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The Impact of the Ohana MANA Challenge on Native Hawaiian  
and Pacific Islander Children

Kristin K. Van Tassell

A thesis submitted to the faculty of  
Brigham Young University  
in partial fulfillment of the requirements for the degree of  
Master of Science

Jane H. Lassetter, Chair  
Jonathan J. Wisco  
Lora Beth Brown

College of Nursing  
Brigham Young University

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## ABSTRACT

### The Impact of the Ohana MANA Challenge on Native Hawaiian and Pacific Islander Children

Kristin K. Van Tassell  
College of Nursing, BYU  
Master of Science

In this four-week, family-focused pilot intervention study, researchers studied the impact of culturally relevant nutrition and activity sessions on eleven children from eight Native Hawaiian and Pacific Islander (NHPI) families. Mixed methods were used in analysis. In their favorite meal drawings, children included more fruits and vegetables at week four than week one, which was consistent with their self-reported intake of healthy foods that were new to them. From week one to four, mean total scores increased on the nutrition and exercise knowledge exercise questionnaire and the physical activity self-efficacy tool; however, the mean total score decreased on healthy diet self-efficacy tool, and two children moved to less healthy BMI categories. This is the first study on the impact of a family intervention on nutrition and healthy activity for NHPI children. Further studies are needed with larger samples and longer duration to determine the most helpful intervention for NHPI families.

Keywords: childhood obesity, family intervention, nutrition, physical activity, Pacific Islanders

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## Introduction

Native Hawaiian and Pacific Islanders (NHPIs) are among the populations in the United States (U.S.) at greatest risk for overweight (body mass index [BMI]  $\geq 25$ ), and obesity (BMI  $\geq 30$ ; Centers for Disease Control and Prevention, 2013). In a recent study, 84.3% of the NHPI sample was overweight or obese (Duncan et al., 2014), which contributes to many non-communicable diseases, such as dyslipidemia, hypertension, coronary heart disease, stroke, cancer, sleep apnea, osteoarthritis, liver disease, and type 2 diabetes (Centers for Disease Control and Prevention, 2013).

NHPI children are also at risk for being overweight. Children in the U.S. of all ethnicities, ages 10 to 17 years, have an overweight rate of 32% and an obesity rate of 16%. By comparison, NHPI children in the U.S., have the highest overweight prevalence rate at 44%, with an obesity rate of 21% (Singh & Kogan, 2010). These increased overweight and obesity rates place NHPI children at greater risk than their peers for developing many childhood non-communicable diseases and psychosocial disorders, such as hypertension, hyperlipidemia, type 2 diabetes, asthma, orthopedic complications, liver disorders, low self-esteem, and depression (Robinson, Geier, Rizzolo & Sedrak, 2011).

Furthermore, Utah, one of seven states with the largest populations of NHPIs (U.S. Department of Health & Human Services, Office of Minority Health, 2011), has an overall obesity rate of 23.4% (Levi, Segal, St. Laurent, & Kohan, 2011), but Utah's NHPI obesity rate is more than double, at 50.9% (Utah Department of Health, 2011). NHPIs in Utah have significantly higher BMIs than NHPIs in Hawaii ( $p = 0.017$ ; Duncan et al., 2014).

Efforts to improve nutrition and activity among the NHPI community in Utah have begun. The Queen Center, a non-profit, community-based organization established in 2003 by

Joyce and Sale AhYou, is committed to improving the health of NHPIs in Utah. Towards this goal, they developed the “MANA Challenge,” a nutrition and activity program. Inspired by the Hawaiian word *Mana*, meaning strength, MANA stands for **M**ovement, **A**wareness, **N**utrition, and **A**ction (Queen Center, 2014). Prior to this study, four groups of adults have participated in the MANA Challenge with positive anecdotal results; however, children have not been included, and the effectiveness of the program has not been studied.

For the purpose of this study, NHPI families with children were included in the MANA Challenge. NHPIs have strong cultural and family values, and are more likely to participate in nutrition and activity interventions if family members are involved and cultural values and traditions are incorporated (Fujita, Baun, & Hughes, 2004; Lassetter et al., 2014). In addition, children learn a healthy lifestyle through observation and modeling, direct instruction, and experiences with their surroundings (Lanigan, 2010). Thus, we chose to include parents and children in the MANA Challenge and focused on the children’s outcomes, modifying the intervention’s title to Ohana MANA Challenge. Our purpose was to assess the impact of the Ohana MANA Challenge on NHPI children’s BMI percentiles, self-efficacy and knowledge of nutrition and physical activity, and their dietary and activity patterns.

