have used the internet as a vehicle for delivering interventions [88, 89]. Cullen et al. conducted a pilot feasibility study of a multi-media 8-week web-based intervention, Family Eats, to be accessed by parents once per week to enable improvements in the home food environment and promote healthful food choices, with an emphasis on fruits and vegetables. Sixty-seven African American families participated in the study; participants included one parent and at least one daughter between the ages of 9 to 12 years. Modest positive results were seen. Frequency of logon rates were below goals (59% vs. 80%), although significant

improvements in the parent's self-efficacy in preparing meals and making healthy choices as well as significantly increased parent modeling of fruits were reported with only marginally significant increases in parent modeling of vegetable consumption [88]. A similar study was conducted with 54 Chinese American adolescents (12-15 years of age) and their families. An obesity prevention behavioral Web-based program, Web ABC, was delivered to both the adolescents and their parents that focused on promoting healthful lifestyles in the form of healthy eating and adequate physical activity as well as maintaining a healthy weight. Informative internet sessions were provided to the adolescents and their parents and the adolescents also received pedometers to track physical activity. Additionally this program was theory based using the Transtheoretical Model Stages of Change and Social Cognitive Theory. Significant improvements were seen in the adolescent's hip-to-waist ratios, diastolic blood pressure, physical activity, vegetable and fruit intake, and knowledge over eight months [89]. The authors of both of the studies conclude that family-based obesity programs are more successful than child-only programs and have the capability of reaching a wider audience given the ease and convenience due to the method of delivery over the internet [88, 89].

Community family-based programs have also been used in the treatment and prevention of obesity in children. Fit Kids/Fit Families, MEND and One Body, One Life are examples of such programs [90-92]. Each of these programs was community focused, engaging with participants from the local areas. All three of the programs lasted approximately 12 weeks and involved both parents and children, ranging in ages 7-16 years. Positive outcomes with regards to healthy lifestyle behavioral changes and improved biometric scores were demonstrated in each of these programs, indicating that

delivery of community family-based obesity treatment and prevention programs may be another viable way to reach a broader audience and provide effective treatment.

Targeting Parents as the Agents of Change

Not only do the data suggest that family-based programs are more effective than child-only programs, but some results indicate that family-based programs that target the parent-only may be the most effective strategy in the treatment of child obesity [93-97]

In a noteworthy study conducted by Golan et al. 60 obese children, age 6-11 years, were randomized to two conditions in which the intervention targeted either the parent-only (treatment group) or the child-only (control group). The parent-only program emphasized a healthy lifestyle intended for the entire family and did not focus on weight reduction. The child-only group received a conventional dietary intervention focused on following a balanced diet and increasing physical activity or reducing sedentary time. At 12 months both groups had significant decreases in percentage overweight; however, the parent-only group had greater reductions (15% vs. 8%) than the child-only group. At two year follow-up the parent-only group had a 15% reduction in overweight status amongst the children as compared to a 2.9% increase in the child-only group. At seven year follow-up 60% of the children from the parent-only group were categorized as non-obese as compared to 31% in the children-only group [37, 93, 95].

These outcomes were consistent with a separate study that compared 32 families with obese children age 6-11 years that were randomized to either a parent-only condition or a parent- and child- targeted condition [94]. Both groups received a comprehensive educational and behavioral healthy lifestyle program for six months. Interestingly, the parent-only group was the only one that had significant reductions in percentage of

overweight status in the children at both six months and at the one year follow-up; there were no differences between parent's overweight statuses in either group.

Epstein and associates performed a small family-based study in which 30 families, with at least one obese parent and one 6-11 year old non-obese child, were randomized into one of two groups [98]. Parents in both groups received a behavior weight-control program with either a focus on increasing fruit and vegetable consumption or decreasing consumption of energy dense foods (high-fat/high-sugar). The children also received materials consistent with the parent's dietary changes, but without caloric restriction. Both parent groups showed significant differences in changes of overweight, while the children maintained percentage of overweight over time. The author concludes that improvements in dietary intake can be made through parent focused efforts where the parents are the targets of change who deliver materials and information to the child and that over time this approach may be a successful strategy in the prevention of obesity [98].

West et al. also conducted a family-based lifestyle intervention in which the parents served as the exclusive agents of change [97]. One hundred and one families with children between the ages of 4-11 years who were described by the parents as being overweight or obese participated in this lifestyle-specific program that lasted 12 weeks. Positive outcomes were seen in the child's z-BMI scores and weight-related problem behaviors as well as increased confidence in parent's ability to manage their child's weight-related problem behaviors. These results persisted at one year follow-up [97].

Janicke and colleagues assessed the parent-only versus family-based interventions in an underserved rural setting in a randomized clinical trial delivered in a real-world

community-based setting [96]. Ninety-three overweight or obese children, ages 8-14 years, and their parents participated in this study. The participants were randomized to one of three interventions; Family-based (parent and child), parent-only, or a waitlist control group. The interventions were delivered through Cooperative Extension Service offices by Family and Consumer Sciences agents. In-person educational and goal setting sessions were held with participants in each of the groups. Significant changes in pre- and post- treatment were seen in child z-BMI scores at months 4 and 10 between the parent-only group as compared to the control group. No statistically significant differences were seen between the family-based and control group or the family-based and parent-only group. No differences in parent weight were seen between any of the groups. Both the family-based and parent-only interventions had positive outcomes, although in children over 11 years of age the family-based group had greater reductions in z-BMI scores at follow-up as compared to the parent-only group. The authors conclude that older children may experience greater benefits from a family-based than a parent-only approach [96].

The home environment has been identified as one of the most important conditions for affecting children's eating and physical activity behaviors as well as producing more sustainable results, particularly when the whole family is involved. Moreover, when a family-based approach is used where the parent is the sole agent of change, disordered eating may be prevented along with the prevention of obesity. Additionally, healthy lifestyle habits, improved self-esteem and body image may also be enhanced [37].

Considerations

While research is supportive regarding the role of family-based programs in the treatment and prevention of obesity in children, it is suggested that improvements in interventions are needed [84, 85]. The ideal level of parental involvement is not clearly understood given the significant variance in family member involvement between studies [84, 86]. Furthermore, most interventions target lifestyle changes such as physical activity and diet. However, the family environment and its impact on obesity can include other factors such as parental stress due to work or economic issues, self-esteem issues, and general parenting styles [85]. It is therefore suggested that future research more clearly define family-based interventions and take into consideration other factors beyond lifestyle changes that may impact the success or failure of obesity treatment and prevention interventions [84-86]. Lastly, while there appears to be ample evidence in support of family-based obesity treatment programs data is lacking in the area of prevention and further research is required [25, 99].

America On the Move Foundation

The America On the Move (AOMF) Foundation was founded by James O. Hill, PhD and John C. Peters, PhD as a national non-profit organization that is focused on improving the health and quality of life of individuals, families and communities alike through the promotion of healthful eating and active living. Based on research demonstrating that small changes in diet and physical activity can have a significant effect on health and the prevention of weight gain, the America On the Move (AOM) Program was established in 2003 through a joint effort between the AOMF, University of Colorado Denver and the Friends of the Center for Human Nutrition. The AOM Program

is a free, self-administered web-based program in which individuals learn to take control of their health through small sustainable changes in their diet and exercise routines and to manage their weight through energy balance [27].

Colorado State University Extension

Across the United States there are more than 100 land-grant universities whose mission, in addition to teaching and research, is to extend their resources and information to help solve public needs. The term “Extension” actually means “reaching out” [100]. The programs that are brought to the community are offered through thousands of county and regional extension offices located throughout the country. Both the Universities and Extension offices are supported by the National Institute of Food and Agriculture, a division within the United States Department of Agriculture. When the Extension system was set up by congress almost 100 hundred years ago in 1914, its sole focus was to address rural and agricultural issues as more than 50% of the population resided in rural communities at that time. While today that number has shifted to less than 20% of the population, Extension has evolved to continue addressing public needs not only for rural communities, but for urban and suburban areas as well. Extension focuses on a wide range of human, animal and plant needs to help individuals make informed decisions about issues ranging from, but not limited to, health and nutrition, financial literacy, pasture or livestock management, renewable energy and elder or child-care. Its primary objective is to address public needs at the local level with expertise that is unbiased and researched based. One of the major areas of focus for Extension includes Family and Consumer Sciences, in which families are provided with knowledge and skills about proper nutrition, food preparation, child care, family communication, financial

management and healthcare strategies in order to help them maintain a healthy lifestyle [100, 101]. Colorado State University (CSU) Extension has been serving its communities for nearly a century and currently supports 64 counties across the state [101].

CHAPTER THREE

METHODS

Study Background and Objectives

In 2009 the United States Department of Agriculture (USDA) funded the America On the Move (AOM) Family Program for Weight Gain Prevention study, USDA Grant number 2008-04432, led by Principal Investigator, James O. Hill, PhD, University of Colorado Denver (UCD), Anschutz Medical Campus.

The goal of the grant was to develop, evaluate, and disseminate to families across the state of Colorado via Extension, an engaging, interactive, and evidence-based Family Program in order to prevent weight gain in adults and excess weight gain in children (defined as an increase in body weight beyond the increase in weight associated with normal growth and development) through small, sustainable, lifestyle changes. The grant consisted of three separate phases that are outlined below:

Phase 1: Enhance the current AOM Family Program to include food and physical activity environment assessments, an online social network, and a pre-programmed health-based text messaging system.

Phase 2: Conduct a randomized trial to evaluate the impact of the enhanced AOM Family Program on the prevention of weight gain in families with at risk of overweight children.

Phase 3: Disseminate the AOM Family Program through Extension in Colorado and evaluate the usefulness of the program for Extension agents and participating families.

Thesis Research Objective

The focus of this thesis was exclusively centered on phase three of the USDA grant and was designed to assess the effectiveness of the AOM Family program in a real-life setting through Colorado Extension. Phase three of the grant was led by Jennifer Anderson, PhD, Co-Principal Investigator, Colorado State University (CSU). Phases one and two were completed previously by UCD, for which published results are not yet available.

Participants

The ideal study participants were families living in Colorado Extension communities with at least one child between the ages of 8-12 years who was overweight or at risk of becoming overweight. However, since screening for height and weight was not part of the recruitment process any family with at least one child between the ages of 8-12 years that was interested in utilizing a family program to live more healthfully was eligible to participate in the study (see Study Procedures for further details, p. 32). Colorado State University (CSU) Extension agents also served as study participants as they were asked to provide feedback regarding their experience delivering the program in their communities at the end of the study period.

The Role of Colorado State University Extension

CSU Extension agents were an integral part of the research team. Agents were responsible for recruiting families from their respective communities to participate in the study; they served as the primary point-of-contact for the families for the duration of the study; and they were responsible for collecting all participant self-reported data (Appendix A).

An invitation to participate in the study was sent to all Family and Consumer Science Colorado Extension Agents from the research team and eleven agents agreed to take part in the project. Eligibility for involvement required that every agent be able to demonstrate current completion of the CSU Internal Review Board Human Subjects Training; submission of the signed Agent Agreement form; and participation in a half-day training session. The training session took place in Salida, Colorado on May 5, 2011 and provided the agents with detailed information about the AOM Family Program fundamentals and the required research study procedures and protocols. The training was co-delivered with a University of Colorado Denver/AOM staff member. Agents received funds to be used for programming based on the number of families recruited.

