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The Steps to Growing Up Healthy Study: Barriers to Initial Behavior
Change in a Primary Care Based Obesity Prevention/Reversal
Program for Young Children

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The Steps to Growing Up Healthy Study: Barriers to Initial Behavior Change in a Primary Care Based Obesity Prevention/Reversal Program for Young Children

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Abstract

BACKGROUND: Children of color are disproportionately affected by obesity creating a need for effective prevention/reversal programs. This study investigated a first dose response to a pediatric primary care-based obesity prevention program (*Steps to Growing Up Healthy*) targeting Hispanic and Black children. We examined whether mothers experienced barriers to behavior change and if maternal, child, environmental, or intervention variables predicted barrier status.

METHODS: Hispanic and Black mothers and their children (N=234; 51%F; 88.9% Hispanic; 35.4±8.7months) were recruited from an urban pediatric primary care clinic. The intervention utilized brief motivational counseling delivered by clinicians and nurses with the goal of decreasing obesogenic behaviors. During a routine clinic visit, the medical team facilitated the selection of a specific goal (e.g., reduce SSB) that was meaningful to the mothers and taught mothers simple behavioral strategies (e.g., self-monitoring). Study staff conducted follow-up telephone calls 5-7 days after the visit, reviewed the selected goal, and assessed whether the mother experienced a barrier to behavior change.

RESULTS: 16.8% of mothers reported a barrier to behavior change in the week following the first intervention dose. Logistic regression models identified mother's confidence ($p<.05$) and child sex ($p<.01$) as predictors of barrier status. Mothers who were "somewhat" or "not confident" were 6.21 times more likely to report a barrier than mothers who were very confident and mothers were 0.351 times more likely to identify a barrier if their child was male.

CONCLUSION: Obesity prevention/reversal programs may be well served to address maternal confidence levels especially with regard to changing their son's obesogenic behaviors.

The Growing Up Healthy Study: Barriers to Initial Behavior Change in a Primary Care Based Obesity Prevention Program for Young Children

Obesity is a major public health threat in the U.S. where an estimated 66% of adults are overweight [BMI ≥ 25 kg/m²] and 33% of adults are obese [BMI ≥ 30 kg/m²] (Flegal, Carroll, Ogden, & Curtin, 2010). The health risks associated with obesity are numerous including coronary heart disease, type 2 diabetes, cancer, stroke, and hypertension (Kopelman, 2007; National Heart Lung and Blood Institute, 1998). What may be more alarming is the continued rise in obesity prevalence among children. In the U.S., it is estimated that 16.2% of children and adolescents aged 2-19 years are obese (BMI $\geq 95^{\text{th}}$ percentile) and an additional 30.4% are overweight (BMI = $\geq 85^{\text{th}} < 95^{\text{th}}$ percentile) (Ogden, 2012). This burden is not shared equally and health disparities in overweight and obesity prevalence have been identified for Hispanic and non-Hispanic Black children and adolescents with obesity rates greater than 20% in both groups (Ogden et al., 2012). Recent trends suggest disparities in obesity have not improved in the past decade (Rossen & Schoendorf, 2012) and may be due to differential access to healthful nutrition (Watt, Appel, Roberts, Flores, & Morris, 2013), physical activity spaces (Carroll-Scott, et al., 2013), health care, and other resources that facilitate the growth and health of children and adolescents (Thompson & Bentley, in press). Parenting practices might also play a role. For example, parental time constraints, permissive feeding styles, unhealthful food preparation practices, and lack of knowledge about nutrition have been shown to set the stage for obesity development among Mexican children (Rodriguez, et al., 2011).

Given these well-documented disparities and the projection that the current generation of children will have a shorter life expectancy than their parents due to the comorbidities of

excessive weight (Catenacci, Hill, & Wyatt, 2009; Ludwig, 2007), prevention and intervention strategies that reach high-risk children are urgently needed. The Steps to Growing Up Healthy Study is a project designed specifically to prevent/reverse obesity in young children of color. This study is testing a pediatric primary care-based intervention that uses a motivational interviewing framework (Brief Motivational Counseling; BMC) delivered by a primary care clinician and/or nurse to form partnerships with families with the goal of reducing obesogenic behaviors. Primary care pediatricians could play a critical role in childhood obesity prevention because of continuity of care and the opportunity for health care providers to maintain motivation by providing frequent feedback on progress as well as suggesting behavioral changes (Taveras, Gortmaker, Mitchell, & Gillman, 2008). The Steps to Growing Up Healthy Study is investigating whether a primary care-based approach can successfully prevent/reverse obesity in young Black and Hispanic children. Briefly, at every routine clinic visit, mothers and their medical provider are encouraged to select a specific nutritional and/or physical goal(s) that will have an impact on the child's weight from a list of key behaviors (i.e., reduce milk to 1%, decrease the amount of milk and/or juice consumed, eliminate all sugar sweetened beverages, decrease amount of TV watched, and increase amount of physical activity). The mother then works towards this goal until her child's next primary care visit. Child weight change over the one-year intervention period is the primary outcome of the larger, ongoing study.

