

THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

DEPARTMENT OF SOCIOLOGY

GENDERED OVERWEIGHT PREVALENCE AMONG MEXICAN-ORIGIN INDIVIDUALS
BY PARENTAL NATIVITY

CARLY M. CHERWONY
SPRING 2018

A thesis
submitted in partial fulfillment
of the requirements
for baccalaureate degrees in Sociology and Biobehavioral Health
with honors in Sociology

Reviewed and approved* by the following:

Michelle L. Frisco
Associate Professor of Sociology and Demography
Thesis Supervisor

Stacy Silver
Associate Professor of Sociology and Human Development and Family Studies
Honors Advisor, Sociology and Criminology
Director, Undergraduate Program of Sociology
Honors Advisor

* Signatures are on file in the Schreyer Honors College.

ABSTRACT

Gender and generational differences exist in overweight and obesity prevalence among the Hispanic population living in the United States. Previous research finds that overweight and obesity are higher among Hispanic boys in childhood but are higher among women in adulthood. Additionally, gender differences are more prominent among children of immigrants, yet it is not well understood as to when these differences appear as one ages. Using the National Longitudinal Study of Adolescent to Adult Health, I examine sex and overweight during the transition from adolescence to early adulthood among U.S.-born whites, U.S.-born Mexicans with U.S.-born parents, and Mexican children of immigrants (N=4,117). Results indicate that overweight prevalence increases with age but do not support a significant association between sex and overweight among Mexican-origin individuals.

Keywords: overweight prevalence, children of immigrants, Mexican-origin, life course framework

TABLE OF CONTENTS

LIST OF TABLES	iii
ACKNOWLEDGEMENTS	iv
INTRODUCTION	1
BACKGROUND	4
Life Course Framework: Ethnic Differences, Gender, and Weight	7
DATA AND METHODS	11
Data	11
Sample	12
Measures	12
Analysis	14
RESULTS	15
DISCUSSION	20
APPENDIX A	24
BIBLIOGRAPHY	25

LIST OF TABLES

Table 1. Descriptive Statistics for the Total Sample (N=4,117).....	15
Table 2 Descriptive Statistics by Ethnicity/Generational Status and Sex (N=4,117)	16
Table 3 Odds Ratios from Logistic Regression Models Estimating the Association between Gender and Overweight by Race/Ethnicity and Parental Nativity (Unweighted)	18
Table 4 Odds Ratios from Logistic Regression Models Estimating the Association between Gender and Obesity by Race/Ethnicity and Parental Nativity (Unweighted)	24
Table 5 Odds Ratios from Logistic Regression Models Estimating the Association between Gender and Overweight by Race/Ethnicity and Parental Nativity (Unweighted)	24

ACKNOWLEDGEMENTS

Foremost, I would like to thank Dr. Michelle Frisco, my thesis advisor, for her patience and support through this process and for devoting her time to help me. She helped me to understand the ins and outs of research and provided me with a solid base to develop my interests in the future. I am so grateful to have had her on my team. I would like to thank Tori Thomas for all her help with STATA. I could not have undertaken this software without her. I also would like to thank Dr. Stacy Silver for all her advice and hands-on guidance. She was a tremendous help in getting my thesis started and a great source of encouragement.

Thank you to my amazing teachers and professors over the years for reinforcing my love of learning. I would like to thank Dr. Michelle Hostetler, for igniting my interest in obesity. Lastly, I would like to thank my family and friends for loving me, supporting me, and believing in me.

INTRODUCTION

In the last few decades, overweight and obesity prevalence has increased across all age groups in the United States (Ogden et al, 2014). Approximately 17% of children and adolescents, and 36% of adults in the US are overweight or obese and more than three million new cases of obesity are confirmed each year (Centers for Disease Control and Prevention, 2015). Past research indicates that overweight and obesity have become more prominent earlier in the life course, increasing the overall risk for obesity in adulthood (Lee et al, 2010; Reilly & Kelly, 2011), and raising risk of chronic disease development such as hypertension and diabetes over the life time (Kopelman, 2007). The development of obesity among children and adolescents is concerning as it impacts both healthy life expectancy and overall longevity, threatening long term health.

