



# Abuela to mother motivational interviewing intervention to reduce low-nutritive simple carbohydrate intake

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## Abstract

**Background:** Mexican-American children have the highest rates of childhood obesity of any ethnic group [1]. Because Mexican-American mothers follow the advice of abuelas (respected grandmothers in the Mexican-American community) more than that of health care providers [2], this pilot study evaluated the efficacy of using abuelas to deliver a motivational interviewing intervention to encourage Mexican-American mothers to limit their children's low-nutritive simple carbohydrate intake. Specific questions were whether or not 1) abuelas could deliver a motivational interviewing intervention, 2) abuelas could recruit and retain participants, and 3) mothers altered their attitudes/beliefs, perceived norms, perceived behavioral control (self-efficacy), intent and behavior of limiting their children's low-nutritive simple carbohydrate intake.

**Methods:** Two abuelas were recruited and trained to deliver a motivational interviewing intervention. The abuelas recruited 6 mothers to participate in the study. Assessments and interventions occurred at baseline and 1 month. Attitude/beliefs, perceived norm and perceived behavioral control (self-efficacy) were measured using sub-scales of the Healthy Diet Survey [3], intent was measured using an Intent Questionnaire, and behavioral change was assessed using a short-form food frequency questionnaire. A Wilcoxon test ( $\alpha=0.05$ ) was used to evaluate changes in responses between baseline and 1 month.

**Results:** The abuelas were successfully trained in motivational interviewing and reliably delivered the intervention. The abuelas recruited 6 mothers and all 6 participated through the entire study. All mothers felt it was important to limit their children's low-nutritive simple carbohydrate intake ( $M=9.83$ ,  $SD=.408$ ) and scored their readiness to change as highly or extremely likely. Confidence in their ability to limit their children's low-nutritive simple carbohydrate intake increased ( $z=-2.041$ ,  $p=.041$ ) between baseline ( $M=6.33$ ,  $SD=1.97$ ) and 1 month ( $M=9.67$ ,  $SD=.82$ ) for 5 of the mothers. The sixth scored her confidence as 10 (the maximum) at both assessments. Responses to the food frequency questionnaire suggest a trend towards limiting their children's low-nutritive simple carbohydrate intake.

**Conclusions:** This study demonstrated that recruitment, retention, and program delivery using abuelas were successful and the results suggest a trend towards mothers limiting their children's low-nutritive simple carbohydrates.

**Keywords:** Hispanic, abuela, childhood obesity, mothers, simple carbohydrates

## Introduction

Mexican-American children have the highest rates of childhood obesity of any ethnicity (more than 38%), with children age 2-6 years having almost twice the rate of obesity (17%) of white children (9.1%) [1]. Rural areas in this country have higher rates of obesity than urban areas [4]. This study was conducted in a rural mid-western area that is approximately 40% Mexican-American with an overweight prevalence among children of 31.5% [5]. Children who are obese are at higher risk for adult obesity and its co-morbidities including hypertension, diabetes, cardiovascular disease, joint disorders, psychological disorders, hyperlipidemia, cancers, and asthma [1]. Obese children consume on average three times the cost of health care resources as a normal-weight child [6]. The national cost of childhood obesity is estimated at approximately 11 billion dollars for children with private insurance and 3 billion dollars for those with Medicaid. Children diagnosed with obesity are two to three times more likely to be hospitalized. Obese children are

far more likely to be diagnosed with mental health disorders than non-obese children [6]. These facts support the need for obesity prevention and treatment interventions during early childhood.

Obesity is a complex multifaceted disease with multiple factors that contribute to or promote greater than expected weight gain in childhood. Limiting LNSCI in young children has been associated with lower rates of childhood obesity [7]. Low-nutritive simple carbohydrate foods are those foods that contain high proportions of simple sugars [8]. These foods are rapidly digested and absorbed, resulting in rapid peaks in blood glucose and insulin followed by a trough in blood glucose which results in increased perceptions of hunger. Commonly these foods have little nutritional value [8]. Examples include processed and homemade foods made with white flour, sugar, and corn syrup such as white bread, tortillas, pastas, candies, sweetened beverages, fruit juices/drinks and sodas. Foods with high sugar content have been shown to contribute to

the increasing prevalence of obesity in children [9]. Brekke reported a positive relationship between one year old children who had a high intake of LNSCI and child obesity [9]. Starc [10] reported that high dietary intake of LNSCI is associated with lower HDL-cholesterol concentrations that are an important coronary risk factor and should be considered in diet planning for children [11]. It is important to recognize that in both children and adults obesity is strongly related to increased triglycerides and low HDL cholesterol [12]. Therefore, limiting LNSCI is likely to decrease the risk of developing childhood obesity. Also notable is the relationship between mothers' weight or body mass index (BMI) and child's weight or BMI. Several studies have confirmed this positive relationship in Mexican-American populations [13-16]. Mothers' eating and feeding behaviors have been positively associated as well [17]. Therefore, it is important to understand the mothers' role in contributing to and preventing obesity, and to include the mother in interventions to solve childhood obesity.