AOM Family Program Overview and Materials

The AOM Family Program is intended to prevent weight gain in adults and excess weight gain in children through small, sustainable, lifestyle changes. The program was self-administered over a period of six months and delivered by way of the AOM Family Program Toolkit. Each consented family received one Toolkit per household, which came in the form of a binder and included numerous tools and resources to help participants achieve energy balance through small daily lifestyle changes in both increased steps and reduced energy intake. Each month of the program families were asked to set two monthly goals: 1) increase steps by 2,000 steps per day over baseline and 2) decrease energy intake by 100 calories. Specifically, the materials included in the Toolkit provided instructions and resources for setting goals and tracking progress along with hundreds of ideas and tips for reducing energy intake and making more healthful choices, such as grocery shopping and preparing meals more healthfully; making

healthier choices when dining out; fun ways to increase activity; assessments for evaluating the home food and activity environment; as well as a section specifically designed for children. Materials were available in both English and Spanish. In addition, information in the toolkit encouraged participants to register with the AOM website where they could receive additional tips, track their progress and interact with other users. Pedometers were also provided to each family member participating in the program in order to track their step activity. The families were allowed to keep the Toolkit and pedometers after the study ended.

Study Procedures

The research for this study was approved by the Colorado State University Institutional Review Board (Appendix B).

Participant Recruitment

Extension agents were asked to recruit approximately 20-25 families each for a combined study target goal of 200 families. The original recruitment period started in May 2011 after the half-day training session and was scheduled to conclude at the end of June 2011. However, due to challenges identifying interested families the recruitment period was extended to September and the age range of the children was broadened to include children 7-13 years of age. Agents recruited families from the counties that they serve, including: Arapahoe, Boulder, Eagle, La Plata, Logan, Morgan, Phillips, Routt, San Luis Valley, Washington and Yuma. The agents were provided IRB approved recruitment materials including a script, email and flyer (Appendix C). Families were recruited using a variety of strategies including: existing contact lists, flyers placed throughout the community and mailed to residences, press releases placed in local

newspapers and radio stations, outreach to pediatrician's offices, referrals, word-of-mouth, and via relationships with local community programs and groups including 4-H club leaders, recreation centers and English as a Second Language (ESL) programs. In spite of these efforts, the final number of families was significantly less than the original target (see, Chapter 3, Table 1). Some of the anecdotal reasons provided were conflicting activities such as other competing nutrition programs, children at camp, vacations, 4-H programs, bible school and groups that might have otherwise served as liaisons for recruitment efforts were on hiatus for the summer. Additionally, many of the agents were heavily involved in preparations for their local county fairs.

No monetary compensation was offered for participation; however, families were allowed to keep their AOM Family Program Toolkit and pedometers. Extension agents were responsible for consenting participants and consent was received from each family prior to beginning participation in the program, consent forms were offered in both English and Spanish. Sixty-three families were consented and 52 families submitted the initial baseline data. Three families were removed due to the child not meeting the age criteria. The remaining eight either did not return their baseline data or the data submitted was incomplete. Final data were submitted for 36 families. Most of the 16 families who did not submit their final data were unresponsive to the agent's request to collect the final assessments and in just a few cases the program was not completed due to unrelated personal reasons (e.g. family left the area). The 36 families served as the final data set used in the data analysis process.

Data Collection

In order to maintain confidentiality names were not used in the data analysis process. A coding system was created and unique codes were provided for each participant to use for the duration of the study. If more than one parent was participating in the study, it was requested that one adult be identified as the primary point-of-contact for the duration of the study and be responsible for submitting all the self-reported data on behalf of their family, including completion of the questionnaires.

In order to ascertain the effectiveness of this program under real-life circumstances, all participant data was self-reported. Parents were asked to provide all measurements on behalf of themselves and their children and to use the same measurement tools for determining height and weight throughout the study period if at all possible. They were also offered use of their Extension agent's measurement tools if they desired to do so. However, this was not a mandatory request as the purpose of this study was to assess the value of the program under real-life circumstances.

After being consented families were requested to track their steps over a seven day period (for which an average daily step value was calculated), take their family's height and weight measurements and record this information on their Baseline Assessment forms (Appendix D). In addition, families were asked to complete the demographic forms (Appendix E) for each consented participant along with the pre-questionnaire (Appendix F), which was to be filled out by the primary adult on behalf of their household. Completed forms were to be returned immediately thereafter to their respective Extension agent.

At the end of month six the families were asked once again to track their steps over a seven day period, take their family's height and weight measurements and record this information on their final Six Month Assessment forms (Appendix D). In addition, families were requested to fill out the post-questionnaire (Appendix F), which was to be completed by the same primary adult on behalf of their household. Completed forms were to be returned immediately thereafter to their respective Extension agent. It should be noted that while this was a six month program, some families returned their final assessments beyond the six month designation and some prior to, with an average length of participation being 194 as opposed to 180 days.

It is important to note the distinctions between the pre- and post- questionnaires as these were different tools designed to collect different information:

- Pre-Questionnaire: Collected at the start of the program and designed to provide background information such as participant's prior relationship with their agent, prior participation in other health-related programs, and prior use of pedometers.
- Post-Questionnaire: Collected at the end of the program and designed to gather the participant's feedback about their experience using the AOM Family Program.

Questionnaires were validated for content by experts in nutrition, Extension and the AOM Program in order to assess whether the tools were measuring what was intended to be measured.

Extension Agent Questionnaire

In addition to gathering feedback from the participants about the AOM Family Program, The Extension agents were also asked to provide feedback, which they did in the form of a short online questionnaire that was delivered after all participant data were collected (Appendix G).

Data Analysis

The data analysis was performed using SPSS Statistics version 20. Body Mass Index (BMI) was calculated using the following formula [102]:

$$[\text{weight (lb)} / [\text{height (in)}^2] \times 703.$$

The Children's BMI percentiles and z-BMI scores were calculated using the CDC Epi InfoTM Software, version 3.5.3, reference CDC 2000 [103].

BMI values and BMI percentiles (BMI_p) for adults and children, respectively, were used as the primary determinants of weight status categorization in this analysis. BMI is measured the same way in both adults and children and is height and weight specific. Adults with a BMI equal to or greater than 25 are categorized as overweight, and individuals with a BMI greater than 30 are considered to be obese [104]. For children, BMI is gender and age specific. BMI is plotted on BMI-for-age growth charts against national averages in order to obtain a BMI percentile (BMI_p) ranking. This is the most common method for assessing size and growth patterns for children in the United States [105]. BMI z-scores are based on an external reference and can be matched to growth chart percentiles and converted into equivalent BMI percentile scores [106]. Both BMI z-scores and BMI percentile can be used to classify weight status; however, because the z-score may be a better measurement when a continuous measure of relative weight

over time is desired [106], both BMI percentile and BMI z-score measurements were included in the final analysis.

Children with a BMI value at the 5th percentile and below the 85th percentile have a weight status categorization of normal; those with a BMI value at or above the 85th percentile and below the 95th percentile are categorized as overweight; and those with a BMI greater than the 95th percentile are categorized as obese [105].

A total of 36 families submitted the final six month assessments and served as the total data set used in the data analysis. Data analysis was limited to the children falling within the 7-13 year age range. Frequency tables and descriptive statistics were used to analyze participant responses to the pre- and post- questionnaires and to summarize demographic information. In order to compare changes in weight (e.g. BMI, BMI percentiles, z-BMI scores) and step activity status, an independent t-test was used to determine differences between gender groups in both the adults and children. Paired t-tests were used to compare differences in weight and step activity status from baseline to final assessment for both the adult and child groups. Crosstabs was used to determine changes in BMI and BMI percentile weight status categorization in the adult and child groups, respectively. McNemar analysis was conducted; however, due to lack of values in some of the categories, significance could not be computed.

Two analyses were performed, Pearson Chi-Square and Spearman Rho's Correlation, in order to assess the relationship between changes in step activity with changes in weight status for each of the groups, using change in BMI for adults and change in BMI percentile for children.

Further analyses were performed to determine whether relationships existed between changes in BMI with responses to specific behavior-related questions on the post-questionnaire. These analyses were limited to the primary adult's data (referred to as "You" in the response options) as they completed the questionnaire on behalf of their household. Spearman Rho's Correlation was used to assess the relationship between changes in BMI associated with the frequency with which activity logs were completed (Q12), pedometers were worn (Q13), and there was contact with the Extension agent during the program. Independent t-Tests were used to determine associations between changes in BMI and setting of monthly small-change goals (Q21), completion of the Environmental Assessment (Q14), completion of the Home Food Purchasing Questionnaire (Q15) and completion of the Sedentary Behavior Log (Q16).

CHAPTER FOUR

RESULTS

Participation Information and Demographics

From baseline (month 1) to final assessment (month 6) sixty-nine percent (n=36) of the enrolled families completed the AOM Family Program study for a total of 105 participants from nine different Colorado communities. Of the 16 families who did not complete the program, 11 were from rural communities, 3 from urban communities and 2 from a mixed rural/urban community. For a breakdown comparison of participant numbers from baseline to final assessment by family, individual and agent see Table 1.

Table 1: Participant number breakdown comparison

	Baseline Assessment (Month 1)	Final Assessment (Month 6)
Total Number of Families	52	36
Total Number of Participants	146	105
Total Number of Agents	11	9
Number of Families per Agent	4.73	4.0*

*Note: 41.2% of final families came from one agent (n=15)

The number of adults versus children was split somewhat equally, with 50 adults and 55 children completing the program; as was the number of male versus female children, at 29 and 26, respectively. Over 90% of the final respondents classified their race as white, with over 50% reporting their ethnicity as Hispanic. For a breakdown of demographics for the final 36 families included in this analysis see Table 2.

Table 2: Participant demographics (n=36 final families)

	Adults	Children
Gender		
Male	16	29
Female	34	26
Total	50	55
Average Age, years (SD*)		
Male	42.31 (10.59)	9.76 (1.85)
Female	37.18 (6.92)	9.85 (2.01)
Ethnicity % (n)		
Non-Hispanic	44% (22)	45% (25)
Hispanic	56% (28)	52.7 (29)
Race % (n)		
American Indian	-	-
Asian	-	-
Black/African American	-	-
White	92% (46)	90.9% (50)
Native Hawaiian	-	-
Other	8% (4)	7.4% (4)

* SD = Standard Deviation

Weight and Step Activity Outcomes

Adult height and weight status were used to calculate BMI values and changes in these values were assessed from baseline to final measurement (Table 3). Of particular relevance is the change in total weight status from baseline to final assessment, which resulted in a statistically significant ($p = 0.011$) decrease in the mean adult weight of -3.66 pounds. The average adult BMI value at both baseline and final assessments were in the obese category, at 31.73 and 31.08, respectively. The change in BMI status also resulted in a statistically significant decrease ($p = 0.009$) in the mean BMI value by -0.652. At baseline, 84% of the adults were categorized as either overweight or obese

and at final assessment 80% were categorized as such. The number of individuals that were in the overweight status did not change from baseline to final assessment; however, those in the obese category decreased by 4% (n=2), see Table 4 for details.