The obesity prevalence among racial and ethnic minority groups averages ten percent higher compared to non-Hispanic whites in both youth and adulthood (Wang & Beydoun, 2007). The Hispanic population living in the United States has one of the highest obesity prevalences among adults and youths, 42.5 and 21.9 percent respectively (Ogden et al, 2015). Considering that the Hispanic population is one of the fastest growing ethnic groups in the U.S, making up approximately 17 percent of the population (Brown & Lopez, 2013), it is vital to understand what may contribute to obesity in this group.

Overweight and obesity prevalence among Hispanic youth varies by generational status. First-generation Hispanics, those born outside the US to foreign-born parents, have lower obesity prevalence than those born in the US to foreign-born parents, second-generation (Popkin &

Udry, 1998; Singh, Kogan, & Stella, 2009). Among Mexican-origin individuals, obesity prevalence by generational status is similar to Hispanics overall and additionally second-generation have higher prevalence than third-generation Mexican-origin youth (Frisco, Quiros, & Van Hook, 2016).

Much of the literature on obesity among Hispanic children points to acculturation, assimilation to the obesogenic environment in the United States, as an explanation for increased prevalence of overweight and obesity among Hispanic children (Van Hook et al, 2012; Van Hook & Baker, 2010; Sosa, 2012). Evidence suggests, though, that there are gender differences in obesity during childhood possibly due to the pace at which male and female children of immigrants acculturate. Childhood overweight and obesity among Hispanic immigrants and children of immigrants is higher among boys than girls (Van Hook & Baker, 2010). This may be due to parents keeping girls closer to the family (Sosa, 2012). I discuss this more in my Background section.

However, the literature indicates a gender crossover in obesity prevalence among Hispanics starting in adolescence and early adulthood. Hispanic women have higher obesity prevalence than men in adulthood (Gillum & Sempos, 2005; Flegal et al, 2010). A 2016 JAMA report found higher obesity prevalence among Hispanic women than men by approximately 4%, 9.6%, and 16.5% from ages 20-39, 40-59, and 60+ respectively (Flegal et al, 2016). This trend pertains to Mexican-origin men and women as well (Flegal, Ogden, & Carroll, 2004, Hedley et al, 2004, Barcenas et al, 2007). Barcenas et al (2007) found that differences in obesity prevalence among Mexican-origin men and women may be attributed to length of duration living in the United States, acculturation, and level of physical activity. Additionally, gender role norms may also play a role in gendered obesity prevalence in adults (Galanti, 2003; Thornton et al, 2006).

The gender crossover detected in previous research is based on analysis of repeated cross sections of data collected as part of the National Health and Nutrition Examination Surveys (NHANES). This means that these studies give a picture of what people of different ages weigh at a moment in time, but the studies cannot address how weight changes for an individual longitudinally over time as they transition from adolescence to adulthood. Longitudinal analysis has rarely been applied to studies on gender crossovers in obesity prevalence, especially those among the Hispanic population living in the United States. My thesis addresses two primary questions: 1) Do gender differences in overweight change as young people transition from adolescence to adulthood? 2) Are gender differences across time similar for U.S.-born whites, U.S.-born Mexicans with U.S.-born parents, and Mexican children of immigrants. I use data from the National Longitudinal Study of Adolescent to Adult Health to answer my research questions.

