

Examining Relationships between the Family Stage of Change Survey and the Family  
Nutrition Physical Activity Survey among Hispanic and Non-Hispanic Families.

by

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ABSTRACT OF THE THESIS OF

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Family influence in the home environment has been linked to children's nutrition and physical activity behaviors. However few tools exist to identify family level behaviors and families' readiness to change those behaviors, particularly for populations at high risk for obesity such as Hispanics. This study summarizes the relationships of similar items between a newly created family obesity-preventing behavior screening tool (Family Stage of Change [FSOC] Survey), and a validated screening tool that measures both family and child-level behaviors shown to predict child obesity (Family Nutrition and Physical Activity [FNPA] screening tool). Of particular interest for this study was whether responses on these surveys differed between Hispanic and non-Hispanic families to determine potential validity of the FSOC instrument for use with Hispanic families. Study participants included parents and caregivers (N=66) of children ages 2-14 years recruited through preschool, elementary, and middle school listservs and through word of mouth. Descriptive analyses were conducted on the demographic data, and correlations were run to examine associations between FSOC and FNPA items. Mean Domain, and Total scores were analyzed for differences between Hispanic and non-Hispanic responders. After stratifying respondents by education level, a second set of correlations was conducted to better understand the role of education on participant responses. Moderate to strong correlations were observed between the

individual items (0.33 to 0.97,  $p < 0.05$ ). When correlations were examined by education level, the strength of several correlations decreased substantially with the lowest correlations observed among those with the lowest education level. Significant differences were also examined between FNPA and FSOC domain scores. On the FNPA Hispanics had lower FNPA mean summary score relative to Eating Behaviors (EB;  $19 \pm 3.3$  vs.  $20.6 \pm 1.8$ ,  $p = 0.02$ ) and Screen Time Behaviors (ST;  $6.1 \pm 1.7$  vs.  $6.9 \pm 1.5$ ,  $p = 0.04$ ). On the FSOC Hispanics had lower mean individual and mean summary scores in the PA and Sleep Behavior domains ( $p < 0.05$ ). In conclusion, additional research is needed to determine if the FSOC is a valid and reliable instrument and has the potential to meet an identified need related to family-directed, obesity prevention efforts for Hispanic families, or any families when the caregiver has low education.

Key words: Child obesity, family home environment, Hispanics, obesity preventing behaviors, readiness to change, Family Stages of Change, Family Nutrition and Physical Activity Screening Tool

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I understand that my project will become part of the permanent collection of Oregon State University. My signature below authorizes release of my project to any reader upon request.

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## INTRODUCTION

Overweight and obesity in children continues to be a concern and remains a major focus of public health efforts in the United States [1, 2]. The childhood obesity epidemic has grown rapidly over the last three decades, almost tripling since 1980. Results from the 2011-2012 National Health and Nutrition Examination Survey (NHANES) showed an estimated 17% of children and adolescents aged 2 through 19 years were obese and approximately 32% were overweight or obese. The survey also projected just over 8% of children ages 2 through 5 years and 18% of children ages 6 through 11 were obese in 2011-2012 [2]. NHANES has consistently reported differences in obesity prevalence by race/ethnicity, which continues to be higher among non-Hispanic black and Hispanic children and adolescents than among non-Hispanic white youth. Between the years of 1999-2010, the odds of being obese were significantly higher for Mexican-American males and females compared with non-Hispanic white males and females [3]. In 2011-2012, 22% of Hispanic children and adolescents were obese compared with 14% of non-Hispanic white children and adolescents [2].

Overweight is defined as at or above the sex-specific 85th percentile of the Center for Disease Control's (CDC) 2000 growth charts, but less than the 95<sup>th</sup> percentile. Obesity is defined as a BMI at or above the sex-specific 95th percentile. For the purpose of this study, Hispanic and Latino will be used interchangeably and will be referring to the same group. What is clear from the most recent analyses of NHANES data is that overweight and obesity continues to be a significant problem for Latino populations. Latino youth

ages 2-19 have higher overweight and obese prevalence compared to any other measured race/ethnic categories [2].

### **Effects of Overweight and Obesity**

The repercussions of obesity are far ranging. Evidence suggests that overweight children are more likely to become obese adults [1, 4] and the incidence of a child being obese between the ages of 5 and 14 years is more likely to have occurred at younger ages [5]. In addition, overweight and obesity during childhood and adolescence is associated with a number of cardiovascular diseases and negative psychosocial health risk factors. These risk factors include but are not limited to diabetes, hypertension, dyslipidemia, asthma, sleep apnea, low self-esteem, and increased engagement in high-risk behaviors [6, 7]. The negative effects of overweight and obesity in Hispanic youth cannot be understated. Hispanics currently represent the most populous and fastest growing ethnic minority in the United States, accounting for approximately 16 percent, or 50.5 million people in 2010 [8]. Thus more attention should be directed at addressing the public health crisis of obesity for this population – particularly considering the potential repercussions on health care costs. Studies have indicated that Hispanics have increased risks of developing chronic diseases [9], tend to be less knowledgeable about certain risk factors, prepare more fried foods, and engage in less physical activity compared to white/non-Hispanics [10]. In aim of fostering effective preventative and intervention strategies, it is imperative to further investigate the factors that influence the development of overweight and obesity in Hispanic children.

## **Family Home Environment and Family-Based Interventions**

For the last decade, substantial progress has been made to curb the overall rise in childhood obesity [2]. The stem in prevalence may be due from the change of efforts of targeting and changing individual child-level behavior towards the importance on emphasizing and creating environments that support children's ability to enact obesity preventing behaviors [4]. Though biological and heritable factors can influence a child's risk for becoming overweight and obese [11], evidence suggests school and family home settings likely have the greatest potential to impact child obesity, showing strongest indications ascribed to school-based efforts for effective prevention programs [12] and family-based behavioral obesity treatment for combating pediatric obesity [13]. The term 'obesogenic' has been used to describe an environment that contributes to overeating and inactivity, and expressed among experts as a major contributing factor in the obesity epidemic [14, 15]. Evidence also suggests that a child's contexts such as family and home environments highly influence diet and physical activity behaviors [14, 16]. Davidson and Birch [14] identified obesogenic families in terms of parent's degree of physical activity and dietary behavior patterns. The study reported parents who participated in less physical activities and ate poorly, were more likely to have overweight daughters. Suggesting that the unhealthy behaviors unintentionally created by the parents, may actually predisposed their children in becoming overweight or obese. Numerous studies continue to exemplify the importance of home environments and parenting behaviors on children's nutrition and physical activity behaviors, and a handful of studies have focused on Hispanic families [17-19]. Matheson's et al. study

[27] of Mexican-American mothers, found that a mother's pressure on their children to eat highly affected their children's weight. While parenting styles (i.e. controlling, authoritative, or permissive) do play a complex role in a child's home obesogenic environment [29], and thus – teaching parenting skills may be an effective way to influence behavior change, this has generally not been an effective strategy [12]. Though the importance of the family home environment on children's risk for obesity is signified [15, 16, 20-22], even among minority groups [23], few family-based interventions have been known effective at influencing children's obesity risk [12], particularly targeting Hispanics [17, 23, 67].