The aim of the present study was to investigate the initial response to the first dose of this intervention; specifically, we examined how many mothers reported a barrier to behavior change in the first week following the initial dose of the intervention and whether experiencing a barrier

was associated with any maternal (e.g., stress, depression), child (e.g., gender, age, BMI), family environment (e.g., number of people in the household), or intervention level (e.g., goal selected) variables. Early identification of barriers to implementation may help tailor the delivery of this type of intervention to high-risks groups in the future. Previous research has suggested that maternal stress and depression, heavier weight status of the child, mother's feeding style, and absence of self-monitoring are predictive of poor outcomes (Chang, Nitzke, Guildford, Adair, & Hazard, 2013; Hughes, Power, Orlet Fisher, Mueller, & Nicklas, 2005; Kitscha, Brunet, Farmer, & Mager, 2009; Setse, Grogan, Cooper, Strobino, Powe, & Nicholson, 2007; Zabinski, Saelens, Stein, Hayden-Wade, & Wilfley 2003). Based on this literature as well as our own observations, we hypothesized that mothers who report experiencing a barrier to behavior change will 1) have higher levels of stress, depression, be unemployed, single, have lower confidence and/or be Spanish speaking than mothers who do not report a barrier(s); 2) will be more likely to have a child who is overweight (BMI $\geq 85^{\text{th}} < 95^{\text{th}}$ percentile) or obese (BMI $\geq 95^{\text{th}}$ percentile) compared to normal weight; have a child who is older (i.e., closer to the age of 4 years); and will have an indulgent and/or uninvolved feeding style; 3) will have more people living in their households and be more food insecure than mothers who do not report barrier(s) and; 4) will have chosen a nutritional goal (e.g., decrease amount of juice consumed versus increase activity); have questions about materials given to them and will not have used the study calendar to keep track of their goal(s).

Methods

Participants

254 mothers and their children (see Table 1) were recruited from the Primary Care Center (PCC) at Connecticut Children's Medical Center (CCMC), an urban-based clinic that serves a predominantly publicly insured population of children. To participate, mothers had to be present at the time of enrollment, be 18 years or older, self-identify as either Hispanic or Black, have a child between the ages of 2-4 years old, and be receiving/eligible for Women, Infants, and Children (WIC) benefits. Mothers were ineligible if they were not the child's primary caretaker, planned to move from Hartford or the surrounding area within the next 12 months or if their child's medical home was not the PCC. Children who were identified as having special needs (e.g., dietary, physical, or emotional) were also ineligible. The study was approved through CCMC's Institutional Review Board (IRB # 10-044).

Procedure

Potentially eligible mothers were approached in the clinic waiting room by study staff and given a brief description of the project. If interested and eligible, mothers completed baseline questionnaires and the child's medical record was flagged to inform their medical provider that they would be participating in the study. The first dose of the intervention (described below) was delivered that day during the child's regularly scheduled visit. Follow-up telephone calls with mothers were conducted by study staff within 5-7 days of this initial visit. During this 10-15 minute call, research assistants reviewed the behavioral goal selected by the mother during the clinic visit and inquired about any barriers to implementing behavior change using a scripted set of questions. Maternal responses were systematically recorded.

Intervention

The intervention consisted of Brief Motivational Counseling (BMC) framework delivered by a member of the child's teamlet (i.e., attending clinician, nurse, or other medical staff assigned to the child's care). Motivational interviewing has been used in obesity prevention clinical trials and has been shown to increase satisfaction and adherence to treatment (Bean, Mazzeo, Stern, Bowen, & Ingersoll, 2011). Elements of BMC that were used in this intervention included open questions, reflective listening, and positive affirmations. While in the waiting room, caregivers completed a brief survey of obesogenic behaviors. A member of the medical teamlet then reviewed this survey and using a motivational interviewing framework, highlighted areas of strength and engaged the caregiver to select a specific goal(s) that was meaningful and important to them. Possible goals included: (1) reduce milk to 1%; (2) decrease volume of milk consumption; (3) decrease volume of juice consumption; (4) eliminate all other sugar sweetened beverages; (5) reduce screen time to < 2 hours per day; (6) increase play time to 60 minutes per day; and (7) other. The goal of "other" was intended to be selected for any healthful behavior goal (e.g., increase fruits and vegetables, decrease eating fast food) that mothers wanted to work on. The discussion took place in the larger context of the child's health with the clinician providing accurate feedback in a relevant manner on the child's weight status and possible health risks of excessive weight. The ultimate goal of this intervention was for the mother and medical staff to decide together on a specific goal that resonated with the mothers and was according to the AAP Guidelines for Obesity, a healthy behavior for children this age. Once the goal was selected, mothers and a member of the medical signed a "contract" and were given a one-month self-monitoring calendar to track goal progress. Additional materials were also given to the

mother to help support the selected goal(s) (e.g., ball to increase activity, six-ounce cup to measure amount of juice given, food placemat with recommended portion sizes). Participating mothers then received brief motivation counseling (BMC) delivered by their medical teamlet at every well or sick visit and WIC check-in over a 12-month period.

Measures

Barriers to implementing the selected behavior change were assessed 5-7 days following enrollment in the study. Research assistants telephoned the mother and inquired about the selected goal, whether she had experienced any barriers or difficulties with her selected goal(s), if she had any questions regarding the goal, whether she was using the calendar provided to record achievement of the selected goal(s) and how confident she was in her ability to continue with the goal. Participants completed numerous measures at study entry; all demographic and survey data were self-reported and weight and height were measured by medical staff. Only instruments relevant to the current investigation are outlined below.

Maternal Measures

Perceived Stress Scale (PSS): Maternal stress was measured with the 4-item self-report Perceived Stress Scale. This scale assesses the degree to which an individual reports that their life has been “unpredictable, uncontrollable, and overloaded” over the prior month (Cohen, 1994, p. 1) using questions such as “In the last month, how often have you been upset because of something that happened unexpectedly,” “In the last month, how often have you found that you could not cope with all the things that you had to do” (Cohen, 1994, p.2). Responses to items are recorded on a Likert-type scale, with “0” being never and “4” being very often. Responses are

then summed, with positive worded items being reversed scored, such that a higher score represents higher stress levels. Internal reliability of the measure is equal to coefficient alpha of .78 (Cohen & Williamson, 1988).