Table 3: Change in adult weight status from baseline to final assessment

Adult Weight Status Variables	Baseline Assessment Mean (SD)	Final Assessment Mean (SD)	Change Status Mean (SD)
	Total n=50	Total n=50	Total n=50
Weight (lb)	194.32 (58.46)	190.66 (57.61)	-3.66* (9.79)
BMI	31.73 (8.31)	31.08 (7.81)	-0.65* (1.68)

* $p < 0.05$, Paired t-Test, for changes from baseline to final assessment
SD = Standard Deviation

Table 4: Change in adult weight status categorization from baseline to final assessment

Adult BMI Category	Baseline Assessment % (n)	Final Assessment % (n)	Change Status % (n)
	Total n=50	Total N=50	Total n=50
Underweight (BMI: <18.5)	2% (1)	0% (0)	-2% (-1)
Normal (BMI: 18.5 – 24.9)	14% (7)	20% (10)	6% (+3)
Overweight (BMI: 25 – 29.9)	38% (19)	38% (19)	0% (0)
Obese (BMI: >= 30)	46% (23)	42% (21)	-4% (-2)

Height, weight, BMI, BMI percentile (BMI_p) and z-BMI scores were determined for the children in this study at both baseline and final assessment in order to establish a change in weight status (Table 5). There were statistically significant changes in height ($p < 0.01$), weight ($p < 0.01$), and BMI ($p = 0.03$) between baseline and final assessment. However, no significant changes were seen in BMI_p ($p = 0.89$) or z-BMI score ($p = 1.0$) from baseline to final assessment. And no significant differences were seen between the genders at either time point.

Table 5: Change in child weight status from baseline to final assessment

Child Weight Status	Baseline Assessment Mean (SD)	Final Assessment Mean (SD)	Weight-Change Status Mean (SD)
	Total n=55	Total n=55	Total n=55
BMI	21.55 (6.62)	21.92 (6.37)	0.37* (1.23)
BMIp	72.02 (30.50)	71.82 (30.98)	-0.20 (10.51)
z-BMI	0.87 (1.29)	0.87 (1.22)	0.00 (0.58)

* $p < 0.05$, Paired t-Test, for changes from baseline to final assessment
SD = Standard Deviation

The average child's BMI values were in the normal weight status category at both baseline and final assessment, although 54.54% of the children were either overweight or obese at baseline, which increased slightly to 56.37% at final assessment (Table 6). There was a 3.64% (n=2) increase in the number of children falling into the overweight category and a slight decrease of 1.81% (n= 1) in the number of children in the obese category at final assessment (Table 6).

Table 6: Change in child weight status categorization from baseline to final assessment

Child BMIp Category	Baseline Assessment % (n)	Final Assessment % (n)	Change Status % (n)
	Total n=55	Total n=55	Total n=55
UW	-	1.82% (1)	1.82% (+1)
Normal	45.45% (25)	41.82% (23)	-3.63% (-2)
OW	18.18% (10)	21.82% (12)	3.64% (+2)
Obese	36.36% (20)	34.55% (19)	-1.81% (-1)

UW (underweight): < 5th percentile

Normal: 5th to <85th percentile

OW (Overweight): 85th to < 95th

Obese: ≥ 95th

BMIp = BMI percentile

When evaluating changes in average step activity from baseline to final assessment, both the adult ($p = 0.08$) and child ($p = 0.27$) groups exhibited a non-significant decrease in average steps (Table 7 and Table 8). Additionally, no significant differences were seen within gender groups for adults or children at either time point.

Table 7: Change in adult average step activity from baseline to final assessment

Adult Step Status	Baseline Mean (SD)	Final Assessment Mean (SD)	Step-Change Status Mean (SD)
	Total n=50	Total n=50	Total n=50
Average Daily Steps (7 days)	6,382 (3,103)	5,601 (3,422)	-780 (3,106)

* $p < 0.05$, Paired t-Test, for changes from baseline to final assessment
SD = Standard Deviation

Table 8: Change in child average step activity from baseline to final assessment

Child Step Status	Baseline Mean (SD)	Final Assessment Mean (SD)	Step-Change Status Mean (SD)
	Total n=55	Total n=55	Total n=55
Average Daily Steps (7 days)	7,285 (3,327)	6,825 (3,459)	-460 (3,083)

* $p < 0.05$, Paired t-Test, for changes from baseline to final assessment
SD = Standard Deviation

Two tests were performed to assess whether or not a relationship existed between step activity and changes in BMI for adults and BMIP for children. The first test, Pearson Chi-Square, did not result in a statistically significant relationship for either the adults ($p = 0.122$) or for the children ($p = 0.373$), see Table 9. In general, more of the children increased their steps from baseline to final assessment as opposed to those who did not, which was in contrast to the adult group. Beyond this distinction, the results for both groups were similar. When no increase in average steps occurred, about half of each group had increases in BMI or BMIP and half did not; however, when average steps did increase a lower percentage of participants demonstrated an increase in BMI or BMIP.

Table 9: Change in average steps with change in adult BMI and child BMIP

			Change in Average Steps		Total
			No Increase	Increase	
Adults	Change in BMI	No Increase	16	14	30
		Increase	15	5	20
	Total		31	19	50
Children	Change in BMIP	No Increase	12	18	30
		Increase	13	12	25
	Total		25	30	55

* $p < 0.05$, Pearson Chi-Square

The Spearman Rho's Correlation also showed no significant relationship between changes in average steps with changes in BMI or BMIP (Table 10). Although the direction of the correlation was negative, with an increase in average steps being

associated with a decrease in BMI and BMIp, the correlation was weak and explained only two percent or less of the variability seen for both adults and children.

Note: Both Pearson Correlation and Spearman Rho’s analyses were done with similar outcomes, but due to slight skewness seen in the data Spearman Rho’s was used for the final results.

Table 10: Relationship between change in average steps with change in adult BMI and child BMIp

Correlations			
			Change in Average Steps
Adults	Change in BMI	Correlation Coefficient	-0.153
		Sig. (2-tailed)	0.289
Children	Change in BMIp	Correlation Coefficient	-0.102
		Sig. (2-tailed)	0.460

*p<0 .01, Spearman’s Rho Correlation, significant at the 0.01 level (2-tailed)

Pre-Questionnaire Outcomes

At the start of the program, the primary adult was asked to complete a pre-questionnaire on behalf of their household. Thirty-five completed pre-questionnaires were received from the final 36 families. Questions were categorized based on prior familiarity with their local Extension agent and use of Extension programs; AOM Family Program expectations; prior experience using activity logs or tracking tools; prior experience using the Internet for health-related information; and expected participation from members of the household. Based on the results received, question 17 was poorly written and caused confusions with the respondents. That question was eliminated from the final data analysis, which was not detrimental, since actual participant information was already known and did not contribute further value to the study.

The majority of the participants learned about the AOM Program from their Extension agent, and most of them already knew their agent prior to starting the program. Over 60% said their agent played an important part in their decision to participate and less than half had ever been involved in an Extension-related health program before (Table 11).

Table 11: Participant’s prior familiarity with Extension agent and use of programs

Question (abbr.)	Response	
Q1. How did you hear about the program (n=35)	Extension Agent	68.6%
	Friend	11.4%
	YMCA or Community Center	0.0%
	Other	20.0%
Q2. Did you know Extension agent prior to program (n=34)	Yes	76.5%
	No	23.5%
Q3. Importance of Extension agent in participation decision (n=34)	Very	61.8%
	Somewhat	20.6%
	Didn’t factor into decision	17.6%
Q4. Length of time known agent (n=34)	0 – 6 months	38%
	6 months – 1 year	2.9%
	1 – 3 years	23.5%
	3+ years	35.3%
Q5. Prior participation in Extension health-related programs (n=35)	Yes	45.7%
	No	54.7%

The most common expectation for the program was to learn about ways to keep their families healthy, with 85.7% of the respondents choosing this option (Table 12)

Table 12: Participant's AOM Program expectations

Question (abbr.)	Response	
Q6. What do you hope to get out of program (n=35)	Learn ways to keep family healthy	85.7%
	Learn how to help family prevent weight gain	42.9%
	Learn about more healthful food options	57.1%
	Learn how to become more active as a family	51.4%

Few of the participants had ever tracked their physical activity before, although 51% of the primary adults had used a pedometer as had 31% of their children (Table 13).

Table 13: Prior experience using activity logs and tracking tools

Question (abbr)	Response	
Q7. Tracked physical activity before (n=35)	Yes	34.3%
	No	65.7%
Q8. Tracked Child(rens) physical activity before (n=35)	Yes	14.3%
	No	85.7%
Q9. Ever used a pedometer (n=35)	Yes	51.4%
	No	48.6%
Q10. If yes to Q9. How frequently (n=17)	Every day	29.4%
	Few days/week	29.4%
	Few times/month	29.4%
	< once/month	11.8%

Table 13 Continued: Prior experience using activity logs and tracking tools

Question (abbr)	Response	
Q11. Child(ren) ever used a pedometer (n=35)	Yes	31.4%
	No	68.6%
Q12. If yes to Q11. How frequently (n=11)	Every day	18.2%
	Few days/week	18.2%
	Few times/month	36.4%
	< once/month	27.3%

Prior to starting this program 77% of the respondents had accessed the Internet for information about diet and physical activity at some point, and less than 30% had ever participated in any health-related online social networks. The majority of the children in the study had not participated in any kind of online social network (Table 14). Most respondents expected all of their household members to participate in the program (Table 15).

Table 14: Use of the Internet for health-related information

Question (abbr)	Response	
Q13. Frequency using internet for information about diet and physical activity (n=35)	Every day	2.9%
	Few days/week	11.4%
	Few times/month	20.0%
	Less than once/month	42.9%
	Never	22.9%
Q14. Participation in health-related social networks online (n=35)	Yes	28.6%
	No	68.6%
	I don't think so	2.9%
Q15. Child(ren) participation in any online social networks (n=35)	Yes	25.7%
	No	71.4%
	I don't think so	2.9%

Table 15: Expected household participation in AOM Program

Question (abbr)	Response	
Q16. Are all members of household expected to participate (n=34)	Yes	85.3%
	No	14.7%

Post-Questionnaire Outcomes

The post-questionnaire was collected at the end of the study and designed to capture the participant's feedback about their experience using the AOM Family Program. The primary adult who completed the pre-questionnaire was also asked to complete the post-questionnaire and is referred to as "you" in the questionnaire response options.

The majority of the participants (86%) rated the program as good or better, with 83.3% saying they would recommend it to others (Table 16). Sixty-one percent of the respondents indicated they were "likely" or "very likely" to continue using the program and 41.7% said their children were "likely" or "very likely" to continue using it (Table 16).

When asked about how frequently they interacted with their Extension agent, 25.7% said they spoke to their agent four or more times after beginning the program and 5.7% did not speak to their agent again (Table 17).

Overall, the items in the AOM Toolbox were well received. The top two rated items were the 100 Ways to Cut Calories and Tips to Reduce Portion Sizes, with at least 94% of the participant's giving those items a rating of good or better (Table 18). The least favorite items were the Home Food Purchasing Questionnaire and the Sedentary Behavior Log, which received good or better ratings from 71.9% and 80.7%, respectively (Table 18).