BACKGROUND

In much of the literature concerning the health of Hispanic individuals living in the United States, the notion of an epidemiological paradox is discussed. Pertaining to Hispanic immigrants, this paradox suggests favorable health outcomes consistent with those of non-Hispanic whites despite socioeconomic status and educational attainment comparable to non-Hispanic blacks (Markides & Coreil, 1986; Rubalcava et al, 2008). The paradox though is found most consistently when estimating mortality outcomes (Franzini, Ribble, & Keddie, 2001, Palloni & Morenoff, 2001; Markides & Eschbach, 2005). Trends in overweight and obesity among both Hispanic immigrants and those born in the United States are not consistent with the paradox (Kershaw, Albrecht, & Carnethon, 2013).

Acculturation—the adjustment of immigrants or minority groups to the cultural norms of a given society (Gordon-Larsen et al, 2003; Van Hook et al, 2012)—has long been used a potential explanation for high rates of obesity among Hispanic children of immigrants. The obesogenic environment in the United States, including elements of sedentary lifestyle, technology, and high caloric and fatty foods, impacts the acculturation of immigrants, especially children (Gordon-Larsen et al, 2003). Children of immigrants, particularly those of Mexican-origin, may be at a health disadvantage given their parents' limited exposure to American food and customs as well as the poor quality of food (Gordon-Larsen et al, 2003).

The literature though varies on how different Hispanic generational groups experience overweight and obesity by the process of acculturation in the U.S. Some studies suggest that those born outside of the United States would be more susceptible to weight gain through the

acculturation process (Baker, Balistreri, & Van Hook, 2009; Van Hook & Baker, 2010) while others suggest that obesity prevalence is higher among second generation Hispanic youth compared to first generation (Popkin & Udry, 1998; Gordon-Larsen et al, 2003; Frisco, Quiros, & Van Hook, 2016). These differing conclusions can be attributed to a bevy of explanations including diet, exercise habits, and socioeconomic status, but both 1st and 2nd generation Hispanics share a common feature—immigrant parents. Van Hook & Baker (2010) assert that in childhood, children of immigrants' weight may be largely determined by gender roles and parental attitude towards weight. This assertion indicates that children of immigrants regardless of foreign or native-born status experience cultural factors that influence weight.

Hispanic children and adolescents may be more susceptible to weight changes than adults because of their exposure through school, other activities, and media outlets (Gorson-Larsen et al, 2003). While some literature cites immigrant culture in the home as a protective factor against weight gain associated with acculturation (Siega-Riz & Popkin, 2001; Gordon-Larsen et al, 2003), it has been established that attitudes of immigrants regarding weight can contribute significantly to higher overweight and obesity prevalence among children of immigrants. Concerns of immigrants including employment, legal status, and discrimination may distract parents from recognition of weight gain in their children (Van Hook et al, 2012; Sosa 2012; Viruell-Fuentes 2007). Mexican immigrant parents may not view the obesity-promoting risk factors and behaviors in the US as a threat to health, and thus may not recognize when their children engage with these factors (Sosa 2012; Van Hook et al, 2012).

Gender roles are prominent among many Hispanic groups and for immigrants and children of immigrants living in the United States, this cultural value is especially prevalent (Gallo & Penedo, 2009). Van Hook and Baker (2010) indicate that culturally enforced gender

roles may impact Hispanic parents' attitudes regarding their children and adolescents' weight. Parents who were socialized abroad tend to be more protective of daughters and are more likely to be permissive and indulgent towards sons. Girls are typically more restricted in social activities and have more obligations in the home. Given greater freedoms than girls, boys may experience more exposure to the acculturation process and therefore interact more with the obesogenic environment of the United States. Boys on average weigh more than girls in childhood (Van Hook & Baker, 2010).

Gender roles may impact the health of Hispanic adults as well. Many Hispanic ethnic groups emphasize a higher level of patriarchal authority and thusly women are considered submissive to men. Larger decisions of the household, including those related to health, are made by husbands (Galanti, 2003). Hispanic gender expectations promote women's roles as in the home and as caretakers of the household, placing limited value on time for exercise and self-care and promoting a strong importance on familial needs over their own (Campos et al, 2008; Perez & Cruess, 2014).