## **Background**

### **Health Disparities Related to Obesity**

The high overweight and obesity prevalence among NHPIs have contributed to poor health related to non-communicable diseases, including cardiovascular disease, hypertension, stroke, asthma, arthritis, and type 2 diabetes (Bitton, Zaslavsky, & Ayanian, 2010; U.S. Department of Health & Human Services, Office of Minority Health, 2011). Cardiovascular disease is the most frequent cause of death in the NHPI population, accounting for 55% of



deaths. Furthermore, the cardiovascular disease mortality rate is nearly four times higher in NHPIs that are diagnosed with type 2 diabetes compared to those without diabetes (Aluli et al., 2010).

The incidence rate of type 2 diabetes in the NHPI population is among the highest in the world (WHO, 2010). In the United States, 23.7% of NHPIs are diagnosed with type 2 diabetes, which can lead to many complications including coronary artery disease, hypertension, atherosclerosis, neuropathy, nephropathy, and retinopathy (American Diabetes Association, 2012; U.S. Department of Health and Human Services, Office of Minority Health, 2011). In Utah, the statewide prevalence of diabetes (6.9%) is less than half the NHPI prevalence of type 2 diabetes (13.7%) in the state (Utah Department of Health, 2011).

### **Childhood Obesity**

Among U.S. children, early onset obesity is associated with an increased rate of obesity in adolescence. In a recent study, 14.9% of kindergarteners were overweight, and 12.4% were obese. By the eighth grade 17.0% of these same children were overweight, and 20.8% were obese (Cunningham, Kramer, & Narayan, 2014). Compared to their normal weight peers, overweight kindergarteners were four times more likely to become obese by eighth grade (Cunningham et al., 2014).

In addition to the previously stated risks associated with childhood overweight and obesity, these children are at a greater risk for obesity in adulthood, which contributes to chronic health disparities (Centers for Disease Control and Prevention, 2012). Children who develop chronic diseases in childhood are at risk for a decrease in both quality of life as adults and life expectancy (Shabbir, Kwan, Wang, Shih, & Simon, 2010).

### **Causes of Obesity**

Poor nutrition and a sedentary lifestyle contribute to NHPs' health disparities related to obesity. Only 17% of NHPs are consuming more than five fruits and vegetables a day (Moy, Sallis, & David, 2009), and for many NHPs, their traditional diet has been replaced by a high calorie, low nutrient diet from imported foods (WHO, 2010). Lassetter et al. (in review) found many NHPs have difficulty interpreting nutrition facts labels, which might contribute to poor nutrition.

Additionally, despite widespread knowledge that physical activity can prevent many serious diseases, most NHPs do not participate in physical activity on a regular basis. A study measuring NHPs' activity levels found the majority were not involved in regular physical activity, and they did not plan to change in the next six months. Participants identified barriers to activity as a lack of self-discipline, interest, companions, energy, and time (Moy, Sallis, Ice, & Thompson, 2010). Among NHP children, Oliver et al. (2010) found an association between obesity and sedentary behaviors, such as excessive television viewing and participation in gaming systems.

### **Previous Exercise and Nutrition Interventions**

There have been few intervention studies for lifestyle changes among NHPs, and they focus primarily on adults. The Uli'eo Koa Program, or Warrior Preparedness Program, was one of the first community intervention programs developed to improve Native Hawaiians' health. A traditional Hawaiian diet was combined with a traditional exercise program for a group of non-obese, moderately active Native Hawaiian adults. Similar to meals eaten by their Hawaiian ancestors, the meals provided were high in complex carbohydrates, low in dietary fat, and low in protein. The exercise program included a traditional Hawaiian fighting art once used to train

Native Hawaiian warriors. Cultural values and traditions were woven throughout the intervention. The intervention began with three weeks of twice daily exercise classes and meals. Then meals were no longer provided, and exercise classes were decreased to two to three times per week for an additional eight weeks. For the remainder of the study year, participants maintained their own physical activity and dietary intake. At the end of the first 12 weeks of the study, muscles strength, flexibility, weight, and BMIs had improved from baseline measurements (Hughes, 2001; Leslie, 2001).