Table 16: Participant’s experience using the AOM Family Program

Question(abbr)	Response	
Q1. Rate AOM Program (n=36)	Excellent	19.4%
	Very Good	47.2%
	Good	19.4%
	Average	5.6%
	Poor	8.3%
Q2. Recommend to others (n=36)	Yes	83.3%
	No	16.7%
Q3. Rate instructions (n=36)	Excellent	16.7%
	Very Good	50.0%
	Good	13.9%
	Average	13.9%
	Poor	5.6%
Q5A. Rate AOM website (n=34)	Excellent	5.9%
	Very Good	8.8%
	Good	5.9%
	Fair	-
	Poor	5.9%
Q5B. Rate AOM online community (n=34)	Did not use	73.5%
	Excellent	2.9%
	Very Good	8.8%
	Good	5.9%
	Fair	-
Q6. Likelihood you will continue to use program (n=36)	Poor	2.9%
	Did not use	79.4%
	Very likely	22.2%
	Likely	38.9%
	Somewhat likely	22.2%
Q7. Likelihood child(ren) continue to use program (n=36)	Not likely	16.7%
	Very likely	25.0%
	Likely	16.7%
	Somewhat likely	30.6%
Q8. Number of times spoke to agent after starting program (n=35)	Not likely	27.8%
	1 to 3 times	68.6%
	4 to 6 time	17.1%
	More than 6 times	8.6%
	I didn’t speak to my agent	5.7%

Table17: Participant’s interaction with Extension agent after starting AOM Program

Question (abbr)	Response	
Q8. Number of times spoke to agent after starting program (n=35)	1 to 3 times	68.6%
	4 to 6 time	17.1%
	More than 6 times	8.6%
	I didn’t speak to my agent	5.7%

Table 18: Participant’s evaluation of AOM Program Toolbox tips, ideas and tools

Question	Response				
Q4. Rate items in your AOM Program Binder	Excellent	Very Good	Good	Fair	Poor
Tips – 100 Ways to Cut 100 Calories (n=35)	28.6%	34.3%	31.4%	5.7%	-
Tips to Reduce Fat (n=36)	25.0%	38.9%	27.8%	8.3%	-
Tips to Reduce Portion Size (n=36)	22.2%	30.6%	41.7%	5.6%	-
Tips to Reduce Sugar (n=36)	27.8%	30.6%	33.3%	8.3%	-
Grocery Shopping 101 (n=34)	20.6%	32.4%	41.2%	5.9%	-
100 Ways to Surround Your Family with Success (n=33)	27.3%	36.4%	27.3%	9.1%	-
Outdoor Activity Ideas (n=32)	25.0%	31.3%	28.1%	15.6%	-
Indoor Action Games (n=32)	15.6%	37.5%	28.1%	18.8%	-
Tips – 100 Ways to increase steps (n=32)	21.9%	46.9%	21.9%	9.4%	-
Just for Kids Tools (n=29)	31.0%	20.7%	37.9%	10.3%	-
100 Ways to Eat Healthier (n=32)	31.3%	28.1%	34.4%	6.3%	-
Smart Choices When Eating Out (n=33)	18.2%	36.4%	33.3%	12.1%	-
Kid’s Activity Converter to Steps (n=31)	38.7%	25.8%	22.6%	9.7%	3.2%
Adult’s Activity Converter to Steps (n=31)	25.8%	35.5%	29.0%	6.5%	3.2%
Tracking Log for Steps & Small Goals (n=29)	17.2%	44.8%	24.1%	10.3%	3.4%
Home Food Environmental Assessment (n=33)	30.3%	30.3%	21.2%	9.1%	9.1%
Home Activity Environmental Assessment (n=31)	25.8%	32.3%	22.6%	9.7%	9.7%
Sedentary Behavior Log (n=32)	25.0%	25.0%	21.9%	15.6%	12.5%
Home Purchasing Questionnaire (n=32)	25.0%	28.1%	18.8%	18.8%	9.4%

The majority of the participants took their height and weight measurements outside of their Extension agent’s office, with the home being the most common location for both adults and children (Table 19).

Table 19: Location of height and weight measurements

Question (abbr)	Response	
Q9. Where did you take <u>your</u> HT & WT measurements? (n=36)	At home	36.1%
	Doctor’s office	16.7%
	At my extension agent’s office	19.4%
	Other	27.8%
Q10. Where did you take your <u>child(ren)</u> HT & WT measurements? (n=36)	At home	33.3%
	Doctor’s office	19.4%
	At my extension agent’s office	25.0%
	Other	22.2%
Q11. Where did your <u>spouse/significant other</u> take HT & WT measurements? (n=34)	At home	38.2%
	Doctor’s office	5.9%
	At my extension agent’s office	5.9%
	Other	8.8%
	Spouse did not participate	41.2%

Although less than 50% of the respondents indicated that their family completed their activity logs “every day” or “a few days a week”, they reportedly wore their pedometers more frequently (Table 20).

Table 20: Tracking of steps and pedometer use

Question (abbr)	Response		
Q12. How often did the following members of your family complete their activity logs?	You (n=35)	Your Child(ren) (n=35)	Your Spouse/ Significant Other (n=22)
Every day	5.7%	5.7%	9.1%
A few days a week	40.0%	42.9%	40.9%
A few times per month	34.3%	22.9%	18.2%
Less than once a month	5.7%	8.6%	4.5%
Only during the first and last month of the program	14.3%	20%	9.1%
Never	-	-	18.2%
Q13. How often did the following members of your family wear their pedometers?	You (n=36)	Your Child(ren) (n=36)	Your Spouse/ Significant Other (n=21)
Every day	25.0%	25.0%	14.3%
A few days a week	27.8%	25.0%	38.1%
A few times per month	27.8%	25.0%	14.3%
Less than once a month	5.6%	8.3%	-
Only during the first and last month of the program	13.9%	16.7%	14.3%
Never	-	-	19.0%

Greater than 50% of the respondents completed the environmental assessment and sedentary logs; however, nearly 90% said they completed the Home Food Purchasing questionnaire (Table 21), which also was the lowest rated item in the Toolbox.

Table 21: Use of assessments

Question (abbr)	Response	
Q14. Did you complete the Environmental Assessment? (n=35)	Yes	51.4%
	No	48.6%
Q15. Did you complete the Sedentary Log? (n=35)	Yes	54.3%
	No	45.7%
Q16. Did you complete the Home Food Purchasing questionnaire? (n=36)	Yes	88.9%
	No	11.1%

The majority of the respondents did not use the AOM website, with 80.6% citing they never referenced it for information. The support tools on the site were also under-utilized; 100% of the users did not interact with other users on the site and 58% did not know they could receive daily tips (Table 22).

Table 22: Participant use of the AOM Website

Question (abbr)	Response	
Q17. How often did you reference the AOM website for information? (n=36)	Every day	-
	A few days a week	-
	A few times per month	8.3%
	Once per month	11.1%
	Never	80.6%
Q18. Did you use the AOM website to track your progress? (n=36)	Yes	2.8%
	No	97.2%
Q19. Did you interact with other users on the AOM website? (n=36)	Yes	-
	No	100.0%
Q20. Did you receive daily tips from the AOM website? (n=36)	Yes	5.6%
	No	36.1%
	Didn't know there were daily tips	58.3%

Setting monthly small-change goals is a key element of the AOM Family Program. Nearly 86% of the respondents and 82% of their children and spouses set small-change goals each month. However, 8.6% of the primary adults, 5.7% of their children and 18.2% of the spouses did not set any goals (Table 23). Of those who did set goals, more than 60% of the adults and 74% of the children were either “somewhat successful” or “very successful” at achieving those goals (Table 23).

Table 23: Participant’s experience setting goals

Question	Response		
Q21. Please indicate if the following members of your family set small change goals each month	You (n=35)	Your Child(ren) (n=35)	Your Spouse/ Significant Other (n=23)
Yes	85.7%	82.9%	82.6% (19)
No	14.3%	17.1%	17.4% (4)
Q22. Please indicate how successful the following members of your family were at achieving any or all of those goals.	You	Your Child(ren)	Your Spouse/ Significant Other
Very Successful	14.3%	11.4%	13.6%
Somewhat successful	51.4%	62.9%	50.0%
Neither successful or unsuccessful	8.6%	5.7%	9.1%
Somewhat unsuccessful	8.6%	8.6%	9.1%
Very unsuccessful	8.6%	5.7%	-
No goals were set	8.6%	5.7%	18.2%

When asked about what small changes the family members made related to reduced sedentary behaviors and participation in family-oriented meals and meal planning (Q23 and Q24), the most common responses were increased daily steps and eating dinner at the table with other family members, see Table 24 for a detailed

breakdown of all responses. When asked how likely they were to continue these small changes, both increased daily steps and eating dinner with other family members remained the top selections. Though, in some cases the percentage of those intending to continue a particular small change was greater than the responses given for actually trying the small change during the program.

The respondents were also given the option to select “other” in order to provide information about other specific small changes they made (Q23) and intended to continue (Q24) that were not included in the list provided in the questionnaire; however, most failed to do so (Table 25).

Table 24: Small changes made during the Program and intent to continue changes

Question	Response		
Q23. What small changes did the following members of your family try while on the program? (please select all that apply)	You (n=36)	Your Child(ren) (n=36)	Your Spouse/ Significant Other (n=18)
Increased number of daily steps	83.3%	86.1%	77.8%
Tried new physical activities	55.6%	63.9%	33.3%
Reduced amount of time spent on the computer (not including physical video games)	25.0%	52.8%	11.1%
Reduced amount of time watching TV	55.6%	63.9%	44.4%
Ate dinner at the table with other family members	83.3%	80.6%	94.4%
Participated in meal planning	44.4%	36.1%	38.9%
Participated in grocery shopping	58.3%	41.7%	27.8%
Did not try any small changes while on the program	2.8%	-	-
Q24. If you selected any of the above items (Q23), which changes will you continue to implement now that the program is over?	You (n=36)	Your Child(ren) (n=36)	Your Spouse/ Significant Other (n=18)
Increased number of daily steps	80.6%	75.0%	72.2%
Tried new physical activities	55.6%	61.1%	38.9%
Reduced amount of time spent on the computer (not including physical video games)	30.6%	44.4%	16.7%
Reduced amount of time watching TV	52.8%	66.7%	27.8%
Ate dinner at the table with other family members	77.8%	80.6%	94.4%
Participated in meal planning	41.7%	38.9%	33.3%
Participated in grocery shopping	58.3%	52.8%	33.3%
None	-	-	-

Table 25: “Other” responses provided regarding additional small changes made that were not on the list of options and intent to continue those changes

Question	Response
Q23. What small changes did the following members of your family try while on the program? “Other” (n=5)	<i>“We mostly increased activity and used 100 tips: - reduce fat, - adjust portion sizes, - increase vegetable consumption”</i>
Q24. If you selected any of the above items (Q23), which changes will you continue to implement now that the program is over? “Other” (n=3)	<i>“1. increase vegetable consumption 2. lower fat 3. monitor portion sizes 4. more activity”</i>

Changes in BMI with Post-Questionnaire Behaviors

The final statistical analyses of this study explored whether relationships existed between changes in BMI and key behavior variables from the post-questionnaire. Key variables included how frequently activity logs were completed (Q12) and pedometers were worn (Q13); how often the respondent spoke to their Extension agent during the program (Q8); setting of monthly small-change goals (Q21); and completion of the Environmental Assessments (Q14), the Home Food Purchasing Questionnaire (Q15) and the Sedentary Behavior Log (Q16).

