Health Behaviors and Weight Gain Among Immigrant Youth: a Novel Approach to Understanding Immigrant Adolescent Health

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HEALTH BEHAVIORS AND WEIGHT GAIN AMONG IMMIGRANT YOUTH: A

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ABSTRACT

Pediatric obesity is considered a debilitating chronic illness, and a major public health concern in the United States. Researchers have recently observed that certain social groups in the U.S. are at a higher risk of overweight and obesity, such as immigrant children and adolescents. Two competing models in the literature, risk and protective frameworks, have been used to characterize the trajectory of weight gain as immigrants spend more in the U.S. Risk models assert that first generation immigrant groups are at higher risk of overweight and obesity while protective models refer to the phenomenon wherein obesity is less prevalent in first generation immigrant youth when compared to second and third generation co-ethnic peers. Thus far, literature examining immigrant health in relation to weight gain has been mixed with each model garnering support. In addition to conflicting findings throughout the literature, current research is also limited in that it merely describes health outcomes without explaining *why* differences across generations may exist.

Therefore, the present research seeks to identify specific health behaviors and changes in cultural context that may contribute to weight gain among immigrant adolescents. In Study 1, we examined the mediating role of several health behaviors on the relation between obesity and generation status among a nationally representative sample of Latino immigrant youth. The results showing that sedentary behaviors partially mediated the relation between obesity and generation status provide a first step in explaining weight gain among Latino immigrants. In Study 2, we further examined *how* these health behaviors might change from one cultural context to another. A new

behavioral model, the Operant Model of Acculturation, was directly tested among a community-based sample of immigrant adolescents to examine if changes in culturally-reinforced behaviors from one culture to another account for differences in healthy and unhealthy behaviors across various levels of assimilation. The results indicate that changes in culturally-reinforced behaviors do, indeed, account for changes in health behaviors as immigrants spend more time in the U.S. Findings from both studies can be used to inform the development of targeted preventive efforts to reduce weight gain among immigrant adolescent groups.

CHAPTER ONE

Introduction

Childhood and adolescent obesity is widely recognized as a significant public health concern in the U.S. Obesity has been identified as the most common physical health problem among youth and the leading cause of preventable deaths (Halfon, Larson, & Slusser, 2013). Pediatric obesity places children and adolescents at increased risk for early onset type 2 diabetes (Hannon, 2005) and cardiovascular disease (Freedman, 2002; Freedman et al., 2004). Obese children and adolescents also face a multitude of psychosocial challenges, including significant impairments in quality of life (Griffiths, Parsons, & Hill, 2010; Schwimmer, Burwinkle, & Varni, 2003), self-concept (French, Story, & Perry, 1995; Wardle & Cooke, 2005), and relations with peers (Pearce, Boergers, & Prinstein, 2002). Childhood and adolescent obesity is a strong predictor of obesity in adulthood, which in turn is related to increased rates of morbidity and mortality (Baker, Olsen, & Sorensen, 2007). Though promising trends within the past several years reveal that obesity prevalence appears to have reached a plateau, nationally representative data indicate that obesity has more than doubled in children and quadrupled in adolescents in the past 30 years (Ogden, Carroll, Kit, & Flegal, 2014). The percentage of children aged 6–11 years in the U.S. who were obese increased from 7% in 1980 to nearly 18% in 2012. Similarly, the percentage of adolescents aged 12–19 years who were obese increased from 5% to nearly 21% over the same period (Ogden et al., 2014).

The dramatic rise in obesity prevalence among U.S. youth, particularly adolescents, is undoubtedly a major concern due to the range of adverse obesity-related health outcomes associated with obesity in adolescence. Adolescence has been shown to be an especially vulnerable developmental period for the onset and persistence of obesity.

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In fact, studies have revealed that adolescent-onset obesity is a stronger predictor of obesity and associated adverse health conditions in adulthood than both child- and adult-onset obesity (Guo, Wu, Chumlea, & Roche, 2002). This rapid rise in obesity during adolescence, a critical developmental stage for dynamic physiological and psychological growth, is gaining attention as a major public health concern in the U.S.

Not only are adolescents as a whole at-risk for obesity but certain social groups of adolescents have been recognized as more vulnerable than others. There is a substantial health disparity in obesity prevalence, with obesity disproportionately affecting racial and ethnic minority adolescent populations compared to Caucasians. Research has consistently documented this health disparity, with some studies showing prevalence rates among adolescent minority groups reaching levels of over 40% (Popkin & Udry, 1998). Research has also documented a relatively higher prevalence of obesity-related health conditions among ethnic and racial minority groups such as Type 2 Diabetes and cardiovascular diseases (Kumanyika, 1993). The present research focuses on one of these at-risk minority groups, immigrant adolescents, as research has yet to reveal why this group is exhibiting particularly elevated obesity rates.

Researchers have started to examine the mental and physical health outcomes of immigrant youth in the U.S. in order to better understand the factors leading to elevated risk for weight gain among this group. In these studies, both risk and protective models have been used to understand health outcomes as immigrants spend more time in the U.S. (Rumbaut, 1997; Garcia Coll & Marks, 2012). Consistent with traditional assimilation models, risk frameworks demonstrate that first generation immigrant children and

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families are at an elevated risk for poorer physical and mental outcomes. This model predicts improved health as immigrants spend more time in the U.S. due to associations with increased levels of SES and higher levels of social support (Rumbaut, 1997). More recently, a protective model of immigrant health has also been offered to describe findings that first generation immigrant adolescents (foreign-born children with both immigrant parents) are faring better with physical and mental health outcomes than second generation (U.S. born children with one or both immigrant parents) and third generation (U.S. born children with both U.S. born parents) immigrant adolescents (Garcia-Coll & Marks, 2012). These findings have been coined the "immigrant paradox" since most traditional assimilation models would predict better outcomes as immigrants spend more time in the U.S. (e.g., increased access to resources, income, and English language proficiency) (Alba, Logan, & Stults, 2000).

Conflicting research in the literature has provided support for both a risk and protective framework of immigrant health in relation to weight gain. While some studies reveal higher or similar rates of obesity for first generation immigrants compared to their second and third generation counterparts, other studies have shown lower rates of overweight and obesity among first generation adolescents (Popkin & Udry, 1998; Singh, Kogan & Yu, 2009). Other limitations in the literature, such as the use of acculturation and lack of attention to cultural context, also preclude our understanding of weight gain and health behaviors among this at-risk group. Most researchers use the notion of acculturation to explain why certain immigrant groups exhibit elevated obesity rates across generations, but without explicitly measuring or considering the particular cultural

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adaptations or behaviors underlying the cultural change. In other words, using acculturation alone as a broad theoretical framework to explain declining health outcomes in particular immigrant groups is problematic in that it is more descriptive than explanatory or predictive. Additionally, most research that uses acculturation to describe these findings often does not use standardized measures to examine acculturation (e.g., Popkin & Udry, 1998). Lastly, these studies fail to attend to the contextual changes in values and behaviors that occur when an individual immigrates from their culture of origin to the U.S. The limitations in the extant research obscure our understanding of the mechanisms underlying the decline in health that appears to occur for some immigrants as they acculturate to the U.S. Given that immigrant children and adolescents comprise the fastest growing population in the U.S. (Hernandez, Denton, & Blanchard, 2011), it is increasingly important to continue investigating whether a risk or protective model best explains weight gain among this group.

Therefore, two studies were conducted to address these aforementioned limitations and to further clarify our understanding of weight gain and health behaviors among immigrant adolescents. Study 1 provides specificity for this concerning health trend by investigating the possible mediating role of several health behaviors on the relation between generation status and Body Mass Index (BMI) among a nationally representative sample of Latino first, second and third generation immigrant adolescents and young adults. Unlike other studies, this research goes beyond using the term "acculturation" to identify specific health behaviors that may serve to explain this health outcome. This study is the first of our knowledge to evaluate the extent to which specific

health behaviors may be linked to elevated rates of obesity among second and third generation Latino immigrant adolescents and emerging adults (McCullough & Marks, 2014). In Study 2, we went beyond identifying specific health behaviors to examine the behavioral mechanism accounting for the changes in health behaviors observed as acculturation occurs with a community-sample of immigrant adolescents. With a novel measure created for this study, we tested a recent model, The Operant Model of Acculturation, among a sample of first, second and third generation immigrant adolescents to evaluate if cultural and behavioral factors account for the changes in health behaviors associated with acculturation. A central component of this theory is explaining group behavior through changes in cultural metacontigencies, or positive and negative reinforcers, punishers, and discriminative stimuli that are delivered to, and experienced by, an entire population (Landrine & Klonoff, 2004). For the purposes of this study, we created a measure of adolescent-perceived metacontingencies around healthy and unhealthy food and activity messages in the U.S., as contrasted by messages from their family's culture of origin.

Aims of the Current Research

The present research represents a significant contribution to the literature as this is the first set of studies to examine the role of specific health behaviors in obesity rates and healthy/unhealthy eating behaviors among immigrant adolescents in both a mixed community-sample and nationally-representative sample of Latino immigrant adolescents. It is important to highlight that this research uses two different samples – a large sample of Latino immigrant adolescents and a smaller sample of immigrant

adolescents from diverse ethnic backgrounds. Comparing results from these two studies

may provide us with insight into the way in which weight and health behaviors vary

between immigrant ethnic minority groups. Additionally, Study 2 is the first work to

examine the Operant Model of Acculturation in relation to obesity among second and

third generation immigrant adolescents. In the following two studies, we were seeking to

answer three main questions: 1) Does Body Mass Index (BMI) vary as a function of

immigrant generation status in our samples of immigrant youth?; 2) Do eating behaviors,

physical activity, and sedentary behavior levels vary as a function of generation status

and acculturation levels?; 3) Do the changes in metacontingencies across cultures, as

explained by the Operant Model of Acculturation, help to explain the healthy and

unhealthy eating behaviors adopted by adolescents as a function of acculturation?

The findings from these two studies will be used to better understand why second

and third generation immigrant youth are at risk for obesity and unhealthy eating

behaviors while also highlighting what factors are contributing to certain groups being

"protected" from obesity growth across generations. Understanding both the risk and

protective mechanisms underlying health disparities that appears to occur for some

immigrants as they acculturate to the U.S. could provide an important empirical basis for

future culturally-sensitive obesity intervention and prevention efforts.

CHAPTER TWO

Examining Health Behaviors as Potential Mediators of the

Immigrant Paradox in Latino Adolescent Obesity

(McCullough & Marks, 2014)

Introduction

Childhood and adolescent obesity is widely recognized as a significant and growing public health concern in the U.S. The overall rate of childhood and adolescent obesity has nearly tripled over the last thirty years and is estimated at approximately 18% (Ogden, Carroll, Kit, & Flegal, 2012). Although obesity in adolescents in the U.S. appears to be leveling off, particularly among females, federal initiatives aimed to decrease rates of obesity in the U.S. have not been met (CDC, 2013). The high rates of obesity among U.S. youth, particularly among adolescents, are undoubtedly a major concern due to the range of adverse obesity-related health outcomes. Compared to children and adolescents of healthy weight, youth who struggle with excess weight are at a heightened risk for deleterious health outcomes (e.g., orthopedic complications, Type 2 diabetes, hypertension, asthma, sleep apnea) and psychosocial concerns (e.g., lower health-related quality of life, social isolation, victimization, psychological distress, poorer educational outcomes (Daniels et al., 2005; Cunningham, Ellis & Naar-King, 2010). Further, studies have revealed that adolescent-onset obesity is a stronger predictor of obesity and associated adverse health conditions in adulthood than both child- and adult-onset obesity (Guo et al., 1994).

Not only are adolescents as a whole at-risk for obesity but certain groups of adolescents have been recognized as more vulnerable than others. Particularly concerning is the rapid rise of obesity among second and third generation immigrant adolescents in the U.S. Research has shown that second generation (U.S. born children with one or both immigrant parents) and third generation (U.S. born children with both U.S. born parents)

immigrant youth are demonstrating higher rates of overweight and obesity than first generation youth (foreign-born children with both immigrant parents) (Gorden-Larsen et al., 2003); a finding referred to as the "immigrant paradox" (Singh, Kogan, & Yu, 2009). Since most traditional assimilation models would predict better outcomes as immigrants spend more time in the U.S. (e.g., increased access to resources, English language proficiency; Alba, Logan, & Stults, 2000), the results showing that first generation immigrants are doing better than later generations is referred to as a paradox (Rumbaut, 1997). That is, despite having fewer economic and social resources, first generation immigrant adolescents suffer lower rates of obesity than their later-generation peers. This theoretical orientation of the paradox does not discount the importance of economic and social correlates of health for immigrants' well-being. On the contrary, poverty, lack of structural and material resources, and low education/low-wage job rates are just as concerning as risk factors for new comers as they are for U.S.-born youth. Instead, the paradox posits that, even after accounting for such economic and social risk factors, first generation immigrant youth appear to be faring better than their circumstances would predict, which may provide insight into how to better serve second and third generation immigrant communities (Garcia Coll & Marks, 2012).The paradox can therefore be understood as a population-level pattern important to understand and explain, as it may provide key insights into some of the protective cultural or social practices which may be lost due to acculturation in immigrant communities.

    This pattern of results underscores the importance of examining the physical and mental health of immigrant families in the U.S. Immigrant youth are the fastest growing

population of children, and are leading the ethnic and racial transformation that is occurring in the U.S. (Hernandez, Denton, & Blanchard, 2011). The population of children and adolescents in immigrant families has grown nearly seven times faster than the population of children of U.S. born parents (Hernandez et al., 2011). In fact, as of 2005, nearly one fourth (23%) of children lived in immigrant families, with the majority of these children (79%) born in the U.S. (Hernandez et al., 2011). These numbers are only expected to increase. The Census Bureau projects for 2030 that 54% of children in the U.S. will live in immigrant families (Hernandez et al., 2011).

To better understand the physical health of this growing population, many researchers have conducted studies that focus specifically on immigrant generation status and BMI (Gorden-Larsen, Harris, Ward, & Popkin, 2003; Singh et al., 2009; Popkin & Udry, 1998). These studies are difficult to interpret as they often use inconsistent methodology and have produced conflicting results. For example, while some studies show that Latino youth are experiencing higher levels of obesity as they spend more time in the U.S., other research reveals that obesity rates among Latino youth are similar or even decreasing across generations (Singh et al., 2009, Popkin & Udry, 1998). Generational differences in obesity also vary across subpopulations of the "same" ethnic group. Although Cuban and Mexican-American children are both classified as Latino youth, obesity rates are increasing for Cuban immigrants and, in some studies, decreasing or staying the same across generations for Mexican immigrants (Gordon-Larsen et al., 2003). It is unclear if this variation in obesity rates is due to inconsistency in measurement across studies or true differences in rates of obesity across generations for

some ethnic minority immigrant groups. This highlights the importance of using standard measures across studies as well as continuing to examine this trend among immigrant groups.

Most researchers have used acculturation (Berry, 1980) to explain these findings, such that immigrants lose the values specific to their native culture and fully adopt the behaviors, beliefs, practices and values of the U.S. (e.g., increased fast-food consumption, involvement in sedentary activities, Singh et al., 2009). This explanation is limited as it is merely descriptive at the population level, and does not specify the individual behaviors or mechanisms which contribute to elevated rates of obesity among later generations of immigrant youth. Moreover, acculturation does not fully explain why some ethnic minority groups seem to be "protected" from this pattern of increased obesity rates. In order to gain a comprehensive understanding of this concerning health outcome, we need to focus on identifying specific mechanisms that are driving the relation between BMI and generation status.

Therefore, in the present study, we provide more specificity for this concerning health trend by investigating the possible mediating role of several health behaviors on the relation between generation status and Body Mass Index (BMI). Based on research showing that exposure to obesogenic environments in the U.S. fosters unhealthy behaviors among immigrant children (Sussner, Lindsay & Greeney, 2008), we propose that sedentary behaviors, fast-food consumption, and low rates of physical activity may serve to explain the obesity immigrant paradox. We focus on Latino youth as this is an immigrant group that has demonstrated high rates of obesity as well as high levels of

sedentary behaviors, physical inactivity, and fast-food consumption (Singh et al.,

2009).We are also hoping to resolve some inconsistencies in the literature related to

acculturation, physical activity, and dietary intake among Latino immigrants. While some

studies show that rates of physical activity decrease as immigrants spend more time in the

U.S. (Esparza, Fox & Harper, 2000), others show that rates of physical activity increase

and amount of sedentary behaviors decrease (Crespo, Smit, Carter-Pokras, 2001; Wingo,

Kulkarni, Bulgrad, 2009). Additionally, though many studies have linked higher rates of

fast-food consumption to second and third generation immigrants (Creighton, Goldman,

& Pebley, 2012), other studies have not revealed any notable differences in fast-food

consumption between first and later generations. Understanding the mechanisms

underlying the decline in health for specific immigrant ethnic groups as they acculturate

to the U.S. could provide an important empirical basis for future culturally-sensitive

obesity intervention and prevention efforts.

Method

Participants and Procedures

The study sample included 2,292 Latino male (n =1138) and female (n = 1154)

participants (M age = 22.29; Range = 16.0 – 27.0) enrolled in wave III (2001) of the

National Longitudinal Study of Adolescent Health (Add Health), a longitudinal,

nationally representative, school-based study of U.S. adolescents. Wave III data were

used because of the detailed health behavior information available (see measures below).

first generation (n = 514), second generation (n = 841) and third generation (n = 937)

participants were included in the analyses. Frequencies of adolescents in each cultural

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group were not publicly available through Add Health, therefore, frequencies were not included in analyses. Variables used in the analyses were taken from the In-Home Interview, a series of questionnaires administered to adolescents at their residence. The survey design and sampling frame have been described in detail in other studies (Harris, 2011).