Pre-school children are primarily reliant upon an adult, usually their mother, for the quantity and selection of food available to them [18]. That mother/child relationships may affect childhood obesity is well documented in the literature, though there have been few studies examining Mexican-American mother/child eating behaviors. Children's disregulated energy intake has been positively correlated with mothers' disinhibition (inability to control food intake) [19,20]. Furthermore, Mexican American mothers' dietary disinhibition has been associated with less healthy food choices for themselves and their children [21]. Restrictive parent-child feeding practices have been associated with higher child weight [22]. Clark recommends that parents offer healthy foods to their children (e.g., limiting LNSCI) and allow the child to decide how much to eat [18]. This approach promotes healthy eating and allows the child to self-regulate intake of healthy foods. Other than sugar sweetened beverages (e.g., soda), there is little literature on limiting low-nutritive simple carbohydrates to reduce or prevent the incidence of obesity. Literature on treating childhood obesity in rural America is also limited.

Given the difficulty of reversing obesity, it is preferable to prevent overweight/obesity from developing by intervening in early childhood [23-25]. Few interventions have targeted prevention and treatment of childhood obesity in preschool children [25-27]. Interventions involving Hispanic preschoolers are even more limited [28,29]. A number of interventions have been trialed to treat childhood obesity with limited effectiveness. Few have focused on influencing attitude/beliefs, perceived behavioral control (self-efficacy), perceived norms, intent and limiting LNSCI behaviors among Mexican-American populations. Nutrition education programs generally focus on information dissemination, but have had limited effect on behavior change [30,31]. Nutrition education programs alone, which suggest specific diets, may be expensive and the Mexican-American populations in most communities are often poverty stricken and lack access to outlets providing

inexpensive, healthy foods [32].

There is a growing body of literature that supports use of culturally appropriate interventions to facilitate behavior change [33]. We propose that using abuelas to deliver a Motivational Interviewing (MI) intervention to encourage Mexican-American mothers to limit their children's LNSCI would be more effective at producing behavior changes than other strategies because Mexican-American mothers follow the advice of abuelas (respected grandmothers in the Mexican-American community) more than that of health care providers [2]. If employing abuelas to deliver the MI intervention helps Mexican-American mothers limit low-nutritive simple carbohydrate feeding behavior, it may help normalize their children's body composition and decrease their risks for childhood obesity and the associated co-morbidities.

This pilot study evaluated the efficacy of using abuelasto deliver a MI intervention, with the goal of positively changing Mexican-American mothers' attitudes/beliefs, perceived norms, perceived behavioral control (self-efficacy), intent to limit their children's LNSCI and actual behavior of limiting their children's LNSCI. MI is evidence-based and uses encouragement and non-confrontational methods to favorably change attitude/beliefs, perceived norms, perceived behavioral control (self-efficacy) and intent to change behavior [34]. This approach is client-centered, empowering individuals to establish their own realistic goals for behavior change. It has been used extensively to change dietary intake, diabetes self-care, and addiction behaviors and is hypothesized to be an effective strategy for improving other health behaviors [35-37].

This pilot study evaluated whether or not 1) abuelas could be successfully trained to deliver a MI intervention to limit LNSCI following an algorithm 2) abuelas could successfully recruit and retain participants and 3) mothers altered their attitudes/beliefs, perceived norms, perceived behavioral control (self-efficacy), intent to limit their children's LNSCI and actual behavior of limiting their children's LNSCI.

## Methods

The framework for this pilot study was adapted from the Predicting and Changing Behavior Theory (PCBT) [38]. PCBT proposes that the primary determinants of behavior influence intention to engage in a particular behavior. These determinants include attitudes/beliefs (an individual's perception toward a behavior), perceived norms (including social pressures within a culture or family), and perceived behavioral control (self-efficacy or an individual's belief about the ease or difficulty of performing a behavior). The PCBT has been used to predict behaviors such as weight loss, physical activity and self-efficacy for healthy eating in Mexican-American populations [39-42].