When the relationship between changes in BMI and frequency of pedometer use (Q12), completion of activity logs (Q13) and frequency of contact with the Extension agent (Q8) was investigated, a slight positive correlation was seen amongst all three variables. A lower frequency of Q12 and Q13 was associated with greater increases in BMIs. Interestingly, more contact with the agent (Q8) was associated with greater increases in BMI. Nevertheless, these slight positive correlations were not statistically

significant for any of the variables, and explained less than four percent of the variability observed (Table 26).

Table 26: Associations between change in BMI and frequency of completing activity log, use of pedometer and agent contact during Program

Correlations					
			(Q12) Frequency Completing Activity log	(Q13) Frequency Wearing Pedometer	(Q8) Frequency of Contact with Agent
Primary Adult	Change in BMI	Correlation Coefficient	0.12	0.08	0.20
		<i>p</i> , Sig. (2-tailed)	0.49	0.64	0.26
		n	35	36	35

* $p < 0.01$, Spearman's Rho correlation, significant at the 0.01 level (2-tailed)

As indicated previously, 85.7% of the respondents set monthly small-change goals. When this behavior was related to changes in BMI, no statistically significant outcomes were seen ($p = 0.24$). However, those who did set monthly goals had a mean change in BMI of nearly one point, albeit not statistically significant (Table 27).

Table 27: Relationship between changes in primary adult's BMI and setting of monthly small-change goals

Primary Adult	Set monthly small change goals	N	Mean	Std. Deviation	Sig. (2-tailed) <i>p</i>
Changes in BMI	Yes	30	-0.87	1.91	0.24
	No	5	0.20	0.85	

* $p < 0.05$, Independent t-Test

When relationships between changes in BMI and completion of the environmental assessment, sedentary behavior log and home food purchasing questionnaire were

examined, again, no statistically significant outcomes were seen (Tables 28-30). The mean change in BMI decreased for each of the variables associated with a “yes” response. Interestingly, for those who did not complete the environmental and sedentary behavior assessments, a greater mean decrease in BMI was seen as compared to those who did (Table 28 and 29). Nonetheless, none of these outcomes were statistically significant.

Table 28: Relationship between changes in primary adult’s BMI and completion of environmental assessment

Primary Adult	Completed Environmental Assessment	N	Mean	Std. Deviation	Sig. (2-tailed) <i>p</i>
Changes in BMI	Yes	18	-0.24	1.27	0.12
	No	17	-1.20	2.23	

* $p < 0.05$, Independent t-Test

Table 29: Relationship between changes in primary adult’s BMI and completion of Sedentary Behavior Log

Primary Adult	Completed Sedentary Behavior Log	N	Mean	Std. Deviation	Sig. (2-tailed) <i>p</i>
Changes in BMI	Yes	19	-0.41	1.29	0.31
	No	16	-1.06	2.32	

* $p < 0.05$, Independent t-Test

Table 30: Relationship between changes in primary adult’s BMI and completion of Home Food Purchasing Questionnaire

Primary Adult	Completed Home Food Purchasing Questionnaire	N	Mean	Std. Deviation	Sig. (2-tailed) <i>p</i>
Changes in BMI	Yes	32	-0.76	1.90	0.37
	No	4	0.13	0.85	

**p*<0.05, Independent t-Test

Extension Agent Questionnaire Outcomes

At the end of the AOM Family Program after the final participant data was collected, the Extension agents provided their feedback about the program and their experience delivering it to families in their communities. When asked how they would rate the program only 50% rated it as good and nearly 78% indicated they would not continue to offer the program (Table 31).

Table 31: Extension agent’s feedback about their experience using the AOM Family Program in their communities

Question(abbr)	Response (n=10)	
Q1. How would you rate the AOM Family Program?	Excellent	0.0%
	Good	50.0%
	Average	40.0%
	Poor	10.0%
Q2. How do you think your participants would rate the AOM Family Program?	Excellent	0.0%
	Good	30.0%
	Average	50.0%
	Poor	20.0%
Q5. Would you continue to offer this program to families in your community?	Yes	22.0%
	No	77.8%

The agents were also asked what they liked best and least about the program; what they would tell other agents about it; in addition to being given the chance to elaborate on the responses they provided in Table 31. A few common themes surfaced across all of the responses (Table 32). The majority of the agents indicated the materials and pedometers were what they liked most about the program. The parts of the program that they liked least, or felt needed improvement, had to do with the lack of contact with the participants; lack of incentives, support and accountability for participants during the six month period; the length of the program; and the timing of the rollout. When asked whether they would continue to offer the program most indicated they would not do so without changes.

Table 32: Summary of agent comments about the AOM Family Program (n = 10)

Question	Q1. How would you rate the AOM Family Program?
Comments	<ul style="list-style-type: none"> • <i>“I feel the concept is good, but needs some tweeking.”</i> • <i>“It was hard to get the final data from the participant families even though I had communicated with them every month through e-mail or leaving a phone message.”</i> • <i>“The concept of working with the whole family has merrit; but the execution was not good.”</i> • <i>“Lots of good information, but as a self-paced program with no incentives or personal contact, it lacks impact.”</i> • <i>“not having human contact with families was not good for a 6 month period of time”</i>
Question	Q2. How do you think your participants would rate the AOM Family Program?
Comments	<ul style="list-style-type: none"> • <i>“Feel they needed more supervision and "coaching" to fully complete and remain engaged.”</i> • <i>“The participants liked the pedometers best.”</i> • <i>“6 months is a very long time for a busy family; and a 3-ring binder doesn't offer much incentive or interaction.”</i> • <i>“Most participants said they did not complete the program. They had good intentions, but got busy and lost interest. Needed more accountability.”</i> • <i>“They needed more than the binder and the online connection”</i>

Table 32: Summary of agent comments about the AOM Family Program, Continued

Question	Q3. What did you like best about the program?
Comments	<ul style="list-style-type: none"> • <i>“Didn't require a lot of my time.”</i> • <i>“I liked that the whole family was included in eating healthier and being more physically active.”</i> • <i>“A multitude of resources- handouts in the notebook. The idea of the use of pedometers.”</i> • <i>“I liked the concept of working with the family - on both nutrition and physical activity education.”</i> • <i>“It was family based, flexible and an on-your-own style to do at times that fit with each family's schedule and had lots of good resources.”</i> • <i>“Participants liked getting a pedometer, a real measurement of activity level, vs. perception of activity level. Great worksheets!”</i> • <i>“Notebook of materials was excellent.”</i> • <i>“The research behind it that encouraged physical activity. The handout that told participants how to calculate certain common activities where they did not wear a step counter.....into steps!!!!”</i> • <i>“Goal setting and tracking forms”</i>
Question	Q4. What did you like least about the program?
Comments	<ul style="list-style-type: none"> • <i>“That the 6 months ended in the coldest, darkest part of winter when people are thinking less of being physically active.”</i> • <i>“It was too long. Not enough guidance, interaction or accountability. Also, the participants should be asked to track their activity everyday and report their weekly totals to see any trends or changes in activity.”</i> • <i>“There was little interaction with the families; and I felt bad that it did not live up to their expectations of a program that CSU Extension would promote/recruit.”</i> • <i>“The long length of time, and even though the independant format was a positive, it also made it difficult to be very connected and hold participants accountable.”</i> • <i>“No contact with participants for 6 months.”</i> • <i>“Not having contact with the families. I would have connected with them monthly via a newsletter or an online survey to see how things were going along the way....too long of a time without human interaction from CSU Extension whether by email, electronic newsletter, online, twitter, blog, etc.”</i> • <i>“Many overweight families need more structure and support than this program offered. I was reluctant to offer too much more to the program for fear that any benefit would not be attributable to the AOM program.”</i> • <i>“Very little support for families participating.”</i>
Question	Q5. Would you continue to offer this program to families in your community?
Comments	<ul style="list-style-type: none"> • <i>“Not as it is currently set up - but still feel it has some merits and with work could be a good option for some families.”</i> • <i>“Possibly, I think there needs to be more incentives like the pedometer and notebook.”</i> • <i>“With some changes”</i> • <i>“not in the current format”</i> • <i>“The timing to implement the program was hard. Most of the schools in my county were either out or on the last day of school so recruitment was VERY difficult. Fall would be a much better time to implement.”</i> • <i>“Not the way that it currently is.”</i> • <i>“It was too difficult to find interested families”</i>

Table 32: Summary of agent comments about the AOM Family Program Continued

Question	Q6. What would you tell your fellow Extension Agents about the AOM Family Program?
Comments	<ul style="list-style-type: none"> • <i>“It is one more tool to help families become active and eat healthy.”</i> • <i>“I’m sure there is some good content; but the delivery method or strategies need some work.”</i> • <i>“It needs to be revamped to include incentives, workshops, events etc. before it is offered again.”</i> • <i>“very difficult to get follow thru for the length of time without having contact etc”</i> • <i>“Good program, but not realistic for our workload.”</i>
Question	Q7. What additional comments and/or suggestions would you like to make about the AOM Family Program
Comments	<ul style="list-style-type: none"> • <i>“Timing was difficult as we started in June and ended in the winter. It would have been more successful to begin the program in early spring when people are thinking about getting outside and being active.”</i> • <i>“I really liked the "family" concept of wellness. Have specific activities for the families to do together and then report back on. It would mean more paperwork-followup for the agent, but you would actually get participation and results.”</i> • <i>“I hope we can gather input and improve this program -- and try again. I still believe the family holds the key.”</i> • <i>“It should be rolled out in the early Fall vs. May- July, because many of the families we work with are only accessible through school and pre-school programs that do not operate in the summer.”</i> • <i>“timing wasn’t good, need to build in some form of connection with participants to keep the participation, decrease paper and make notebook more "exciting" for stimulation”</i> • <i>“For a 6 month study, if we would have had an incentive for families to stay involved and connected with them after the first month ...families have told me that would have helped. They were too embarrassed to say that they had stopped calculating their steps.”</i>

CHAPTER FIVE

DISCUSSION

The focus of the AOM Family Program is on the prevention of weight gain in adults and excess weight gain in children through small, sustainable, lifestyle changes. The objective of this study was to disseminate the program through Extension in Colorado under real-life circumstances and evaluate its usefulness for both the participating families and Extension agents alike. At the end of the six month study the adults had achieved a statistically significant reduction in mean body weight and BMI and the children demonstrated no statistically significant changes in mean BMI percentile (BMIP), consistent with the AOM Family Program objectives of weight gain prevention. The majority of the participants (86%) rated the program as either good or better and would recommend it to others. In contrast, only half of the Extension agents rated the program as good and most would not continue to offer it in their communities without changes.

Weight Status Outcomes

When considering the effect of the program on weight status in the adults and children who participated in this study, positive results were seen, consistent with findings from other similar studies [77, 78]. Based on the self-reported data provided, the mean adult BMI had a statistically significant decrease and the children maintained their mean BMIP, with no significant changes from baseline to final assessment. The factors contributing to these outcomes are unclear.