Measures

Immigrant generation status. Immigrant generation was based on participant reports of their own nativity and their parents' nativity as recorded in the in-home interview. Adolescents were coded as ''first generation'' if neither they nor their resident parents were born in the U.S., ''second generation'' if they were born in the U.S. but one or both of their resident parents were not born in the U.S., and ''third generation and above'' if both they and their resident parents were born in the U.S. Thus, children born third generation and above were collapsed into one category as is typical in generational research (Pena et al., 2008).

Latino ethnicity. Ethnicity for first and second generation participants was determined by resident mother's nativity. First and second generation adolescents and emerging adults were coded as Latino if their resident mother endorsed any of the following as her birth country or region: Colombia, Cuba, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Nigeria, Panama, Peru, Puerto Rico, Central and Northern South America, or Southern South America. Because mothers of third generation participants were born in the U.S., they were coded as Latino if they marked ''yes'' to the question: ''are you of Latino origin?''

Physical activity. Moderate to vigorous physical activity was assessed using standard 7-day recall (times per week) questionnaire methodology (Anderson et al., 1998). The Add Health adolescents were asked about the times/week spent in various physical activities (e.g., "During the past week, how many times did you go roller-blading, bicycling, skateboarding''). Based on previous work, a Physical Activity Summary variable was created by summing together participation in eight moderate to vigorous physical activities each week (Niemeier, Raynor, Lloyd-Richardson, Rogers, & Wing, 2008). Responses for each question could range from 0 (none) to 7 (7 or more times); therefore, responses for the Physical Activity Summary Variable could range from 0 to 56.

Fast-food consumption. As used in previous research (Anderson et al., 1998), frequency of fast-food consumption was assessed using a standard 7-day recall (times per week) questionnaire methodology (Anderson et al., 1998). Participants were asked one question about the times/week spent eating fast-food (e.g., "On how many of the past seven days, did you eat food from a fast-food place, or a local fast-food restaurant?") Responses could range from 0 (none) to 7 (7 or more times).

Sedentary behavior. Sedentary behaviors were also assessed using standard 7-day recall (hours per week) questionnaire methodology (Anderson et al., 1998). Frequency of sedentary behavior was based on questions about the amount of adolescents and emerging adults' participation in sedentary behaviors each week ("On average, how many hours do you spend watching T.V., playing video games). Based on previous research (Gorden-Larsen et al., 2003), a Sedentary Behavior Summary variable was

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created by summing together participation in three sedentary activities each week. Responses for each question could range from 0 – 168 hours; therefore, responses for the sedentary behavior summary variable could range from 0 – 504 hours.

Body Mass Index. Height and weight were directly measured by field interviewers in Wave III during in-home surveys. Body Mass Index (BMI; kg/m2) stratified by age and gender was used to classify individuals as underweight (BMI < 5th percentile), normal weight (BMI = 5 to < 85th percentile), overweight (BMI = 85 to < 95th percentile), or obese (BMI > 95th percentile) (CDC, 2012).

Planned Analyses

Prior to analyses, variables were inspected for missing data and normality of distribution. No deviations were observed which would preclude the use of parametric tests. As a first step in analyses, Pearson bivariate correlations were calculated to quantify relations among health behaviors and our outcome variable, BMI. A Chi-square test examined whether immigrant generation status differed by categorical overweight designation from established BMI cut-off levels (see Figure 1). A series of Analyses of Variance (ANOVAs) were then conducted to examine generational differences in our health behaviors and BMI variables of interest. Note that we used an ANCOVA when testing for the paradox on BMI by immigrant generation status, while controlling for parent income (a control condition necessary to demonstrate the paradox). The health behavior ANOVAs were also used to identify predictor variables to use in our mediation analysis; any health behaviors which demonstrated significant generation differences after controlling for family income were considered as potential mediators to explain

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generational differences in BMI. For health behaviors with a significant immigrant generation effect, a series of ordinary least squares regression models were calculated to test the following mediation conditions on BMI (dependent variable; DV): (a) the independent variable (IV) must be significantly associated with the DV, (b) the IV must be significantly associated with the mediator variable (MV), (c) the MV must be significantly associated with the DV, and (d) the impact of the IV on the DV is less after controlling for the MV (Baron & Kenny, 1986). Note that the final mediation model (d) also included family income as a control variable. The results presented below follow this data analytic plan.

Results

Bivariate correlations were first examined to identify relations among physical activity, sedentary behaviors, fast-food consumption and BMI. Frequency of sedentary behavior was positively correlated with BMI ($r = .12$, $p < .05$) and fast-food consumption ($r = .15$, $p < .01$), such that as frequency of sedentary behaviors increased, so did BMI and frequency of fast-food consumption. No other significant correlations emerged.

We next ran a one-way ANCOVA to identify any differences in our outcome variable by generation status (while controlling for family income). We documented the immigrant paradox by observing a significant difference by immigrant generation on our outcome variable, BMI, ($F(1, 2275) = 10.94$, $p < .01$). Post-hoc analyses showed that second ($M_{BMI} = 29.09$) and third generation ($M_{BMI} = 30.97$) immigrant youth had significantly higher BMI levels than first generation youth ($M_{BMI} = 25.88$), after controlling for family income. Further, first generation youth had a significantly lower

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percentage of overweight classifications (19.8%) than second (37.2%) and third

generation adolescents (43.0%), (χ_2(1, N = 2278) = 14.53, p < .01). See Figure 1.

Figure 1.
Mean BMI and Percentage Overweight by Generation Status
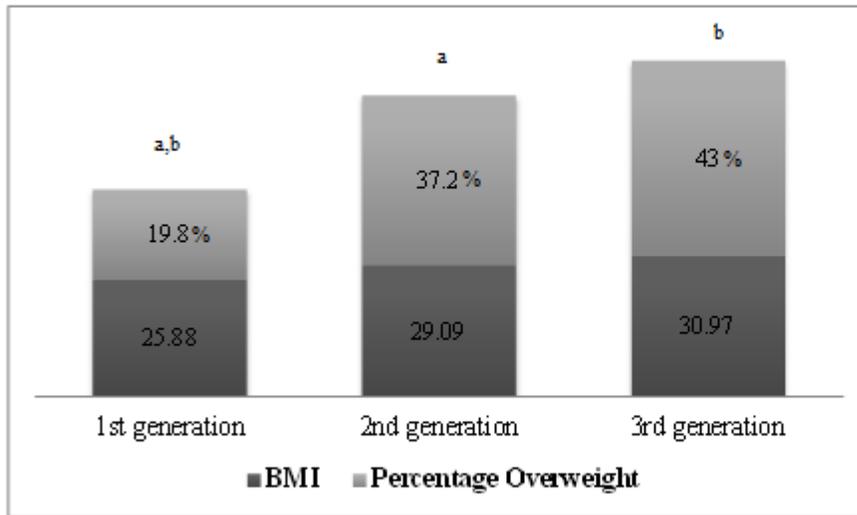
Note. Each letter (a,b) indicates categories that differ from each other at the p < .01 level.

To determine which potential mediators (i.e., physical activity, fast-food

consumption, sedentary activities) differed by immigrant generation, we ran three

additional one-way ANOVAs. Sedentary behaviors emerged as the only health behavior

significantly related to generation status (F(1, 457) = 4.84, p < .05). First generation

Latino immigrants demonstrated significantly lower rates of sedentary behaviors (M =

18.15 hours/week, SD = 11.2) than their third generation peers (M = 22.04 hours/week,

SD =16.73). First generation also showed lower rates of sedentary activities than second

generation immigrant youth (M = 19.45, SD = 16.47), though these results were not

significant; see Figures 2 and 3. On average, first generation Latino adolescents spent

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approximately 4 fewer hours engaging in sedentary activities than third generation

Latinos, and 3 fewer hours than second generation Latinos. Therefore, we proceeded to

test for sedentary behaviors only in our final mediation models. See Table 1 for

descriptive information for the variables of interest by generation status.

Table 1.
Means (SD) for Health Behaviors by Generation Status.

	Health Behaviors		
Generation Status	Sedentary Behaviors (Hours/Week)	Physical Activity (Times/Week)	Fast-Food Consumption (Times/Week)
Latino 1st Generation	18.15 (11.21)	5.87 (5.43)	2.5 (2.28)
Latino 2nd Generation	19.45 (16.47)	7.08 (7.38)	2.60 (2.05)
Latino 3rd Generation	22.04 (16.73)	6.79 (7.43)	2.44 (2.08)

Figure 2.
Mean frequency of sedentary behaviors (hours/week) by generation status after controlling for household income.
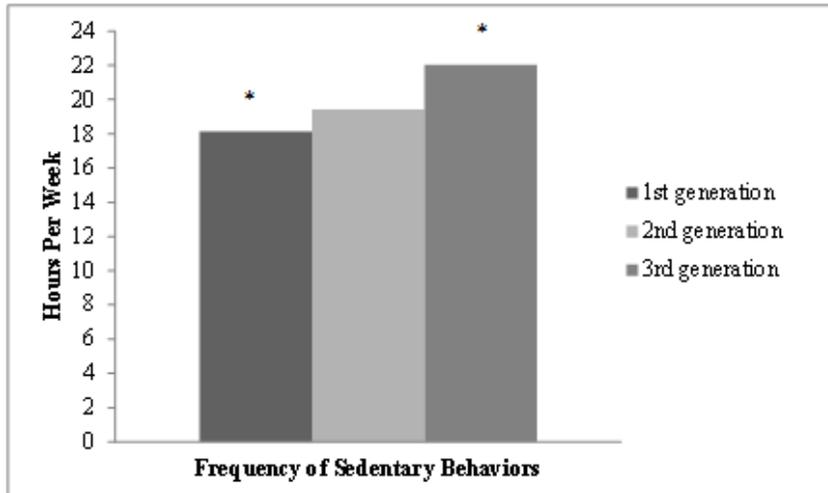
Note. *$p < .05$. One-way ANOVAs revealed differences in sedentary behaviors by generation status ($F(1, 457) = 4.84, p < .05$). Tukey post-hoc analyses revealed 1st generation Latino immigrants demonstrated lower rates of sedentary behaviors than 3rd generation Latino immigrants.*

Figure 3.
Mean frequency of physical activity and fast-food consumption (times/week) by generation status after controlling for household income
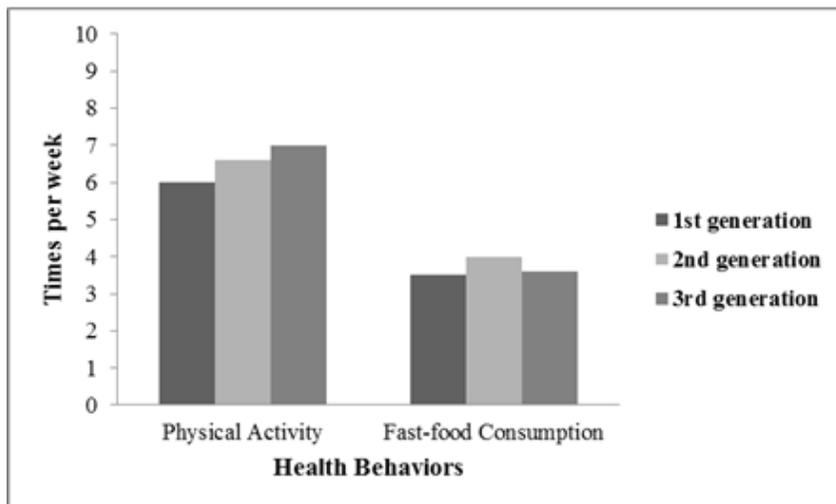
Note. No differences at the $p < .05$ emerged for physical activity or fast-food consumption.

Using multiple linear regression (MLR) and controlling for household income, the

first model established the immigrant paradox, $(F(2, 2276) = 13.46, p < .01)$, such that

generation status significantly predicted BMI $(\beta = 3.101, t(2276) = 3.67, p < .01)$, with

first and second generation youth demonstrating lower BMIs than third generation youth.

The second model also was significant, $(F(2,457) = 4.59, p < .05)$, such that generation

status predicted frequency of sedentary behaviors, $(\beta = 3.129, t(457) = 2.14, p < .05)$,

with first and second generation youth demonstrating lower rates of sedentary behavior

than third generation. The third and final model indicated that sedentary behaviors

predicted BMI levels $(\beta = .157, t(457) = 2.38, p < .05)$, such that higher rates of sedentary

behaviors predicted greater levels of BMI. The relation between generation status and

BMI was no longer significant when accounting for sedentary behaviors. These results

reveal that sedentary behaviors partially mediate the relation between generation status

and BMI; see Table 2. This final model predicted 1.6% of the variability in adolescent

BMI.

Table 2.

Mediation analysis: Sedentary behaviors mediating the relation between generation status and BMI while controlling for household income.

Variable	*B*	*SE B*	*β*	*Adj. R*^{2}
Model 1: Generation Status[1]	2.68	1.29	.097*	.009
Model 2: Generation Status[2]	3.13	1.45	.100*	.008
Model 3: Sedentary Behaviors[1]	.157	.066	.111*	.016
Generation Status[1]	2.37	1.29	.085	

Note. *p < .05. **p < .01. [1] = Predicting BMI. [2] = Predicting Sedentary Behaviors.

Discussion

To our knowledge, this study is the first to demonstrate that specific health behaviors may be linked to elevated rates of obesity among second and third generation Latino immigrant adolescents and emerging adults, and account for the population "paradox" observed for this group. Over the last three decades, the U.S. has experienced an alarming increase in rates of childhood and adolescent obesity, particularly among immigrant ethnic minorities; although this trend is beginning to level off, the average BMI is greater than CDC recommendations. Research such as the current study, which offers evidence regarding specific behaviors which may be placing Latino adolescents and emerging adults at increased risk for obesity as they acculturate, is therefore of timely importance.

Unlike other studies, this research goes beyond using the term "acculturation" as a description of this obesity concern to identify specific health behaviors that may serve to explain this health outcome. Our findings revealed that higher rates of sedentary behaviors common among adolescents and emerging adults in the U.S., such as playing video games, watching TV, and playing on the computer, play a role in explaining the higher rates of obesity among third generation Latino immigrant youth. Recent work in the health behavior literature has established that sedentary behavior, or sitting for prolonged periods of time, is a distinct health behavior from engaging in low levels of exercise (Owen, Healy & Matthews, 2010). In fact, engaging in sedentary activities has been shown to be an independent predictor of premature mortality risk (Owen et al., 2010). Individuals that meet the public health guidelines for physical activity are still at

risk for metabolic conditions if they engage in prolonged periods of sedentary behaviors (Owen et al., 2010). Our findings, which show the unique role of sedentary behaviors in predicting obesity risk, are concerning given the powerful association between sedentary activity and numerous adverse health conditions.

Interestingly, our results showed that the only significant differences observed in sedentary behaviors were between first generation and third generation youth, such that third generation immigrants engaged in significantly more sedentary activities than first generation. While second generation youth demonstrated higher rates of sedentary activities than first generation, these rates were not statistically significant. These findings point to a shift that may occur in health behaviors which is most pronounced from the second to the third generation. When compared to White non-immigrants, research has shown that third generation Latino immigrants have higher rates of sedentary behavior as well, particularly higher rates of TV viewing and videogame playing (Allen, Elliot, & Morales, 2007). These findings identify sedentary behaviors as an important consideration for intervention efforts among Latino immigrant families, particularly for third generation Latino-Americans.

Interestingly, we did not find any generational differences in adolescents and emerging adults' engagement in physical activity or fast-food consumption. Participants across all generations reported that they engaged in little physical activity and fast-food consumption. Compared to White non-immigrant youth, though, other studies have shown that Latino immigrant youth have lower rates of physical activity and higher consumption of unhealthy foods (Allen et al., 2007); pointing to the potential role of

other health behaviors in the development and persistence of obesity in the Latino immigrant community. In our study, physical activity and fast-food consumption were measured in "times per week" while sedentary behaviors were measured in "hours per week." This floor effect observed for the physical activity and fast-food consumption scales could be one reason we did not find generational differences with these two health behaviors. Future studies would benefit from using the same measurement for all health behaviors as to be able to make meaningful comparisons. Additionally, using summary scores for these health behaviors may not have fully captured the day-to day variability in health behavior patterns. More accurate assessments of health behaviors, such as accelerometers to measure daily levels of physical activity, should be used in future studies to represent engagement in physical activity health behaviors. Though the Add Health dataset is comprehensive and includes a nationally-representative sample of adolescents, the year of data collection (2001) may have also limited our understanding of more current health behavior patterns among immigrant youth.

Overall, our findings suggest that decreasing sedentary behaviors may be one way to reduce obesity among third generation Latino immigrant adolescents and emerging adults in the U.S. It is important to note, though, that there is a bidirectional relationship between sedentary behaviors and obesity. Adolescents that are obese are more likely to engage in sedentary behaviors, and in turn, sedentary behaviors are associated with increased rates of obesity. The current research suggests that focusing on decreasing sedentary behaviors is important for obesity preventive and intervention efforts, however, other areas need to be included (e.g., identifying alternative reinforcing behaviors) in

order to assist overweight adolescents in decreasing sedentary activities. One of this study's main strengths is that it represents an important first step in better understanding weight gain among Latino immigrant populations, and sets the stage for future studies to further examine this concerning population health pattern. Since sedentary behaviors emerged as only partially mediating the relation between generation status and BMI, future research could examine other culturally-specific health behaviors not captured in the Add Health study that also may be playing a role in intergenerational variation in obesity rates. Additionally, prospective studies could measure behaviors in participants' culture of origin as well as behaviors in the U.S. to see how changes in culturally-reinforced behaviors from one culture to another may impact the development of unhealthy behaviors.

Though the current study adds important information to this topic area, there is still much more variability remaining to more robustly explain Latino adolescents and emerging adults' BMIs by immigrant generation. Future studies which take into account important immigration-related contextual factors (such as immigrant's legal status) and culture-specific eating and physical activity beliefs and behaviors, may provide greater detail needed to support intervention and prevention efforts among Latino communities. Additionally, although the majority of literature on the immigrant paradox phenomenon is cross-generational in nature (Suarez-Orozco, Rhodes, & Milburn, 2009), future research should consider the important acculturation-related construct of time-since-arrival in the U.S. It will be very important moving forward for researchers to track acculturation within-subjects (i.e., using longitudinal designs) to determine whether

acculturation within individuals over time also indicates the 'declines' in health behaviors

and outcomes observed across immigrant generations.