The Hawaii Community Resource Obesity Project was a lifestyle enhancement program conducted by the Wai'anae Coast Comprehensive Health Center in 2009. This was a multi-disciplinary program focused on morbidly obese participants, 58% of whom were Native Hawaiian (Bradley, Beckham, & Washburn, 2009). The program included physical activity, nutrition education, and behavioral counseling over 12 months. During the 12 month study, the control group had an average 8.0 pound weight gain, but the intervention group had an average weight loss of 4.1 pounds ( $p = <0.001$ ) (Bradley et al., 2009). Although the difference between groups was statistically significant, a four pound loss over one year in a morbidly obese sample is not likely to be clinically significant.

Fotu et al. (2011) conducted the Ma'alaha Youth Project (MYP), an intervention focusing specifically on Tongan adolescents in Tonga. For three years they promoted healthy eating and regular physical activity through community activities, including nutrition workshops, community gardens, and a wide variety of physical activity options. MYP improved community awareness of healthy behaviors; however, despite their multi-level efforts, participants exhibited little change in their activity and nutrition habits (Fotu et al., 2011).

Coppell et al. (2009) conducted a two-year community intervention in New Zealand aimed at diabetes prevention among indigenous Maori adults. Health promotion activities combined with community nutrition education and exercise classes dramatically decreased the overall insulin resistance in participants, decreased the diabetes rate by 2% ( $p = 0.003$ ), and decreased the female participants' mean BMI from baseline ( $M = 33.6, s.d. = 8.6$ ) to completion of the two-year intervention ( $M = 32.1, s.d. = 7.3$ ). However, male participants' mean BMI slightly increased from baseline ( $M = 31.7, s.d. = 5.4$ ) to the end of the intervention ( $M = 32.3, s.d. = 6.4$ ; Coppell et al., 2009).

In another New Zealand study, Pacific Islander adult participants, with an average baseline BMI of 36.3, experienced improved cardiorespiratory health after a four-week intervention, which involved 45 minutes of physical activity at least three times a week. Height and weight were not re-measured post intervention; however, from baseline to post intervention, oxygenation improved ( $p = 0.003$ ), and high density lipoproteins (HDL) significantly increased ( $p = 0.02$ ; Biddle et al., 2011).

The PILI 'Ohana Project, based in Hawaii, was a 12-week weight loss intervention aimed at diabetes prevention among NHPs. Participants were encouraged to eat a healthy diet and walk briskly at least 150 minutes per week. The intervention included eight classes that incorporated NHP cultural values with the National Diabetes Prevention Program Lifestyle Intervention (DPP-LI) curriculum. The DPP-LI curriculum includes tips for managing stress, staying motivated, safely increasing activity, and making healthy food choices. Significant improvements from baseline were made in participants' mean weight (-1.8 kg; 95% CI -2.3 to -1.3), systolic blood pressure (-6.0 mmHg; 95% CI -8.5 to 3.5), physical function (+42 ft. traveled

during a 6 minute walking test; 95% CI 25 to 28) and mean dietary fat intake (-0.27 points; 95% CI -0.37 to -0.22; Mau et al., 2010).

### **Rationale for Our Study**

The aforementioned studies provide important background information for our intervention. Review of these previous studies suggests a need for culturally appropriate interventions to assist in decreasing Utah's NHPI overweight and obesity prevalence. Furthermore, programs that allow NHPI families to learn and be physically active together provide children an opportunity to mirror their parents' efforts to improve their nutrition and increase their physical activity. Thus, the Ohana MANA Challenge was developed to address the need for a nutrition and activity intervention for NHPI families in Utah. This article focuses on the results from the children who participated in the intervention.

### **Methods**

#### **Recruitment, Inclusion Criteria, and Setting**

Participants were recruited through the Hawaiian Cultural Center in Midvale, Utah, the MANA website, and by word of mouth. Inclusion criteria were: 1) self-identify as NHPI, 2) be free of known heart disease, and 3) have NHPI family members willing to participate in the study, including at least one child 5-17 years of age. All qualifying families, who were available on the days the sessions were held, participated.