Given that a major component of this program is focused on increasing daily steps, a positive change in average daily steps might be expected; however, this was not

observed. One potential reason for this outcome may be due to the fact that step activity was only measured at two different time points, baseline (month 1) and final (month 6) assessments. It is possible that the single measurement did not accurately reflect the total average step activity that took place over the six month course of the program. Another important consideration is the seasonal impact, given that the study ended during the winter months. Research evaluating the impact of weather on physical activity was conducted with 2,000 girls and boys between the ages of 5-12 years of age and it was concluded that inclement weather has a habitual negative effect on physical activity [107]. While this may seem obvious, it is an important consideration when taking into account potential alternatives for outdoor activities. A section within the AOM Program Toolkit provides recommendations and resources to address this issue, including a list of indoor action games as well as a way to convert several non-step activities into steps for both adults and children. It may be that the participants used these recommendations and tools, but did not find a conversion factor for their activity or they did not record the converted step activity on the assessment forms they submitted. Another factor that could have contributed to the reduced steps may have been due to the functionality of the pedometers. Several comments were made about the pedometers not working and in one case the family said they purchased new ones. Finally, it is possible that participants, in fact, did not increase their step activity and the outcomes seen were the result of some other factor(s).

Setting small-change goals monthly was another important part of the program and although more than 80% of the participants indicated they set monthly goals no relationship was seen between goal setting and changes in BMI. While actual data were

provided for step activity, information about specific changes in energy intake is not known and may have been a key factor related to the observed outcomes. Although participants were asked to list other small-change goals they made, most failed to do so. The AOM Toolkit provides hundreds of ideas and ways to reduce energy intake, which were too numerous to accurately capture in this study; however, future research of this sort would benefit by creating separate goal-setting questions for small changes made that were specific to both physical activity and energy intake.

The relationship between BMI and the behavior variables (frequency of completing the activity logs and wearing of pedometers; frequency of contact with the Extension agent; and completion of the environmental assessments, sedentary behavior logs and home food purchasing questionnaires) were weakly correlated and did not provide statistically significant outcomes, and thus, also failed to provide conclusive information. It may be that other parts of the program that were not measured in this study contributed to the findings or some combination of these factors. Consideration should also be given to the effect that involvement in the study may have had on participants, which could have uniquely influenced their behavior. Additionally, given the challenges finding interested families willing to participate in this study, the 36 families who did complete the full program may have been exceptionally motivated to make healthful changes upon entering the program as compared to those who did not. This factor may also explain the weak relationship seen between how frequently participants interacted with their agent and BMI outcomes. Lastly, given the nature of self-reported data, the accuracy of the information provided may be in question; potentially affecting the reliability of the results. Overall, while much of the data trended

in the right direction, the small sample size was not sufficient to achieve statistical power and may have affected the outcomes observed.

Participant Feedback

Weight status is only one factor to consider when evaluating the effectiveness, value and usefulness of the AOM Family Program for families in Extension communities. Another key consideration is how the participants felt about their experience utilizing the program and their overall attitude about it going forward. The majority of the respondents (86%) gave the program a rating of good or better and 83% said they would recommend it to others. Sixty-one percent said they were “likely” or “very likely” to continue using it and if the responses for “somewhat likely” were taken into consideration that would represent over 80% of the respondents. When asked about the likelihood that their children would continue to use the program, only 41.7% said their children were “likely” or “very likely” to do so. Although this may appear to be a less than desired outcome, based on recent research regarding the effectiveness of family-based programs, there is some evidence to suggest that a more effective strategy for treating childhood obesity is one in which the parent serves as the exclusive agent of change [93, 94, 96, 97].

The AOM Toolkit materials also received very positive ratings, with the lowest rated item, the Home Food Purchasing Questionnaire, receiving favorable ratings from over 70% of the respondents. Additionally, when participants were asked about specific small changes (Q23) that were made and those they planned on continuing (Q24), increased daily steps and eating together as a family were the top two items chosen by the respondents, 80.6% and 77.8%, respectively. Similar outcomes were seen when

participants were asked the question on behalf of their child(ren) and spouse/significant other. In fact, it was indicated that 94% of the spouses/significant others would continue eating dinner with other family members. These results are encouraging for longer-term outcomes. Evidence has found a positive correlation between parental support and child physical activity [80] and in a large cross-sectional study of older children and adolescents, increased frequency of eating dinner with other family members was associated with increased nutrient intake and more healthful dietary eating patterns [108].

Although the overall sentiment was positive, some of the respondents did express concerns in the comments such as frustrations with the functionality and unreliability of the pedometers; timing of the program being difficult due to the winter months; and the long duration from baseline to final assessment. A comment was also received suggesting that items on the Physical Activity Environmental Assessment were more geared towards city rather than rural living. Finally, the AOM website and tools received low evaluations, primarily due to the lack of use and awareness about the availability of resources on the site.

Extension Agent Feedback

In contrast to the overall feedback from the study participants, only half of the agents rated the program as good, and the other 50% rated it as fair or poor. Furthermore, when asked how they thought their families would rate the program there was a significant disconnect between the agent's perceptions of how the families would rate the program versus the actual ratings given by the participants. While nearly all agents expressed positive attitudes about the program materials, the most consistent feedback had to do with the lack of contact and interaction they had with the participants; including

providing support, incentives and accountability (six months being too long a period of time to go without contact). The issue regarding lack of contact is not fully clear and requires further investigation. While many referenced lack of contact with the issue of support, others did not. There may have been confusion about the agent's role with the participants during the study, although during the training session they were encouraged to use the program and interact with the participants as they would under normal circumstances and at month three they were asked to reach out to participants to see how they were doing, gather initial feedback about their experiences and answer any questions. The agent agreement also indicated that they would serve as the point-of-contact for the duration of the study. Based on these considerations, it seems more plausible that the issue of contact is more about the lack of support and accountability mechanisms that would normally be provided when offering an Extension program. Either way, the issue of contact may be another factor that impacted the final results and requires further exploration. Some of the agent's comments regarding what they liked least about the program (Q4) are provided below:

Q4. What you liked least about the program:

"It was too long. Not enough guidance, interaction or accountability. Also, the participants should be asked to track their activity everyday and report their weekly totals to see any trends or changes in activity."

"The long length of time, and even though the independant format was a positive, it also made it difficult to be very connected and hold participants accountable."

"Not having contact with the families. I would have connected with them monthly via a newsletter or an online survey to see how things were going along the way....too long of a time without human interaction from CSU Extension whether by email, electronic newsletter, online, twitter, blog, etc."

"Many overweight families need more structure and support than this program offered. I was reluctant to offer too much more to the program for fear that any benefit would not be attributable to the AOM program."

Another area of uncertainty is how this feedback relates to those 36 families that completed the program as opposed to those who did not. For those completing the program, no significant correlation between frequency of contact with the Extension agent and changes in BMI were seen; however, had this data existed for those families who did not submit final data, the results may have been different.

The other significant finding from the Extension Agent Questionnaire was that nearly 78% of them indicated they would not continue to offer the program in its current form. Unfortunately, little information was provided as to the changes required to alter this sentiment. Below are some of the comments associated with whether or not they would continue to offer the program (Q5) as well as what they would tell fellow agents about it (Q6):

Q5. Continue to offer the program:

“Not as it is currently set up - but still feel it has some merits and with work could be a good option for some families.”

“Possibly; I think there needs to be more incentives like the pedometer and notebook.”

“With some changes”

“not in the current format”

Q6. What would you tell other Extension agents:

“It is one more tool to help families become active and eat healthy.”

“I'm sure there is some good content; but the delivery method or strategies need some work.”

“It needs to be revamped to include incentives, workshops, events etc. before it is offered again.”

Another important consideration related to these findings is the research nature of the project and the role of the agent in that respect. Although the agents were asked to provide their evaluation of the program separate from the research elements, it still may

have factored into their opinions and attitudes and influenced their feedback. The recruitment, consenting and reporting process was quite involved and challenging, making the AOM Family Program much more complex to administer than it would be under normal circumstances, including the timing of when it was rolled out.

Study Strengths and Limitations

A large amount of information was gathered from the participants regarding their experience using the AOM Family Program, including a detailed evaluation of the tools and resources that are a part of the Toolkit. Furthermore, the process of understanding how Extension would utilize this particular program in their communities has begun and the groundwork has been laid to explore the adaptations required for the agents to consider offering it to families they serve in the future.

One limitation with this study is the lack of participating families and the small sample size. The number of families who completed the program fell far below expectations. Recruitment proved to be extremely difficult and the exact reasons for this are not completely understood, although there is research that suggests it is not uncommon to have difficulties finding families in Extension communities willing to participate in research-related programs [109]. Information is also lacking about the reasons some families started, but failed to complete the program. Additionally, of the families who did participate, 41% were from a single community, perhaps limiting the ability to generalize the data to all Colorado communities served by Extension agents.

The puberty status of the participating children was not considered in the data collection and analysis process and while BMI percentile cutoff points are based on national averages for age and gender, these measurements may not accurately reflect an

individual child's categorization if that child's onset of puberty falls outside of the national average [110].

Lastly, the self-reported nature of the data collected and the variability in the length of time families were on the program may have also impacted the reliability of the outcomes observed.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

With the rising rates of obesity across the United States, including increased risks for those living in rural communities, interventions focused on prevention offer another tool in the battle against obesity. In this study, positive outcomes and experiences were seen with the majority of the families that completed the AOM Family Program and while the factors associated with these findings are not clear, most of the participants rated the program favorably and would recommend it others. This was not the case for Extension agents participating in the study. In order for this program to be one they would consider offering to families in their communities, adjustments are needed. Therefore, it is highly encouraged that additional feedback be gathered from the agents, specifically as it relates to lack of participant interaction, support and accountability. It is also suggested that any future studies conducted with Extension seek to get their involvement and input earlier in the research planning and design process.

With regard to the AOM Program Toolkit and information, it is suggested that more attention be given to the web-based tools and resources. Prior to starting the program 77% of the respondents indicated that they had used the internet to access information about diet and physical activity, with 34% doing so a few times per month or more. Unfortunately, not only did most of the participants not utilize the AOM online resources, but most were not aware they existed. This underutilization of the online resources may represent a significant missed opportunity to provide further resources and support to help those participating in the program experience greater success. Positive outcomes have been demonstrated with web-based programs, particularly when a

theoretically based approach is incorporated and may be worth further exploration [88, 89, 111].

In order to create a more user-friendly experience and increase awareness about the availability of online tools and resources, changes to the way in which the Toolkit is delivered to participants should be considered. Enhancements might include a larger binder that allows easier access to and navigation of the materials; a more engaging and colorful binder cover and spine; a table of contents that clearly outlines the materials in the binder; a section devoted exclusively to goal setting and tracking forms; and an interactive instruction video that provides a human element, visually walking the participant through all of the program components and instructions. This could be included with the binder on a DVD, flash drive or accessed via the AOM website. Other communication methods, such as delivery of content via a smart phone application, should also be considered. Finally, it is imperative that more reliable and durable pedometers are identified if they will continue to be offered as part of the program Toolkit.