CHAPTER THREE

Testing the Operant Model of Acculturation: Explaining Health Behaviors among a

Community-Based Sample of Immigrant Youth

Introduction

The U.S. has seen tremendous growth among immigrant children and families over the last thirty to forty years. Immigrant youth are the fastest growing population of children, and are leading the ethnic and racial transformation that is occurring in the U.S. (Hernandez, Denton, & Blanchard, 2011). The population of children and adolescents in immigrant families has grown nearly seven times faster than the population of children of U.S. born parents (Hernandez et al., 2011). In fact, as of 2005, nearly one fourth (23%) of children lived in immigrant families, with the majority of these children (79%) born in the U.S. (Hernandez et al., 2011).

As the U.S. experiences marked growth in immigrant children and families, researchers have become increasingly concerned about the health of immigrants living in the U.S. Researchers have used two competing models to explain the health of immigrants as they spend more time in the U.S. One model explains immigrant health from a risk perspective, suggesting that variables such as lower SES, fewer sources of social support and limited access to resources (e.g., healthy food) predict poorer outcomes for first generation immigrants (Rumbaut, 1997). This model predicts that with increased acculturation and more time spent in the U.S., immigrant families may experience better health outcomes. Research has also supported a protective model, such that in many immigrant minority groups, first generation immigrants are showing a significant advantage over their U.S. born counterparts in numerous areas, including academic, psychosocial as well as health behaviors and outcomes (Suarez-Orozco et al., 2009). This pattern of results has been coined the "immigrant paradox" as it is counter to what we would expect based on traditional assimilation models (Rumbaut, 1997). This

advantage in various outcomes tends to dissipate with increasing acculturation levels or length of residence in the U.S. (Portes & Rumbaut, 2001).

One such health outcome that has recently gained traction as an area of concern among immigrant adolescents and families is overweight and obesity. While the NHANES indicates that approximately 17% of children and adolescents are classified as obese (Ogden et al., 2014), these rates do not accurately reflect the populations disproportionately affected by overweight and obesity in the Unites States. Research has consistently documented this health disparity, with some studies showing prevalence rates among adolescent minority groups reaching levels of over 40% (Popkin & Udry, 1998). For example, Popkin and Udry (1998), reviewing the National Longitudinal Study of Adolescent Health, revealed the highest prevalence of overweight and obesity among American Indian adolescents (42.3%), followed by Black Non-Latino (30.9%), Latino (30.4%), White Non-Latino (24.2%), and Asian-American adolescents (20.6%). Research has also documented a relatively higher prevalence of overweight and obesity-related health conditions among ethnic and racial minority groups such as Type 2 Diabetes and cardiovascular diseases (Kumanyika, 1993).

Given the myriad health concerns and increased risk of weight gain among minority groups, it is important to examine health behaviors that may impact weight gain among immigrant children and adolescents. Several studies have shown higher levels of weight gain and unhealthy behaviors adopted by second and third generation immigrant when compared to first generation adolescents (e.g., McCullough & Marks, 2014). Though several studies have documented this protection model or "paradox" model of immigrant health, there are just as many showing that immigrant groups have similar

rates of weight gain across generation or even lower rates with increased acculturation (Singh et al., 2009). These conflicting findings in the research point to the importance of going beyond risk and protection models to identify specific behaviors and mechanisms accounting for differences in health outcomes.

Overall, studies examining weight gain and health behaviors among immigrant youth partially support the argument that second and third generation immigrant adolescents may be at greater risk for overweight and weight gain (e.g., Gordon-Larsen et al., 2003). The findings showing that some immigrant groups do not follow this pattern, however, challenge the very foundation of the immigrant paradox. Why do some immigrant groups follow this pattern while others seem to be "protected" from this effect? The existing research is limited in that it uses varying definitions and measurements of acculturation, making it difficult to interpret findings across studies. Further, current research has mostly focused on documenting health outcomes instead of identifying culturally-linked attitudes which may lead to acculturation-related differences in health behaviors. Alternately put, there is a lack of attention to changes in values and behaviors that occur when an individual immigrates from one culture to another. Better understanding how behavioral factors may account for acculturation-related differences in health outcomes could provide researchers with a deeper and more meaningful understanding of immigrant health.

Measurement of Acculturation

A key limitation that exists in the literature is the measurement and use of the notion of acculturation. Most researchers invoke acculturation as an explanation for observed behavioral health differences and changes among immigrants as they reside in

the U.S., but do not measure acculturation itself. For studies that do measure this construct, they often use indirect measures – proxies of acculturation such as English language use - and these measures typically vary across studies. For example, Popkin et al. (1998) did not measure acculturation in their study, and Singh et al. (2009) used language use as indirect measures of acculturation. Gordon-Larsen et al. (2003) improved upon these studies by examining other key contextual components of acculturation, such as ethnic composition of an individual's neighborhood, meals consistent or inconsistent with native culture, as well as generation status and language use. However, *none* of these studies used direct, validated acculturation measures, thereby missing important components of acculturation. This has been a strong limitation of the immigrant health literature to date.

Further, though these studies are not directly measuring acculturation, they are still using it to *explain* increasing obesity rates across generations. The Bidimensional Model of Acculturation is often used as a framework for explaining declining health outcomes across generations for numerous health behaviors, including adolescent obesity (Berry, 1980). This model argues that acculturation entails two behavior changes: simultaneously losing behaviors, beliefs, practices and values specific to an individual's indigenous culture and gaining behaviors, beliefs, practices and values of an individual's host culture (Berry, 1980). Assimilation is typically defined by this model as losing the values specific to the indigenous culture and fully adopting the behaviors, beliefs, practices and values of an individual's host culture.

Using acculturation without measuring it to explain declining health outcomes in immigrant groups is problematic in that it is more *descriptive* than explanatory or

predictive. That is, it may provide a post-hoc description of behaviors that were acquired

by adopting the host culture, such as increased use of technology and fast-food

consumption in lieu of physical activity (Gordon-Larsen et al., 2003; Singh et al., 2009).

As evidenced by Gordon-Larsen et al. (2003), when controlling, or accounting for

acculturation variables, generational differences in obesity rates narrowed for Puerto-

Rican and Cuban youth while increasing for Mexican youth. Thus, acculturation factors

certainly play a large role in *describing* the behaviors that these groups acquired over

time; yet, it does not explain *why* certain subpopulations acquire these behaviors and

exhibit increased obesity rates across generations while others do not.

Culturally-Based Changes in Behaviors

Another major limitation of the literature is that research does not attend to the

changes in values and behaviors that occur when an individual immigrates from their

culture of origin to the U.S. These changes, as outlined by the Operant Model of

Acculturation, may explain why some groups are at risk for weight gain and adopting

unhealthy behaviors with increased time spent in the U.S. A central component of this

theory is explaining group behavior through cultural metacontigencies, or positive and

negative reinforcers, punishers, and discriminative stimuli that are delivered to, and

experienced by, an entire population (Landrine & Klonoff, 2004). Metacontingencies

guide individual behavior in culturally specific ways because they determine what is

acceptable and not acceptable in specific cultures. Examples of metacontigencies include

costs of food, advertising, laws, and access to food/physical activities.

The Operant Model of Acculturation argues that behaviors that are prevalent

among the members of a culture are those that are maintained by their cultural

metacontingencies. Consider the metacontingency of food costs. If fruit is less expensive than chips in a specific country, buying fruit would be considered more accessible and thus, more people would purchase fruit in that country. However, if another country's fruit prices are more expensive than chips, eating fruit would be less accessible and thus, this healthy eating behavior would occur far less. Metacontingencies play an integral role in maintaining population-level prevalence of many health behaviors, and in fact, research has shown that they exert more influence and control over individual behaviors than individual-level contingencies (Glenn, 1991).

This theory not only allows us to explain a population's behavior, but also, to reliably predict changes in behavior as individuals immigrate from one culture to another. We can predict that when certain behaviors that were prevalent in the culture of origin are no longer being reinforced (maintained by cultural metacontingencies) in the new culture, that behavior will decrease. Consequently, we can expect behaviors to remain the same if an individual enters a new culture in which these behaviors continue to be reinforced. For example, fruit consumption may decrease if an individual enters a culture in which fruit costs are higher and less prevalent than the culture of origin. However, if fruit costs do not change across cultures, we would predict fruit-eating behavior to remain the same as well. Since this model relies on an in-depth understanding of learning theory, such as contingencies (e.g., reinforcers, punishers) and discriminative stimuli, these terms will be further defined and explained in the following section.

Learning Theory: Addressing Metacontingencies

Contingencies and discriminative stimuli. Learning Theory states that behavior is a function of its consequences. Reinforcers are consequences that increase the

probability of a behavior occurring, while punishers decrease the probability of a behavior. Both reinforcement and punishment are known as contingencies (Wood, Wood, & Boyd, 2011). Therefore, behaviors that are acquired and learned are those that are reinforced, and behaviors that are lost are those that are no longer being reinforced or those that are punished.

Learning and losing behaviors, however, involve more than just contingencies. Since human behavior always occurs in a context, contextual factors are an integral piece of acquiring and extinguishing behaviors. A *discriminative stimulus* is a feature of the context in which a behavior is more or less likely to occur in its presence (Wood et al., 2011). For example, an individual is more likely to step on the car break in the presence of a red light, and an individual is less likely to smoke in the presence of a non-smoking sign. Thus, there are always three components to learning: the contingencies, the behavior, and the discriminative stimuli, referred to as a 3-term contingency (Wood et al., 2011).

Metacontingencies. Generalizing the theory to a cultural context entails focusing on more than just individual-level contingencies and discriminative stimuli. It involves focusing on *metacontingencies* or *cultural contingencies.* Metacontingencies are defined as the "contingencies of social reinforcement which generate and maintain its members' behavior" (Skinner, 1969, p. 13). Metacontingencies involve positive and negative reinforcers, punishers, and discriminative stimuli that are delivered to and experienced by an entire population. This includes laws, religions, myths, symbols, icons, social norms, rituals, prices, parks, vending machines, and advertising. For example, cultural metacontingencies such as low cost of fast-food and pervasive fast-food establishments

and advertisements would influence groups to purchase and eat more fast-food. These culturally-guided behaviors are extinguished in a different culture if the context that maintained them is no longer present. For example, if an individual from the culture described above moved to a culture that had fewer fast-food establishments, advertisements, and more expensive fast-food, individuals would be less likely to purchase and eat this food.

The Operant Model of Acculturation suggests that acculturation is understood as losing previously-held culturally-normative behaviors because of the loss of the reinforcers and cultural context that maintained them. As such, high prevalent behaviors will decrease in prevalence with acculturation because the cultural metacontingencies that maintained them are no longer present. Prior low-prevalence behaviors will increase in prevalence with acculturation as metacontingencies that inhibited them are no longer present. Cultural metacontingencies, which have been overlooked in the aforementioned studies, could serve as a framework for understanding patterns of health behaviors that are increasing for some immigrant groups and decreasing for others after increased residence in the U.S. (Landrine & Klonoff, 2004).

The Present Study

The present study extends and builds on the findings from the first study. Study 1 showed that sedentary behaviors may explain some of the variance between health declines and increasing generation status among Latino immigrant adolescents (McCullough & Marks, 2014). Another interesting finding was the *lack* of change in other behaviors – physical activity and fast-food consumption - across generations. To better understand why some behaviors change while others stay the same, the present

study is focused on identifying a model for understanding *how* these changes in behavior might occur from one cultural context to another. We will be using a new measure, the Operant Model of Acculturation (OMA), to examine any changes in health behaviors in relation to acculturation levels among immigrant adolescents. To test the OMA, the present study will examine eating behaviors, activity levels (physical and sedentary), BMI, acculturation as well as a novel measure of adolescent-perceived eating and activity-related metacontingencies present in both the country of origin and U.S. culture. This study represents an important contribution to the literature as the Operant Model of Acculturation has yet to be tested or used to explain differences in health behaviors among immigrant adolescents. Using this framework also allows us to pinpoint the specific cultural-behavioral processes that are obscured in studies which focus on comparing ethnic groups without directly measuring cultural behaviors. We are hypothesizing the following: 1) BMI levels will increase as a function of generation status and acculturation levels; 2) Eating behaviors and physical activity levels will vary as a function of acculturation levels; and 3) The change in metacontingencies across cultures will explain the relationship(s) between generation status and/or increased acculturation levels, and eating behaviors and/or physical activity.

Method

Participants

Adolescents ($n = 56$; 24 males, 32 females; M age = 15.58; $SD = 3.1$; Age range = 11.4 – 20.2) were recruited in-person from two low SES community-based after-school programs serving predominantly urban immigrant communities in the Northeast. The sample included a diverse sample of first ($n = 10$), second ($n = 30$), and third ($n = 16$)

generation immigrant adolescents. The majority of adolescents identified themselves as Non Latino Black ($n = 28$), with Latino ($n = 15$) comprising the second largest group ethnic/racial group. Non Latino White ($n = 10$), Asian/Pacific Islanders ($n = 2$) and Multiracial ($n = 1$) comprised the rest of the sample. Country of Origin included Haiti ($n = 20$), Guatemala ($n = 5$), Dominican Republic ($n = 3$), Puerto Rico ($n = 4$), Cape Verde ($n = 3$), Mexico ($n = 3$) and U.S. (n = 11). Please see Table 3 to examine demographic information for the sample as a whole and by generation status.

Table 3.
Means (SD) or N(%) of the adolescent sample

Variables	Generation Status			
	1st	2nd	3rd	Overall
Adolescent Participants	10 (17.9%)	30 (53.6%)	16 (28.6%)	56 (100%)
Age	16.77 (2.3)	15.46 (3.3)	15.14 (3.3)	15.58 (3.1)
Female	6 (60%)	19 (63.3%)	7 (43.8%)	32 (57.1)
Measured BMI	25.81 (8.1)	24.45 (4.7)	22.32 (4.34)	24.08 (5.4)
BMI Categories				
Underweight	0 (0%)	4 (13.3%)	5 (31.3%)	9 (16.1%)
Normal Weight	6 (60%)	12 (40%)	5(31.3%)	23 (41.1%)
Overweight	2 (20%)	10 (33.3%)	6 (33.3%)	18 (32.1%)
Obese	2 (20%)	4 (13.3%)	0 (0%)	6 (10.7%)
Ethnicity				
Latino	2 (20%)	9 (30%)	4 (25%)	15 (26.8%)
Non Latino	8 (80%)	21 (30%)	12 (75%)	41 (73.2%)
Race				
Caucasian	0 (0%)	3 (10%)	7 (43.8%)	10 (17.9%)
African American	7 (70%)	18 (60%)	3 (18.8%)	28 (50%)
Asian American	1 (10%)	0 (0%)	1 (6.3%)	2 (3.6%)
Hispanic	2 (20%)	9 (30%)	4 (25%)	15 (26.8%)
Multi-racial	0 (0%)	0 (0%)	1 (6.3%)	1 (1%)
Preferred Language				
English	5 (50%)	10 (33.3%)	15 (93.8%)	30 (53.6%)
Spanish	1 (10%)	3 (10%)	0 (0%)	4 (7.1%)
Creole	3 (30%)	8 (26.7%)	0 (0%)	11 (19.6%)
English + Native Language	1 (10%)	9 (30%)	1 (6.3%)	11 (19.6%)
Country of Origin				
Haiti	5 (50%)	15 (50%)	0 (0%)	20 (35.7%)
US	0 (0%)	0 (0%)	11 (68.8%)	11 (19.6%)
Guatemala	1 (10%)	4 (13.3%)	0 (0%)	5 (8.9%)
Puerto Rico	0 (0%)	4 (13.3%)	0 (0%)	4 (7.1%)
Dominican Republic	1 (10%)	0 (0%)	2 (12.5%)	3 (5.4%)
Cape Verde	1 (10%)	2 (6.7%)	0 (0%)	3 (5.4%)
Mexico	0 (0%)	2 (6.7%)	1 (6.3%)	3 (5.4%)
Liberia	1 (10%)	0 (0%)	0 (0%)	1 (1.8%)
China	1 (10%)	0 (0%)	0 (0%)	1 (1.8%)
Colombia	0 (0%)	1 (3.3%)	0 (0%)	1 (1.8%)
France	0 (0%)	1 (3.3%)	0 (0%)	1 (1.8%)
Portugal	0 (0%)	1 (3.3%)	0 (0%)	1 (1.8%)
Italy	0 (0%)	0 (0%)	1 (6.3%)	1 (1.8%)
Cambodia	0 (0%)	0 (0%)	1 (6.3%)	1 (1.8%)

Note: No differences emerged between variables of interest across generation status

Inclusion criteria for the adolescent participants included English speaking, though we did not require English to be their first language. Parent consent forms were available in English and Spanish, therefore the parent or guardian completing the measure needed to be able to speak English or Spanish. Translation of the measures into Spanish was completed by a bilingual (Spanish and English) graduate student who first translated the measure into Spanish and provided it to another Spanish speaker who confirmed its accuracy. There were no exclusion criteria. Adolescent participants were compensated with a $10 iTunes gift card for participation. Adolescent assent and parent consent (for adolescents younger than 18) were obtained prior to participation; this study was approved by an Institutional Review Board.