For many, the solution appears simple – adequately educate families to value and enact upon healthy choices, eat fewer calories and expend more. However it may not be that easy, the challenge requires families to support their children's healthy eating and physical activity behaviors involving the family and their lifestyles [24]. There are a variety of components that hinder a families' ability to change healthy eating and physical activity behaviors that ultimately influence the risk of child obesity, thus making it a multifactorial issue. Gable et al [25] for example, supported theories regarding the contributions of television watching, neighborhood safety and family meals to children's weight status. Children in families of lower socioeconomic status (SES) tend to have less access to healthy foods compared to more well-to-do families [26], live in regions where safety of the neighborhood is seen as a barrier to physical activity [22], and have more electronic media in their bedrooms that tend to further sedentary behavior [27]. The prevalence of overweight children also tends to be higher in low income, minority

families [28-30]. Parents with higher education completed (e.g. college degree) are less likely to have children that are obese compared to those with less education, though the relationship among parent education is not consistent, in that SES and obesity may vary by race and ethnic groups [30]. SES may also affect family adopted principles regarding physical activity. Tandon et al [27] suggested that low income families tend to have more restrictive physical activity principles compared to families of higher SES, and lower SES home environments provided fewer opportunities for physical activity and more opportunities for sedentary behavior. Other factors have also been shown to affect healthy eating and physical activity behaviors and subsequent obesity risk including conflicts between work and family life [31], child's caring needs and responsibilities [32], and the type of area you live (rural versus urban) [33]. Therefore, it is difficult to understand and isolate the impact on lifestyle factors since a complex web of factors influence family behaviors, making it a challenging goal to develop and implement effective family-based obesity prevention strategies.

While these factors involve the whole family, there are unique barriers confronting children in particular. Parents ultimately impact the physical and social environments that children have access to – providing healthy or unhealthy foods, promoting physical activity and sedentary behaviors at home. Since children are not entirely responsible for their choices and do not have volitional control over their home environment; parents provide the context for children's obesity preventing behaviors. Family is known to be a major source of influence in effecting change [34], and the reciprocal nature of adult-child relationships grants importance as a means of

influencing healthy behaviors for both [35]. Parental health behavior also guides the development of health practices in children, and children can influence these same behaviors of their parents and siblings [36, 37]. Since it is recognized that health behaviors predominately begin in childhood [37], and obesity is known to track from early childhood to adolescence and the lifespan [5], early recognition and understanding of family dynamics is critical to the development of effective intervention strategies and takes precedence in prevention efforts as it may provide the most potential for the greatest impact. Gruber and Haldeman [24], and Golan colleagues [38-40] suggested that to effectively combat child obesity, it is essential to create a family or home environment that promotes healthy family habits. In order to create a family unit suitable for health promotion intervention, Gruber and Haldeman [24] proposed that we need to “more effectively advance the notion that family be considered as a central unit for making behavior changes that support healthy eating and physical activity habits,” and distinguish how family impacts the development of childhood overweight and obesity preventing behaviors. Recently, several home environment assessment tools have been developed to include family-level behaviors [15, 17, 41-43], in an effort to identify contributors of overweight and obesity. These tools are utilized by health practitioners to pinpoint factors associated with overweight and obesity among target populations, enabling improved tailoring of intervention strategies. Among these, the Family Nutrition and Physical Activity (FNPA) Screening Tool, the parenting strategies for eating and activity scale (PEAS) and recently the Comprehensive Home Environment Survey (CHES), have been associated with child BMI status [17, 20, 41]. The PEAS was a

developed culturally appropriate scale measuring Latino parenting strategies related to children's diet, physical activity and BMI. Results from these instruments indicated that family based behaviors such as providing healthy snacks, limiting access to unhealthy snacks, providing opportunities for family active time and parenting strategies were associated with child BMI [17, 20, 41].

To date, applicable screening tools designed for the development of effective prevention and intervention strategies remain a challenge among ethnic groups. Critical gaps still exist in understanding the influence of culturally-specific family relationships on obesity in children, and few assessment tools have been validated in specific ethnic populations. Such research is necessary to further the knowledge in this area [17].

Ethnic groups can respond differently to health promotion and interventions, thus emphasis on examining these differences is important. Nader et al [36] reported that Anglo-white families conveyed more change in their dietary and physical activity habits than Mexican American families after an intervention to reduce cardiovascular risk among school children. Hispanic families are also known to be very family-centric, making the influence of the family both a facilitator and a barrier for practicing particular behaviors. Evenson et al [44] described the role of Hispanic wives and mothers in a families' physical activity participation. For many of the women, the family and care of the home came before self. Hispanics feel that activities that involve the family, particularly their children, can provide them the necessary incentives and opportunities to be physically active in order to overcome barriers [44]. The use of a family-based assessment tools as a means for understanding change in dietary and



activity practices among Hispanics groups may be applicable to the family unit. Thus, family-based interventions developed within the context of the target audience may result in more effective behavior change. However, what remains absent in such interventions, is a theory describing family-level involvement as a framework to *change* obesity-preventing behaviors [24]. Consequently, this encouraged the development of a theory-based screening instrument to guide family-level obesity-preventing behavior change [45].

The comprehension and examination of change in a behavior is essential to design effective communication and intervention strategies. The newly designed instrument incorporates The Transtheoretical Model (TTM) of behavior change. The TTM was originally used for smoking cessation, and since, has been extensively integrated and applied to a variety of behaviors, population's and settings [46]. James Prochaska and Carlo DiClemente introduced the TTM as a way to characterize the integration of current behavioral status with a person's intention to change his/her behavior [46]. The model describes current behaviors in which individuals attempt to eliminate or adopt a health behavior that progresses through five distinct stages of change: precontemplation, contemplation, preparation, action, and maintenance. They emphasized the importance of designing programs that are tailored to the appropriate stage of change. In the TTM, change processes (ultimately intervention strategies) differ across and are applied optimally at each stage of change. For example, behavior change strategies (e.g. reducing screen time/media in bedrooms) are more likely to result in positive changes for individuals in preparation or action stages whereas individuals in

contemplation will be more open to strategies that increase knowledge (e.g. sharing information about screen time/media in bedrooms related to child's health) [47]. The transtheoretical framework is also considered one of the more promising approaches for enhancing physical activity behavior [48], though race/ethnicity variability have shown to be associated with varying patterns of stages of change [49]. The application of the stages-of-change theory has been successful in addressing childhood obesity among clinical populations [50] and in school settings [51, 52]. Since limited data exists on the TTM (or the stages-of-change theory) for obesity prevention involving family-level behaviors enacting in the home environment that are not entirely under the responsibility of the child, particularly for Hispanic children's preventative obesity behaviors, the applicability cannot yet be fully understood.

### **Statement of Purpose**

The objective of this study was to examine and summarize the relationships of similar items between a newly created family obesity-preventing behavior screening tool, and a validated screening tool that measures both family and child-level behaviors shown to predict child obesity. Of particular interest for this study was whether relationships between the measures differed between Hispanic and non-Hispanic families in order to determine the validity of the FSOC instrument for use with Hispanic families. The present study is designed to correlate specific FNPA items scores to related FSOC items. Since parent education level has been shown to influence child obesity, and may influence survey method procedures [30] we included a variable that

indicates level of parent education, to adjust for that in our analyses between the two groups. A strong relationship between FSOC and FNPA items would support the utility of the FSOC as an indicator of families' stage of change, and their readiness to change obesity preventing behaviors. Poor relationships between the FSOC and FNPA items could indicate limitations and or weaknesses within the FSOC.