Caregiver Feeding Style Questionnaire (CFSQ) The Caregiver Feeding Style Questionnaire was used to assess feeding style practices (i.e., authoritarian, authoritative). The dimensions of demandingness (e.g., “allow the child to choose the foods he or she wants to eat for dinner from foods already prepared”) and responsiveness (e.g., “reason with the child to get him or her to eat for example, Milk is good for your health because it will make you strong”) (Hughes, 2008, p.1) are assessed and participant’s feeding styles are categorized as: (1) authoritative (high demandingness/high responsiveness), (2) authoritarian (high demandingness/low responsiveness), (3) indulgent (low demandingness/high responsiveness), and (4) uninvolved (low demandingness/low responsiveness). Test-retest reliability of the measure is estimated to be .85 to .82 for authoritative and authoritarian feeding styles and the instrument has strong internal reliability .86 (Cronbach’s alpha) (Hughes et al., 2005).

Patient Health Questionnaire (PHQ-2): The PHQ-2 is a two-item questionnaire developed to screen for anhedonia and depressed mood over the past two weeks. Scoring ranges from 0-6, with an identified optimal cutoff of 3; however, a score of 2 enhances sensitivity. Responses to items were recorded using a Likert-type scale, with “0” being not at all and “3” being nearly every day. Example questions include “Over the past 2 weeks, how often have you been bothered by any the following problems: (1) little interest or pleasure in doing things, (2) feeling down, depressed or helpless” (Kroenke, Spitzer, & Williams, 2003). As a screener, the PHQ-2

has shown good sensitivity, but poor specificity in identifying depression (Arroll et al., 2010). For the purpose of this study, specificity was not needed; the purpose of using the screener was not to diagnose participants with depression but to identify those who may be displaying symptoms of depression.

The U.S. Household Food Security Instrument: Food security is defined as having access to food in order to maintain a healthy and active life, while food insecurity as defined as having limited access to foods (United States Department of Agriculture, 2012). The U.S. Household Food Security Instrument consists of a 15-item measure that assesses both food security and insecurity within a household. Responses to the items are coded as either “affirmative” or “negative” and coded “1” or “0,” respectively and then the final score is summed. Example items include, “(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more” and “The food that (I/we) bought just didn’t last, and (I/we) didn’t have money to get more” (USDA, 2012, p. 3). Validity of the measure is estimated to be 0.87 (Cronbach’s alpha) (Gulliford, Mahabir, & Roche, 2004).

Data Analytic Plan

Descriptive analyses (Table 1-5) were conducted on sample characteristics and on all variables included in the statistical models using chi-square analyses for dichotomous variables and analysis of variance (ANOVA) analyses for continuous variables. Logistical regressions, regression of a criterion variable on the logit of a binary variable (i.e., experiencing a barrier or not), were used to examine predictors of barrier status. Logistic regressions allowed us to predict a dichotomous criterion from one or more variables that may be continuous (e.g., stress level) or

coded (e.g., Spanish speaking); they rendered odds ratios that informed us about the odds of experiencing a barrier. Prior to running the logistical regressions, data were checked and coefficients were calculated individually using The Wald χ^2 test. To make the models as parsimonious as possible, variables were grouped by category (i.e., mother, child, environmental and intervention, and environmental). SPSS, version 18.0 was used in all analyses.

Power

Power calculation for logistical regression requires a minimum sample of 150 to render a change that signifies an odds ratio of 2.11 (Hsieh, Bloch, & Larsen, 1998). The study has 234 participants, which is sufficient for 80% power at a significance level of .05. Ratio of cases to variables was calculated and no model exceeded the maximum ratio of 20 to 1.

Results

234 children were enrolled in the study (119 male, 115 female) with a mean age of 35.4 ± 8.7 months; 89.3% of the children were Hispanic and 10.3% Black. Average BMI percentile was 73rd percentile and over 45% of the sample was overweight or obese. Among mothers, 15.8% were married, 41.5% were employed outside the home, and 24.4% reported food insecurity in their homes. 13.7% of mothers reported experiencing depressive symptoms and mean stress scores suggested very low scores overall ($M=5.49 \pm 3.2$).

Most mothers (83%) selected a nutritional goal at the initial visit (e.g., reduce milk to 1%, decrease amount of juice consumed), with only 13.8% selecting an activity goal (e.g., increase play time, spend less than 2 hours watching TV) and 3.1% selecting both a nutrition and physical activity goal. In the week following the initial dose of the intervention, 90.2% ($n=211$)

completed the follow-up phone call and of those mothers, 16.8% (n=35) reported experiencing a barrier to behavior change (Table 6). Examples of barriers reported by mother included the following: “My child cries for juice”, “The daycare center will not stop giving them juice unless I have a note from the doctor”, and “I can’t get 1% milk until I change my WIC”.

Model 1: Mother Variables

The first model (Table 6) focused on maternal variables as potential predictors of barrier status. Variables included in the model were survey language, mother’s depression score, marital status, employment status, perceived stress score, and mother’s confidence to carry out the given goal. Testing the overall model against the null model was significant ($X^2 = 13.760$, $df=8$, $p < .05$) indicating that overall the predictors combined contribute to whether or not the mother identified a barrier in implementing her selected goal. Nagelkerke’s R^2 of .887 indicated a strong relationship between prediction and grouping of variables (variables placed in the model) and prediction success overall was 84.3%. The Wald χ^2 criterion displayed that mother’s confidence to carry out her selected goal contributed significantly to predicting a barrier ($p < .001$). Mothers who reported being somewhat or not confident were 6.21 times more likely to report a barrier than mothers who reporting being very confident. All other variables included in the model did not yield significant results.