Procedure

The primary investigator visited after-school programs at two different community centers to invite adolescents to participate in a single-session study examining the impact of culture on health. Adolescents were informed that their participation would be voluntary and that their data, if they decided to participate, would be kept confidential. Adolescents were also informed that they would receive a $10 gift certificate to iTunes for their participation. The investigator passed out parent consent forms in English or Spanish, depending on their parent or guardian's needs (see Appendices A and B) and adolescent assent forms in English (see Appendix C) to interested adolescents at the after-school programs. For adolescents over 18, a participant consent form was passed out for them to sign if interested (see Appendix D). Adolescents were asked to sign up for a date and time to return to the after-school program to complete the study. They were reminded that they would only be eligible to participate if

they provided written personal assent and written parent consent, if under 18. If over 18, they only needed to provide written consent. Adolescents were asked to return the signed parent consent form and assent form to the investigator on the assigned date/time. Participants were asked to provide their phone number and/or email addresses for the investigator to remind them of their assigned date and time to return to complete the study.

On the scheduled day of testing, the investigator returned to the after-school program to collect parent consent forms and adolescent assent forms from the adolescents who signed up to complete the study on the specified date. Adolescents completed paper-based copies of questionnaires independently (in groups ranging from 2 -7) in a separate room at the after-school program. After each adolescent completed the paper-based questionnaires, the investigator measured their height and weight with a Detecto 339 Physician Scale with Height Rod. This measurement tool has been used in numerous studies to determine height and weight and has been shown to be an accurate and reliable measurement system (e.g., Tamura et al., 2005). Adolescents were measured in a private area of the room and height and weight was recorded on their questionnaire packet. The investigator only shared their height and weight with them if they inquired. The entire study lasted approximately 40 minutes for each adolescent participant.

Measures

Paper-based questionnaires were used with adolescents in this study. Measures were administered in the following order. Please see Appendices G through J to view the measures.

Demographic information. The demographic information form asked participants to report their age, generation status, ethnicity, and language use. Generation status was calculated from child and parent-report of child's country of birth, parent country of birth, and grandparent country of birth. Adolescents were coded as ''first generation'' if neither they nor their resident parents were born in the U.S., ''second generation'' if they were born in the U.S. but one or both of their resident parent was not born in the U.S., and ''third generation and above" if both they and their resident parents were born in the U.S. Thus, children born third generation and above were collapsed into one category as is typical in generational research (Pena et al., 2008). Body Mass Index will be calculated by directly measured height and weight. Using the 2000 CDC BMI charts as a reference, obesity will be defined as gender and age-specific BMI values at or above the 95th percentile of the reference population, and overweight will be defined as gender and age-specific BMI values at or above the 85th percentile of the reference population (Barlow, 2007). Completion of the demographic form took participants approximately 5 minutes.

Acculturation. The Acculturation, Habits, and Interests Multicultural Scale for Adolescents (AHIMSA) (Unger et al., 2002) was used to measure adolescents' level of acculturation. The AHIMSA (Unger et al., 2002) uses the Bidimensional Model of Acculturation to measure acculturation among adolescents of different ethnicities. It is an 8-item scale that generates four orientation scores for each participant: U.S. Orientation (Assimilation); Other Country Orientation (Separation); Both Countries Orientation (Integration); and Neither Country Orientation (Marginalization). Scores for each of these four orientations range from 0 to 8. For example, participants with a high U.S.

Orientation score would be conceptualized as having "assimilated" into U.S. Culture. Unger et al. (2002) validated the measure with a sample of adolescents 10-to 13-years-old from various ethnic backgrounds. Cronbach's alpha for the orientation scales are acceptable, ranging from .50 to .79 (Unger et al., 2002). Further, the AHIMSA demonstrates good convergent validity, correlating highly with other measures of acculturation, such as the ARSMA-II (a commonly used measure of acculturation), a scale of English Language use, and generation status (Unger et al., 2002). The present study is only using the Assimilation subscale of the AHIMSA as we are interested in acculturation to the U.S. Completion of the AHIMSA took participants approximately 5 minutes.

Eating behavior and physical activity. The Youth/Adolescent Questionnaire (YAQ) was used to measure adolescents' frequency of food intake. The YAQ is a widely used 152-item self-administered food frequency questionnaire that assesses the previous year's diet in 9- to 18-year-olds (Wolf et al., 1994). A typical item asks the participants to report the frequency with which they consumed a particular food (e.g., yogurt, potato chips) over the previous year. There are six response categories: 1 (never/less than 1 per month); 2 (1-3 times/month); 3 (1-2 times/week); 4 (3-6 times/week); 5 (1 per day); 6 (2+ per day). Studies that have used this measure typically collapse dietary behaviors into 6 scales. Scores for each of the scales range from 0-6: 1) Fruits/Vegetables (e.g., how much do you eat grapes?); 2) Snack Foods/Desserts (e.g., how much do you eat potato chips?); 3) Breads and Cereals (e.g., how much do you eat wheat bread?); 4) Dairy (e.g., how much do you eat yogurt?); 5) Soda/Juice (e.g., how much do you drink soft drinks?); 6) Fast-Food (e.g., how much do you eat at fast-food restaurants?) (Rockett et al., 1995).

Reproducibility (Rockett et al., 1995) and validity studies (Rockett et al., 1997) demonstrate that the YAQ is a moderately reliable and valid measure of adolescents' eating habits.

Youth/Adolescent Activity Questionnaire (YAAQ) (Wolf et al., 1994) is a two-dimensional (physical and sedentary activity) measure of the previous year's activity levels in 9- to 18-year-olds. A typical question asks participants to report the amount of time spent engaged in physical (e.g., running, walking, sports teams) and sedentary (e.g., watching television, reading) activities over the previous year. Response categories differ by type of activity (physical or sedentary). There are 6 response options for physical activity responses, ranging from less than 1/2 hour/week to greater than 6 hours/week. There are 7 response options for sedentary activities. Response options range from engaging in sedentary activity 0 hours per week to 31+. Two scales were created from this measure: 1) Physical Activity Scale: Scores can range from 0-6; 2) Sedentary Activity Scale: Scores can range from 0-7. Reproducibility and validity studies (Gortmaker et al., 1999; Wolf et al., 1994) have demonstrated that the YAAQ is a moderately valid and reliable measure of adolescents' physical activity habits. Completion of both measures took participants approximately 20 minutes.

Operant model of acculturation. Finally, adolescents were asked to complete a questionnaire to examine metacontingencies present in both American culture and their family's culture (their culture of origin). The Operant Model of Acculturation (OMA) questionnaire was adapted from a measure that Marks, Patton, and Garcia-Coll (2011) used to examine biculturalism. First, since there are different areas or "segments" of society in which individuals could reside in the U.S., it is important to examine what an

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individual thinks of when he or she hears the word "American culture." Therefore, the first question on the questionnaire asks participants, "When you think about 'American Culture,' what comes to mind? Some people think about neighborhoods, places, music, food, or famous people. What do you picture?" This will provide us with a context in which to interpret the answers from the measure.

The remaining questions ask participants, "How common are each of these [metacontingencies] in American culture compared to your Family's culture?" and "How expensive are each of these [metacontingencies] in American culture compared to your Family's culture?" on a scale from 0 (More Common/Expensive in My Home Culture) to 5 (More Common/Expensive in American Culture). Items assess metacontingencies that could influence eating and physical activity behaviors in both cultures, such as costs, social norms, rituals, advertisements, and availability of foods, drinks, and physical activities. This measure contains two main scales and four subscales. The two main scales are the following: 1) Unhealthy behaviors (e.g., metacontingencies related to eating fast-food, junk food and sedentary behaviors), and 2) Healthy Behaviors (e.g., metacontingencies related to consumption of fruit and vegetables, and physical activities). Each scale contains 17 questions. The four subscales are the following: 1) Healthy Food (e.g., metacontigencies related to eating fruits and vegetables, breads and grains); 2) Unhealthy Food (e.g., metacontingencies related to eating fast-food and snack s/dessert food); 3) Sedentary Behaviors (e.g., metacontingencies related to playing video games, watching TV); and 4) Physical Activities (e.g., metacontingencies related to playing outside, going to the gym).

Important to note that responses under the second question ("how expensive are...") will be reverse-scored (e.g., a score of "5" will be scored as "1"). Low scores (scores from 17-34) on each subscale indicate that behaviors in the culture of origin are no longer being reinforced in the new culture; and thus, we expect these behaviors to decrease across generations and acculturation levels. Scores ranging from 35 – 67 indicate that behaviors are reinforced in both cultures, thus, we expect these behaviors to stay the same. High scores (scores from 68 – 85) indicate that behaviors that were not reinforced in the culture of origin are now being reinforced in the U.S.; thus, we expect these behaviors to increase across generations and acculturation levels. Completion of this measure took approximately 5 minutes.

Planned Analyses

Parametric statistical tests, using SPSS 22.0 statistical software, were used to analyze the data. A probability level of $p < .05$ was used to establish statistical significance for all hypothesis testing. Before running any analyses, the data was checked to ensure it met the assumptions for parametric tests, namely Multiple Linear Regression (MLR) and ANOVA models. The data was examined for accuracy of input, outliers, missing values, normality, linearity, homoskedasticity, and multicollinearity.

Initially, descriptive statistics were run to assess for accuracy of input. These analyses indicated that there was less than 10% missing data for each of the variables. As outlined by Tabachnik and Fidell (2007), if data has less than 10% missing data, it can be included in analyses. Maximum likelihood estimation was used to estimate and correct for missing values. Univariate ouliers were determined by standardized z-scores, with scores above 3.29 considered outliers. These values were replaced, as suggested by

Tabachnik and Fidell (2007), with a value that is one unit larger or smaller than the value closest to, but not exceeding, a z-score of 3.29. An examination of residual plots revealed there were no multivariate outliers present.

To ensure that the data met the remaining assumptions of MLR and ANOVA, normality, linearity, homoskedasticity, and multicollinearity were examined through histograms, scatterplots, and correlation matrices. A histogram, as well as skewness and kurtosis scores, showed that the variables used in the analyses followed a normal curve. Scatterplots were examined to ensure the residuals did not follow a systematic pattern and correlations were run between all the variables to assess for multicollinearity. The OMA scales and subscales were the only variables to demonstrate multicollinearity. The items included in these scales appeared to be highly related and this was carefully considered as we conducted the following analyses.

Results

Bivariate correlations were first examined to identify relations among all of the variables used in the analyses. Since we had a small sample size, we recognize that Type 11 error may be at play, thus true relationships may exist between variables that did not emerge as significant. First, and surprisingly, a significant inverse correlation emerged between the AHIMSA US Assimilation scale and Adolescent BMI ($r = -.26$, $p < .05$), such that adolescents with higher levels of assimilation to the U.S. had lower levels of BMIs. Other significant correlations included positive associations between Sedentary Activities and Adolescent BMI ($r = .28$, $p < .05$) as well as between Age and Physical Activities ($r = .44$, $p < .01$). Age was also found to be inversely correlated with Snacks and Desserts ($r = -.48$, $p < .01$), Dairy ($r = -.27$, $p < .05$), and Soft Drinks and Juice ($r = -$

.31, $p < .05$) scales. An Analysis of Variance (ANOVA) was also run to examine if the

AHIMSA Assimilation scale was associated with Generation Status. Results indicated

that generation status is significantly related to Assimilation, ($F(2, 55) = 3.35$, $p < .05$),

such that third generation immigrant adolescents ($M = 4.75$, $SD = 2.4$) have higher levels

of assimilation than first ($M = 2.40$, $SD = 2.27$) and second ($M = 3.16$, $SD = 2.5$)

generation immigrant adolescents. No significant results emerged when examining

differences among variables of interest between the two sites where data was collected (p

>'s .05). Please see Table 4 to examine the correlation matrix between all of the variables

used in the analyses.

Table 4.

Pearson correlations among variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Age		-0.03	-0.53	-0.17	0.08	-0.16	0.01	-0.24	-0.48**	-0.19	-0.27*	-.31*	-0.22	.44**	0.01
2 Adolescent BMI			-.26*	-0.03	-0.08	-0.19	-0.18	-0.24	0.18	-0.01	-0.04	-0.22	-0.11	-0.04	.28*
3 AHIMSA Assimilation				0.15	-0.05	-0.03	0.02	0.01	0.2	0.09	0.01	0.07	-0.04	0.08	-0.01
4 OMA Healthy Foods					.65**	.43**	.56**	-0.01	.26*	-0.08	0.01	0.2	-0.15	0.2	-0.02
5 OMA Unhealthy Foods						.46**	.86**	-0.05	-0.1	-0.2	-0.21	-0.15	-0.26	0.22	-0.08
6 OMA Physical Activity							.52**	0.19	0.04	0.01	0.15	0.2	-0.02	-0.01	-.27*
7 OMA Sedentary Behavior								0.05	-0.08	-0.02	-0.14	-0.05	-0.24	.27*	-0.23
8 Fruits and Vegetables									.38**	.51**	.53**	.32*	.37**	0.01	-0.09
9 Snacks and Desserts										.53**	.40**	.39**	.36**	-0.01	.34**
10 Breads and Grains											.35**	0.23	.44**	0.11	.31*
11 Dairy												.47**	.39**	-0.01	-0.12
12 Soft Drinks and Juice													.43**	0.08	-0.05
13 Fast-Food														-0.11	0.17
14 Physical Activities															0.04
15 Sedentary Behaviors															

Note. Pearson correlation coefficients for variables included in analyses. * = $p < .05$; ** = $p < .01$

Hypothesis 1: BMI Levels Will Increase As a Function of Generation Status and Acculturation Levels

Multiple Linear Regression (MLR) models and Analyses of Variance (ANOVA) models were used to examine if the immigrant paradox existed within this community sample of immigrant adolescents. BMI was entered as the outcome variable with generation status and the AHIMSA Assimilation Scale entered as the independent variables. No significant differences in BMI emerged between first ($M = 25.80$), second ($M = 24.45$), and third ($M = 22.32$) generation immigrant adolescents, (F, 1, 55) = 2.667, $p > .05$). In order to examine the individual impact of assimilation on adolescent BMI, a separate regression model was run with BMI as the outcome and AHIMSA Assimilation scale as the independent variable. As presented earlier, bivariate correlations revealed a significant inverse correlation between Assimilation scale and Adolescent BMI ($r = -.26$, $p < .05$). Thus, counter to our prediction, BMI levels did not increase as a function of generation status and acculturation levels; however, interestingly, acculturation did account for differences in BMI levels, just not in the direction predicted. In our study, adolescents who were more assimilated to the U.S. had healthier, lower BMIs.

Hypothesis 2. Eating Behaviors and Physical Activity Levels Will Vary As a Function of Generation Status and/or Increased Acculturation Levels

Due to the small sample size and positive association between the Assimilation and Generation Status variables, the AHIMSA Assimilation scale was used with the remaining analyses instead of Generation Status to increase power. To test the prediction that eating behaviors and activities varied as a function of acculturation, bivariate correlations were run between assimilation and each of the six eating behavior scales

(Fruits and Vegetables, Snacks and Desserts, Breads and Grains, Dairy, Soft-Drinks and Juice, Fast-Food) and two activity scales (Physical Activity, Sedentary Behaviors) as outcome variables. Counter to our prediction, results revealed that assimilation was not significantly associated with any of the eating behavior or activity scales among this sample of immigrant youth (p's > .05). In other words, adolescents' eating behaviors and physical activity levels did not vary as a function of their assimilation to U.S. culture.

Hypothesis 3. The Change in Metacontingencies Across Cultures Will Help Explain the Relationship(s) Between Increased Acculturation Levels, and Eating Behaviors and/or Physical Activity

This final prediction is of central importance because it tests the Operant Model of Acculturation as it relates to how acculturation may impact health behaviors. Internal consistency of the two main scales (OMA Healthy, OMA Unhealthy) as well as four subscales (OMA Healthy Food, OMA Physical Activity, OMA Unhealthy Food, OMA Sedentary Behavior) were examined to determine whether the items comprising the scales hang together and could be averaged for a composite measure in analyses. Internal consistency of the scales was determined using Cronbach's alpha, with an adequate alpha value $\geq$ .70 as the criterion (Tabachnik & Fidell, 2007). Alphas for each subscale and scale ranged from .83 to .96, indicating that the items comprising the scale were strongly related. Therefore we averaged grouped items according to their healthy and unhealthy food and behavior components.

Since the Operant Model of Acculturation would predict that adolescents' behaviors would change as a function of acculturation only if metacontingencies were in place, a moderation analysis was used. To examine the moderating quality of

acculturation on the OMA Scales (OMA Healthy Food, OMA Unhealthy Food, OMA Physical Activity, OMA Sedentary Activity), an interaction term was created by multiplying the AHIMSA Acculturation scale with each of the four OMA Scales. Using Multiple Linear Regression (MLR), first-order effects of Acculturation and the various OMA subscales were examined for each eating and activity behavior (e.g., Fruits and Vegetables, Snacks and Desserts, Breads and Grains, Dairy, Soft Drink and Juice, Fast-Food, Physical Activity, and Sedentary Behaviors). Next, Acculturation, OMA subscales, and their interaction terms were included in an all-in model for each behavioral outcome to see whether, in the presence of their first-order terms, the interaction may be significant. The results revealed that significant interactions emerged between the OMA Healthy Food subscale and four different eating behaviors. Interestingly, no significant interactions were found between any of the other OMA subscales and Acculturation.

First, the results showed a significant interaction between OMA Healthy Food and Acculturation on Fruit and Vegetable intake ($B = 1.58$, $t = 2.76$, $p < .01$; $F(3,55) = 2.56$, $p > .05$, $R^2 = .13$), such that the level of assimilation to U.S. moderates, or changes the quality of, the relationship between OMA Healthy Food messages which, in turn, impacts fruit and vegetable intake. These results show that adolescents are more likely to perceive healthy foods as reinforced in the U.S. compared to their culture of origin *only* if they are highly assimilated to the US, which is related to higher fruit and vegetable consumption. Please see Figure 4 for a description of the findings.

Figure 4.