With further exploration and adjustments it is feasible that the AOM Family Program could become a valued tool in support of a more healthful lifestyle for families living in Colorado, with Extension serving as the conduit within their respective communities.

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Appendix A: Extension Agent Role

Role of Extension Agent:

- Attend a mandatory half-day training session to learn about the AOM Family Program fundamentals and the required research study procedures and protocols
- Demonstrate completion of the Human Subjects Training prior to the half-day training session, per IRB requirements
- Agree to and sign the Agent Agreement form
- Aim to recruit 20-25 families from their respective communities, with a minimum target of five families
- Obtain signed consent for each family prior to families beginning program
- Provide each participant with a unique code, based on the coding system provided, as no participant names will be used in the data analysis process.
- Provide AOM Toolkit and pedometers to participating families
- Deliver and collect baseline (month 1) forms and data:
 - o Self-reported baseline assessments (height, weight, and steps)
 - o Pre-questionnaires from the participants
- Deliver and collect final (month 6) forms and data:
 - o Self-reported final assessments (height, weight, and steps)
 - o Post-questionnaires
- Serve as the point of contact for families should questions or concerns arise and maintain contact with the participating families for the duration of the study

Appendix B: Human Subjects Approval and Renewal

NOTICE OF APPROVAL FOR HUMAN RESEARCH

DATE: April 26, 2011
TO: Anderson, Jennifer, 1571 Food Sci and Human Nutrition
Melby, Chris, 1571 Food Sci and Human Nutrition, Roark, Constance, 1571 Food Sci and Human Nutrition
FROM: Barker, Janell, , CSU IRB 1
PROTOCOL TITLE: Assessing the Effectiveness of the America On the Move Family Program in a Real-Life Setting Through Colorado Extension. America On the Move Family Program for Weight Gain Prevention
FUNDING SOURCE: US Department of Agriculture : 81082
PROTOCOL NUMBER: 11-2554H
APPROVAL PERIOD: Approval Date: April 26, 2011 Expiration Date: April 12, 2012

The CSU Institutional Review Board (IRB) for the protection of human subjects has reviewed the protocol entitled: Assessing the Effectiveness of the America On the Move Family Program in a Real-Life Setting Through Colorado Extension. America On the Move Family Program for Weight Gain Prevention. The project has been approved for the procedures and subjects described in the protocol. This protocol must be reviewed for renewal on a yearly basis for as long as the research remains active. Should the protocol not be renewed before expiration, all activities must cease until the protocol has been re-reviewed.

If approval did not accompany a proposal when it was submitted to a sponsor, it is the PI's responsibility to provide the sponsor with the approval notice.

This approval is issued under Colorado State University's Federal Wide Assurance 00000647 with the Office for Human Research Protections (OHRP). If you have any questions regarding your obligations under CSU's Assurance, please do not hesitate to contact us.

Please direct any questions about the IRB's actions on this project to:

Janell Barker, Senior IRB Coordinator - (970) 491-1655 Janell.Barker@Colostate.edu
Evelyn Swiss, IRB Coordinator - (970) 491-1381 Evelyn.Swiss@Colostate.edu

Barker, Janell



Barker, Janell

Includes:

The approval is for a maximum of 200 families; using the approved recruitment and consent documents. Human subjects training must be completed by all personnel prior to recruiting participants.



Knowledge to Go Places

Research Integrity & Compliance Review Office
Office of the Vice President for Research
321 General Services Building - Campus Delivery 2011
Fort Collins, CO
TEL: (970) 491-1553
FAX: (970) 491-2293

Approval Period: April 26, 2011 through April 12, 2012
Review Type: EXPEDITED
IRB Number: 00000202
Funding: US Department of Agriculture : 81082

e-protocol

NOTICE OF APPROVAL FOR HUMAN RESEARCH

DATE: April 12, 2012
TO: Anderson, Jennifer, 1571 Food Sci and Human Nutrition
Melby, Chris, 1571 Food Sci and Human Nutrition, Roark, Constance, 1571 Food Sci and Human Nutrition
FROM: Barker, Janell, . CSU IRB 1
PROTOCOL TITLE: Assessing the Effectiveness of the America On the Move Family Program in a Real-Life Setting Through Colorado Extension. America On the Move Family Program for Weight Gain Prevention
FUNDING SOURCE: US Department of Agriculture : 81082
PROTOCOL NUMBER: 11-2554H
APPROVAL PERIOD: Approval Date: April 12, 2012 Expiration Date: April 11, 2013

The CSU Institutional Review Board (IRB) for the protection of human subjects has reviewed the protocol entitled: Assessing the Effectiveness of the America On the Move Family Program in a Real-Life Setting Through Colorado Extension. America On the Move Family Program for Weight Gain Prevention. The project has been approved for the procedures and subjects described in the protocol. This protocol must be reviewed for renewal on a yearly basis for as long as the research remains active. Should the protocol not be renewed before expiration, all activities must cease until the protocol has been re-reviewed.

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Evelyn Swiss, IRB Coordinator - (970) 491-1381 Evelyn.Swiss@Colostate.edu

Barker, Janell



Barker, Janell

Includes:

Approval is to survey 10 extension agents using the approved electronic cover letter. Because of the nature of this research, it will not be necessary to obtain a signed consent form. However, all subjects must be consented with the approved electronic cover letter. The requirement of documentation of a consent form is waived under § __.117(c)(2).



Knowledge to Go Places

Research Integrity & Compliance Review Office
Office of the Vice President for Research
321 General Services Building - Campus Delivery 2011 Fort Collins,
CO

TEL: (970) 491-1553

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Approval Period: April 12, 2012 through April 11, 2013
Review Type: EXPEDITED
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e-protocol

Appendix C: Recruitment Materials

Initial Family Recruitment Meeting Script

This program is designed to help you, and your family, make small healthy lifestyle changes. It deals with living more healthfully, but is NOT a weight-loss program.

This is a 6 month program. After going through the consent, if you are interested in participating, you will start the program today.

At this first visit, you will be given a binder with the 6-month program and a pedometer for you and your family members.

If this study sounds like something you'd be interested in, I have a series of questions about you and your family I need to ask you to see if you might qualify.

Do you have a child 8-12 years old who you think would like to participate? Yes ____ No ____

Must have at least 1 child this age. If no, proceed to bottom for ineligible families.

How old is your child? (must be 8-12 years at study onset): ages of children in this category:

1) ____ yrs old 2) ____ yrs old 3) ____ yrs old 4) ____ yrs old

Do you have access to a scale and tape measure in order to weigh and measure your children?

Can you give us your NAME AND PHONE NUMBER?

Name: _____

Phone #1: (_____) _____ Phone #2: (_____) _____

Phone #3: (_____) _____

Email #1: _____

Email #2: _____

What is your preferred method of contact? _____ Phone: _____ Email: _____

Who in your family is interested in participating?

Mom? Y or N

Dad? Y or N

8-12 yr old Child Y or N Age: _____ M or F? _____

Other kids? Y or N Age: _____ M or F? _____

Other kids? Y or N Age: _____ M or F? _____

Other kids? Y or N Age: _____ M or F? _____

Other kids? Y or N Age: _____ M or F? _____

Other kids? Y or N Age: _____ M or F? _____

Other kids? Y or N Age: _____ M or F? _____

Family NOT eligible:

- I am so sorry, but in order to participate in our study we are obligated to only include:
 - 8-12 year old children
- Thank you so much for your willingness to be a part of this project.
- **If child is seven**, “When does your child turn eight? _____ If we are still recruiting at that time, we will call you back then.”
- Hopefully in the future we will have other opportunities for you and your family to participate.
- Good-bye.
- Shred all information for this family

Recruitment Script

Dear _____,

This letter is to inform you of a potential opportunity for you and your family. Your county Extension agent, _____, is currently recruiting families for a community based research study promoting more healthful living through small, sustainable lifestyle changes.

The program is looking for families of all different shapes, sizes, and body types with at least one child around 8 to 12-years-old and at least one parent or guardian willing to participate. The program is 6 months long. One visit may be required with your Extension agent to receive and go over program materials, but other than that minimal to no travel should be necessary. During the 6 months, your family would keep track of heights and weights, wear pedometers (step-counters) and track steps, fill out questionnaires, and read various materials about living more healthfully.

If interested, please call _____ at _____, or email _____.

Thank you for your time and we look forward to hearing from you regarding this great opportunity to better our community's health.

Sincerely,

_____ County Extension Office

FAMILIES WANTED!

Fun Research Study

- ◇ Would you like to learn more about healthful lifestyles for you and your family?
- ◇ Are you a parent or guardian with at least one child between the ages of 8—12 years old?

We are looking for families to participate in a 6-month research study investigating healthy lifestyles of Colorado families

Here are just a few of the fun things you can expect...



- ◇ Try new ways to be physically active and eat well
- ◇ Get hundreds of tips about living a healthful lifestyle
- ◇ Track and report your daily steps, height and weight
- ◇ Fill out food and physical activity questionnaires



To learn more contact Extension Agent Name

xxx-xxx-xxxx

extensionagent@csu.edu

IRB Protocol #112554H, PI: Jennifer Anderson, Colorado State University · Version 5.16.11

Appendix D: Assessment Forms

America On the Move

FAMILY PROGRAM TOOLBOX

Baseline Steps

Adult Participant's AOM Code: _____

Date: _____

Height: _____

Weight (pounds): _____

Daily Steps:

<u>Day:</u>	<u>Date:</u>	<u>Steps I took today</u>
Sunday	/ /	
Monday	/ /	
Tuesday	/ /	
Wednesday	/ /	
Thursday	/ /	
Friday	/ /	
Saturday	/ /	

America On the Move

FAMILY PROGRAM TOOLBOX

Month 6 Steps

Adult Participant's AOM Code: _____

Date: _____

Height: _____

Weight (pounds): _____

Daily Steps:

<u>Day:</u>	<u>Date:</u>	<u>Steps I took today</u>
Sunday	/ /	
Monday	/ /	
Tuesday	/ /	
Wednesday	/ /	
Thursday	/ /	
Friday	/ /	
Saturday	/ /	

America On the Move

FAMILY PROGRAM TOOLBOX

Baseline Steps

Child Participant's AOM Code: _____

Date of Birth: _____

Height: _____

Weight (pounds) _____

Daily Steps:

<u>Day</u>	<u>Date</u>	<u>Steps I took today</u>
Sunday	/ /	
Monday	/ /	
Tuesday	/ /	
Wednesday	/ /	
Thursday	/ /	
Friday	/ /	
Saturday	/ /	

America On the Move

FAMILY PROGRAM TOOLBOX

Month 6 Steps

Child Participant's AOM Code: _____

Date of Birth: _____

Height: _____

Weight (pounds) _____

Daily Steps:

<u>Day</u>	<u>Date</u>	<u>Steps I took today</u>
Sunday	/ /	
Monday	/ /	
Tuesday	/ /	
Wednesday	/ /	
Thursday	/ /	
Friday	/ /	
Saturday	/ /	

Appendix E: Demographic Form

**AOM FAMILY PROGRAM FOR WEIGHT GAIN PREVENTION
STUDY**

PHASE III

Participant Demographics

For Study Use Only:

AOM Participant ID #: _____	Date: / /
-----------------------------	-----------------

Last name: _____ First name:

Gender: Female Male

Date of Birth: (mm/ dd / yy): _____

Age: _____

Please check categories you identify with

Non-Hispanic

- American Indian or Alaska Native
- Asian
- Black or African-American
- White
- Native Hawaiian or other Pacific Islander
- Other (please specify): _____

Hispanic/Latino

- American Indian or Alaska Native
- Asian
- Black or African-American
- White
- Native Hawaiian or other Pacific Islander
- Other (please specify): _____

For Study Use Only:

Data Entry Date: _____
Staff: _____

Appendix F: Participant Questionnaires

America On the Move Family Program Project
Phase III Participant Pre-Questionnaire
(To be completed by only one parent or guardian per household)

We are excited you and your family will be taking part in the America On the Move Family Program. Before you begin the program, we would like to learn a little bit about you and your expectations for the program. This should only take about 15 minutes.