Generational status is also thought to impact overweight and obesity prevalence among Hispanic adults. Bates et al (2008) found that foreign-born Hispanic adults are less likely to be overweight or obese than those born in the United States and overweight and obesity prevalence increases with generational status. While gender differences in weight by generation in the US are not always pronounced among the Hispanic population at large, but Mexican-origin women are more likely to be overweight and obese than men at first, second, and third generation status (Bates et al, 2008). Overall though, Hispanic women have higher prevalence of overweight and obesity than men (Baskin et al, 2005; Gillum & Sempos, 2005).

Life Course Framework: Ethnic Differences, Gender, and Weight

The life course perspective observes patterns of human development and aging in structural, social, temporal, and historical contexts. Traditionally, these patterns are usually studied in terms of life transitions or trajectories, where changes in personal identity or social status leads to a different sequence of experience and positions and can ultimately leads a change an individual's life direction (Elder Jr, Johnson, & Corsnoe, 2003). The current understanding of these transitions acknowledges that life trajectories vary greatly by the age that one experiences a transition and that environmental and cultural exposure impact outcomes. Though the life course framework utilizes transitions in adulthood, "adulthood" has become harder to define by any specific life event and is now understood by a series of events that vary on an individual level (Amato & Kane, 2011).

Historically using the life course framework, transition to adulthood has been characterized by leaving the familial home particularly through seeking higher education, entering the workforce, and marriage (Shanahan, 2000). Amato and Kane (2011) isolate distinct pathways in early adulthood, suggesting that pathways with multiple transitions provide a better insight into health outcomes across the life course than single transitions. These pathways combine employment or education with family and relationship formation, and better reflect the reality of young adulthood. People commonly undergo a combination of transitions from school to full time employment, cohabitation, marriage, and having children by the age of 30, some may experience all the transitions. Gender differences in weight may become more pronounced during early adult transitions because men and women undergo adult transitions at different times. Women are more likely to experience adult transitions at earlier ages than men (Amato & Kane, 2011).

Throughout the life course, Mexican-origin children of immigrants undergo transitions, especially those during early adulthood, at different times than 3rd generation Mexican-origin individuals and the overall Hispanic population living in the US. Mexican-origin individuals from immigrant families are more likely to remain in the familial home longer than 3rd+ generation and non-Hispanic whites. Men from immigrant families staying in the familial home longer than females (Lei & South, 2016). Children of immigrants, especially 1st generation individuals, have lower rates of college entry (Suro & Passel, 2003; Lei & South, 2016) and are more likely to get married at younger ages (Lei & South, 2016) compared to both whites and 3rd+ generation, this indicates that family formation plays a larger role in early adult transitions.

Trends in the delay in leaving the familial home among children of immigrants are thought to be influenced heavily by gender and cultural expectations. As the literature demonstrates, immigrant households more likely to practice traditions of their home country and are less likely to adapt to American lifestyles (Gordon-Larsen et al, 2003). We know that a prominent feature of Mexican culture is the emphasis on family and the roles that men and women have in the family. Men may stay in the familial home longer because they wait until marriage to leave and women both get married younger and leave home earlier than men (Lei & South, 2016).

Gender roles also impact weight differences in early adulthood among children of Mexican immigrants. Gender roles heighten in marriage and expectations for women to serve as caretakers of the family and home can lead to an increase in stress and serve as a detriment to the health of the individual especially since they are responsible for the health of others as well (Galanti, 2003). Large families are heavily emphasized and reflect the machismo—prosperity and masculinity—of Mexican-origin men, yet family size and subsequent child rearing put

pressure on Mexican-origin women and their health (Galanti, 2003; Thornton et al, 2006).

Mexican women in immigrant households are less likely to lose weight after pregnancy, potentially due to their role as caretaker in the home (Thornton et al, 2006). Gender roles may factor into weight differences during family formation transitions among 3rd+ generation Mexican Americans, though to a lesser extent than among children of immigrants (Galanti, 2003). A gendered crossover in weight prevalence may occur in early adulthood given what we know about gender roles in marriage and family formation among female children of immigrants.