Moderating Effect of OMA Healthy Food Scale and Acculturation on Frequency of Fruit and Vegetable Intake
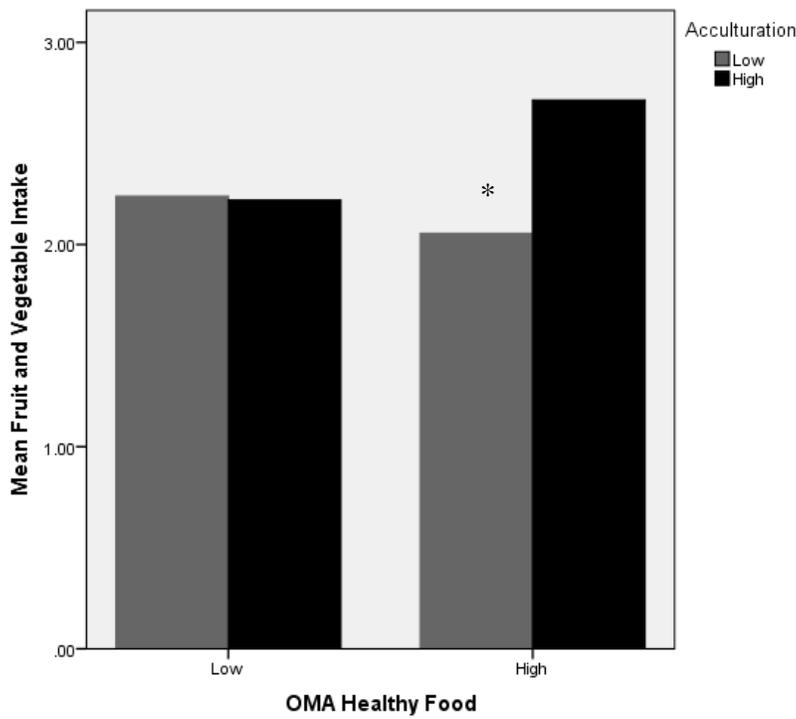
Note: * = $p < .05$. OMA Healthy Food is a binary variable representing the median split of the OMA Healthy Food subscale. Acculturation is a binary variable representing the median split of the AHIMSA Assimilation Scale. "Low" indicates scores below the median; "High" represents scores above the median. Fruit and Vegetable Intake is on a scale ranging from 1 – 6.

There was also a significant interaction between OMA Healthy Food and Acculturation on Bread and Grain intake ($B = -.1.41$, $t = 2.46$, $p < .05$; $F(3,55) = 2.42$, $p > .05$, $R^2 = .12$). These results demonstrate that the level of assimilation to US moderates, or changes the quality of, the relationship between perceptions of healthy food reinforcements and bread and grain consumption. In other words, adolescents are more likely to perceive healthy foods as reinforced in the U.S. compared to their culture of origin *only* if they are highly assimilated to the US, which in turn, is related to higher bread and grain intake. Please see Figure 5 for a visual representation of the findings.

Figure 5.

Moderating Effect of OMA Healthy Food Scale and Acculturation on Frequency of
Bread and Grain Intake
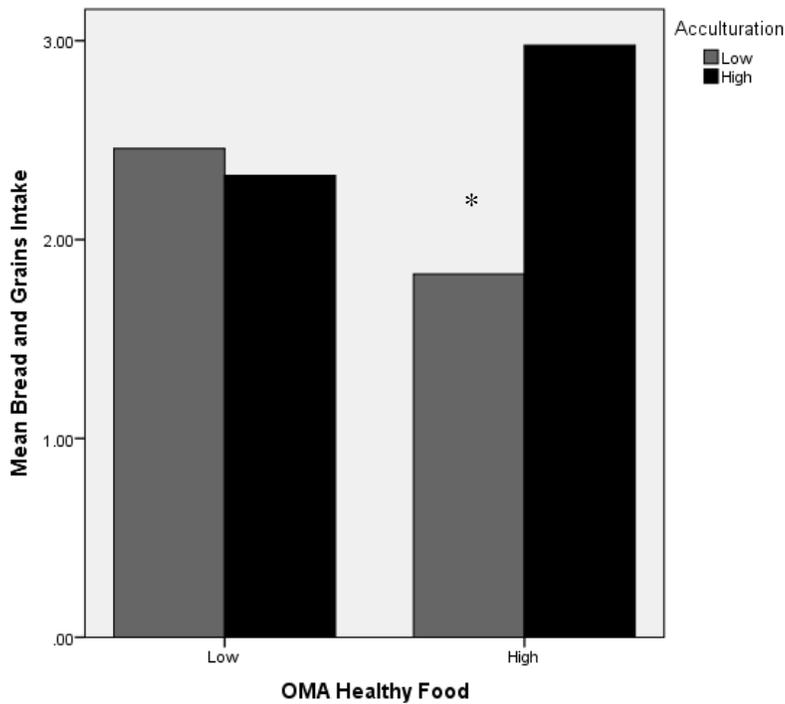
Note: * = p < .05. OMA Healthy Food is a binary variable representing the median split
of the OMA Healthy Food subscale. Acculturation is a binary variable representing the median
split of the AHIMSA Assimilation Scale. "Low" indicates scores below the median; "High"
represents scores above the median. Bread and Grain consumption is on a scale ranging from 1 – 6.

Similar findings emerged with Dairy consumption, such that there was also a

significant interaction between OMA Healthy Food and Acculturation ($B = 1.25$, $t = 2.13$,

$p < .05;$ $F(2,55) = 1.53$, $p > .05$, $R^2 = .08$). Adolescents are more likely to perceive

healthy foods as reinforced more in the U.S. compared to their culture of origin, only if

they are highly assimilated. This internalization of healthy food messages is subsequently

related to higher dairy consumption. Please see Figure 6 for a visual representation of the

findings.

Figure 6.

Moderating Effect of OMA Healthy Food and Acculturation on Frequency of Dairy Intake

Note: * = $p < .05$. OMA Healthy Food is a binary variable representing the median split of the OMA Healthy Food subscale. Acculturation is a binary variable representing the median split of the AHIMSA Assimilation Scale. "Low" indicates scores below the median; "High" represents scores above the median. Dairy consumption is on a scale ranging from 1 – 6.

Lastly, and importantly, a significant interaction effect was found between OMA Healthy Food and Acculturation on Fast-Food consumption, ($B = 1.73$, $t = 3.11$, $p < .01$; $F(2,55) = 3.76$, $p < .05$, $R^2 = .17$). These results indicate that the level of assimilation moderates, or changes the quality of, the relationship between perceptions of healthy food reinforcement and fast-food consumption. In other words, adolescents are more likely to perceive healthy foods as reinforced in the U.S. compared to their culture of origin if they are highly assimilated to the US, which is related to higher fast-food consumption. Please see Figure 7 for a visual representation of the findings.

Figure 7.

Moderating Effect of OMA Healthy Food Scale and Acculturation on Frequency of Fast-Food Intake
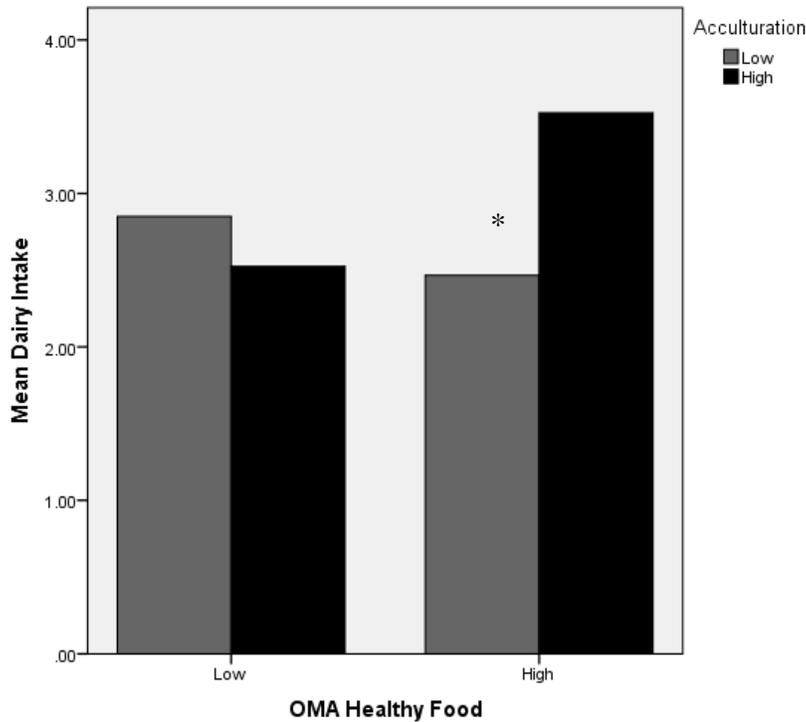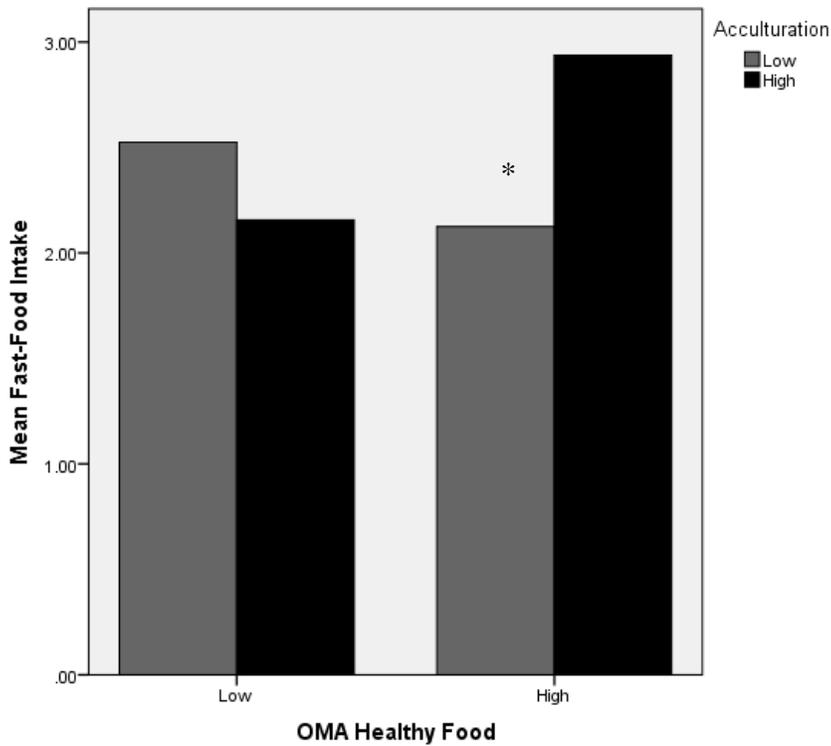

Note: * = $p < .05$. OMA Healthy Food is a binary variable representing the median split of the OMA Healthy Food subscale. Acculturation is a binary variable representing the median split of the AHIMSA Assimilation Scale. "Low" indicates scores below the median; "High" represents scores above the median. Fast-food consumption is on a scale ranging from 1 – 6.

Discussion

This study represents an important step in the research as it is the first to test the Operant Model of Acculturation in relation to weight gain and health behaviors in a mixed community-based sample of immigrant youth. This research uses a behavioral-cultural model to go beyond describing outcomes to coherently and meaningfully explaining the change that occurs for health behaviors, particularly healthy eating patterns, from one cultural context to another. The findings from this study demonstrate the complex interaction between perceived healthy food messages and acculturation that

could provide researchers and clinicians with a mechanism for understanding how to improve healthy behaviors among immigrant youth.

The key finding from this study is the role that metacontingencies, particularly perceived reinforcements related to healthy food, play in immigrant adolescents' eating behaviors. The results showing the moderating effect of the Operant Model of Acculturation Healthy Food subscale and Acculturation on eating behaviors indicates that adolescents who are more assimilated into U.S. culture may internalize healthy eating messages more than those that are not as highly assimilated. Interestingly, in turn, when adolescents perceive certain foods as more reinforced in the U.S. than in their culture of origin, they are also more likely to consume those foods, but *only* if they have higher levels of acculturation. This makes sense from the behavioral operant perspectives in the operant model of acculturation. It is likely that adolescents who feel more integrated into American culture are more acutely aware of the reinforcing messages about healthy eating (e.g., accessibility of healthy foods, advertisements for fruits and vegetables, healthy foods that are less expensive) due to a higher degree of internalizing these messages as directly relevant to them.

Research on ethnic identity development would support such internalization of messages as an identity mechanism which is highly salient in the adolescent developmental period (Phinney, Horenczyk, Liebkind, & Vedder, 2001). This would be a very interesting new area of research moving forward – to explore the potential role of ethnic identification with being American or of an American ethnicity (e.g., "Latino"), as an indicator of internalization of metacontingencies governing health behaviors. Of note, several public health campaigns have been recently enacted in the U.S. to target

adolescents' awareness and knowledge of healthy foods and behaviors (Obama, 2014).

Messages from these campaigns may be internalized by adolescents who are more

acculturated into U.S. culture as they often focus on increasing frequency of foods and

behaviors that are highly valued and accessible in the U.S.

Though the bulk of the findings point to the role of OMA in predicting healthy

food consumption, it is also interesting that fast-food consumption increased when

adolescents perceived more reinforcement around healthy eating in the U.S. This finding

may be due to metacontingencies such as prevalence and low costs of fast-food that may

reinforce the purchase of fast-food. In fact, when adolescents in this sample were asked

on the Operant Model of Acculturation questionnaire, "When you think about American

culture, what comes to mind," many adolescents answered with common fast-food chains

(McDonalds, Wendys). It appears that in the context of being more assimilated into U.S.

culture, messages about healthy food can play a large and impactful role in adolescents'

healthy food intake as well as influence intake of highly accessible foods in the U.S.,

such as fast-foods.

The lack of findings for the Operant Model of Acculturation Unhealthy Food and

Sedentary Activity subscales points to the specificity of this measure in predicting

healthy eating behaviors, or protective factors, as opposed to unhealthy behaviors, or risk

factors. It is possible that these results are specific to the community-based mixed sample

of immigrant adolescents that demonstrated lower levels of BMI with higher levels of

acculturation. These findings may not extend to specific ethnic minority immigrant

groups, such as Latino immigrant youth, that may demonstrate declining health outcomes

with increased residence in the U.S. As the first study to test the Operant Model of

Acculturation, it is unclear if these findings would also extend to other groups of ethnic minority immigrant groups, such as Latino immigrant adolescents whose eating patterns and BMI deteriorate due to assimilation. In order to better understand the interplay between acculturation, internalized messages regarding foods and activities, and behavior change, it will be important to continue modifying the scale and testing it in various populations to better understand both protective and risk factors influencing health behaviors in immigrant youth.

Interestingly, this study did not show a protective or "paradox" effect as predicted. The results showing that adolescents demonstrated lower BMI levels with higher levels of acculturation supports a risk model of immigrant health. Notably, many studies that have documented the immigrant paradox in relation to weight gain have focused on Latino immigrant groups with a large proportion representing overweight or obese adolescents. The current sample is predominantly Non Latino (73%) with the largest proportion of adolescents classified as either normal or underweight (57.2%). These findings showing improvements in health with increased generation status or acculturation levels has been documented in many existing studies that have used mixed samples of immigrant youth (e.g., Gordon-Larsen et al., 2003). Therefore, it is important to note that this pattern of improved health may not hold if the sample was predominantly Latino or had more variability in terms of BMI and weight status. Therefore, it will be incredibly important for future research to hone in on one cultural group in order to identify culturally-specific behaviors and outcomes that could, perhaps, be better predicted with the Operant Model of Acculturation.

An interesting pattern of results to further examine is the finding that immigrants in the underweight category comprised 13% of the second generation and 31% of the third generation sample. Perhaps increased acculturation does not mean improved health in this sample. Acculturation, depending on the culture of origin, could place immigrant adolescents at risk for underweight as opposed to overweight. Our sample size is too small to examine this question in more depth; however, it would be interesting for future research to examine how weight (underweight to obesity) relates to acculturation and what role perceived reinforcement might play.

While this study represents an important contribution to the field, future research would benefit from reducing this study's limitations in order to improve our understanding of immigrant health. One key limitation was the sample size, and in particular, inconsistent sample sizes within each generation status category. Increasing the sample size, particularly within the first generation group, would increase power and allow for more complex analyses that depend on higher sample sizes. Although using a community sample of immigrant adolescents was important for understanding health outcomes and behaviors among a diverse mix of immigrant youth, sampling within one cultural group, such as Latino immigrants from the Dominican Republic, would greatly improve the specificity of the results and measures. Lastly, the Operant Measure of Acculturation, specifically the items comprising the Unhealthy Behavior Scale, were highly correlated and perhaps asking the same question repeatedly. Future research should focus on modifying this measure to better capture risk factors, such as unhealthy eating and sedentary behaviors, in addition to protective factors among a group of immigrant adolescents from one culture. In order to provide more specificity for the

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model, future work can examine the impact of different levels of metacontingencies (ones that directly impact behaviors and ones that indirectly impact behaviors) to better understand where to intervene. Overall, the current research demonstrates the OMA's unique role in modeling improvements in health with higher levels of acculturation. These results can be used to inform the development of preventive interventions that focus on increasing internalized, culturally-reinforced messages about healthy eating in the U.S.

CHAPTER FOUR

Discussion

"When you think about "American Culture," what comes to mind? Some people think about neighborhoods, places, music, food, or famous people. What do you picture?" Adolescents in Study 2 were asked this question on the Operant Model of Acculturation measure. Responses ranged from "Red, white and blue" to "McDonalds" and tended to center around food and common fast-food restaurants in the U.S. These responses demonstrate the pervasive nature of food messages in U.S. culture and the extent to which Study 2's sample of immigrant adolescents value and internalize these messages. Current research examining weight loss interventions for adolescents have not been particularly promising, with few demonstrating improvements in adolescent weight or weight-related behaviors, particularly with ethnic minority samples (Jelalian & Steele, 2008). The current research showing the importance of adolescents' perceptions of healthy food reinforcements to improvements in health behaviors is encouraging as it may be an element that is currently missing in weight loss interventions for immigrant adolescents.