The Family Stage of Change (FSOC) Screening Tool was designed to measure family readiness to enact the obesity preventing behaviors shown to influence child BMI [20]. While strong relationships between the FSOC and the FNPA have been previously observed in a sample of non-Hispanic families, suggesting it has utility in measuring non-Hispanic family stage of change [45] these relationships have not yet been studied in a sample of Hispanic families.

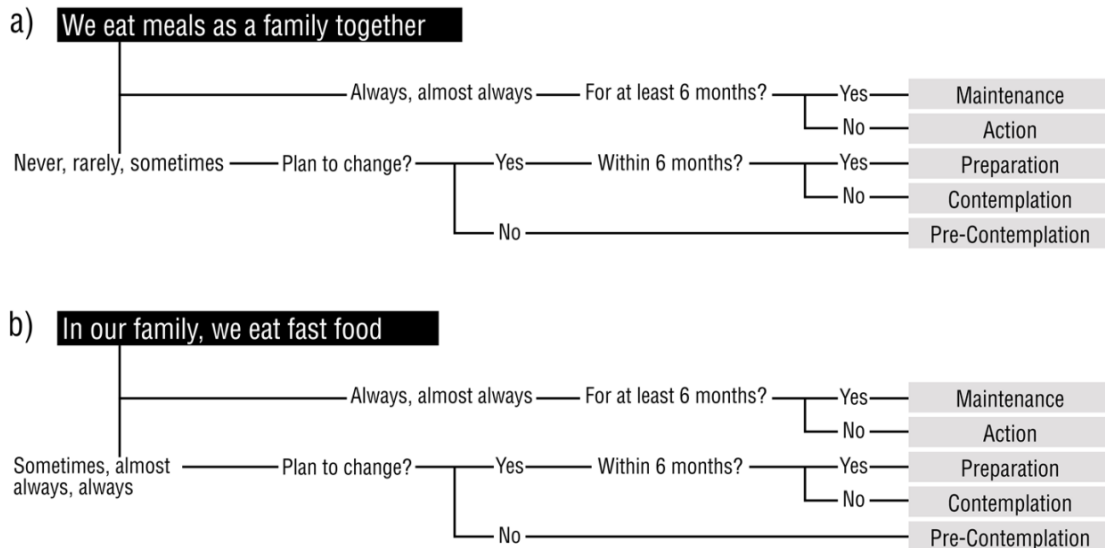
Thus our study is relevant for practitioners working with Hispanic families to prevent obesity. This study was approved by the University Institutional Review Board under a larger study.

## **METHODS**

### **Survey Development and Delivery**

The development of the FSOC instrument was driven by a desire to match childhood obesity intervention strategies targeting the family home environment with families' readiness to implement those strategies. Thus, Gunter et al [45] needed a valid measure of family obesity preventing behaviors as a launch point. The Family Nutrition and Physical Activity (FNPA) Screening Survey is a valid measure of the family home nutrition and physical activity environment which consists of 21 items assessing child and family behaviors, family policies, and home environmental characteristics shown to influence child BMI [20]. Twelve of the twenty-one items measured by the FNPA are specific to family (versus individual) behaviors and include "eating behaviors" (n=6), "physical activity behaviors" (n=3), "screen time behaviors" (n=2) and "sleep time behaviors" (n=1) (Table 1). These twelve FNPA items were adapted and included in the FSOC by applying a staging algorithm to each item based on the TTM [46] (Figure 1). The survey was originally written in English, and then a Spanish version was created to obtain and record larger and diverse groups.

**Figure 1.** This image demonstrates how the TTM staging algorithm constructed by DiClemente and colleagues<sup>12</sup> was applied to create the FSOC “support statement” (a) and “barrier statement” (b) items.



The FNPA items are single statements, evaluated on a Likert scale, that reflect how often (almost never, sometimes, usually, almost always) a family reports engaging in a particular behavior, such as eating meals together as a family (e.g. “Our family eats meals together...”; to which the respondent indicates almost never, sometimes, usually or almost always). To construct the FSOC Tool a staging algorithm constructed by DiClemente and colleagues [46] was applied to the FNPA statement as shown in Figure 1a.

This process was followed for all FNPA statements where the desirable behavior was reflected in a response of “always” or “almost always.” These statements were identified as support statements. Statements where the desired behavior was reflected

by a response of “never” or “rarely” (e.g. “our family eats fast food”) were identified as barrier statements. This required a different application of the staging algorithm (Figure 1b).

Each FSOC item was coded by applying a score of 1 (Precontemplation) through 5 (Maintenance) based on respondents’ answers for that item. Stage scores were calculated item by item and by summing the scores of items within each domain (eating (n=6), physical activity (n=3), screen time (n=2), sleep behavior (n=1)). An overall mean stage of change score can also be calculated. The content, layout and format of the questions were piloted among parents and caregivers, practitioners, and content experts, resulting in a final version that was disseminated for validation testing done by the larger study [45]. The FNPA Screening Tool is available in English and Spanish and has been validated in both populations [20]

### **Participants and Procedures**

The target population included parents or caregivers of children ages 2-14. The majority of the survey data came from a larger study examining the validity of the Family Stage of Change Tool [45]. In that study results were not examined relative to race/ethnic status. Of the 146 complete surveys included in this larger study, n= 25 were filled out by individuals who identified as Hispanic; those data were used for this sub-group analysis. We additionally recruited n= 8 families to complete surveys for a total of N=33 surveys filled out by Hispanic families. We applied a random sampling procedure and pulled a similar number of surveys from the larger study for a non-

Hispanic comparison group. An attempt to proportionally match surveys was included for education level of the child. In other words, a similar number of surveys filled out by preschool, elementary, and middle school parents were included in each of the Hispanic and non-Hispanic data pools (Table 1). In addition to filling out the FSOC and the FNPA participants were asked to fill out a brief questionnaire requesting information such as race, ethnicity, their child/children’s grade level, age, and household characteristics regarding eligibility for free and reduced meals, parent/caregiver education, and food insecurity status.

**Table 1.** *Proportion Summary of Child Education Level of Families in Preschool, Elementary, Middle School among the Hispanic and Non-Hispanic responders*

	Preschool	Elementary (K-5)	Middle School (6-8)
Hispanic	9	26	12
Non-Hispanic	6	30	16

### **Analytic Approach**

Descriptive analyses were conducted on the demographic data, and correlations were run to examine relationships between statements from the FSOC and FNPA among the self-described Hispanic and non-Hispanic respondents. The first series of correlations were done on single equivalent items from both surveys between those answered in Spanish and those in English. Scores for each of the four measured domains: Eating Behaviors, Physical Activity Behaviors, Screen Time Behaviors, Sleep

Behaviors, were created by summing and averaging sub-samples of similar items. For example, the FSOC Physical Activity domain score reflects the mean score of three items related to family physical activity behaviors. The mean of the total summary scores were also calculated for the domains. Table 2 presents the individual FNPA items (column 1) that were adapted for the FSOC in comparison to the FSOC items (column 2), nested within domains (Eating Behaviors, etc.), also included is the Spanish translations of Table 2 shown in Table 3. In addition, total scores were calculated for the twelve FSOC items and related FNPA items, and the means of these scores were calculated. Once correlations were completed for the single equivalent items, we then conducted t-tests to measure the strength of the single item correlations, mean domain and total summary domain scores to find potential differences between the Hispanic and non-Hispanic groups. We also assessed and compared correlation pairs between Hispanic and non-Hispanic groups to find a differences. A second series of analysis was performed to understand the influence of caregiver education on participant responses. We stratified our sample into three groups defined by level of caregiver education: 1) attended or completed grades 1 to 11, 2) attended or completed grade 12 (or obtained GED), and 3) attended or completed college 1-3 years or 4th year (degree obtained). Because 100% of the non-Hispanic population was in group 3 - comparisons between Hispanic and non-Hispanics were only conducted within this sub-group.