Model 2 Child Variables

Model 2 (Table 7) examined child variables that were hypothesized to influence barrier status including child’s age in months; child’s body mass index, overweight (BMI $\geq 85 < 95$ percentile) or obese (BMI ≥ 95 percentile), gender, and feeding style. The model was significant ($X^2 =$

17.151, $df=7$, $p<.01$) indicating that overall the variables in the model contributed significantly to predicting an identified barrier. Nagelkerke's R^2 of .32 indicates a weak relationship between groupings and prediction; however, the Wald χ^2 criterion showed that child's gender contributed significantly to predicting a barrier ($p=.011$). Mothers were more likely to identify a barrier if their child was male than female, with the odds of identifying a barrier decreasing by .331 for females.

Model 3: Family Variables

Model 3 (Table 8) included parameters specific to the family; independent variables were total number of individuals living in the household, total number of adults, total number of children and food security. The model was not significant ($\chi^2= 2.434$, $p = .927$ with $df= 4$), indicating that overall grouped variables in the model did not contribute significantly to predicting an identified barrier. Nagelkerke's R^2 of .019 indicated a weak relationship between prediction and grouping. According to the Wald χ^2 test, none of the parameters in the model made significant contributions at the .05 level.

Model 4: Intervention Variables

Model 4 (Table 9) examined intervention-related variables including type of goal selected (i.e., nutritional or activity), use of self-monitoring calendar supplied by the study, and if the mother had any questions about the informational handouts given to her. Testing the null model against the overall model failed to yield significance ($\chi^2= .282$, $p = .991$ with $df= 4$), and indicated that grouped variables in the model did not contribute significantly to model fit.

Discussion

With continued health disparities in overweight and obesity among children of color, interventions for high-risk groups are needed (Rossen & Schoendorf, 2012). These interventions need to be tailored to address variables specific to disparities such as socioeconomic status, access to care, language barriers and other cultural differences. Even when interventions are tailored, many times programs are delivered with little or no information obtained about whether mothers and families are able to implement the changes suggested to produce long-term weight management. The purpose of this study was to examine whether mothers experienced barriers to behavior change in the first week following an obesity prevention program targeting Hispanic and Black children and to explore whether experiencing a barrier was associated with maternal, child, family environment or intervention factors. Examining response to the first dose of the intervention can help decipher whether the treatment itself is working and may provide important clues about how to further refine the intervention. Our results suggest that mothers were more likely to report a barrier if they felt less confident about behavior change and if their child was male. No other maternal, child, family environment or intervention variables that were measured predicted barrier status.

The intervention we studied used elements of brief motivational interviewing (MI) to engage Hispanic and Black families with young children in the weight management process. The use of MI has proven efficacious in eliciting behavior change among populations with poor treatment retention (MacDonell, Brogan, Naar-King, Ellis, & Marshall, 2012) and may be well suited to address cultural differences between populations of color and white individuals. Motivational interviewing holds that change takes place by exploring and resolving a patient's ambivalence,

eliciting the patient's own reasons for change, and by providing positive affirmations to enhance patient's confidence in achieving desired results (Miller and Rollnick, 1991). Our results show that the less confident the mother was in her ability to achieve the goal, the more likely she was to report a barrier. Despite the time constraints of the primary care setting, it may be beneficial for providers to measure maternal confidence in the clinic and provide additional positive affirmations and/or support to bolster mothers' beliefs in their ability to make change.

Child gender was also shown to be a predictor in the mother's ability to carry out a selected goal. Specifically, mothers were more likely to report a barrier if their child was male than if their child was female. This finding may reflect gender differences in childrearing practices, particularly among Hispanic mothers. Over 87% of the sample identified themselves as being Hispanic and prior research has found that Hispanic mothers have different feeding practices (Lindsay, Sussne, Greaney, & Peterson, 2010) and expectations for their child's participation in physical activity for boys as compared to girls (Rodriguez-Oliveros et al., 2011; Cong, Feng, Liu, & Esperat, 2012). For example, Latina mothers have been shown to engage in more restraining behaviors with girls than with boys (Olvera Ezzell, Power, & Cousins, 1990) and it has been suggested that mothers might have more concerns about their daughters gaining weight than their sons (Arredondo et al., 2006). Mothers in our sample may have been more concerned about their daughter's weight and therefore more likely to take action than mothers of boys who may feel more ambivalent about behavior change.

Many of the other variables that were initially hypothesized to predict barriers to change did not. Variables such as mother's perceived stress, depression scores, food security, which have

been found by others as being barriers to weight loss (Chang, Nitzke, Guildford, Adair, & Hazard, 2013; Setse, Grogan, Cooper, Strobino, Powe, & Nicholson, 2007), did not predict a barrier to change in our sample. These findings may be due in part to the low levels of stress and depression that mothers in our sample reported. Only 13.7% of mothers reported experiencing a depressive symptom and the mean stress score was quite low. Including mothers with more stress and depressive symptoms and a greater range of scores on the food security scale may yield different relationships and is a direction for future study.

There are some limitations to note in this study. We only examined mothers' responses to the first dose of the intervention; it is unknown whether the same pattern of results would hold true for later doses of the intervention. Additionally, this study only measured whether or not a barrier was experienced; however, implementation of the goal was not measured. In some instances mothers may have reported experiencing a barrier, but later may have been able to overcome the reported barrier and followed through with selected goal(s). Examination of later doses may show whether mother was able to follow through with the selected goal.

In our sample, only 16.8% of the mothers reported experiencing a barrier. This low rate of reported barriers may be reflective of mother's goal choice; using brief motivational counseling, goal selection was collaboration between provider and mother. Mothers may have selected a goal upon which they felt they could easily implement (e.g., reducing sweeten beverage consumption vs. increase fruit and vegetable intake). A selection of a goal deemed more difficult by the mother may prove otherwise and show a greater amount of barriers reported. Furthermore,

about 10% of the mothers were unable to be reached at follow-up. Mothers who were unable to be reached might be the mothers most likely to report a barrier.