Given the current climate in the U.S. showing alarming rates of weight gain among immigrant youth (Ogden, 2014), the present research focused on advancing our understanding of specific health behaviors linked to higher BMI levels among immigrant youth as well as mechanisms accounting for changes in behaviors across acculturation levels. Existing research has yet to fully support a risk or protective model of immigrant health, therefore, the current research was also important for elucidating factors that could lead to increased risk or protection as immigrants spend more time in the U.S.

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Study 1 focused on one specific immigrant group, Latino immigrant adolescents, to examine the mediating role of several health behaviors on the relation between BMI and generation status. The results supported a protective model, or immigrant paradox, showing that first generation immigrant adolescents demonstrated lower rates of obesity than second and third generation immigrants (McCullough & Marks, 2014). Importantly, sedentary behaviors, such as playing video games, watching TV, and playing on the computer were found to be the only health behaviors to partially mediate the relation between obesity and generation status. To our knowledge, this study was the first to link specific health behaviors to elevated rates of obesity among second and third generation Latino immigrant adolescents and emerging adults. These results were important as they identified sedentary behaviors as one factor in explaining weight gain among immigrant adolescents. This study, however, did not offer a mechanism for understanding *how* these behaviors change with increased generation status.

Using the findings from Study 1 as a base, Study 2 focused on examining the behavioral mechanism accounting for changes in health behaviors observed as acculturation occurs. Using a newly developed measure, the Operant Model of Acculturation was tested with a sample of first, second and third generation mixed culture immigrant adolescents to evaluate if cultural and behavioral factors account for the changes in health behaviors associated with acculturation. Surprisingly and counter to our prediction, Study 2 supported a risk model of immigrant health such that adolescents demonstrated improvements in BMI with higher levels of acculturation.

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The critical and exciting finding from this study was that adolescents' perceived messages about reinforcements of healthy food interacted with acculturation levels to impact eating behavior. The measure developed for this study to examine adolescents' perceived reinforcements about food and activity in the U.S., The Operant Model of Acculturation, was effective in predicting improvements in healthy eating behaviors with higher levels of assimilation. In line with a behavioral operant perspective, adolescents are more likely to perceive healthy foods as reinforced in the U.S. compared to their culture of origin *only* if they are highly assimilated to the US, which is related to higher fruit and vegetable, dairy, breads and grains and fast-food consumption. In other words, adolescents who are more assimilated into U.S. culture may internalize healthy eating messages more than those who are not as highly assimilated. Interestingly, when adolescents perceived certain foods as more reinforced in the U.S. than in their culture of origin, they are more likely to consume those foods, but *only* if they report higher acculturation levels.

Interestingly, the OMA measure predicted improvements in healthy behaviors specific to eating but did not predict as many risk behaviors, such as sedentary behaviors. Given the findings from Study 1 showing the unique contribution of sedentary behaviors to weight gain among second and third generation Latino immigrants, it was surprising that Study 2 did not also show an interaction between reinforced messages about sedentary behaviors and assimilation. A significant positive correlation between sedentary behaviors and BMI did emerge, though, such that higher frequency of

sedentary behaviors were related to higher BMI levels; however, this finding was not linked to generation status or acculturation levels. Given that we had a relatively healthy sample (>50% underweight or normal weight), this model may have been more effective in predicting improvements in health because of the sample's relatively low engagement in sedentary behaviors ($M = 6$ hrs a week) and snack/dessert intake ($M = 1$-2 snacks/desserts a week). Future studies should examine if this pattern of results holds when extending to populations whose eating patterns and BMI tend to deteriorate due to assimilation. This model may be more predictive of risk and protective factors when high-risk samples are included and when more variability in the sample exists.

The findings from both studies, unfortunately, provide support for both of the competing models – risk and protective frameworks- explaining immigrant health. While Latino immigrant groups demonstrated declines in health with higher generation status, the mixed sample of immigrant youth, mostly driven by immigrants from Haiti, showed health improvements with higher levels of acculturation. These conflicting findings point to the importance of examining one cultural group in depth to gain insight into culturally-specific risk and protective factors. Future research would benefit from conducting studies with specific ethnic minority immigrant groups to provide further insight and clarity into immigrant health as it relates to weight gain and health behaviors.

Overall, these two studies provide a first step in understanding how changes in culturally-reinforced behaviors may be driving differences in weight gain and health behaviors among immigrant adolescents in the U.S. Future research should continue to

test the Operant Model of Acculturation among specific immigrant groups, such as Latino immigrants from the Dominican Republic, to see if OMA explains risk among groups that often demonstrate declining health outcomes with acculturation. Modifying the measure to include more questions about unhealthy behaviors (e.g., more questions about specific desserts or snack foods) that are not as highly correlated with each other might be another way to better capture risk with this measure. Including parents in the measurement process would also enhance these findings and perhaps provide a different perspective for understanding cultural differences in behaviors.

The findings from these two studies can be used to better understand behaviors accounting for weight gain among immigrant adolescents as well as differentially reinforced behaviors that lead to improvements in healthy eating. This research highlights the healthy behavioral changes that may occur when adolescents who are highly assimilated into U.S. culture perceive higher reinforcement around healthy foods. Understanding these protective and risk mechanisms can provide clinicians and researchers with an important empirical basis for the development of culturally-sensitive obesity intervention and prevention efforts.

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Parent/Guardian Consent: English

Study Title: A Novel Approach to Understanding the Immigrant Paradox and Obesity
Principal Investigator: Amy Marks, Ph.D.
Co-Investigator: Mary Beth McCullough, M.A.

Why is this study being conducted?
We are asking for your permission for you as well as your son or daughter to take part in a research study. This research study is designed to help us learn more about how cultural beliefs and values may influence children's eating behaviors and physical activity levels. We are very pleased to have the cooperation of the staff at the YMCA and Progreso Latino and hope you will offer your support too. Thank you so much for your time and consideration.

Where is this study going to take place and how long will it last?
You are being asked to complete two questionnaires (attached to the end of this form) to help us learn more about how culture may impact children's eating and physical activity habits. These questionnaires contain questions related to you and your child's demographic information, ethnicity, cultural beliefs and values. It is expected to take approximately 10 minutes to complete the questionnaires. Your child will be asked to complete paper-based questionnaires and have their weight and height measured in the computer lab at the YMCA or Progreso Latino during after-school hours. A graduate student from Suffolk University will be providing your child with these questionnaires and measuring your child's height and weight. Your child's involvement in this study will take approximately 40 minutes.

How much will this cost?
It will not cost you or your child anything to take part in this study. To thank you and your child for participating, we will be providing your child with a $10 gift certificate to iTunes. If your child does not answer all questions on the survey, or chooses to stop at any point while completing the questionnaires, they will still receive a gift certificate.

Are there any risks?
To the best of our knowledge, the things you and your child will be doing in this research have no more risk of harm than one would experience in everyday life. You and your child's participation in all aspects of this study are completely voluntary and both of you may choose not to answer any of these questions or stop participating at any time. All information will be keep confidential unless we are required by law to share it with others.

Are there any benefits for participation?
Research is designed to help people learn more about a specific topic. You and your child will be helping us learn if cultural values and beliefs impact health behaviors. This could make a difference in future understanding of other adolescents.

Do I have to sign this form?
You can choose not to sign this form. You can also choose which level of consent you would like to give. For example:

- If you do not wish to participate, but you would like to give permission for your child to participate, you only need to check off the "child permission" box at the end of this form.
- If you would like to participate, but you do not wish to give permission for your child to participate, you only need to check off the "parent consent" box at the end of this form.
- If you would like for both of you to participate, you can check off both the "parent consent" and "child permission" boxes at the end of this form.
- If you would not like for you or your child to participate in the study, you do not have to check any of the boxes or sign the form.

If you *do* give your child permission to participate, your child will still be given an opportunity to decide whether or not he or she would like to take part in the study. If your child decides to take part in the study, it should be because he or she really wants to participate. There will be no penalty and if your child chooses not to volunteer he or she will not lose any normal benefits or rights. Your child will not be treated differently by anyone if he or she chooses not to participate in the study. Your child can stop at any time during the study and still keep the same benefits and rights.

Will the information provided be kept confidential?
We will do our best to protect you and your child's privacy during this study. Information from this study (you and your child's questionnaires) will be stored on a secure computer database and identified by a code number only. The code key connecting you and your child's name to specific information will be kept in a separate, secure location. Five years after this information is no longer being used for research purposes, it will be stored in the principal investigator's lab space.

All of you and your child's information will remain confidential. However, if you or your child's answers show that either of you are very sad, being harmed by someone else, or have some other really serious problem, the researchers cannot keep this information private. In these cases, we would need to share the information with your child's teacher, principal, and/or other individuals such as medical personnel.

If any of the results of the study are published or presented in a research meeting or conference, they will not contain you or your child's name or any identifying information. Only averages and totals for groups of participants will be included and individual examples may be reported. Individual examples would not contain you or your child's name or identifying information. The information collected will become a part of the lab's database. Information without you or your child's name may be used to compare with information from future studies within the lab.

Who can I call if I have questions?
The principal investigator is Amy Marks, Ph.D. She can be reached at (617) 573-8017 or akmarks@suffolk.edu. The co-investigator is Mary Beth McCullough, M.A. She can be reached at (615) 972-2185 or at mmccullough@suffolk.edu. We are happy to talk with you about the study over the phone or in-person. Please call either Mary Beth McCullough or Dr. Amy Marks with any questions or concerns you may have about you or your child's involvement in the study.

Who approved this study?
Suffolk University's Institutional Review Board (IRB) approved this study. The purpose of the IRB, by federal law, is to ensure the ethical and legal standards of all research conducted by or at Suffolk University are followed. The IRB reviews all studies proposed by any member of the university to make sure that the study follows federal guidelines. The IRB decided that this study meets the ethical obligations required by federal law and by Suffolk University policies.

How can I get more information?
You may ask more questions about this study at any time. You may also call us later if you have questions or concerns. If you have any concerns or complaints about the treatment of you or your child during this study, please contact Suffolk University's Institutional Review Board at (617) 557-2006, 1-888-634-4387 or irb@suffolk.edu.

Study Title: A Novel Approach to Understanding the Immigrant Paradox and Obesity
Principal Investigator: Amy Marks, Ph.D.
Co-Investigator: Mary Beth McCullough, M.A.

If you do choose to participate, please place this page of the consent form and your completed questionnaires in the provided envelope, seal it, and sign the seal. You can give the envelope to your child to return to the YMCA or Progreso Latino.

Permission to participate in research
I certify that I have read these pages or that they have been read to me. I have been given the chance to ask questions about the study. The study staff answered all of my questions. I understand that Ms. Mary Beth McCullough or Dr. Amy Marks will answer

further questions that I may have. My signature below shows that I give permission for me or my child to take part in the study. Please check as many boxes as apply:

☐ Check here if you are willing to participate in the study yourself by filling out some questionnaires.

☐ Check here if you give permission for your son or daughter to participate in the study.

_____
Printed Name of Child

☐ Check here if you are the biological parent or legal guardian:

_____
Printed Name of Parent (or Legal Guardian)

_____   _____
Signature of Parent (or Legal Guardian)   Date

Parent/Guardian Consent: Spanish

Titulo del Estudio: Examinando el efecto de cultural sobre Costumbres de Alimentación y actividad física
Investigador Principal: Amy Marks, Ph.D.
Co-Investigador: Mary Beth McCullough, M.A.

Razón por el Estudio:
Estamos pidiendo su permiso para que usted y su hijo(a) participe en nuestro estudio. El estudio esta diseñado para ayudarnos aprender mas sobre como las creencias culturales y los valores influyen los costumbres de alimentación y el nivel de actividad física de su hijo(a). Estamos muy contentos por tener la cooperación de los directores y personal de YMCA o Progreso Latino para completar este estudio y esperamos, que usted ofrecerá su apoyo también. Muchas gracias por su tiempo y consideración.

¿Dónde se Llevará a Cabo este Estudio y Cuanto Tiempo Durara?
Le estamos pidiendo que completen dos cuestionarios (ajunto en el final de este formulario) para ayudarnos aprender mas sobre como cultura influye las costumbres de alimentación y los hábitos de actividad física de los niños. Estos cuestionarios contienen preguntas relacionados con información demográfica, etnicidad, creencias culturales, y valores de usted y su hijo(a). Se espera que los cuestionarios se puedan llenar en aproximadamente 10 minutos. A su hijo(a) le vamos a pedir que complete un cuestionario además de medirle su altura y peso en el laboratorio de computación de Progreso Latino después del horario escolar. Un estudiante postgrado le va administrar el cuestionario y medir el peso y la altura de su hijo(a). La participación de su hijo(a) en este estudio tomará aproximadamente 40 minutos.

¿Cuánto Costará?
No le va costar nada a usted o su hijo(a) para participar en el estudio. Su hijo(a) recibirá un certificado de regalo de $10 para iTunes como muestra de agradecimiento.

¿Hay riesgos por participar?
Por el mejor de nuestro conocimiento, las cosas que usted y su hijo van hacer por este estudio, no tienen más riesgo de lo que usted experiencia en un día normal. La participación de usted y su hijo(a) en todos los aspectos de este estudio son completamente voluntarios y ambos pueden optar a no contestar cualquier pregunta o dejar de participar en cualquier momento. Toda la información obtenida se va mantener confidencial a menos que estemos obligados, por ley, a compartir con otros.

¿Hay beneficios por participación?

Investigaciones son diseñadas para ayudar a las personas aprender más sobre un tema específico. Usted y su hijo(a) nos van a ayudar investigar si valores culturales o creencias impactan la salud conductual. Esta información podrá hacer una diferencia en la compresión futura de otros adolescentes.

¿Tengo que firmar este formulario?
Usted puede decidir no firmar este formulario. También puede elegir el nivel de consentimiento que quiera dar. Por Ejemplo:

- Si usted no quiere participar pero le quiere dar permiso as su hijo(a) para participar, solamente tiene que marcar el "consentimiento del niño(a) al final de este formulario.
- Si usted quiere participar pero no quiere dar el permiso para que su hijo(a) participe, solamente tiene que marcar el "consentimiento del padre" al final de este formulario.
- Si usted quiere que ambos participen, puede marcar el "consentimiento del niño(a)" y "el consentimiento del padre" al final de este formulario.
- Si no quiere participar, y no quiere que su hijo(a) participe, no tendrás que marcar ningunas de las cajas ni firmar el formulario.

Si usted le da permiso a su hijo(a) para participar, su hijo(a) tendrá la oportunidad de decidir si él o ella quiere participar en el estudio. Si su hijo(a) decide participar, tendrá que ser porque él o ella verdaderamente quiere participar. No habrá consecuencias, ni perderán beneficios o derechos si su hijo(a) decide no ser voluntario en el estudio. Su hijo(a) no será tratado de manera diferente por cualquier persona si él o ella decide no participar. Su hijo(a) puede dejar de participar en cualquier momento durante el estudio sin perder sus beneficios y derechos.

¿La información que proveerá es confidencial?
Vamos hacer todo lo posible para proteger la privacidad de usted y sus hijo(a). Información obtenida por este estudio (los cuestionarios de usted y su hijo(a)) se va a guardar en una computadora segura y será identificado solamente por un código. El código conectando usted y su hijo(a) a información específica se mantendrá en un lugar seguro y diferente. Cinco años después que esta información no se utilizan para el estudio científico, la información se guardara en la oficina de la investigadora principal.

Toda la información de usted y su hijo(a) permanecerá confidencial. Sin embargo, si las respuestas demuestran que usted o su hijo(a) estén muy triste, que alguien le está haciendo daño, o tiene otro problema muy serio, la investigadora no podrá mantener la información privada. En estos casos, tenemos que compartir la información con los maestros de su hijo(a), el principal de la escuela, y otros individuales como personales medicas.

Si los resultados de este estudio se publican o son presentados en una conferencia, los resultados no van a contener el nombre de usted o su hijo(a) o cualquier información que se pueda conectar con usted o su hijo(a). Ejemplos individuales no va a contener el nombre de usted o su hijo(a) o cualquier información que se pueda conectar con usted o su hijo(a). La información coleccionada se va a convertir parte de la base de datos del laboratorio. La información sin identificación se podrá utilizar para comparar con información obtenida en el futuro de otros estudios.

¿Con quien puedo hablar si tengo preguntas?
La investigadora principal, Amy Marks, Ph.D. La pueden encontrar a (617) 573-8017 o por mensaje electrónico akmarks@suffolk.edu. La co-investigadora es Mary Beth McCullough, M.A. Elle se encuentra a (615) 972-2185 o por mensaje electrónico marybeth.mccullough@gmail.com. Estaríamos encantadas de hablar con usted sobre el teléfono o en persona sobre el estudio. Si usted tiene comentarios, preguntas, o preocupaciones, por favor llame a Mary Beth McCullough o Dr. Amy Marks para hablar sobre la participación de usted o su hijo(a).

¿Quién aprobó este Estudio?
El Institutional Review Board (IRB) aprobó este estudio. El IRB revisa todos los estudios científicos propuestos por cualquier miembro de la universidad para asegurarse que el estudio sigue todas las directrices federales. El IRB decidió que este estudio cumple con las obligaciones éticas exigidas por la ley federal.

¿Cómo puedo obtener mas información?
Usted puede hacer más preguntas sobre este estudio en cualquier momento. Si usted tiene preocupaciones o preguntas, también nos puede llamar más tarde. Si usted tiene quejas o preocupaciones sobre el tratamiento de usted o su hijo(a) durante su participación en este estudio, por favor póngase en contacto con el Institutional Review Board por teléfono: (617) 557-2006, 1-888-634-4387 o irb@suffolk.edu.

Titulo del Estudio: Examinando el Efecto de la Cultural Sobre los Costumbres de Alimentación y la Actividad Física
Investigadora Principal: Amy Marks, Ph.D.
Co-Investigadora: Mary Beth McCullough, M.A.