**Table 2** *FNPA Family Behavior Statements and Corresponding FSOC Statements, Nested within Behavior Domains*

FNPA Statements (Statement #)	FSOC Statements (Statement #)
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<b>DOMAIN 1: EATING BEHAVIORS (n=6)</b>	
Our family eats meals together... (2)	We eat meals together as a family. (1)
Our family eats while watching TV/computer/electronic games... (3)	Our family eats meals and/or snacks while watching TV/computer or playing electronic games. (3)
Our family eats fast food... (4)	In our family we eat fast food. (4)
Our family uses microwave or 'ready to eat' foods... (5)	In our family we eat microwavable or ready-to-eat foods. (5)
Our family monitors eating of chips, cookies, and candy... (9)	In our family we limit eating of chips, cookies, and candy. (2)
Our family uses candy or sweets as a reward for good behavior... (10)	In our family we use candy/sweets as a reward for good behavior. (6)
<b>DOMAIN 2: PHYSICAL ACTIVITY BEHAVIORS (n=3)</b>	
Our family provides opportunities for physical activity... (14)	In our family we make time for physical activity. We also provide support so our children can play actively and do organized physical activities and/or sports. (8)
Our family encourages our child to be active every day... (15)	In our family we encourage our children to be active every day. (7)
Our family finds ways to be physically active together... (16)	In our family we find ways to be active together. (9)
<b>DOMAIN 3: SCREEN TIME BEHAVIORS (n=2)</b>	
Our family limits the amount of TV/games/computer our child watches... (12)	In our family we limit the time children can spend watching TV/computer and playing electronic games. (10)
Our family allows our child to watch TV/games/computer in his/her bedroom... (13)	In our family we allow children to watch TV/computer or play electronic games in their bedroom. (11)
<b>DOMAIN 4: SLEEP BEHAVIORS (n=1)</b>	
Our family has a daily routine for our child's bedtime... (19)	In our family we have a daily bedtime routine for our children. (12)

**Table 3** FNPA Family Behavior Statements and Corresponding FSOC Statements, Nested within Behavior Domains in translated in Spanish

<b>FNPA Statements (Statement #)</b>	<b>FSOC Statements (Statement #)</b>
<b>DOMAIN 1: EATING BEHAVIORS (n=6)</b>	
Nuestra familia come comidas juntos... (2)	Nuestra familia comparte las comidas juntas. (1)
Nuestra familia mira la televisión/computadora/videojuegos mientras come... (3)	Nuestra familia come comidas y/o bocadillos mientras mira la televisión Nuestra familia controla el consume de papitas, galletas y dulces. (3)
Nuestra familia come comidas rápidas...(4)	Nuestra familia come comidas rápidas. (4)
Nuestra familia come comidas que se preparan en el microondas o comidas empacadas... (5)	En nuestra familia comemos comidas preparadas en el microondas o comidas empacadas “listas para comerse”. (5)
Nuestra familia controla el consumo de papitas, galletas y dulces... (9)	Nuestra familia controla el consumo de papitas, galletas y dulces. (2)
Nuestra familia usa los dulces o golosinas como recompensa por buen comportamiento... (10)	Nuestra familia usa los dulces/golosinas como recompensa por buen comportamiento. (6)
<b>DOMAIN 2: PHYSICAL ACTIVITY BEHAVIORS (n=3)</b>	
Nuestra familia ofrece oportunidades s para la actividad física... (14)	En nuestra familia brindamos apoyos y oportunidades para que los niños estén físicamente activos. (8)
Nuestra familia anima a nuestro hijo/a a estar activo (moverse más)... (15)	Nuestra familia anima a nuestros hijos a ser más activos todos los días. (7)
Nuestra familia encuentra formas de estar físicamente activos juntos... (16)	En nuestra familia buscamos formas de estar activos juntos. (9)
<b>DOMAIN 3: SCREEN TIME BEHAVIORS (n=2)</b>	
Nuestra familia limita el tiempo de televisión que nuestro hijo/a mira... (12)	En nuestra familia limitamos el tiempo que los niños pueden pasar viendo la televisión/computadora jugando los videojuegos. (10)
Nuestra familia anima a nuestro hijo/a mirartelevisión/videojuegos/computadora en su habitación... (13)	En nuestra familia permitimos a los hijos a ver la televisión/computadoras, o jugar los videojuegos en sus recámaras. (11)
<b>DOMAIN 4: SLEEP BEHAVIORS (n=1)</b>	
Nuestra familia tiene una rutina diaria para la hora de dormir con nuestro hijo/a... (19)	En nuestra familia tenemos una rutina diaria para la hora de dormir para nuestros hijos. (12)

## RESULTS

### Descriptive Analyses

Of the 66 respondents whose data were analyzed for this study, 50% reported as non-Hispanic or Latino (n=33) and the other 50% reported as being of Hispanic or Latino ethnicity (n=33). Among the reported non-Hispanic/Latinos, all reported race as “White”. Among the reported Hispanic/Latinos, 57.6% reported race as “White”, 9.1% as “American Indian or Alaska Native”, and 33.3% did not identify race. The majority of the respondents (66.8%) were from households with two adults, 15.2% reported living in a household with three adults, and 3.0% (all Hispanic/Latino) reported living in a household with four adults and 4.5% were in single parent households. The majority of non-Hispanic/Latinos (72.7%) were from households with two adults, compared to Hispanic/Latino respondents (54.5%). In total, 7.6% of children lived in more than one household, of the Hispanic/Latinos, 6.0 % lived in more than one household, compared to 9.0% of non-Hispanics. There was a similar distribution of respondents who reported that their children were not eligible to receive free or reduced meals (50%), and those reporting their children were eligible for free or reduced meals (45.5%); 3.0% did not know if their children were eligible for free or reduced meals. Of the Hispanic/Latino families, 72.7% reported that their children were eligible for free or reduced meals compared to 10.6% of non-Hispanic/Latinos. A modest amount of our sample (39.4%) would be classified as food insecure based on their response to how often they worried

that their food would run out before they had enough money to buy more (answering “sometimes true”). Of these, 57.6% were of Hispanic/Latino ethnicity compared to 21.2% of non-Hispanic/Latino, though did not have a significant difference ( $\chi^2=3.16$ ,  $p=0.08$ ). The majority of our sample (63.6%) reported having a college degree or completed 1 to 3 years of college, 21.2% reported having graduated from high school as their highest year of schooling or completed grades 9 to 11, and 6.1% reported having completed grades 1 to 8. There was a significant difference in the proportion of our Hispanic sample that attended or completed college compared to the non-Hispanic sample (30% versus 100%;  $\chi^2=5.88$ ,  $p=0.02$ ). As such, we adjusted for this difference in our correlational analyses by stratifying the Hispanic sample by education level (and conducting a second set of correlations within each group to understand the potential influence of education level on survey responses.