Lastly, the low rate of barriers reported might be reflective of cultural differences and personal ethnic pride that may hinder a mother from reporting a barrier. Ethnic pride has been described as having a positive affection, dignity, affiliation and self-respect for toward one's culture (Castro, Stein, & Bentler, 2009). Reporting a barrier might lead the mother to believe this is a measure of personal failure and respect from group may be lost (Panitz, McConchie, Sauber, Fonseca, 1983). In order to protect their pride for their culture, mothers may have been more inclined to state they had not encountered a barrier. One other reason may have been mother's sense of self-efficacy. Having high personal pride for their group may have been instrumental in helping mother's self-efficacy and their ability to carry out a goal even when barriers are encountered barriers. Investigating later doses of the intervention could help discern if mothers who stated they were not experiencing barriers at the time of the follow-up phone call were unable to carry out the selected goal.

One other limitation includes confidence. Confidence was measured at follow-up phone call; this was measured at the same time that mothers were also asked whether or not they experienced a barrier. It is unknown whether confidence would differ if measured before the mother attempted to implement behavior change. The experience of a barrier may have influenced confident level or level of confidence may have influenced mother in experiencing a barrier. In this instance self-efficacy may also surface as a moderator in mother's confidence level.

While the outcomes of the larger ongoing study have yet to be explored, our results indicate that the intervention was well received and the majority of mothers were able to enact immediate behavioral changes that may lead to obesity prevention. Although this is encouraging from an intervention implementation perspective, it may have limited our power to detect significant predictors given the small number of mothers reporting a barrier. We should also caution that our sample was predominately Hispanic and that our findings may not generalize to mothers from other cultural backgrounds. Future studies may wish to build on our promising work and include a better representation of populations of color.

References

- Arredondo, E. M., Elder, J. P., Ayala, G. X., Campbell, N., Baquero, B., & Duerksen, S. (2006). Is parenting style related to children's healthy eating and physical activity in Latino families? *Health Education Research, 21*(6), 862–871. doi:10.1093/her/cy1110
- Arroll, B., Goodyear-Smith, F., Crengle, S., Gunn, J., Kears, N., Fishman, T., et al. (2010). Validation of PHQ-2 and PHQ-9 to Screen for Major Depression in the Primary Care Population. *The Annals of Family Medicine, 8*(4), 348–353. doi:10.1370/afm.1139
- Bean, M. K., Mazzeo, S. E., Stern, M., Bowen, D., & Ingersoll, K. (2011). A values-based Motivational Interviewing (MI) intervention for pediatric obesity: Study design and methods for MI Values. *Contemporary Clinical Trials, 32*(5), 667–674. doi:10.1016/j.cct.2011.04.010
- Catenacci, V. A., Hill, J. O., & Wyatt, H. R. (2009). The obesity epidemic. *Clinics in Chest Medicine, 30*(3), 415-444.
- Carroll-Scott, A., Gilstad-Hayden, K., Rosenthal, L., Peters S. M., Mccaslin, C., Joyce, R., & Ickovics, J. R. (in press). Disentangling neighborhood contextual associations with child body mass index, diet, and physical activity: The role of built, socioeconomic, and social environments. *Social Science and Medicine*. Retrieved from <http://tk8nj5xn8a.search.serialssolutions.com/?sid=Entrez:PubMed&id=pmid:23642646>.
- Castro, F. G., Stein, J. A., Bentler, P. M. (2009). Ethnic pride, traditional family values, and acculturation in early cigarette and alcohol use among Latino adolescents. *The Journal of Family Prevention. 30*(3-4), 265-292.
- Chang, M., Nitzke, S., Guilford, E., Adair, C. H., & Hazard, D. L. (2013). Motivators and barriers to healthful eating and physical activity among low-income overweight and

- obese mothers. *Journal of the American Dietetic Association*, 108, 1023-1028. doi: 10.1016/j.jada.2008.03.004
- Cohen, S. (1994). *Perceived stress scale*. Retrieved from http://www.ncsu.edu/assessment/resources/perceived_stress_scale.pdf
- Cohen, S., & Williamson, G. (1988). *Perceived stress in a probability sample of the United States*. In S. Spacapan & S. Oskamp (Eds.), *The social psychology of health: Claremont Symposium on applied social psychology*. Newbury Park, CA: Sage.
- Cong, Z., Feng, D., Liu, Y., & Esperate, C. (2012). Sedentary behaviors among Hispanic children: Influences of parental support in a school intervention program. *American Journal of Health Promotion*, 26(5), 270-280
- Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010) Prevalence and trends in obesity among US adults, 1999-2008. *JAMA*, 303(3), 235-241. Hedley, A. A., Ogden, C. Gulliford, M. C., Mahabir, D., & Roche, B. (2004). Reliability and validity of a short form household food security scale in a Caribbean community. *Biomed Central, Public Health*, 4, 1-9
- Hsieh, F. Y., Bloch, D., & Larson, M. D. (1998). A simple methods of sample size calculation for linear and logistic regression. *Statistics in Medicine*, 17, 1623-1634
- Hughes, S. (2008). *Caregivers feeding Styles questionnaire (CFSQ)*. Retrieved from: http://www.bcm.edu/cnrc/faculty/CFSQ_English.pdf
- Hughes, S. O., Power, T. G., Orlet Fisher, J., Mueller, S., & Nicklas, T. A. (2005). Revisiting a neglected construct: parenting styles in a child-feeding context. *Appetite*, 44(1), 83-92. doi:10.1016/j.appet.2004.08.007