The intervention and data collection took place at the Hawaiian Cultural Center in Midvale, Utah during four consecutive Saturdays beginning early March 2013. A reunion event was held four weeks post intervention, for final data collection.

**Procedure**

When recruits asked about our program, we explained the purpose of our study and what participation would involve. For those who expressed interest, we answered any questions and then asked them to sign a consent form for adult participants (ages 18 years and older) for themselves and their children. Children (ages 8-17 years) were asked to sign an assent form.

Data were collected at the beginning of the first and fourth sessions. To maintain respect and confidentiality for participants, heights and weights were measured in a private room. Each child participant's height was measured with shoes removed, and his/her back to Seca 213 Stadiometer. Each child participant was weighed fully clothed without shoes on a digital Seca 803 scale at least twice, three times if the first two measurements differed. The weights were averaged and then used to determine their growth chart percentiles.

Demographic data were also gathered at the beginning of the first and fourth sessions. Child participants completed a demographics questionnaire and a questionnaire on self-efficacy related to nutrition and activity and their knowledge of nutrition and exercise. Children were asked to draw their favorite meal on the first and fourth weeks of the intervention. We also collected weekly data from children about their physical activity, healthy habits, and efforts to try new nutritious foods.

For optimal NHPI involvement, NHPI community leaders at the Queen Center established four weeks as the most appropriate duration for the intervention; therefore, our intervention consisted of four weekly classes and activities, lasting ninety minutes each. A reunion session was held four weeks later. During the first 30 minutes we discussed nutrition and self-efficacy topics with the adults, and children participated in their own nutrition class. An example of a learning activity in the children's class was inviting them to draw pictures of their

favorite meals, followed by a group discussion about My Plate and the importance of colorful meals. Each child was given a proportion plate based on My Plate to help them determine appropriate serving sizes at home.

During the next 30-45 minutes of each weekly session, families participated in a physical activity together, such as Zumba, jump rope, and relay races. The remaining time was spent eating a healthy meal as researchers, NHPI facilitators, and participants visited together discussing nutrition, gardening ideas, and healthy activity.

### **Instruments**

Most questionnaires were based on literature review and 5<sup>th</sup> grade physical education standards and were originally used at Anatomy Academy, a school-based health and science intervention program that originated at University of California, Los Angeles, where they were assessed for face validity (Mageno et al., 2014). We modified these questionnaires slightly to fit our context. Only the healthy diet self-efficacy questionnaire was developed for the Ohana MANA Challenge. It was based on literature review and assessed for face validity.

**Demographics.** Questionnaires collected data on demographics, dietary and exercise behaviors, self-efficacy, and knowledge of nutrition and physical activity. Demographic questions for children included gender, age, ethnicity, household members, number of years lived in their current home, and how long they have lived in the U.S.

**Self-efficacy questionnaires.** Children were given two self-efficacy questionnaires, containing eight questions each. These instruments assessed their self-efficacy related to physical activity and healthy diet. Our healthy diet self-efficacy questionnaire consisted of eight items. Total score possibilities ranged from 8 to 40 with higher scores reflecting a greater sense of self-efficacy. An example question is “I feel confident I can eat healthy foods.” The five

response options were “Yes,” “sort of,” “not really,” “no,” and “I don’t know.” The physical activity self-efficacy questionnaire also consisted of eight items, with total score possibilities ranging from 8 to 40 with higher scores reflecting a greater sense of self-efficacy. An example question is “I can exercise even if there is no gym or exercise equipment around.” The response options were the same as the healthy diet self-efficacy tool.

**Nutrition and exercise knowledge questionnaire.** Children also completed a 10-item nutrition and exercise knowledge questionnaire. These questions were in a multiple choice format. Responses to each item were scored as either correct or incorrect. Total score possibilities ranged from 0 to 10 with higher scores reflecting a greater knowledge. The quiz included questions such as: “What happens when a person eats as many calories as they burn?” The response options were “a. the person loses weight, b. the person gains weight, c. the person’s weight stays the same, d. the person could lose weight or gain weight.” To assess application of nutrition knowledge in a different way, researchers kept the pictures children drew of their favorite meals the first and fourth weeks of the intervention.