### **Correlation Analyses**

*Correlations on the Total Sample:* Mean FNPA and FSOC item, domain and total mean sum scores are presented in Table 4. The mean total scores calculated for the twelve FSOC items and related FNPA items were: 44.0 for Hispanics, 50.7 for non-Hispanics between the FOSC, and 36.8 for Hispanics and 41.3 for non-Hispanics for the FNPA, higher scores reflect more positive behavior. Correlations of single similar items between FSOC and FNPA are presented in Table 6. Overall, correlations between the FNPA and FSOC item for respondents in the combined Hispanic and non-Hispanic groups

ranged from 0.41 to 0.79. Correlations above 0.5 were considered strong, positive correlations and correlations of moderate strength reflect those between 0.3 to 0.5. There were five correlations among the Hispanic group that fell below the strong positive threshold, this included items between: FSOC #1 (We eat meals together as a family) and FNPA #2 (Our family eats meals together) (0.49), FSOC #4 (In our family we eat fast food) and FNPA #4 (Our family eats fast food) (0.41), FSOC #5 (In our family we eat microwavable or ready-to-eat foods) and FNPA #5 (Our family uses microwave or 'ready to eat' foods) (0.46), and FSOC #11 (In our family we allow children to watch TV/computer or play electronic games in their bedroom) and FNPA #13 (Our family allows our child to watch TV/games/computer in his/her bedroom) (0.47). There were only two correlations among the non-Hispanic group that fell below this threshold, these included items between: FSOC #7 (In our family we encourage our children to be active every day) and FNPA #15 (Our family encourages our child to be active every day) (0.42), and FSOC #12 (In our family we have a daily bedtime routine for our children) and FNPA #19 (Our family has a daily routine for our child's bedtime) (0.47). Despite these lower than desirable correlations, all single item correlations from both samples were statistically significant ( $p < 0.05$ ). There were no significant differences between Hispanic versus non-Hispanic correlation comparisons for any of the paired items based on the standard normal z distribution for the first series ( $p < 0.05$ ).

Differences in Hispanic versus non-Hispanic FNPA and FSOC item, domain and mean total summary scores are presented in Table 5. Of the individual items in the FSOC, there were four significant differences between Hispanic versus non-Hispanic

respondents ( $p < 0.05$ ). These included items FSOC #4 (In our family we eat fast food), FSOC #7 (In our family we encourage our children to be active every day), FSOC #8 (In our family we make time for physical activity). We also provide support so our children can play actively and do organized physical activities and/or sports) and FSOC #12 (In our family we have a daily bedtime routine for our children). Of the individual items in the FNPA, there were three significant differences between Hispanic versus non-Hispanic respondents ( $p < 0.05$ ). These included items FNPA #3 (Our family eats while watching TV/computer/electronic games), FNPA #9 (Our family monitors eating of chips, cookies, and candy), and FNPA #12 (Our family limits the amount of TV/games/computer our child watches).

Both the mean item and mean summary scores for Physical Activity Behavior domains ( $(3.9 \pm 1.2$  versus  $4.56 \pm 0.66$ ,  $p=0.02$ )( $11.2 \pm 4.1$  versus  $13.67 \pm 2.0$ ,  $p=0.00$ ) were lower for Hispanic responders compared to non-Hispanic responders, respectfully. Hispanics had lower FSOC mean summary score relative to Screen Time Behavior ( $7.0 \pm 2.6$  versus However there were no differences in the remaining domains on the FSOC ( $p > 0.05$ ). Significant differences were also examined on the FNPA mean item and mean summary domain scores. Hispanics had lower FNPA mean summary scores relative to Eating Behaviors ( $19 \pm 3.3$  versus  $20.6 \pm 1.8$ ,  $p=0.02$ ) and Screen Time Behaviors ( $6.1 \pm 1.7$  versus  $6.9 \pm 1.5$ ,  $p=0.04$ ). Mean domain for Screen Time Behavior also had a lower score among Hispanics compared to non-Hispanics on the FNPA ( $3.0 \pm 0.54$  versus  $3.5 \pm 0.75$   $p=0.04$ ).

*Correlations by Education Level:* We repeated the correlational analyses within each of the stratified education levels. Correlations of single FSOC and FNPA items among participants who completed or attended college data are presented in Table 7. This is the only group that has a Hispanic-Non-Hispanic comparative component as 100% of non-Hispanics attended or completed college.

Correlations within this group ranged from 0.33 to 0.97, with no significant difference between Hispanics and non-Hispanics for any of the paired items were measured based on the standard normal z distribution ( $p < 0.05$ ). Only two correlations among the Hispanic group fell below desirable threshold, these included items between: (FSOC #1 (We eat meals together as a family) and FNPA #2 (Our family eats meals together) (0.33), and FSOC #14 (Our family provides opportunities for physical activity) and FNPA #8 (In our family we make time for physical activity. We also provide support so our children can play actively and do organized physical activities and/or sports) (0.43). Neither correlation was statistically significant ( $p > 0.05$ ). Among non-Hispanics, two correlations were lower than desirable. These included correlations between: FOSC #7 and FNPA #15 (0.42), and FSOC #19 and FNPA #12 (0.41). However, both were statistically significant ( $p < 0.05$ ).

Correlations for respondents reporting they attended or completed grades 12 (or obtained GED) are presented in Table 8. This analysis includes only Hispanic responders. Correlations ranged from 0.14 to 0.79. Half of the correlations among the group fell below the undesirable threshold and were not statistically significant ( $p > 0.05$ ).

The last subset of correlations conducted on respondents reporting they attended or completed Grades 1- 11, are presented in Table 9. Again, this analysis only includes Hispanic responders. Correlations ranged from 0.11 to 0.71. Half of the correlations among the group also fell below the undesirable threshold, with even weaker, positive coefficients. None of the correlations within this group were statistically significant ( $p>0.05$ ).



**Table 4** FNPA Means for Hispanic and Non-Hispanic by Item, Domain and Total Summary Scores with their associated p-values.

DOMAIN 1: EATING BEHAVIORS (n=6)			
FNPA Item (n=Hispanic) (n=Non-Hispanic)	Mean (SD)		p-value
	Hispanic	Non-Hispanic	
2 (n=32) (n=33)	3.16 (0.90)	3.33 (0.65)	0.45
3 (n=32) (n=33)	2.88 (0.94)	3.45 (0.71)	0.01
4 (n=32) (n=33)	3.19 (0.79)	3.42 (0.50)	0.15
5 (n=32) (n=33)	3.53 (0.62)	3.42 (0.61)	0.42
9 (n=32) (n=33)	3.03 (1.00)	3.60 (0.66)	0.01
10 (n=32) (n=33)	3.48 (0.72)	3.36 (0.65)	0.42
EB Domain (n=32) (n=33)	3.21 (0.54)	3.43 (0.30)	0.28
EB Total Sum (n=32) (n=33)	19.00 (3.30)	20.61 (1.77)	0.02
DOMAIN 2: PHYSICAL ACTIVITY BEHAVIORS (n=3)			
FNPA Item (n=Hispanic) (n=Non-Hispanic)	Mean (SD)		p-value
	Hispanic	Non-Hispanic	
14 (n=31) (n=33)	3.26 (0.89)	3.48 (0.57)	0.27
15 (n=32) (n=33)	3.41 (0.80)	3.58 (0.50)	0.26
16 (n=32) (n=33)	2.88 (0.91)	3.00 (0.87)	0.48
PAB Domain (n=32) (n=33)	3.18 (0.73)	3.35 (0.49)	0.24
PAB Total Sum (n=32) (n=33)	9.43 (2.29)	10.06 (1.48)	0.18
DOMAIN 3: SCREEN TIME BEHAVIORS (n=2)			
FNPA Item (n=Hispanic) (n=Non-Hispanic)	Mean (SD)		p-value
	Hispanic	Non-Hispanic	
12 (n=32) (n=33)	2.84 (1.08)	3.39 (0.90)	0.04
13 (n=32) (n=33)	3.22 (0.91)	3.55 (0.79)	0.15
STB Domain Mean (n=32) (n=33)	3.03 (0.83)	3.47 (0.75)	0.04
STB Mean Total Sum (n=32) (n=33)	6.06 (1.66)	6.94 (1.50)	0.04
DOMAIN 4: SLEEP BEHAVIORS (n=1)			
FNPA Item (n=Hispanic) (n=Non-Hispanic)	Mean (SD)		p-value
	Hispanic	Non-Hispanic	
19 (n=32)	3.25 (0.88)	3.72 (0.52)	0.39