This survey is voluntary and anonymous.

Please complete with the number provided to you by your Extension agent/educator:

***AOM Program Code Number:* _____**

***Date:* _____**

To begin, we'd like to know about your experience with the Extension agent/educator in your area.

For the following questions, please select only one response by placing a check mark next to your answer.

1. How did you learn about this program?
 - My Extension agent/4-H educator contacted me
 - A friend told me about it
 - YMCA or community center
 - Other

2. Did you know your Extension agent or 4-H educator prior to deciding to take part in this program?
 - Yes
 - No

3. How important was your Extension agent/4-H educator in your decision to take part in this program?
 - Very
 - Somewhat
 - They did not factor into my decision to participate

4. How long have you known your Extension agent/educator?
 - 0 – 6 months
 - 6 months – 1 year
 - 1 – 3 years
 - 3 years or more

5. Have you ever taken part in any nutrition, diet, physical activity, or health-related programs through your local Extension office?

Yes

No

If so, please list: _____

6. What do you hope to get out of taking part in this program? (**please choose your top two choices**)

Learn about ways to help my family stay healthy

Learn how to help my family prevent weight gain

Learn about more healthful food options

Learn how to become more active as a family

Now we'd like to know a little bit about your experience using activity logs or tracking tools. For questions regarding your child's experiences, please refer to only those children who will be taking part in the America On the Move Family Program with you.

For the following questions, please select only one response by placing a check mark next to your answer.

7. Have you ever tracked your physical activity before?

Yes

No

If so, how did you do this? _____

8. Have any of your children ever had their physical activity tracked before?

Yes

No

9. Have you ever used a pedometer (also called a step counter)?

Yes

No

10. If you answered yes to the last question, on average, how often do/did you wear your pedometer (step counter)?

Every day

A few days a week

A few times per month

Less than once a month

11. Have any of your children ever used a pedometer (step counter)?

Yes

No

12. If you answered yes to the last question, on average, how often does/did your child(ren) wear their pedometer (step counter)?

Every day

A few days a week

A few times per month

Less than once a month

Now we'd like to know a little bit about how you access health-related information and which family members will be taking part in this program with you. For questions regarding your child's experiences, please refer to only those children who will be taking part in the America On the Move Family Program with you.

For the following questions, please select only one response by placing a check mark next to your answer, unless stated otherwise.

13. How often do you use the internet to get information on diet and physical activity?

Every day

A few days a week

A few times per month

Less than once a month

___ Never

14. Have you ever taken part in any health related online social networks (such as Facebook, Twitter, chat boards, etc)?

___ Yes

___ No

___ I don't think so

15. Have your children ever taken part in any online social networks (such as Facebook, Twitter, chat boards, etc)?

___ Yes

___ No

___ Not that I am aware

16. Do you expect all of the family members in your household to take part in the AOM Family Program with you?

___ Yes

___ No

17. Which family members in your household do you expect to take part in this program with you? **(please select all that apply, for children and grandparents provide the number of individuals in the space provided)**

___ Spouse or significant other

___ Children age 0-7,

___ please indicate the number of children that are in this age group

___ Children age 8-12,

___ please indicate the number of children that are in this age group

___ Children age 13 -18,

___ please indicate the number of children that are in this age group

___ Other adults (including children's grandparent(s), aunts/uncles, adult siblings (over the age of 18)

Thank You!

America On the Move Family Program Project
Phase III Participant **Post-Questionnaire**
(To be completed by one parent or guardian per household)

Thank you for participating in the America On the Move Family Program. Your feedback is very important to us to ensure we continue to deliver a program that is helpful to individuals and families alike.

This questionnaire is voluntary and anonymous.

Please complete with the same number that was provided to you by your extension agent/educator at the beginning of the program (if you do not have this information, please be sure to get it from your agent/educator prior to returning this questionnaire).

AOM Program Code Number: _____

To begin, we would like to know about your experience using the America On the Move Family Program over the last six months.

For the following questions, please select only one response by placing a check mark next to your answer, unless otherwise indicated.

1. Overall, how would you rate this program?

Excellent

Very Good

Good

Average

Poor

2. Would you recommend this program to others?

Yes

No

3. How would you rate the instructions included in your AOM Program Binder?

Excellent

Very Good

Good

Average

Poor

4. Please rate the following items in your AOM Program Binder by placing a check mark in the box:

Tips, Ideas & Tools	Excellent	Very Good	Good	Fair	Poor
Tips – 100 Ways to Cut 100 Calories					
Tips to Reduce Fat					
Tips to Reduce Portion Size					
Tips to Reduce Sugar					
Grocery Shopping 101					
100 Ways to Surround Your Family with Success					
Outdoor Activity Ideas					
Indoor Action Games					
Tips – 100 Ways to increase steps					
Just for Kids Tools					
100 Ways to Eat Healthier					
Smart Choices When Eating Out					
Kid’s Activity Converter to Steps					
Adult’s Activity Converter to Steps					
Tracking Log for Steps & Small Goals					
Home Food Environmental Assessment					
Home Activity Environmental Assessment					
Sedentary Behavior Log					
Home Purchasing Questionnaire					

5. Please rate the following America On the Move (AOM) website resources by placing a check mark in the box:

Website Resources	Excellent	Very Good	Good	Fair	Poor	Did Not Use
AOM website						
AOM online community						

6. How likely are you to continue to using the AOM Program Binder now that the program is over?

- Very likely
 Likely
 Somewhat likely
 Not likely

7. Will your child(ren) continue to use the AOM Program Binder now that the program is over?

- Very likely
 Likely
 Somewhat likely
 Not likely

8. How many times did you speak with your extension agent/educator after you started the program?

- 1 to 3 times
 4 to 6 times
 more than 6 times
 I did not speak to my agent/educator

Now we would like to learn a little about how you used the America On the Move Program tools and resources. For questions regarding your child's experiences, please refer to only those children who participated in the America On the Move Family Program with you.

For the following questions, please select only one response by placing a check mark next to your answer, unless indicated otherwise.

9. Where did you take your height and weight measurements?

At home

At my doctor's office

At my extension agent's office

other, please specify below:

10. Where did you take your child(ren)'s height and weight measurements?

At home

At my doctor's/pediatrician's office

At my extension agent's office

other, please specify below:

11. Where did your spouse/significant other take their height and weight measurements?

At home

At my doctor's/pediatrician's office

At my extension agent's office

other, please specify below:

My spouse/significant other did not participate

12. How often did the following members of your family complete their activity logs?
(Please answer by placing a check mark in the box)

	You	Your Child(ren)	Your Spouse/ Significant Other
Every day			
A few days a week			
A few times per month			
Less than once a month			
Only during the first and last month of the program			
Never			

13. How often did the following members of your family wear their pedometer (step counter)?
(Please answer by placing a check mark in the box)

	You	Your Child(ren)	Your Spouse/ Significant Other
Every day			
A few days a week			
A few times per month			
Less than once a month			
Only during the first and last month of the program			
Never			

14. Did you complete the environmental assessment?

Yes

No

15. Did you complete the Sedentary logs?

Yes

No

16. Did you complete the Home Food Purchasing Questionnaire?

Yes

No

17. How often did you reference the AOM website for information?

Every day

A few days a week

A few times per month

Once a month

Never

18. Did you use the AOM website to track your progress?

Yes

No

Did not use the site

19. Did you interact with other users on the AOM website?

Yes

No

Did not use the site

20. Did you receive daily tips from the AOM website?

Yes

No

I didn't know there were daily tips

Now we would like to learn a little about any of the small changes you implemented during this program. For questions regarding your child's experiences, please refer to only those children who participated in the America On the Move Family Program with you.

For the following questions, please select only one response by placing a check mark next to your answer, unless indicated otherwise.

21. Please indicate if the following members of your family set small change goals each month?

(Please answer by placing a check mark in the box)

	You	Your Child(ren)	Your Spouse/ Significant Other
Yes			
No			

22. Please indicate how successful the following members of your family were at achieving any or all of those goals?

(Please answer by placing a check mark in the box)

	You	Your Child(ren)	Your Spouse/ Significant Other
Very successful			
Somewhat successful			
Neither successful or unsuccessful			
Somewhat unsuccessful			
Very unsuccessful			
No goals were set			

23. What small changes did the following members of your family try while on the program?
(please select all that apply by placing a check mark in the box)

	You	Your Child(ren)	Your Spouse/ Significant Other
Increased number of daily steps			
Tried new physical activities			
Reduced amount of time spent on the computer (not including physical video games)			
Reduced amount of time watching TV			
Ate dinner at the table with other family members			
Participated in meal planning			
Participated in grocery shopping			
Did not try any small changes while on the program			
Other (please provide details below)			

24. If you selected any of the above items, which changes will you continue to implement now that the program is over? **(please select all that apply)**

	You	Your Child(ren)	Your Spouse/ Significant Other
Increase number of daily steps			
Try new physical activities			
Reduce amount of time spent on the computer (not including physical video games)			
Reduce amount of time watching TV			
Eat dinner at the table with other family members			
Participate in meal planning			
Participate in grocery shopping			
None			
Other (please provide details below)			

25. Is there anything else you would like to share with us about your experience using the America On the Move program?

Thank you!

May we have permission to contact you by phone to speak with you further about your experience using the America On the Move Family Program?

Yes

No

If you answered yes above, please indicate the best days and times of the week you would like to receive a call and a telephone number where we can reach you. Thank you!

Best days and times you can be reached _____

Telephone number _____

Appendix G: Extension Agent Questionnaire

EXTENSION AGENT SURVEY

We value your opinion and would like to gather your input regarding your experience using the America On the Move (AOM) Family Program with families in your community. Please answer the following questions regarding the America On the Move Family Program without regard to the research aspect of this project:

1. How would you rate the AOM Family Program?
 - a. Excellent
 - b. Good
 - c. Fair
 - d. Poor
 - e. Comments: _____

2. How do you think your participants would rate the AOM Family Program?
 - a. Excellent
 - b. Good
 - c. Fair
 - d. Poor
 - e. Comments: _____

3. What did you like best about the program? _____

4. What did you like least about the program? _____

5. Would you continue to offer this program to families in your community?
 - a. Yes
 - b. No, please provide details: _____

6. What would you tell your fellow Extension Agents about the AOM Family Program?

7. What additional comments and/or suggestions would you like to make about the AOM Family Program?

Thank you!!!