- Kitscha, C. E., Brunet, K., Farmer, A., & Mager, D. R. (2009). Reasons for non-return to a pediatric weight management program. *Canadian Journal of Dietetic Practice and Research, 70*(2), 89-94
- Kroenke, K., Spitzer, R. L., & Williams, J. B. (2003). The patient Health Questionnaire-2: Validity of a two-item depression screener. *Medical Care, (41)*, 1284-1294.
- Kopelman, P. (2007). Health risks associated with overweight and obesity. *Obesity, 8*(Suppl. 1), 13-17.
- Lindsay, A. C., Sussner, K. M., Greaney, M. L., & Peterson, K. E. (2010). Latina Mothers' Beliefs and Practices Related to Weight Status, Feeding, and the Development of Child Overweight. *Public Health Nursing, 28*(2), 107–118. doi:10.1111/j.1525-1446.2010.00906.x
- Ludwig, D. S. (2007). Childhood obesity: The shape of things to come. *The New England Journal of Medicine, 357*(23), 2325-23257.
- MacDonell, K., Brogan, K., Naar-King, S., Ellis, D., & Marshall, S. (2012). A Pilot Study of Motivational Interviewing Targeting Weight-Related Behaviors in Overweight or Obese African American Adolescents. *Journal of Adolescent Health, 50*(2), 201–203.
doi:10.1016/j.jadohealth.2011.04.018
- National Heart Lung and Blood Institute: People Science Health. (1998). *Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: The evidence report.* (Item No. 98-4083). Retrieved from http://www.nhlbi.nih.gov/guidelines/obesity/ob_gdlns.htm
- Ogden, C. L., & Carroll, M. (2010). *Prevalence of obesity among children and adolescents: United States, trends 1963-1965 through 2007-2008*: National Center for Health Statistics. Retrieved from: http://www.cdc.gov/nchs/data/hestat/obesity_child_07_08/

obesity_child_07_08.htm

- Ogden, C. L. (2012). Prevalence of Obesity and Trends in Body Mass Index Among US Children and Adolescents, 1999-2010. *JAMA: the Journal of the American Medical Association*, 307(5), 483. doi:10.1001/jama.2012.40
- Olvera Ezzell, N., Power, T. G., & Cousins, J. H. (1990). Maternal Socialization of Children's Eating Habits: Strategies Used by Obese Mexican-American Mothers. *Child Development*, 61(2), 395-400.
- Panitz, D. R., McConchie, D. R., Sauber, R., & Fonseca, (1983). The role of machismo and the Hispanic family in the etiology and treatment of alcoholism in Hispanic American males. *The American Journal of Family Therapy*, 11(1), 31-44.
- Rodriguez-Oliveros, G., Haines, J., Ortega-Altamirano, D., Power, E., Taveras, E. M., Gonzales-Unzaga, M. A., & Reyes-Morales, H. (2011). Obesity determinates in Mexican Preschool children: Parental perceptions and practices related to feeding and physical activity. *Archives of Medical Research*, 42, 532-539.
- Rossen, L. M., & Schoendorf, K. C. (2012). Measuring health disparities: trends in racial-ethnic and socioeconomic disparities in obesity among 2- to 18-year old youth in the United States, 2001-2010. *Annals of Epidemiology*, 22(10), 698-704.
doi:10.1016/j.annepidem.2012.07.005
- Setse, R., Grogan, R., Cooper, L. A., Strobino, D., Powe, S., & Wanda, N. (2007). Weight loss programs for urban-based, postpartum African-American women: Perceived barriers and preferred components. *Maternal Child Health Journal*, 12, 119-127. doi: 10.1007/s10995-007-0211-6
- Taveras, E. M., Gortmaker, S. L., Mitchell, K. F., & Gillman, M. W. (2008). Parental

Perceptions of Overweight Counseling in Primary Care: The Roles of Race/ethnicity and Parent Overweight. *Obesity*, 16(8), 1794–1801. doi:10.1038/oby.2008.264

Thompson, A., & Bentley, M. E. (in press). The critical period of infant feeding for the development of early disparities in obesity. *Social Science and Medicine*. Retrieved from: <http://tk8nj5xn8a.search.serialssolutions.com/?sid=Entrez:PubMed&id=pmid:23312304>

U.S. Department of Agriculture, Economic Research Service. (2012). *U.S. household food security survey module: Three-stage design, with screeners*. Retrieved from: http://www.ers.usda.gov/datafiles/Food_Security_in_the_United_States/Food_Security_Survey_Module_s/hh2012.pdf

Watt, T. T., Appel, L., Roberts, K., Flores, B., & Morris S. (2013). Sugar, stress, and the supplemental nutrition assistance program: Early childhood obesity risks among a clinic based sample of low-income Hispanics. *Journal of community Health*, 38(3), 513-520.

World Health Organization. Obesity and Overweight. (2006) *What are overweight and Obesity*, (Fact sheet N°311) Retrieved from <http://www.who.int/mediacentre/factsheets/fs311/en/print.html>

Zabinski, M. F., Saelens, B. E., Stein, R. I., Hayden-Wade, H. A., & Wilfley, D. E. (2003). Overweight children's barriers to and support for physical activity. *Obesity*, 11(2), 238-246.

Table 1
Sample Characteristics

	N	%
Total enrolled	234	
Experienced Barrier	35	16.6
Gender of child		
Male	119	50.9
Female	115	49.1
Ethnicity		
Hispanic	209	89.3
Black	24	10.3
Other	1	0.04
Weight		
Normal	127	54.3
Overweight	41	17.5
Obese	66	28.2
Food Security		
Secure	176	75.2
Insecure	57	24.4
Type of Goal Selected		
Nutritional	186	79.5
Activity	31	13.2
Both	7	3
Goal Selected		
Reduce Milk to 1%	55	23.5
Decrease amount of Milk	21	9
Decrease amount of Juice	113	47.4
Eliminate all SSB	185	79.1
Spend < 2hrs/day watching TV	13	5.6
Increase play time > 60 min/day	5	2.1
Other	18	7.7

Note: SSB= Sugar sweetened beverages. Percentages are out of entire group.