\*EB = Eating Behaviors; PAB = Physical Activity Behaviors; SCT = Screen Time Behaviors

**Table 5** FSOC Means for Hispanic and Non-Hispanic by Item, Domain and Total Scores with their associated p-values.

DOMAIN 1: EATING BEHAVIORS (n=6)			
FSOC Item (n=Hispanic) (n=Non-Hispanic)	Mean (SD)		p-value
	Hispanic	Non-Hispanic	
1 (n=33) (n=33)	4.36 (0.93)	4.45 (1.28)	0.74
3 (n=32) (n=33)	3.31 (1.40)	3.70 (1.74)	0.33
4 (n=33) (n=25)	3.78 (1.43)	4.62 (1.10)	0.02
5 (n=31) (n=33)	3.90 (1.40)	4.10 (1.50)	0.67
2 (n=33) (n=33)	4.18 (1.21)	4.55 (0.97)	0.18
6 (n=33) (n=33)	4.10 (1.11)	3.91 (1.59)	0.65
EB Domain (n=33) (n=33)	3.97 (0.73)	4.17 (0.87)	0.32
EB Total Sum (n=33) (n=33)	23.97 (4.54)	24.15 (5.74)	0.36
DOMAIN 2: PHYSICAL ACTIVITY BEHAVIORS (n=3)			
FSOC Item (n=Hispanic) (n=Non-Hispanic)	Mean (SD)		p-value
	Hispanic	Non-Hispanic	
8 (n=31) (n=33)	4.06 (1.24)	4.76 (0.83)	0.01
7 (n=31) (n=33)	4.03 (1.25)	4.82 (0.77)	0.00
9 (n=31) (n=33)	3.87 (1.34)	4.10 (1.30)	0.51
PAB Domain (n=33) (n=33)	3.99 (1.19)	4.56 (0.66)	0.02
PAB Total Sum (n=33) (n=33)	11.24 (4.05)	13.67 (2.00)	0.00
DOMAIN 3: SCREEN TIME BEHAVIORS (n=2)			
FSOC Item (n=Hispanic) (n=Non-Hispanic)	Mean (SD)		p-value
	Hispanic	Non-Hispanic	
10 (n=31) (n=33)	3.80 (1.24)	4.21 (1.41)	0.26
11 (n=31) (n=33)	3.50 (1.55)	4.15 (1.66)	0.11
STB Domain (n=33) (n=33)	3.72 (1.33)	4.18 (1.36)	0.17
STB Total Sum (n=33) (n=33)	6.97 (2.58)	8.36 (2.71)	0.04
DOMAIN 4: SLEEP BEHAVIORS (n=1)			
FSOC Item (n=Hispanic) (n=Non-Hispanic)	Mean (SD)		p-value
	Hispanic	Non-Hispanic	
12 (n=32) (n=33)	4.25 (1.32)	4.85 (0.62)	0.02

\*EB = Eating Behaviors; PAB = Physical Activity Behaviors; SCT = Screen Time Behaviors

**Table 6** Correlations of single FSOC and FNPA items for Hispanic and Non-Hispanic Responders.

FSOC	1	2	3	4	5	6	7	8	9	10	11	12
FNPA	0.59											
2	0.49 <sup>1</sup>											
9		0.51										
3		0.50										
3			0.71									
3			0.44 <sup>1</sup>									
4				0.51								
4				0.41 <sup>1</sup>								
5					0.66							
5					0.46 <sup>1</sup>							
10						0.73						
10						0.56						
15							0.42 <sup>1</sup>					
15							0.58					
14								0.64				
14								0.62				
16									0.61			
16									0.78			
12										0.75		
12										0.58		
13											0.79	
13											0.47 <sup>1</sup>	
19												0.41 <sup>1</sup>
19												0.61

*Correlation coefficients designated in numerator are self-reported non-Hispanic respondents completed in English. Coefficients in denominator are self-reported Hispanic respondents completed in Spanish. NOTE: <sup>1</sup>= Denotes a correlation which is lower than desirable. All correlations were statistically significant with  $p < 0.05$ . The number of observations varied between 25 and 33, due to missing data.*

**Table 7** Correlations of single FSOC and FNPA items adjusted for the level of parent education (completed or attended college) for Hispanic and Non-Hispanic Responders

FSOC	1	2	3	4	5	6	7	8	9	10	11	12
FNPA												
	0.59											
2	0.33 <sup>1,2</sup>											
		0.51										
9		0.61 <sup>2</sup>										
			0.71									
3			0.83									
				0.51								
4				0.59								
					0.66							
5					0.52							
						0.73						
10						0.81						
							0.42 <sup>1</sup>					
15							0.83					
								0.64				
14								0.43 <sup>1,2</sup>				
									0.61			
16									0.86			
										0.75		
12										0.83		
											0.79	
13											0.97	
												0.41 <sup>1</sup>
19												---

*Correlation coefficients designated in numerator are self-reported non-Hispanic respondents that attended or completed a college degree, completed survey in English. Coefficients in denominator are self-reported Hispanic respondents that attended or completed a college degree, survey completed in Spanish. NOTE: <sup>1</sup>= Denotes a correlation which is lower than desirable. All the correlations were statistically significant with  $p < 0.05$ , except for those denoted with 2. Did not have a successful correlation for Hispanic respondents between FSOC 12 and FNPA 19. The number of observations varied between 25 and 33, due to missing data.*

**Table 8** Adjusted correlations of single FSOC and FNPA items stratified for the level of parent education (attended or completed grades 12 or obtained GED) for Hispanic Responders

FSOC	1	2	3	4	5	6	7	8	9	10	11	12
FNPA												
2	0.5											
9		0.42 <sup>1</sup>										
3			0.38 <sup>1</sup>									
4				0.49 <sup>1</sup>								
5					0.45 <sup>1</sup>							
10						0.14 <sup>1</sup>						
15							0.68 <sup>*</sup>					
14								0.79 <sup>*</sup>				
16									0.75 <sup>*</sup>			
12										0.57		
13											0.17 <sup>1</sup>	
19												0.62 <sup>*</sup>

NOTE: <sup>1</sup>= Denotes a correlation which is lower than desirable. All correlations were not statistically significant with  $p > 0.05$ , except those denoted = <sup>\*</sup> ( $p < 0.05$ ). The number of observations varied between 25 and 33, due to missing data.