**Diet and physical activity.** Dietary and physical activities were assessed with questions about the family’s food serving practices and patterns of physical activity. Additional questions were asked specifically to the children, assessing their nutrition and physical activity behaviors. These questions were a mixture of both open ended and multiple choice questions. Questions such as: (a) “How do you define the word “junk food,” (b) “How many times did you eat junk food yesterday,” and (c) “Are you involved in some kind of organized physical activity i.e. sports, dance, gymnastics, martial arts?” Children were also asked how they rated their health and strength according to a Likert-type scale with six response options, one being very healthy (or strong) to six being very unhealthy (or weak).



**Weekly activity and healthy diet questionnaires.** Lastly, on weeks two to four of the Ohana MANA Challenge, children completed an open ended questionnaire on nutrition and physical activity. Example questions include: “Did you try a new healthy food this week that you have never had before. If so what was it?” And “What was the most fun physical activity you participated in this week?”

### **Data Analysis**

Quantitative data were entered in SPSS and cleaned. Descriptive statistics were run and reported. Pre post comparisons were conducted using Wilcoxon signed ranks tests. Children’s measured heights and weights were entered into the Centers for Disease Control and Prevention’s (n.d.) BMI calculator for children and teens to determine their BMI percentiles and categories.

Qualitative data, such as free responses to weekly questionnaires and the children’s drawings of their favorite meals were analyzed using qualitative research methods. Responses were read and independently coded with descriptive codes to identify and label segments with topical similarities. Drawings were analyzed for types and variety of foods children included in their favorite meals and any differences from week one to week four of Ohana MANA Challenge.

## **Results**

### **Sample Description**

Our sample included 11 children from the 8 NHPI participant families. There were eight male participants ranging from 5 to 14 years of age, and three female participants ranging from 6 to 8 years of age. The mean age for both male and female participants was 8.2 years (*s.d.* = 2.5). Six children identified themselves as Hawaiian, one as Tongan, two as Samoan, three as White,

and two as “other.” Some children selected more than one ethnicity, which explains why the number of chosen ethnicities is greater than the number of participants. For demographic information see table 1.

### **BMI Percentile**

From week one to week four, changes in children’s BMIz scores ranged from -.13 to .61 ( $M = .09$ ,  $s.d. = .22$ ). According to the Wilcoxon signed rank test, there was no significant difference in BMIz scores from week one to week four ( $p = .122$ ). For BMI percentile information, see table 2.

### **Self-Rated Health and Strength**

Children were asked how they viewed their overall health and strength. Lower scores indicate a more positive response. Results showed an improvement in the children’s responses to their overall health at week one ( $M = 2.30$ ,  $s.d. = 1.25$ ) to week four ( $M = 1.70$ ,  $s.d. = 0.48$ ) and strength at week one ( $M = 2.10$ ,  $s.d. = 0.99$ ) to week four ( $M = 1.90$ ,  $s.d. = 0.57$ ). Wilcoxon signed rank tests were run on pre and post perceptions of health and strength, neither were significant ( $p = .119$  and  $p = .527$  respectively).

### **Healthy Diet Self-Efficacy**

The mean total score on the healthy diet self-efficacy questionnaire decreased from week one ( $M = 34.2$ ,  $s.d. = 4.39$ ) to week four ( $M = 32.9$ ,  $s.d. = 6.9$ ). According to the Wilcoxon signed rank test, there was no significant difference in healthy diet self-efficacy from week one to week four ( $p = .340$ ). Item by item analysis of responses on the healthy diet self-efficacy questionnaire revealed only two questions showed a decrease in self-efficacy: “I feel confident I can eat healthy foods” decreased from week one ( $M = 4.8$ ,  $s.d. = 0.40$ ) to week four ( $M = 4.3$ ,  $s.d. = 1.32$ ) and “When I snack, I can choose something healthy rather than sweets or junk food”

decreased from week one ( $M = 4.4, s.d. = 0.92$ ) to week four ( $M = 4.0, s.d. = 1.15$ ). Items with the largest increases in the means over the course of the Ohana MANA Challenge included: “I can eat the right amounts of dairy, proteins, fruits, vegetables, and grains each day,” which increased from week one ( $M = 4.2, s.d. = 0.75$ ) to week four ( $M = 4.6, s.d. = 0.73$ ), and “I can make healthy food choices when I eat away from home,” which increased from week one ( $M = 3.8, s.d. = 1.4$ ) to week four ( $M = 4.3, s.d. = 0.71$ ).