Table 2
Sample Characteristics and Descriptive Analysis by Reported Barrier

Mother Variables	Reported Barrier		X^2		
	Yes	No			
Survey Language			.496		
English	24(68.6%)	110(62.5%)			
Spanish	11(31.4%)	66(37.5%)			
Employment			.689		
Unemployed	19(54.3%)	102(57.9%)			
Employed	16(45.7%)	74(42.1%)			
Marital Status			.537		
Married	4(11.4%)	32(18.1%)			
Separated/Divorced	3(8.5%)	19(10.8%)			
Never Married	28(80.1%)	125(71.1%)			
Mother's Confidence			.000**		
Very	16(47%)	132(79%)			
Moderately Confident	8(23.5%)	21(12.5%)			
Somewhat or not	10(52.7%)	14(8.5%)			
Confident					
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>η^2</u>
Perceived Stress	6.26	3.76	5.40	3.195	.0002
Depression Symptoms	1.03	1.58	1.09	1.49	.009

Note: Person Chi-Square was used to calculate group differences. ANOVAS were used to determine group differences for continuous data (i.e., perceived stress and depression symptoms). Percentages are within subgroup (i.e., reporting a barrier vs. not reporting a barrier).

** $p < .001$

Table 3
Sample Characteristics and Descriptive Analysis by Reported Barrier

	Child Centered Variables				χ^2
	Reported Barrier(s)				
	Yes	No			
BMI					.264
Normal	19(54.3%)	92(52.3%)			
Overweight	9(25.7%)	29(16.5%)			
Obese	7(20%)	55(31.2%)			
Sex					.01*
Male	25(71.4%)	84(47.7%)			
Female	10(428.6%)	92(52.3%)			
Feeding Style					.193
Indulgent	11(31.4%)	67(38%)			
Authoritarian	19(55.8%)	67(38%)			
Authoritative	4(11.4%)	20(11.4%)			
Uninvolved	1(1.4%)	22(2.2%)			
	M	SD	M	SD	η^2
Age (in months)	37.5	8.6	35.2	8.6	.009

Note: Person Chi-Square was used to calculate group differences. ANOVAS were used to determine group differences for continuous data (i.e., age in months). Percentages are within subgroup (i.e., reporting a barrier vs. not reporting a barrier).

* $p < .05$

Table 4

Sample Characteristics and Descriptive Analysis by Reported Barrier

	Environmental Centered Variables				X^2
	Reported Barrier(s)		No		
	Yes				
Food Security					.943
Secure	26(74.3%)		131(74.9%)		
Insecure	9(25.7%)		44(25.1%)		
	M	SD	M	SD	η^2
Total # in Household	3.97	1.361	4.31	1.5	.007
Total # of children	2.11	.932	2	.855	.002
Total # of Adults	1.89	.9	2.31	1.27	.003

Note: Person Chi-Square was used to calculate group differences. ANOVAS were used to determine group differences for continuous data (i.e., Total number of people living in household, children, and adults). Percentages are within subgroup (i.e., reporting a barrier vs. not reporting a barrier).

* $p < .05$

Table 5
Sample Characteristics and Descriptive Analysis by Reported Barrier

	Intervention Centered Variables		X^2
	Reported Barrier		
	Yes	No	
Type of Goal			.986
Nutritional Goal	29(82.8%)	145(82.4%)	
Activity Goal	5(14.3%)	25(14.2%)	
Both	1(2.9%)	6(3.4%)	
Questions About Handout			.652
No	34(97.2%)	172(98.3%)	
Yes	1(2.8%)	3(1.7%)	
Used Calendar			.900
No	7(20.6%)	34(19.6%)	
Yes	27(79.4%)	139(80.4%)	

Note: Person Chi-Square was used to calculate group differences. Percentages are within subgroup (i.e., reporting a barrier vs. not reporting a barrier).

* $p < .05$

Table 6

Logistical regression of mother centered variables; including survey language, employment status, marital status, perceived stress score, depression scores and mother's confidence in achieving goals on identified barrier by mother.

Variable	β	(SE)	OR	(95% CI)
Constant	-2.581	(.575)	.076	
Survey Language				
Spanish (base=English)	-.062	(.462)	.940	[.380, 2.324]
Employment Status				
Employed (base = unemployed)	.148	(.418)	1.159	[1.159, 2.630]
Marital Status				
Married	-.435	(.624)	.647	[.191, 2.198]
Separated/Divorced (base = never married)	-.223	(.702)	.800	[.202, 3.169]
Perceived Stress	.121	(.079)	1.129	[.967, 1.318]
Depression	-.226	(.177)	.798	[.564, 1.128]
Mother's Confidence				
Confident	1.179	(.508)*	3.251	[1.202, 8.790]
Somewhat/Not Confident (base = very)	1.796	(.523)*	6.025	[2.162, 16.793]

Note: $R^2 = .827$ (Nagelkerke), $p = .083$ (Hosmer and Lemeshow). Model $X = 13.760$, $df = 8$, $p < .05$
 $-2LL = 159.312$
 $p < .01$ * $p < .001$ **

Table 7

Logistical regression of child centered variables; including age in months, BMI category, gender and mother's feeding style on identified barrier by mother