We determined the mothers' attitude/belief score by summing the responses to the attitudes/beliefs sub-scale of The Healthy Diet Survey [3]. Higher scores indicated stronger attitudes/beliefs supporting limiting LNSCI. The Cronbach's alpha (a measure of internal consistency) for this sub-scale

was .80 with a test-retest stability of  $r=.81$  over 2 months [3].

We determined the mothers' normative belief score by summing the responses to the normative belief sub-scale of The Healthy Diet Survey [3]. Higher scores indicated greater normative belief for limiting LNSCI. Cronbach's alpha for this sub-scale was .77 with test-retest stability of  $r=.80$  over 2 months [3].

We determined the mothers' self-efficacy (perceived behavioral control) score by summing the responses to the control belief sub-scale of The Healthy Diet Survey [3]. Higher scores indicated greater belief in ability to limit LNSCI. Cronbach's alpha for this sub-scale was .73 with a test-retest stability of  $r=.76$  over 2 months [3].

We measured the mothers' intent to limit their children's LNSCI using an intent question developed based on Fishbein & Ajzen's guidelines [38] and scored using a 7-point Likert scale.

We measured the mothers' behavior of limiting their children's LNSCI using the short form Food Frequency Questionnaire [43] which we modified to include items unique to this population. Mothers reported how often during the past month they served each simple carbohydrate item listed based on a scale with 9 frequency ranges (never or <1 per month to 6 or more per day). Criterion validity and instrument reliability and reproducibility for the original FFQ have been established. Intra-class correlation coefficients for nutrient intakes ranged from 0.41-0.79 [43]. We determined means and standard deviations for specific simple carbohydrate items from the FFQ.

### **Motivational interviewing intervention**

Our MI intervention was designed to effect behavior change by using abuelas to perform the intervention (addressing perceived norm), sharing information on the benefits of limiting LNSCI (addressing attitude/beliefs), and providing support to increase perceived behavioral control by decreasing mothers' ambivalence and barriers (addressing self-efficacy), which will support intent to limit their children's LNSCI and actual behavior of limiting their children's LNSCI. The abuelas began the MI intervention by asking the mothers how they rate the importance of limiting LNSCI on a 0-10 scale. The second question was how the mothers rate their confidence in limiting LNSCI on a 0-10 scale. If mothers rated the importance of limiting LNSCI low during the MI intervention the abuelas provided them with information on the benefits of limiting LNSCI to reduce the child's risk of obesity, diabetes, heart disease, and numerous other co-morbidities associated with overweight. If mothers rated their confidence in limiting LNSCI as low during the MI intervention then the abuelas provided them with strategies to decrease barriers, such as a list of healthy snack food choices, stepped changes (3 sodas per day to 2 sodas and 1 water per day, etc.), and having the child help choose healthy foods at the store, to increase their confidence. To help increase perceived behavioral control (self-efficacy) for limiting LNSCI, the abuela asked them

about their readiness to change and what would help them be more successful. We believe the combined influence of changes in attitude/beliefs, perceived norm, and perceived behavioral control (self-efficacy) will increase intent to limit LNSCI and behavior of limiting LNSCI in Mexican-American mothers receiving the MI intervention.

### **Abuela recruitment and training**

We recruited 2 abuelas based on referrals from our network of community partners and trained them to provide the MI sessions using a 5-hour DVD that demonstrates Miller and Rollnick's [44] technique for assisting with behavioral change. After learning the basic MI technique from the DVD, the senior author (who is MI certified) trained the abuelas specifically to deliver a MI intervention to encourage mothers to limit their children's LNSCI. The abuelas participated in role playing practice sessions to develop their proficiency. They followed a written algorithm to ensure uniform implementation of the MI intervention throughout the study. Intervention sessions were audio-recorded, transcribed, and reviewed by the senior author to ensure the accuracy of the MI intervention.

### **Participant recruitment and retention**

Relationships are critical when working with the Mexican-American community. Because of their connections within the community and their respected status, we utilized the abuelas to recruit potential participants. To maximize retention we ensured continuity in the abuela-mother relationships and scheduled interviews at the time most convenient for the participants (including weekends and evenings). Incentives (gift cards) were provided to participants at both intervention/assessment sessions to encourage participation for the duration of the study. Gift cards compensated participants for their time and could assist mothers in purchasing healthier foods. We used bilingual abuelas and provided all documents in both English and Spanish to accommodate language preferences. Culturally appropriate interactions were emphasized during each data collection using cultural norms of Mexican-American communication.

### **Informed consent**

We obtained informed consent from both abuelas and mothers who chose to participate. No data was collected until informed consent was completed. The University of Nebraska Medical Center granted IRB approval for this study.