### **Physical Activity Self-Efficacy**

The mean total score for the physical activity self-efficacy questionnaire increased from week one ( $M = 33.7, s.d. = 5.2$ ) to week four ( $M = 34.0, s.d. = 4.27$ ). According to the Wilcoxon signed rank test, there was no significant difference in physical activity self-efficacy from week one to week four ( $p = .686$ ). Item by item analysis of responses on the physical activity self-efficacy questionnaire showed that two questions had a decrease in the means over the course of the intervention. “My family exercises together” decreased from week one ( $M = 3.5, s.d. = 1.12$ ) to week four ( $M = 3.1, s.d. = 1.10$ ), and “Many people around me exercise,” decreased from week one ( $M = 3.6, s.d. = 1.2$ ) to week four ( $M = 3.4, s.d. = 1.4$ ). Two questions, “I feel confident about exercising,” ( $M = 4.81, s.d. = .40$  to  $M = 5.0, s.d. = .00$ ) and “I can exercise even if there is no gym or exercise equipment around,” ( $M = 4.63, s.d. = 1.2$  to  $M = 5.0, s.d. = .00$ ) were answered with 100% of participants rating themselves at a 5, the highest possible mark, on week four of the intervention.

### **Nutrition and Exercise Knowledge**

According to children’s responses on the nutrition and exercise knowledge questionnaire, there was an improvement in their knowledge of nutrition and exercise. The mean total score increased from week one ( $M = 5.8, s.d. = 2.04$ ) to week four ( $M = 7.4, s.d. = 1.96$ ). According

to the Wilcoxon signed rank test, there was no significant difference in children's scores on the nutrition and exercise knowledge questionnaire from week one to week four ( $p = .075$ ).

### **Dietary Patterns**

Children may have improved their diet according to their self-reported intake of fruits, vegetables and junk food. Children reported eating one to two servings of fruit and vegetables a day at week one; this range widened to zero to six servings at week four. Children described junk food as “bad not healthy,” “unhealthy food like chips and soda,” and “foods that have lots of sugar like candy.” The children's definition of junk food did not change over the course of the intervention; however, the amount of junk food decreased that they reported eating. All children reported eating some junk food, but the range of junk food consumption changed from one to five times per day at week one to one to two times per day at week four.

There was an increase in the number of children trying new healthy foods. At the second week, two children (18%) tried a new healthy food during the preceding week, but by the fourth week, four children (36%) tried a new healthy food during the preceding week. Their new healthy foods included broccoli, carrots, salmon, spinach, beans, celery, tomatoes, edamame (green soybeans), humus, and crackers. On weeks two and three of the Ohana MANA Challenge, six children reported using the plate portioned according to “My Plate,” which we gave them on the first week of the intervention. However, by the fourth week, only two participants were still using the plate. Finally, more than 50% of participants were eating as a family around the table more than five times a week on all three weekly questionnaires.

**Children's drawings of their favorite meals.** On the first week of the Ohana MANA Challenge, seven children drew favorite meal pictures and gave them to us. On the last week of the intervention, eight children, including all of the seven children who drew pictures at week

one, drew favorite meal pictures and gave them to us. On the first week, five of seven participants included pizza in their favorite meal, compared to one of eight participants who included pizza in his/her favorite meal drawing on week four. Additionally, on week four, all eight children included fruit in their favorite meal drawings, and there was increase in appearance of vegetables in their drawings from week one (one out of seven participants) to week four (five out of eight participants). Soda pop was the most frequently drawn beverage on week one (three of seven participants), compared to milk being the most frequent beverage drawn on week four (three of eight).

### **Physical Activity Patterns**

According to the children's free responses on questionnaires given on weeks two to four, only one participant reported exercising with his/her family on all three weeks. At week two, five participants exercised three or more days of the week; however, by week four, only three participants were still exercising three or more times a week. Participants reported their physical activities were jumping on the trampoline, jumping rope, running, tumbling, participating in relay races, and playing sports, such as football, basketball, and volleyball. The types of activities did not change from week two to four. Five participants reported participating in an organized recreational activity, which included tumbling, soccer, and basketball.