Variable	β	(SE)	OR	(95% CI)
Constant	-4.961	(1.413)	.007	
Age (months)	.032	(.023)	.033	[.516, 3.531]
BMI Category				
Overweight	.300	(.491)	1.350	[.516, 3.531]
Obese	-.619	(.499)	.538	[.202, 1.433]
<i>(base = normal)</i>				
Sex				
Female	-1.015	(.414)*	.351	[.156, .541]
<i>(base = male)</i>				
Feeding Style				
Authoritarian	1.528	(1.093)	4.607	[.541, 39.249]
Authoritative	1.940	(1.066)	6.960	[.861, 56.249]
Uninvolved	1.703	(1.183)	5.489	[.540, 55.793]
<i>(base = indulgent)</i>				

Note: $R^2 = .32$ (Nagelkerke), $p = .083$ (Hosmer and Lemeshow). Model $X^2 = 13.760$, $df = 6$, $p < .01$

$-2LL = 159.312$

$p < .01$ * $p < .001$ **

Table 8

Logistical regression of environment centered variables; total number of household members and food security on identified barrier by mother

Variable	β	(SE)	OR	(95% CI)
Constant	-1.014	(.667)	.363	
Total # Household	-1.642	(1.447)	.194	[.011, 3.301]
Total # Adults	1.467	(1.442)	4.336	[.257, 73.183]
Total # Children	1.509	(1.468)	4.522	[.254, 80.387]
Food Security				
Insecure	.017	(.430)	1.018	[.438, 2.365]
(base = secure)				

Note: $R^2 = .019$ (Nagelkerke), $p = .275$ (Hosmer and Lemeshow). Model $X = 2.434$, $df = 4$,
 $p < .657$
 $-2LL = 186.802$
 $p < .01^* p < .001^*$

Table 9

Logistical regression of intervention centered variables; goal type, questions about handouts and usage of calendar on identified barrier by mother

Variable	β	(SE)	OR	(95% CI)
Constant	-1.840	(1.154)	.159	
Type of Goal				
Nutritional	.268	(1.124)	1.307	[.144, 11.836]
Activity	.285	(1.213)	1.330	[.123, 14.321]
(base = both)				
Questions about handout	.616	(1.199)	1.851	[.177, 19.410]
Used Calendar	-.078	(.470)	.925	[.368, 2.324]

Note: $R^2 = .002$ (Negelkerke), $p = .973$ (Hosmer and Lemeshow). Model $X^2 = .282$, $df = 4$, $p < .992$

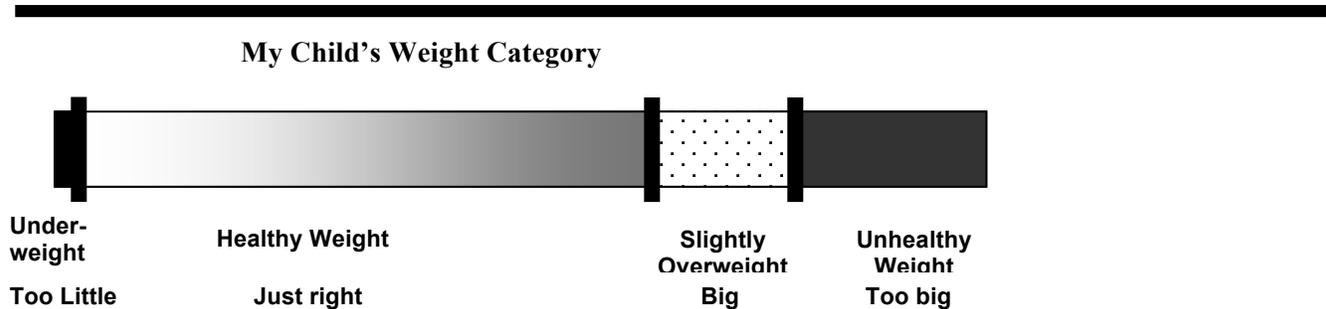
$-2LL = 173.072$

$p < .01^*$ $p < .001^*$

Appendix A

My Growing Up Healthy Plan

BMI % _____ z score _____ Weight _____ Lbs/Kg



Arrow shows your child's weight compared with other children the same age and height.

My doctor and I have talked today about how I can help my child to grow up healthy. The plan we have talked about includes the following:

- Reduce milk to 1% (low fat milk)
- Decrease the amount of milk my child drinks to _____ cups a day (use your measuring cup)
- Decrease 100% fruit juice to _____ ounces a day (use your measuring cup)
- Stop drinking all sweetened punches and sodas
- Spend less than 2 hours a day watching TV or playing on the computer
- Increase play time to 60 minutes a day
- Other: Please Specify: _____

I agree to try this plan and to let my doctor know how well this plan is working for me and for my child at our next visit.

Parent Signature

Doctor's Signature

Doctor: Give parent a copy of specific instruction tool for each recommendation and obtain follow up contact information.

Telephone Follow Up

Parent Telephone Number: _____ Alt. Number: _____
Today's Date: _____ Caller: _____

Check all strategies mother reports:

- Reduce milk to 1% (low fat milk)
- Decrease the amount of milk my child drinks to _____ cups a day
- Decrease 100% fruit juice to _____ ounces a day
- Stop drinking all sweetened punches and sodas
- Spend less than 2 hours a day watching TV or playing on the computer
- Increase play time to 60 minutes a day
- Other: Please Specify: _____

Call attempts: (Date and time) 1. _____ 2. _____ 3. _____
--

Is mother experiencing any barriers or difficulties with plan? Yes No

If yes, explain: _____

Does mother have any questions about the handouts or plan? Yes No

If yes, explain: _____

Is mother using the calendar? Yes No If no, encourage use

How confident is mother to achieve plan?
 Very confident Moderately confident Somewhat Confident Not confident