Si usted decide participar, por favor coloque esta página del formulario de consentimiento y el cuestionario completado en el sobre adjunto, sellé-lo, y firme el sello. Usted le puede dar el sobre a su hijo(a) para que lo devuelva a el YMCA o Progreso Latino.

Consentimiento para participar en la investigación:

Yo certifico que he leído estas páginas o que alguien me la han leído. Me han dado la oportunidad para hacer preguntas sobre el estudio. El personal del estudio contestaron todas mis preguntas. Yo entiendo que Ms. Mary Beth McCullough o Dr. Amy Marks responderán cualquier futura preguntas que pueda tener. Mi firma abajo indica que yo doy permiso para que yo o mi hijo(a) participe en este estudio. Por favor marque todas las cajas que aplican:

☐ Marque aquí si usted está dispuesto a participar en el estudio mismo rellenando algunos cuestionarios.

☐ Marque aquí si usted da el permiso para su hijo o hija a participar en el estudio.

_____
Nombre Impreso de su hijo(a)

☐ Marque aquí si usted es el padre biológico o tutor legal:

_____
Nombre Impreso del padre (o Guardián Legal)

_____   _____
Firma del padre (o Guardián Legal)   Fecha

APPENDIX C

Adolescent Assent

Study Title: A Novel Approach to Understanding the Immigrant Paradox and Obesity
Principal Investigator: Amy Marks, Ph.D.
Co-Investigator: Mary Beth McCullough, M.A.

What is this study about?
We are asking for your permission to take part in a research study. This study is designed to help us learn more about how your values and beliefs may influence eating behaviors and physical activities. Our goal is to learn more about these things so we can help other adolescents in the future. Thank you so much for your time and consideration.

Where is this study going to take place and how long will it last?
The research study will take place in the computer lab at the YMCA or Progreso Latino during after-school hours. The entire study will be completed in about 40 minutes. Your participation in the study will involve completing paper-based questionnaires and having your height and weight measured by a graduate student from Suffolk University.

What will I be asked to do?
If you decide to participate, you will be asked to meet with a graduate student at Suffolk University to complete computer-based questionnaires that ask questions about your demographic information (gender, date of birth, height, weight), ethnicity, cultural beliefs and values, how you feel about your body, as well as eating behaviors and physical activity levels. It will take about 40 minutes for you to complete the questionnaires. You will also be asked to have your height and weight measured by a graduate student from Suffolk University.

How much will this cost?
It will not cost you anything to take part in this study. To thank you for participating, you will receive a $10 gift certificate to iTunes. If you do not answer all questions on the survey, or choose to stop at any point, you will still receive a $10 gift certificate.

Are there any risks?
To the best of our knowledge, the things you will be doing in this research have no more risk of harm than you would experience in everyday life. Your participation in all aspects of this study is completely voluntary and you can choose not to answer any of these questions or stop participating at any time. All information will be keep confidential unless we are required by law to share it with others.

Are there any benefits for me?

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Research is designed to help people learn more about a specific topic. You will be helping us learn if cultural values and beliefs influence health. Your participation in this study will make a difference in our understanding of other adolescents.

Do I have to sign this form?
You can choose not to sign this form. There will be no penalty, and you will not lose any normal benefits or rights if you do not sign the form. You will not be treated differently by anyone if you choose not to participate in the study. You can stop at any time during the study and still keep the same benefits and rights.

Will the information be kept confidential?
We will do our best to protect your privacy during this study. Information from this study (your questionnaires, height and weight measurements) will be stored on a secure computer database and identified by a code number only. The code key connecting your name to specific information will be kept in a separate, secure location. Five years after this information is no longer being used for research purposes, it will be stored in the principal investigator's lab space.

All of your information will remain confidential. However, if your answers show that you are very sad, being harmed by an adult or peer, or that you have some other really serious problem, the researchers cannot keep this information private. In these cases, we would need to share the information with staff members at the YMCA or Progreso Latino, and/or other individuals such as medical personnel.

If any of the results of the study are published or presented in a research meeting or conference, they will not contain your name or any identifying information. Only averages and totals for groups of participants will be included and individual examples may be reported. Individual examples would not contain your name or identifying information. The information collected will become a part of the lab's database. Information without your name may be used to compare with information from future studies within the lab.

Who can I call if I have questions?
The principal investigator is Amy Marks, Ph.D. She can be reached at (617) 573-8017 or akmarks@suffolk.edu. The co-investigator is Mary Beth McCullough, M.A. She can be reached at (615) 972-2185 or at mmccullough@suffolk.edu.

Who approved this study?
Suffolk University's Institutional Review Board (IRB) approved this study. The purpose of the IRB, by federal law, is to ensure the ethical and legal standards of all research conducted by or at Suffolk University are followed. The IRB reviews all studies proposed by any member of the university to make sure that the study follows federal

guidelines. The IRB decided that this study meets the ethical obligations required by federal law and by Suffolk University policies.

How can I get more information?
You may ask more questions about this study at any time. You may also call us later if you have questions or concerns. If you have any concerns or complaints about your treatment during this study, please contact Suffolk University's Institutional Review Board at (617) 557-2006, 1-888-634-4387 or irb@suffolk.edu.

Study Title: A Novel Approach to Understanding the Immigrant Paradox and Obesity
Principal Investigator: Amy Marks, Ph.D.
Co-Investigator: Mary Beth McCullough, M.A.

Please return this page and keep the other pages for your records.

Consent to participate in research
I certify that I have read these pages or that they have been read to me. I have been given the chance to ask questions about the study. The study staff answered all of my questions. I understand that Ms. Mary Beth McCullough or Dr. Amy Marks will answer further questions that I may have. My signature below shows that I agree to take part in this study.

_____
Printed Name

_____   _____
Signature   Date

APPENDIX D

Participants over 18 Consent Form

Study Title: A Novel Approach to Understanding the Immigrant Paradox and Obesity
Principle Investigator: Amy Marks, Ph.D.
Co-Investigator: Mary Beth McCullough, M.A.

The following information describes the research study you are being asked to participate in. Please read this form carefully as it provides important information about participating in this research study. You have the right to take your time in making this decision and ask all the questions necessary to be fully informed about your participation. If you decide to participate in this research study, you will be asked to sign this form. You will be given a copy of this form for your records.

Purpose of Study:
We are asking for your permission to take part in a research study. This research study is designed to help us learn more about how cultural beliefs and values may influence children's eating behaviors and physical activity levels. We are very pleased to have the cooperation of the staff at the YMCA and Progreso Latino and hope you will offer your support too. Thank you so much for your time and consideration.

Research Procedures:
If you decide to take part in this research study, you will be asked to meet with a graduate student at Suffolk University to complete computer-based questionnaires that ask questions about your demographic information (gender, date of birth, height, weight), ethnicity, cultural beliefs and values, how you feel about your body, as well as eating behaviors and physical activity levels. You will also be asked to have your height and weight measured by a graduate student at Suffolk University. The research study will take place in the computer lab at the YMCA or Progreso Latino during after-school hours. The entire study will be completed in about 65 minutes. It will not cost you anything to take part in this study.

Risks and Discomforts:
To the best of our knowledge, the things you will be doing in this research have no more risk of harm than you would experience in everyday life. Your participation in all aspects of this study is completely voluntary and you can choose not to answer any of these questions or stop participating at any time. All information will be keep confidential unless we are required by law to share it with others.

Benefits:

Research is designed to help people learn more about a specific topic. You will be helping us learn if cultural values and beliefs influence health. Your participation in this study will make a difference in our understanding of other adolescents.

Alternatives:
The alternative is to not participate in this study. You can choose not to sign this form. There will be no penalty, and you will not lose any normal benefits or rights if you do not sign the form. You will not be treated differently by anyone if you choose not to participate in the study. You can stop at any time during the study and still keep the same benefits and rights.

Privacy and Confidentiality:
We will do our best to protect your privacy during this study. Information from this study (your questionnaires, height and weight measurements) will be stored on a secure computer database and identified by a code number only. The code key connecting your name to specific information will be kept in a separate, secure location. Five years after this information is no longer being used for research purposes, it will be stored in the principal investigator's lab space.

All of your information will remain confidential. However, if your answers show that you are very sad, being harmed by an adult or peer, or that you have some other really serious problem, the researchers cannot keep this information private. In these cases, we would need to share the information with staff members at the YMCA or Progreso Latino, and/or other individuals such as medical personnel.

If any of the results of the study are published or presented in a research meeting or conference, they will not contain your name or any identifying information. Only averages and totals for groups of participants will be included and individual examples may be reported. Individual examples would not contain your name or identifying information. The information collected will become a part of the lab's database. Information without your name may be used to compare with information from future studies within the lab.

Compensation:
To compensate you for your time and participation, you will receive a $10 gift certificate to CVS. If you do not answer all the questions on the survey or choose to stop at any point, you will still receive a $10 gift certificate.

Voluntary nature of participating/right to withdraw:
Your participation in this research is voluntary. You have the right to refuse to participate in this research study or to withdraw your consent at any time. Your withdrawal will not result in any penalties or loss of benefits and/or services you are otherwise entitled to.

The researcher may withdraw you as a participant from this research study if at such time the investigators feel it is in your best interest.

Contact Information:
The principal investigator is Amy Marks, Ph.D. She can be reached at (617) 573-8017 or akmarks@suffolk.edu. The co-investigator is Mary Beth McCullough, M.A. She can be reached at (615) 972-2185 or at mmccullough@suffolk.edu.

Who approved this study?
Suffolk University's Institutional Review Board (IRB) approved this study. The purpose of the IRB, by federal law, is to ensure the ethical and legal standards of all research conducted by or at Suffolk University are followed. The IRB reviews all studies proposed by any member of the university to make sure that the study follows federal guidelines. The IRB decided that this study meets the ethical obligations required by federal law and by Suffolk University policies.

How can I get more information?
You may ask more questions about this study at any time. You may also call us later if you have questions or concerns. If you have any concerns or complaints about your treatment during this study, please contact Suffolk University's Institutional Review Board at (617) 557-2006, 1-888-634-4387 or irb@suffolk.edu.

Participant Consent:
You have read the information in this consent including the risks and benefits. You have been given an opportunity to ask questions, and enough time to decide whether or not to participate. You voluntarily agree to participate in this research study.

Please return this page and keep the other pages for your records.

_____   _____

Signature of Participant   Date

_____

Printed Name of Participant

APPENDIX E

Letter to Parent/Guardian Describing Study: English

Dear Parent/Guardian,

I am a graduate student working in the clinical psychology doctoral program at Suffolk University. I am working on a research study for adolescents. We are interested in learning how cultural beliefs can influence eating behaviors and physical activity.

What is it and where would it take place?
- Your child's participation in the study would involve completing questionnaires about his or her eating behaviors, physical activity, cultural values and beliefs. This will last approximately 40 minutes, and will take place at Progreso Latino or the YMCA that your child attends. Upon completion, your child will receive a $10 gift certificate to iTunes as a thank you for participating.
- Your involvement, as the child's parent or legal guardian, would include completing two short questionnaires attached to the end of this packet about cultural values, eating behaviors and physical activity. This will take approximately 10 minutes to complete. We ask that your child return these questionnaires, along with the completed consent form, to the YMCA or Progreso Latino at their scheduled appointment time.

It is important for you to know that the research team at Suffolk University is not affiliated with the YMCA or Progreso Latino, and if you do not want to participate, and if you do not want your child to participate, it will not affect you or your child's relationship with the staff at the YMCA or Progreso Latino. If you do give your permission, your child will still be asked if he or she would like to participate. If he or she says no for any reason, they will not be asked to participate in the study. We are pleased to have the cooperation of the Directors and staff at the YMCA and Progreso Latino to conduct this research. We hope that you will offer your support, too.

If you graciously agree to allow both you and your child to participate, please read and sign the enclosed permission form, complete the questionnaires. Please place your completed questionnaires and permission form in the provided envelope, seal it, and sign the seal. You can give the envelope to your child to return to the YMCA or Progreso Latino. We would be happy to discuss the study in more detail over the phone or in-person if you have any comments, questions, or concerns. I can be reached at (615) 972-2185 or mmccullough@suffolk.edu Thank you in advance for your help!

Sincerely,
Mary Beth McCullough, M.A.

APPENDIX F

<u>Letter to Parent/Guardian Describing Study: Spanish</u>

Querido Padres/Guardián Legal,

Yo soy una estudiante postgrado. Estoy colaborando con la Dr. Amy Marks, Ph.D. para un estudio científico titulado "Como la Cultura Afecta las Costumbres de Alimentación y la Actividad Física". El estudio es sobre los adolescentes y sus padres, y queremos aprender como las creencias culturales y sus valores pueden afectar las costumbres de alimentación y la actividad física.

¿Que es y donde se llevará a cabo?
- La participación de su hijo(a) en este estudio implicaría que su hijo(a) completara un cuestionario sobre sus costumbres de alimentación, actividad física, valores culturales, y sus creencias. Esto va a durar aproximadamente 40 minutos. Al terminar el cuestionario, su hijo(a) recibirá un certificado de regalo de $10 para iTunes como un gesto de agradecimiento.
- Su participación, como padre o guardián legal, implicara que usted complete dos cuestionarios ajunto a este paquete sobre valores culturales, costumbres de alimentación, y actividad física. Esto durara aproximadamente 10 minutos para completar.

Si usted tiene comentarios, preguntas, o preocupaciones, podemos discutir el estudio en más detalle sobre el teléfono o en persona. Me pueden llamar a (615) 972-2185 o mandar un mensaje electrónico a <u>marybeth.mccullough@gmail.com</u>.

Gracias en avance por su ayuda!

Sinceramente,

Mary Beth McCullough, M.A.

Adolescent Demographic Form

Please fill out as completely as you can. We are not asking for your name and will not know these answers are yours. If you are uncomfortable answering any questions, please skip and answer the next one. Thank you so much for your time!

1. Date of birth: _____
2. Height: _____
3. Weight: _____
4. Your gender: ☒Male ☐Female

5. In this country, people come from a lot of different cultures and there are many different words to describe the different backgrounds or ethnic groups that people come from. Some examples of the names of ethnic groups are Mexican-American, Hispanic, Black, Asian-American, American Indian, Anglo-American, and White. In terms of ethnic group(s), I consider myself to be:_____

6. Do you speak any languages other than English? ☒Yes ☐No
   a. What is the language(s) you speak, other than English:_____

7. If you speak another language:
   a. What is the first language you learned to speak?

      _____

   b. What language(s) do you currently speak at home?

      _____

   c. Which language(s) do you prefer to speak?
      ☐ I prefer English
      ☐ I prefer my Non-English Language(s)
      ☐ I like speaking both equally
   d. What language do you prefer to read in?
      ☐ I prefer English
      ☐ I prefer my Non-English Language(s)
      ☐ I like reading in both equally
   e. Which language do you prefer to watch TV or listen to music in?
      ☐ I prefer English
      ☐ I prefer my Non-English Language(s)
      ☐ I like both languages equally

1. Were you born in the United States?   ☒ Yes ☐ No
    a. If No, where were you born? _____
    b. Did you live in a(n)   ☐ urban (city or large tow
        countryside or farmland) community?
    c. When did you move to the U.S.?

        _____

2. Were your parents born in the United States?   ☒ Yes ☐ No
    a. If not, country of birth (mother):

        _____

    b. When did she move to the U.S.?

        _____

    c. Country of birth (father):

        _____

    d. When did he move to the U.S.?

        _____

3. Were your grandparents born in the United States?   ☒ Yes ☐ No
    a. If not, country of birth (grandmother):

        _____

    b. When did she move to the U.S.?

        _____

    c. Country of birth (grandfather):

        _____

    d. When did he move to the U.S.?

        _____

AHIMSA Acculturation Measure

Many people in the United States have ancestors who came from another country. Families come to the United States at different times. Maybe you and your parents moved to the United States. Maybe your parents came to the United States when they were kids. Maybe your grandparents' grandparents were the ones who came to the United States. Please answer the following questions about the United States and the country your family is from.

	The United States	The country my family is from	Both	Other/Neither
1. I am most comfortable being with people from:	☐	☐	☐	☐
2. My best friends are from:	☐	☐	☐	☐
3. The people I fit in with best are from:	☐	☐	☐	☐
4. My favorite music is from:	☐	☐	☐	☐
5. My favorite TV shows are from:	☐	☐	☐	☐
6. The holidays I celebrate are from:	☐	☐	☐	☐
7. The food I eat at home is from:	☐	☐	☐	☐
8. The way I do things and the way I think about things are from:	☐	☐	☐	☐

APPENDIX I

YAQ and YAAQ Food Frequency and Activity Questionnaires

Please answer the following questions about your eating habits!