### **Discussion**

The results of our pilot study build upon results of earlier NHPI interventions, such as the Uli'eo Koa Program and the PILI 'Ohana Project. As in these earlier studies, our intervention incorporated the NHPI culture, values and traditions. However, we included children, not just adults, in the Ohana MANA Challenge to encourage families to participate together and improve

their nutrition and activity as they provided a natural support system for each other. Participating together as a family was valued by all of our adult participants.

After an extensive search of the literature aided by a professional librarian specializing in nursing, we were unable to find any other family-oriented NHPI interventional studies that involved children. We were, however, able to find a few family studies in other ethnicities that focused on the children's responses and results.

### **BMI Percentile**

We were unable to decrease the weight of children in our sample who were overweight or obese. This might be due to the short duration of our study and/or to uncontrollable factors, such as possible growth spurts during our intervention. Other family-oriented intervention studies that were successful in decreasing children's BMI percentiles lasted three months or longer, and some met more than once a week (Barkin, Gesell, Po'e, Escarfuller, & Tempesti, 2012; Coppins et al., 2011; Siwik et al., 2013; Vos, Huisman, Houdijk, Pijl, & Wit, 2011; Watson-Jarvis, Johnston, & Clark, 2011; Weigel et al., 2008). If we had extended the length of our pilot study from 4 weeks to 12 weeks or longer or met more than once a week, we might have been more effective in helping the overweight and obese children lose weight.

### **Self-Rated Health and Strength**

Children who participated in our study perceived an improvement in their overall health and strength over the course of the Ohana MANA Challenge. Although other family-oriented studies did not examine self-rated health and strength, two studies examined somewhat similar concepts. Watson-Jarvis et al. (2011) found an increase in their child participants' self-esteem and quality of life associated with decreasing BMI percentiles. Similarly, Vos et al. (2011) found a significant improvement in their child participants' health-related quality of life

associated with a significant decrease in BMI percentiles after a three-month intervention incorporating physical, nutritional, and psychological elements.

### **Healthy Diet Self-Efficacy**

Our child participants' healthy diet self-efficacy decreased from week one to week four of our intervention. This decrease might be due in part to the knowledge children gained about the components of a healthy diet as they participated in the Ohana MANA Challenge. Their new knowledge might have caused them to feel somewhat overwhelmed and less sure of their ability to eat nutritiously than they felt at week one before they learned more about what it takes to eat nutritiously. No other study was located that examined children's self-efficacy related to healthy eating.

### **Physical Activity Self-Efficacy**

In contrast, our child participants' physical activity self-efficacy increased from week one to week four. This increase might be due in part to exposure to the physical activities they participated in during the Ohana MANA Challenge and/or to the coming of spring. Because our intervention began in March, the weather was changing from the chill of winter to the warmth of spring, which might have made children feel more able to play outdoors. Another study examined self-efficacy related to physical activity. In their family-oriented, internet-based intervention, Delamater et al. (2013) found improvements in child participants' self-efficacy, motivation, physical activity, and healthy lifestyle behaviors.

### **Dietary Patterns**

Previous studies suggest family-oriented interventions are a feasible way to incorporate a healthy diet into children's regular routine. The Fit and Healthy Family Camp Pilot Study found child participants ate more fruits and vegetables, more dairy products, more rice and beans, and

less soda and high sugar beverages at the end of their intervention than they had at baseline (Weaver et al., 2014). Other studies found improved eating habits (Teder et al., 2013), less junk food consumption (Coppins et al., 2011), and increased water intake (Siwik et al., 2013) among child participants. Similarly, children in the Ohana MANA Challenge reported an increase in trying new healthy foods and included more fruits and vegetables and fewer soda beverages in their favorite meal drawings at week four than they did at week one. Combined, these studies suggest that family-focused interventions can influence meaningful dietary changes in children.