**Table 9** Adjusted correlations of single FSOC and FNPA items stratified for the level of parent education (attended or completed Grades 1- 11) for Hispanic Responders

FSOC	1	2	3	4	5	6	7	8	9	10	11	12
FNPA												
2	0.71											
9		0.66										
3			0.07 <sup>1</sup>									
4				0.11 <sup>1</sup>								
5					0.14 <sup>1</sup>							
10						0.80						
15							0.61					
14								0.56				
16									0.71			
12										0.49 <sup>1</sup>		
13											0.27 <sup>1</sup>	
19												0.42 <sup>1</sup>

NOTE: <sup>1</sup>= Denotes a correlation which is lower than desirable. All the correlations were not statistically significant with  $p > 0.05$ . The number of observations varied between 25 and 33, due to missing data.



## DISCUSSION

This paper describes the relationships and potential validity of the FSOC to assess family readiness to change obesity preventing behaviors among Hispanics. The FSOC was initially designed due to the lack of empirical evidence supporting the effectiveness of obesity prevention efforts targeting the family home [45]. Since results from the larger study did not examine relationships relative to race/ethnic status, and Hispanic and Latinos face higher risk for obesity and related diseases, the instigation to examine the FOSC among this group was determined. Similar to the larger study, we evaluated the potential utility of the FSOC by comparing it to a validated measure of family level behaviors predictive of child BMI [20] among Hispanic families. Overall results from tests revealed a majority of positive correlations between individual items, domain scores, and mean total FSOC and FNPA scores suggesting that among Hispanics, both surveys are measuring family level behaviors in similar ways. Results showed families who answered a particular statement on the FNPA tended to have a similar answer on the FSOC, and there were no significant differences between Hispanic and non-Hispanic groups when comparing correlated items between surveys ( $p>0.05$ ). Overall, correlations between the two surveys were lower among Hispanics responders compared to non-Hispanics. However when we examined the correlations between Hispanics who had attended or completed college versus non-Hispanics, these differences were minimized. Furthermore, we observed that as parent education level

decreased (attended or completed Grades 1- 11 and those who attended or completed grades 12 or obtained GED) there were more undesirable, and weaker correlations among Hispanics when compared to those who attended or completed college ( $p < 0.05$ ). This suggests that Hispanics who were less educated responded less consistently than those with higher education between the two surveys.

We also ran tests on individual items between Hispanic versus non-Hispanics to measure if scores were similar between each individual item, mean item and mean total summary domain scores on the FSOC and the FNPA to evaluate significant differences. The majority of items did not show significant differences between groups, indicating that scores were similar between Hispanic and non-Hispanic families. However, overall trends for both surveys showed lower scores between Hispanic families across data sets. These findings were consistent with Ihmels et al [15] results, which showed Caucasians respondents had higher, more desirable, total scores than the other ethnicities. In fact, all items between Hispanic versus non-Hispanics were higher among non-Hispanics except for statements FSOC #6, FNPA #5, and FNPA #10, though differences were not statistically significant ( $p > 0.05$ ). What is of interest is that the Hispanic group had twice the variability in their responses compared to the non-Hispanics for the majority of the items. However there were four individual items that were significantly different between the two groups. FSOC #4 (In our family we eat fast food) was the only significantly different item score within the Eating Behavior domain; indicating Hispanics had a lower score (3.71) compared to non-Hispanics (4.60). Essentially, this suggested Hispanic families more likely answered “Almost Always” ate fast food compared to non-

Hispanic families that “Always” ate fast food. Though these results are not consistent with previous findings [53] a possible explanation could suggest that because non-Hispanics White families earn a higher annual salary than Hispanic families [54], wealthier Americans - those earning \$75,000 a year or more - are more likely to eat fast food at least weekly (51%) than lower-income groups, according to Gallup’s annual Consumption poll [55]. Perhaps fast food consumption is not solely dependent on race/ethnicity, that income might also have a greater influence in our case.

The next item that had a significant difference was FSOC #8 (In our family we make time for physical activity. We also provide support so our children can play actively and do organized physical activities and/or sports), indicating Hispanics had a lower score (4.06) compared to non-Hispanics (4.76). In other words, this suggested Hispanic families more likely answered “Almost Always” compared to non-Hispanic families that answered “Always” make time for physical activity and provide support so their children can play actively and do organized physical activities and sports. These findings are consistent with other reported studies that show the impacts on children’s physical activity due to several negative factors [27, 31-33]. More accurately, according to reports from parents collected by a cross-sectional National Survey of Children’s Health, Hispanic youth are significantly less likely than their white counterparts to get involved in organized physical activity outside of school. They presented 50.3% of native Hispanic children ages 6-17 do not participate in sports after school or on weekends compared with 35.9% of native white children [56]. A study of 4th- and 5th-graders (26% Hispanics) from public schools found that children are significantly more likely to

be physically active and spend less time watching television and computer use if their parents enjoy and encourage participation in team or individual sports [57].

Another item that showed a significant difference was FSOC #7 (In our family we encourage our children to be active every day), indicating Hispanics had a lower score (4.03) compared to non-Hispanics (4.82). That is, Hispanic families more likely answered “Almost Always” compared to non-Hispanic families that answered “Always” encourage their children to be physically active everyday. Positive parental influence such as monitoring, engagements, and role modeling, remain to affect Hispanic children’s physical activity [17, 19, 22]. Due to the increased risk factors that potentially impede the encouragement of physical activity for children in Hispanic families (versus non-Hispanic), we can suggest that our findings are consistent. A study done in 13 elementary schools in San Diego County [57], suggested that parents of overweight Hispanic/Latino children provide less support for their children to engage in physical activity (e.g., encouraging participation in physical activity, participating in physical activity with children and providing transportation to areas where children can be physically active). Thus, the overall domain score was shown to be significantly different as was the total score for Physical Activity Behaviors ( $p < 0.05$ ). Though individual items for Screen Time Behaviors (FSOC #10 and #11) did not show significant differences, the total score for Screen Time Behaviors did reveal a significant difference between Hispanic versus non-Hispanic families between the FSOC, indicating Hispanics had a lower score than non-Hispanics. These findings are consistent with those reported children in families of lower SES status have greater access to media in their bedrooms

that tends to promote more sedentary time [27] and that parents set fewer limitations on their children's use of media compared with white or black parents. According to a report by the Kaiser Family Foundation [58], Hispanic children spend 13 hours each day engaged in various forms of media (nearly 4.5 hours more than white children who spend about 8.5 hours per day using media). In addition, Hispanic youth spend almost 5.5 hours per day watching television, about 2 hours more each day than white youth. The same reporting found that Hispanic children ages 8-18 are less likely to report that their parents set rules regarding the amount of time they spend on television, computers and video games compared with white or black children.

The last item that showed a significant difference was FSOC #12 (In our family we have a daily bedtime routine for our children) which indicated Hispanics had a lower score (4.25) compared to non-Hispanics (4.85) ( $p < 0.05$ ). This suggested that Hispanic families likely answered "Almost Always" compared to non-Hispanic families that answered "Always" have a daily bedtime routine for our children. These results are consistent with findings of Hale et al [65] suggesting children from Hispanic households are less likely to have bedtime routines compared to non-Hispanics. They showed that Hispanic children have later bedtimes than white children and reduced odds of using regular bedtimes (by 29%) and used bedtime routines (by 33%). A more recent study revealed that sleeping with a TV in the bedroom was tied to 31 fewer minutes of sleep per day among racial and ethnic minority children [66].