Dietary Behavior						
	At home		At School		Don't eat breakfast	Other: (List)
1. Where do you usually eat breakfast?	❑		❑		❑	
	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
2. How many times each week (including weekdays and weekends) do you usually eat **breakfast** prepared away from home?	❑	❑	❑	❑	❑	❑
3. How many times each week (including weekdays and weekends) do you usually eat **lunch** prepared away from home?	❑	❑	❑	❑	❑	❑
4. How many times each week (including weekdays and weekends) do you usually eat **snacks** in between meals that were prepared away from home?	❑	❑	❑	❑	❑	❑
	Vending Machines	Convenience Store	Street Food Cart	Grocery Store	School Cafeteria	Other: (List)
5. Where do usually get these snacks? (check as many as apply)	❑	❑	❑	❑	❑	
	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
6. How many times each week (including weekdays and weekends) do you usually eat **dinner** prepared away from home?	❑	❑	❑	❑	❑	❑
7. How many times each week (including	❑	❑	❑	❑	❑	❑

		Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
	weekdays and weekends) do you, or someone in your house, cook meals?						
8.	How many times each week (including weekdays and weekends) do you eat meals at a **table** with your family?	❑	❑	❑	❑	❑	❑
9.	How often do you have dinner that is ready made, like frozen dinners, Spaghetti-O's, microwave meals, etc.?	❑	❑	❑	❑	❑	❑
10.	How often do you eat food that is fried **at home**, like fried chicken?	❑	❑	❑	❑	❑	❑
11.	How often do you eat food that is fried **away from home**, like French fries, chicken nuggets?	❑	❑	❑	❑	❑	❑
12.	How often do you eat food from a fast-food restaurant (McDonalds, Burger King, Taco Bell, etc.)?	❑	❑	❑	❑	❑	❑
13.	Where do you usually go? (List):						

Beverages: How much do you drink…							
		Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
14.	Diet Soda (1 can or glass)	❑	❑	❑	❑	❑	❑
15.	Soda, not diet (1 can or glass)	❑	❑	❑	❑	❑	❑
16.	Hawaiian Punch, lemonade, Koolaid, or other non-carbonated fruit drink (1 glass)	❑	❑	❑	❑	❑	❑
17.	Iced Tea - sweetened (1 glass, can, or bottle)	❑	❑	❑	❑	❑	❑
18.	Coffee – not decaf (1 cup)	❑	❑	❑	❑	❑	❑
19.	Beer (1 glass, bottle or can)	❑	❑	❑	❑	❑	❑
20.	Wine or wine coolers (1 glass)	❑	❑	❑	❑	❑	❑
21.	Liquor, like vodka or rum (1 drink or shot)	❑	❑	❑	❑	❑	❑

Dairy: How much do you drink or eat…							
		Never/Less than 1 per	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day

	month					
22. Milk (glass or with cereal)	❑	❑	❑	❑	❑	❑
23. Chocolate milk (glass)	❑	❑	❑	❑	❑	❑
24. Yogurt (1 cup)- Not frozen	❑	❑	❑	❑	❑	❑
25. Cheese (1 slice)	❑	❑	❑	❑	❑	❑
26. Cream Cheese	❑	❑	❑	❑	❑	❑
27. Butter (1 pat) NOT Margarine	❑	❑	❑	❑	❑	❑
28. Margarine (1 pat) NOT Butter	❑	❑	❑	❑	❑	❑
29. What type of milk do you usually drink?	Whole Milk ❑	2% ❑	1% ❑	Skim/Nonfat ❑	Don't Drink Milk ❑	Don't know ❑
30. What type of yogurt, cheese, and dairy products (besides milk) do you use mostly?	Nonfat ❑	Lowfat ❑	Regular ❑	Don't Know ❑		
31. What form and brand of margarine does your family usually have?	None ❑	Stick ❑	Tube ❑	Squeeze ❑	Brand: (List)	

Main Dishes: How much do you eat…						
	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
32. Cheeseburger (1)	❑	❑	❑	❑	❑	❑
33. Hamburger(1)	❑	❑	❑	❑	❑	❑
34. Pizza (2 slices)	❑	❑	❑	❑	❑	❑
35. Tacos/Burritos (1)	❑	❑	❑	❑	❑	❑
	Beef and Beans	Beef	Chicken	Beans	Pork	Other: (List)
36. What taco filling do you typically have?	❑	❑	❑	❑	❑	
	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
37. Chicken Nuggets (6)	❑	❑	❑	❑	❑	❑
38. Hot dogs (1)	❑	❑	❑	❑	❑	❑

	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
39. Peanut butter sandwich (1) (plain or with jelly, fluff, etc.)	❏	❏	❏	❏	❏	❏
40. Chicken or turkey sandwich (1)	❏	❏	❏	❏	❏	❏
41. Roast Beef or Ham Sandwich (1)	❏	❏	❏	❏	❏	❏
42. Salami, bologna, or other deli meat sandwich (1)	❏	❏	❏	❏	❏	❏
43. Tuna Sandwich (1)	❏	❏	❏	❏	❏	❏
44. Chicken or Turkey as main dish (1 serving)	❏	❏	❏	❏	❏	❏
45. Fish sticks, fish cakes, or fish sandwich (1 serving)	❏	❏	❏	❏	❏	❏
46. Fresh fish as main dish (1 serving)	❏	❏	❏	❏	❏	❏
47. Beef (steak, roast) or lamb as main dish (1 serving)	❏	❏	❏	❏	❏	❏
48. Pork or ham as main dish (1 serving)	❏	❏	❏	❏	❏	❏
49. Meatballs or meatloaf (1 serving)	❏	❏	❏	❏	❏	❏
50. Lasagna or baked ziti (1 serving)	❏	❏	❏	❏	❏	❏
51. Macaroni and Cheese (1 serving)	❏	❏	❏	❏	❏	❏
52. Spaghetti with tomato sauce (1 serving)	❏	❏	❏	❏	❏	❏
53. Eggs (1 serving)	❏	❏	❏	❏	❏	❏
54. Shrimp, lobster, scallops (1 serving)	❏	❏	❏	❏	❏	❏
55. French Toast (2 slices)	❏	❏	❏	❏	❏	❏
56. Grilled Cheese (1)	❏	❏	❏	❏	❏	❏
57. Eggrolls (1)	❏	❏	❏	❏	❏	❏

Miscellaneous Foods: How much do you eat…

	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
58. Brown Gravy	❏	❏	❏	❏	❏	❏
59. Ketchup	❏	❏	❏	❏	❏	❏
60. Clear soup (with rice, noodles, vegetables)(1 bowl)	❏	❏	❏	❏	❏	❏

	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
61. Cream (milk) soups or chowder (1 bowl)	❑	❑	❑	❑	❑	❑
62. Mayonnaise	❑	❑	❑	❑	❑	❑
63. Low calorie/fat salad dressing	❑	❑	❑	❑	❑	❑
64. Salad dressing(not low calorie)	❑	❑	❑	❑	❑	❑
65. Salsa	❑	❑	❑	❑	❑	❑

	Eat all		Eat some	Eat none	Don't eat meat	
66. How much fat on your pork, beef, lamb do you eat?	❑		❑	❑	❑	

	Yes		No	Sometimes		
67. When you have chicken or turkey, do you eat the skin?	❑		❑	❑		

Breads and Cereals: How much do you eat…

	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
68. Cold breakfast cereal (1 bowl)	❑	❑	❑	❑	❑	❑
69. Hot cereal, like oatmeal, grits (1 bowl)	❑	❑	❑	❑	❑	❑
70. White bread, pita bread, or toast (1 slice)	❑	❑	❑	❑	❑	❑
71. Wheat bread (1 slice)	❑	❑	❑	❑	❑	❑
72. English muffins or bagels (1)	❑	❑	❑	❑	❑	❑
73. Noodles, pasta (1)	❑	❑	❑	❑	❑	❑
74. Tortilla (no filling) (1)	❑	❑	❑	❑	❑	❑
75. French fries (large order)	❑	❑	❑	❑	❑	❑
76. Muffin (1)	❑	❑	❑	❑	❑	❑
77. Cornbread (1 square)	❑	❑	❑	❑	❑	❑
	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
78. Biscuit/Roll (1)	❑	❑	❑	❑	❑	❑
79. Rice	❑	❑	❑	❑	❑	❑
80. Noodles/Pasta	❑	❑	❑	❑	❑	❑
81. Other grains like kasha, couscous, bulgur (1)	❑	❑	❑	❑	❑	❑

	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
82. Pancakes (2) or waffles (1)	❑	❑	❑	❑	❑	❑
83. Potatoes, baked, boiled, mashed (1)	❑	❑	❑	❑	❑	❑
Fruits and Vegetables: How much do you eat…						
	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
84. Raisins (small pack)	❑	❑	❑	❑	❑	❑
85. Grapes (bunch)	❑	❑	❑	❑	❑	❑
86. Bananas (1)	❑	❑	❑	❑	❑	❑
87. Cantaloupes/Melon (1/4 melon)	❑	❑	❑	❑	❑	❑
88. Apples (1)or applesauce	❑	❑	❑	❑	❑	❑
89. Pears (1)	❑	❑	❑	❑	❑	❑
90. Oranges (1) or grapefruit (1/2)	❑	❑	❑	❑	❑	❑
91. Strawberries	❑	❑	❑	❑	❑	❑
92. Broccoli	❑	❑	❑	❑	❑	❑
93. Beets (not greens)	❑	❑	❑	❑	❑	❑
94. Spinach	❑	❑	❑	❑	❑	❑
95. Green/red peppers	❑	❑	❑	❑	❑	❑
96. Carrots (raw)	❑	❑	❑	❑	❑	❑
97. Celery	❑	❑	❑	❑	❑	❑
98. Lettuce/tossed salad	❑	❑	❑	❑	❑	❑
99. Potato Salad	❑	❑	❑	❑	❑	❑
100. Peaches, plums, apricots (1)	❑	❑	❑	❑	❑	❑
101. Orange juice (1 glass)	❑	❑	❑	❑	❑	❑
102. Apple juice and other fruit juices (1 glass)	❑	❑	❑	❑	❑	❑
103. Tomatoes (1)	❑	❑	❑	❑	❑	❑
104. Tomato/Spaghetti Sauce	❑	❑	❑	❑	❑	❑
	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day

	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
105. Tofu	❏	❏	❏	❏	❏	❏
106. String beans	❏	❏	❏	❏	❏	❏
107. Corn	❏	❏	❏	❏	❏	❏
108. Peas or lima beans	❏	❏	❏	❏	❏	❏
109. Mixed vegetables	❏	❏	❏	❏	❏	❏
110. Greens/kale	❏	❏	❏	❏	❏	❏
111. Yams/sweet potatoes (1)	❏	❏	❏	❏	❏	❏
112. Zucchini, Summer Squash, Eggplant	❏	❏	❏	❏	❏	❏
113. Carrots (cooked)	❏	❏	❏	❏	❏	❏
114. Coleslaw	❏	❏	❏	❏	❏	❏
Snack Foods/Desserts: How much do you eat…						
	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
115. Potato Chips (1 small bag)	❏	❏	❏	❏	❏	❏
116. Nachos with cheese (1 serving)	❏	❏	❏	❏	❏	❏
117. Popcorn (1 small bag)	❏	❏	❏	❏	❏	❏
118. Pretzels (1 small bag)	❏	❏	❏	❏	❏	❏
119. Peanuts, nuts (1 small bag)	❏	❏	❏	❏	❏	❏
120. Fun fruit or fruit rollups (1 pack)	❏	❏	❏	❏	❏	❏
121. Graham Crackers	❏	❏	❏	❏	❏	❏
122. Crackers, like saltines or wheat thins	❏	❏	❏	❏	❏	❏
123. Poptarts (1)	❏	❏	❏	❏	❏	❏
124. Cake (1 slice)	❏	❏	❏	❏	❏	❏
125. Snack Cakes/Twinkies (1 package)	❏	❏	❏	❏	❏	❏
126. Danish, sweet rolls, pastries	❏	❏	❏	❏	❏	❏
127. Donuts (1)	❏	❏	❏	❏	❏	❏
128. Cookies (1)	❏	❏	❏	❏	❏	❏
129. Brownies (1)	❏	❏	❏	❏	❏	❏
130. Pie (1 slice)	❏	❏	❏	❏	❏	❏

	Never/Less than 1 per month	1-3 times/month	1-2 times/week	3-6 times/week	1 per day	2+ per day
131. Chocolate(1 bar or packet) like Hershey's or M &M's	❑	❑	❑	❑	❑	❑
132. Other Candy Bars (Milky Way, Snickers)	❑	❑	❑	❑	❑	❑
133. Other Candy without Chocolate (Skittles) (1 pack)	❑	❑	❑	❑	❑	❑
134. Jello	❑	❑	❑	❑	❑	❑
135. Pudding	❑	❑	❑	❑	❑	❑
136. Frozen Yogurt	❑	❑	❑	❑	❑	❑
137. Ice cream	❑	❑	❑	❑	❑	❑
138. Milkshakes or frappe	❑	❑	❑	❑	❑	❑
139. Popsicles	❑	❑	❑	❑	❑	❑

140. Fill in the number of snacks (food or drinks) eaten on school **days** and weekend/vacation **days**:

School Days	0	1	2	3	4+	Weekend Days	0	1	2	3	4+
Between Breakfast & Lunch	❑	❑	❑	❑	❑	Between Breakfast & Lunch	❑	❑	❑	❑	❑
After Lunch, before Dinner	❑	❑	❑	❑	❑	After Lunch, Before Dinner	❑	❑	❑	❑	❑
After Dinner	❑	❑	❑	❑	❑	After Dinner	❑	❑	❑	❑	❑

Not including gym class, what kinds of physical activities have you done in the past year? Examples of physical activities include running, walking, sports teams, going to the gym

List the activities below and how much you participated in them each week	Less than ½ hr/week	½ - 3 hr/week	4-6 hr/week	7-9 hr/week	10+ hr/week
	❑	❑	❑	❑	❑
	❑	❑	❑	❑	❑
	❑	❑	❑	❑	❑
	❑	❑	❑	❑	❑
How much exercise do you get during a typical week?	❑	❑	❑	❑	❑

1. How many hours do you spend Monday through Friday doing the following: a TOTAL for the week							
	None	1-5 hr	6-10 hr	11-15 hr	16-20 hr	21 – 30 hr	31+ hr
a. Watching T.V.	❑	❑	❑	❑	❑	❑	❑
b. Watching DVDs or videos	❑	❑	❑	❑	❑	❑	❑
c. Reading/Homework	❑	❑	❑	❑	❑	❑	❑
d. Nintendo/Playstation/Computer games	❑	❑	❑	❑	❑	❑	❑
e. Internet/Computers	❑	❑	❑	❑	❑	❑	❑
2. How many hours do you spend Saturday and Sunday doing the following: a TOTAL for the weekend							
	None	1-5 hr	6-10 hr	11-15 hr	16-20 hr	21 – 30 hr	31+ hr
a. Watching T.V.	❑	❑	❑	❑	❑	❑	❑
b. Watching DVDs or videos	❑	❑	❑	❑	❑	❑	❑
c. Reading/Homework	❑	❑	❑	❑	❑	❑	❑
d. Nintendo/Playstation/Computer games	❑	❑	❑	❑	❑	❑	❑
e. Internet/Computers	❑	❑	❑	❑	❑	❑	❑

APPENDIX J

Operant Model of Acculturation Measure

We are interested in how certain behaviors differ in your family's culture (where your family is originally from) compared to American culture. You can answer each question by choosing a number 1 – 5 (1 being more common/expensive in your family's culture; 3 being exactly the same; 5 being more common/expensive in American culture). There are no right or wrong answers. Please answer each question to the best of your ability.

1. When you think about "American Culture," what comes to mind? Some people think about neighborhoods, places, music, food, or famous people. What do you picture?
   _____

How Common are each of these to American Culture compared to Your Family's Culture?					
	Much More Common in my Family's Culture	Slightly More in my Family's Culture	Exactly the Same	Slightly More in American Culture	Much More Common in American Culture
1. Fast-food restaurants/options	❏1	❏2	❏3	❏4	❏5
2. Street food carts	❏1	❏2	❏3	❏4	❏5
3. Fresh food markets/options	❏1	❏2	❏3	❏4	❏5
4. Soda and candy vending machines	❏1	❏2	❏3	❏4	❏5
5. Advertisements for fast-food restaurants	❏1	❏2	❏3	❏4	❏5
6. Advertisements for "junk food" (sugary cereals, chips, candy)	❏1	❏2	❏3	❏4	❏5
7. Advertisements for "healthy food" (vegetables, fruits)	❏1	❏2	❏3	❏4	❏5
8. Advertisements for video games/computers/movies	❏1	❏2	❏3	❏4	❏5
9. Advertisements for physical activities	❏1	❏2	❏3	❏4	❏5
10. Eating out with friends/family	❏1	❏2	❏3	❏4	❏5
11. Eating meals with family	❏1	❏2	❏3	❏4	❏5
12. Eating home-cooked meals	❏1	❏2	❏3	❏4	❏5
13. Snacking in-between meals	❏1	❏2	❏3	❏4	❏5
14. Eating large portions of food	❏1	❏2	❏3	❏4	❏5
15. Spending time on the computer/playing video games	❏1	❏2	❏3	❏4	❏5
16. Watching movies/TV	❏1	❏2	❏3	❏4	❏5
17. Spending time outdoors	❏1	❏2	❏3	❏4	❏5

	Much More Expensive in my Family's Culture	Slightly More in my Family's Culture	Exactly the Same	Slightly More in American Culture	Much More Expensive in American Culture
18. Parks	❑1	❑2	❑3	❑4	❑5
19. Being physically active	❑1	❑2	❑3	❑4	❑5
20. Gyms	❑1	❑2	❑3	❑4	❑5
How Expensive are each of these in American culture compared to your Family's culture?					
21. Fast-food restaurants	❑1	❑2	❑3	❑4	❑5
22. "Junk food" (ice cream, sugary cereals, candy)	❑1	❑2	❑3	❑4	❑5
23. Fried food	❑1	❑2	❑3	❑4	❑5
24. Soda or sugary drinks (Coca-Cola, Sprite)	❑1	❑2	❑3	❑4	❑5
25. Video games/computer games	❑1	❑2	❑3	❑4	❑5
26. Computers	❑1	❑2	❑3	❑4	❑5
27. Going to the movies	❑1	❑2	❑3	❑4	❑5
28. DVDs/movies	❑1	❑2	❑3	❑4	❑5
29. Fruits	❑1	❑2	❑3	❑4	❑5
30. Vegetables	❑1	❑2	❑3	❑4	❑5
31. Lean meats (Chicken, Pork)	❑1	❑2	❑3	❑4	❑5
32. Other Meats (Steak)	❑1	❑2	❑3	❑4	❑5
33. Seafood	❑1	❑2	❑3	❑4	❑5
34. Milk products	❑1	❑2	❑3	❑4	❑5
35. Real Fruit Juice	❑1	❑2	❑3	❑4	❑5
36. Gym membership	❑1	❑2	❑3	❑4	❑5
37. Joining sports' teams	❑1	❑2	❑3	❑4	❑5