### **Physical Activity Patterns**

Despite an increase in our participants' physical activity self-efficacy, their participation in physical activity outside Ohana MANA Challenge did not increase from week one to week four. Our results are different than other family-oriented physical activity interventions of longer duration. Coppins et al. (2010) involved obese or overweight European children in two four-hour workshops on nutrition, physical activity, psychological well-being, and behavioral changes along with twice weekly physical activity sessions. After their one year intervention, children reported an increase in the total weekly minutes of moderate activity (Coppins et al., 2010). In Teder et al.'s (2013) family-oriented intervention, Swedish children and their parents participated for one year in tutoring sessions that encouraged healthy habits, good nutrition, regular physical activity, and psychological well-being. Children and their parents reported an increase in the children's level of physical activity post intervention (Teder et al., 2013). If our intervention had a longer duration, we likewise might have seen an increase in children's physical activity, which in turn might have had an impact on their BMI categories. Furthermore, tracking screen time and other sedentary behaviors might have been informative in our study. After their eight healthy living workshops, Weaver, Kelley, Griggs, Weems, and



Meyer (2014) found children of various ethnicities reported less screen time but an increase in other sedentary activities. In contrast, Backlund, Sundelin, and Larsson (2011) found no change in energy expenditure, screen time, or physical activity of children of various ethnicities after their one-year intervention aimed at improving food habits and increasing physical activity.

### **Strengths and Limitations**

The Ohana MANA Challenge had some important strengths. First, we incorporated NHPI culture, values, and traditions throughout the intervention by including foods and activities consistent with healthy cultural traditions. Second, with the help of community partners, our intervention evolved from an existing NHPI program for adults to include entire families. To our knowledge, we are the first to study the impact of a family-oriented nutrition and physical activity intervention on NHPI children.

Our results show promise; however, there are some limitations to our study. First, due to our small sample size, it is difficult to assess the significance of our findings. All of the statistical tests comparing values pre and post intervention were nonsignificant, likely because the tests were underpowered from our small sample. Second, without a control group, it is difficult to interpret if the improvements participants made were the result of our intervention or outside factors. Third, our intervention was a fairly short duration, lasting four weeks; this might not have been long enough to see lifestyle improvements or solidify enduring lifestyle changes. Finally, without involving NHPI groups in the Pacific islands, we cannot know if our results are transferable outside of the mainland U.S. However, our pilot study does provide an important first look at the impact on NHPI children from a family-oriented intervention on activity and nutrition.

**Recommendations for Future Interventions and Studies**

We recommend including multiple family members in future nutrition and physical activity intervention studies for NHPI and other family-oriented cultures. Including multiple family members attracted participant families to our intervention. Additionally, our participants expressed appreciation for incorporation of cultural values and traditions; other cultural groups might likewise appreciate inclusion of their cultural values and traditions. We also suggest increasing the sample size to allow for higher level statistical analysis and increasing the duration of the intervention to determine if more improvements could be identified with more time. Finally, we recommend similar nutrition and physical activity interventions in the Pacific islands and other mainland U.S. sites to allow comparison of findings between groups.

**Conclusion**

NHPI children have one of the highest rates of overweight and obesity of all ethnic groups. This obesity epidemic contributes to many non-communicable diseases and an increased rate of morbidity and mortality. It is imperative to reverse the obesity trend in this population to improve NHPI children's health and well-being.

Our study adds to the body of knowledge on nutrition and physical activity interventions for NHPI communities. We believe it is the first to examine the impact of a family-oriented intervention on NHPI children. Our results are encouraging. By involving families in interventions like the Ohana MANA Challenge, their present and future can be healthier through increased activity and improved nutrition.

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### Appendix

Table 1

#### *Demographic Information & Descriptive Statistics*

Characteristic	n %	M		Range in years
		years	SD	
<b>Ethnicity</b>				
Hawaiian	6 (54.5)			
Pacific Islander	0			
Tongan	1 (9)			
Samoan	2 (18)			
Asian	0			
White	3 (27)			
Other	2 (18)			
<b>Gender</b>				
Male	8 (73)			
Female	3 (27)			
<b>Age</b>				
		8.2	2.5	
Male				5-14
Female				6-8

Table 2

*BMI Categories*

BMI Percentile Category	Week 1 n (%)	Week 4 n (%)
Underweight (< 5)	2 (18%)	
Normal weight (5 - 85.9)	5 (45%)	4 (44%)
Overweight (85 - 94.9)		
Obese (>95)	4 (36%)	5 (56%)