### **Assessments**

Background information (e.g., age, gender, number of children, education level, income, marital status, years in US, history of family obesity) was collected at baseline only using a demographic questionnaire. All other variables were assessed at baseline and 1 month. Assessments were conducted prior to the delivery of the MI interventions. Attitude/beliefs, perceived norm and perceived behavioral control (self-efficacy) were

**Table 1. Means and (standard deviations) for simple carbohydrates showing the greatest change between the baseline and 1 month food frequency questionnaires (n=6).**

Item	Baseline	1 Month
Soda	3.83 (1.84)	2.67 (1.86)
Fruit drinks	3.33 (2.16)	1.67 (1.21)
<100% Fruit juices	4.33 (2.81)	2.50 (1.64)
Lemonade, punch, koolaid	3.17 (2.32)	1.83 (1.17)
Brownies	2.17 (0.98)	1.33 (0.52)
White rice	3.50 (1.38)	2.00 (1.10)
White bread	3.67 (1.37)	1.83 (1.33)
Cold cereal	4.33 (1.51)	2.67 (1.21)
Table sugar	3.67 (2.07)	1.83 (1.17)

measured using sub-scales of the Healthy Diet Survey [3], intent to limit LNSCI was measured using the Intent Questionnaire, and limiting LNSCI behavior was assessed using a short-form food frequency questionnaire. These questionnaires were used to determine changes in mothers' perceptions and behaviors regarding limiting their children's LNSCI.

### Data analysis

A Wilcoxon test ( $\alpha=0.05$ ) was used to evaluate changes in the mothers' responses to the questionnaires between baseline and 1 month.

### Results and discussion

Although this pilot study was small, it included a diverse sample. Participating mothers ranged in age from 22 to 43, half were from the U.S. and half were from Mexico, education levels ranged from elementary school to an associate's degree, marital status included single, married or divorced, and annual income levels ranged from \$10,000 to \$39,000. All mothers were the primary person responsible for feeding their children. All mothers scored importance of limiting LNSCI for their children as a 9 or 10 (scale of 1-10) ( $M=9.83$ ,  $SD=.408$ ) and scored their readiness to change as either highly likely or extremely likely (Likert scale) during both the baseline and 1 month assessments. Confidence scores regarding ability to limit LNSCI for their children increased significantly (Wilcoxon test,  $z=-2.041$ ,  $p=.041$ ) between the baseline ( $M=6.33$ ,  $SD=1.97$ ) and 1 month ( $M=9.67$ ,  $SD=.82$ ) surveys for 5 of the 6 mothers. The sixth mother scored her confidence as 10 at both assessments and therefore could not increase her score. Though the sample size was a limitation to determining significance, results from the food frequency questionnaires suggest that mothers had reduced the amount of some simple carbohydrates they offered after only 1 month in the study (Table 1).

This study demonstrated that recruitment, retention, and program delivery using abuelas were successful. Each abuela successfully recruited 3 mothers and all 6 mothers participated for the duration of the study. The abuelas were successfully

trained in MI and reliably delivered the intervention following the algorithm. Results suggest a trend towards mothers limiting their children's LNSCI after just one month of participation.

The abuelas stated that they hope this study continues as they felt it was successful and they were so pleased to be a part of helping their community. Mothers also asked to have the study continue for themselves and others. One mother stated that according to her doctor's scale she lost 8 pounds and her overweight son lost 5 pounds during this one month study. In addition, after just one month of limiting LNSCI her doctor told her and her husband that their blood sugars were under control after years of uncontrolled diabetes.

### Study limitations

This study was limited by its geographical area and restriction to a single ethnic group so that it may not be generalizable to other populations. This pilot study is also limited by its sample size, 2 abuelas and 6 mothers.

### Conclusions

Although from a small sample, these results and participant comments support further evaluation of this approach on a larger scale to fully assess its effectiveness and determine statistical significance. This study demonstrated that recruitment, retention, and program delivery using abuelas were successful and the results suggest a trend towards mothers limiting their children's LNSCI after just one month of participation.

Both mothers and abuelas requested that the program be extended to reinforce the mothers' efforts to limit their children's LNSCI. Therefore, additional booster sessions should be considered. MI booster sessions have been effective when delivered as often as weekly and as infrequently as 2-3 month intervals [32,36,45,46].

### Competing interests

The authors declare that they have no competing interests.

### Authors' contributions

Authors' contributions	TA	SW	AK
Research concept and design	✓	--	--
Collection and/or assembly of data	✓	✓	✓
Data analysis and interpretation	✓	--	--
Writing the article	✓	✓	✓
Critical revision of the article	✓	--	✓
Final approval of article	✓	✓	✓
Statistical analysis	✓	--	✓

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