As for mean item and total summary scores for the domains, there were six that were significantly different. Both the mean item and mean summary scores for Physical

Activity Behavior domains were lower for Hispanic responders compared to non-Hispanic responders ( $p < 0.05$ ). There were no differences in the remaining domains on the FSOC ( $p > 0.05$ ). Significant differences were also examined on the FNPA mean item and mean summary domain scores. Indicating that Hispanics had lower FNPA mean summary scores relative to Eating Behaviors and Screen Time Behaviors had both mean item and summary scores ( $p < 0.05$ ).

Though there were still, positive, statistically significant relationships ( $p < 0.05$ ) of all correlated single items between the FSOC and FNPA among Hispanics, there were several undesirable correlations. After further review of the instrument the consideration that the Spanish translations from surveys did not accurately convey some statements due to possible fault of grammatical errors or semantic equivalence, creating misinterpretations from Hispanic respondents. The transfer of meaning across languages with obtaining a similar effect of respondents languages [59] could have been lost between translations, thus could describe undesirable correlations measured. For example, FSOC #1 “We eat meals together as a family”, was translated to “Nuestra familia comparte las comidas juntas”. An issue with grammar arises with the words “comidas juntas”. The position of the words at the end of the sentence suggests that the question is asking whether meals are eaten at once. Because juntas comes after comidas, it loses the meaning “together” and takes on the meaning “all at once”, which then translates to “our family shares meals all at once”, it references the word “comidas” rather than family. If the word were removed, it would avoid the possibility to misinterpret or suggest what it is intending to ask. To ensure that respondents

understand the meaning behind the language, revisions could be made to appropriately fit the meaning of each statement for the specific language (bicultural translations).

The FSOC statement item #4 for Hispanic respondents remains of particular interest. The individual item between surveys had the lowest correlation (0.41) with a significant difference versus non-Hispanics ( $p < 0.05$ ). In fact, all correlations for this statement were undesirable except for Hispanics who attended or completed college ( $p < 0.05$ ). This could suggest that level of education reflects how Hispanics versus non-Hispanics classify fast food. For example, Hispanics with less education could consider some restaurants as fast food opposed to those who are higher educated. “Qdoba Mexican Grill” is a restaurant that serves food at a fast pace; however, it can be seen as a more “fancy” sit down place for some people. The restaurant actually classifies itself into the “fast casual” category, offering both quick service and a higher quality of food than typical fast-food restaurants. Thus, classifying what is fast food (or what we consider is a restaurant with fast food) can be indistinct, and in our case, could have possibly influenced our results.

There have been several instruments developed in recent years that measure family home environment characteristics, policies, and family behaviors associated with obesity [17, 20, 41, 42] however more are needed for the high risk Hispanic populations [60, 61]. The findings from these and other similar instruments have contributed significantly to our understanding of family-level factors that influence child and adult obesity [22, 62]. However, despite these efforts, very few home-based interventions have successfully fostered enduring behavior change and changes in weight status

among participating families [63], particularly Hispanic families . Current literature indicates a need for the development or application of a theoretical framework that explains family behavior *change* [24], this stimulated the creation of The Family Stages of Change Survey [45]. The survey was developed upon the theoretical framework provided by the Transtheoretical Model of Behavior Change [46]. Therefore, the FSOC was design to capture the temporal and intentional aspects of obesity-preventing behaviors shown to predict change in child weight status, thus could then provide insight into families' readiness to change behaviors. A study conducted by Taveras et al [64] suggested that Hispanic parents of overweight or obese children were 2.8 times more likely than their white counterparts to rate as "poor" or "fair" the quality of physical activity and nutrition advice pertaining to their child's weight that they received during a primary care visit. This was a difference seen even after adjusting for parental education and household income. Thus, it may be said that lack of quality advice from healthcare providers about physical activity and weight issues is a barrier for some Hispanic parents. As a possible solution, the FSOC may have the potential to help healthcare providers or practitioners better apply intervention messages and strategies that are more compatible with families' abilities to implement these particular strategies to both Hispanic and non-Hispanics.

Gunter et al [45] demonstrated the validity of the FSOC and the potentiality to meet family-directed, obesity prevention efforts. They identified the need for additional testing among more diverse populations, thus giving this study significance. The examination between the FSOC and FNPA demonstrated that items between Hispanic



and Non-Hispanic families were measuring similarly between surveys – especially when education level was similar. However we could not confirm the validity of the FSOC instrument for use with Hispanic families as there were too many correlations that fell below the desirable minimum of 0.5. Correlations of .5 and above are generally considered strong. Correlations of moderate strength reflect those between 0.3 – 0.5. For all of our analyses, the only correlations falling below the moderate threshold were those among Hispanics who did not attend college confirming the influence of education on survey data. Thus the limitations of the FSOC may be more related to education than to ethnicity. However, because we had no non-Hispanics without a college education in our sample, we could not evaluate this hypothesis. Significant differences examined between Hispanics versus non-Hispanics on the FSOC were consistent with some previous findings, suggesting the survey may be useful for identifying behaviors that influence Hispanic families' obesity preventing behaviors. However ideally, the tool requires refinement and additional research before recommending its broader use with Hispanic populations.

The study does have limitations that merit noting. First, the small sample size cannot be considered representative of our groups to whom results are generalized and the small sample could have made it difficult to find significant relationships from our data. Secondly, the surveys obtained from the larger study were not randomly disseminated, rather were gathered by approaching several schools in the local community, and reflect a convenience sample. Third, due to the limitations from the larger study associated with school listservs, we were unable to calculate response rate

and unable to compare respondents to non-respondents. As such there may be some unidentifiable response bias (e.g. higher rates of healthy families responding to our invitations to complete the survey). Fourth, Spanish translations for the FSOC could have been misinterpreted, thus inconsistent responses could have skewed the representation of our data. Finally, due to the correlational nature of the study, it is important to note that it is not possible to infer causation. For instance, we cannot state that a strong association between two items measured is the actual causation of a relationship, rather it provides an indication of how strong a relationship between two variables are. An example of a false insinuation would be to assume all Hispanics who responded to “always eats fast food”, eat fast food all the time.

Despite these limitations, and the need for additional testing, the FSOC has the potential to measure Hispanic families’ obesity prevention behaviors. It is important to create family home environments that support healthy weight development and sustainability, however it can be a complex endeavor that requires more than informative interventions. This may be of particular importance for Hispanics, who are at a greater risk for obesity compared to non-Hispanics. Hispanic or not, families must be persuaded to make obesity prevention a priority and they need to be ready to enact on healthful changes that will endure preventive efforts. However, the higher number of unfavorable correlations among Hispanic responders suggests a need to better establish results and could lead further research and investigation in assessing the readiness to change in Hispanic families to target behaviors and promote healthful decisions to support their children.

If refined, this instrument can be useful for not only researchers interested in examining these behaviors and their associations with childhood obesity, but also for the development of effective prevention interventions that are able to help parents, and practitioners tailor to specific behaviors. With revisions and testing with larger sample sizes, the FSOC could help to improve targeting of family-level intervention strategies and promote longer lasting and more successful changes in family-level behaviors associated with healthy weight development for both non-Hispanic and Hispanic populations.

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