On the other hand, third+ generation Mexican-origin individuals experience early adult transitions more comparable to non-Hispanic whites. This similarity has mostly to do with timing and college entry. Mexican American women are more likely to attend college than men, a gender difference that also appears among whites (Zarate & Burciage, 2010; Bailey & Dynarski, 2011). Among Mexican Americans, this gender difference aligns with historical trends in workforce differences between men and women. Historically, Hispanic men have more manual and labor-intensive jobs and have lower rates of secondary educational attainment compared to women who have higher rates of college-entry and go on to have more sedentary jobs (Suro & Passel, 2003; Lei & South, 2016). Machismo may influence the manual labor positions among Mexican men, physical strength is an important feature of machismo and the physical aspect of labor implies an active role in providing for the family (Galanti, 2003). Type of employment may impact gendered weight differences in adulthood as more physically demanding jobs may confer a lower likelihood of overweight and obesity among Mexican-origin males.

The conceptualization for this study builds off the 2016 *Demography* paper by Frisco, Quiros, & Van Hook that investigates gender differences in obesity prevalence among Mexican-

origin versus white youth by generational status. While their study utilizes cross sectional data among adolescence, I look for gendered weight changes longitudinally from adolescence to adulthood. I apply the life course framework to my study firstly because my study investigates change over time in a sample starting as adolescents and ending in adulthood. Secondly, because transitions in early adulthood may explain higher overweight and obesity prevalence among Mexican-origin women. Acknowledging gender and generational differences in life course transitions, I hypothesize that women will have a greater prevalence of overweight and obesity than men in following Wave II and that gender differences will be more significant among Mexican-origin children of immigrants.

DATA AND METHODS

Data

The National Longitudinal Study of Adolescent Health (Add Health) is a nationally representative, longitudinal study of adolescents living in the United States conducted by University of North Carolina-Chapel Hill. This study was first implemented in 1994-1995, when more than 100,000 students participated in a school-based survey of middle and high school students. A subsample of 20,745 respondents in grades 7-12 also participated in an in-home survey at Wave I. At Wave I, parents and school administrators also provided data. A second wave of data was collected at the one-year mark in 1996, with interviews from all Wave I respondents except for graduated seniors and school administrators. The third wave of data was collected from 2001-2002, when respondents would have been ages 18-26. During this wave of data collection, all Wave I respondents were contacted, including those excluded from Wave II. The fourth wave of Add Health data was collected in 2008, when respondents were 24-32 years old. Data collection followed protocols set by the Internal Review Board of the University of North Carolina-Chapel Hill. (Popkin & Udry, 1998; Gordon-Larsen, McMurray, & Popkin, 1999; Gordon-Larsen et al, 2003; Harris et al, 2009). For more information about Add Health, see <http://www.cpc.unc.edu/projects/addhealth>.

Sample

The total number of cases in the Add Health Wave I in-home sample is 20,745. I first limited my sample to cases that appeared across Wave I-IV (N=10,120). I then restricted my sample to Mexican-origin and non-Hispanic white respondents in Waves II, III, and IV (total N=6,277, whites= 5,468, Mexican-origin=804). I restricted my sample to those who provided data necessary to create Wave II, III, and IV BMI variables (measured weight, height, sex, and age). I furthered restricted white respondents to those who were U.S. born with U.S.-born parents. I also limited my sample to individuals with no missing data on key study variables. The total number of cases in my study is 4,117 (N=4,117), 436 of which are Mexican-origin (children of immigrants=256 and 3rd+ generation=180) and 3,681 of which are 3rd+ generation non-Hispanic whites.

Measures

Overweight. Overweight is my dependent variable. I predict three indicators of overweight and obesity at Waves II, III, and IV, when height and weight were measured. At Wave I, weight and height were self-reported and were therefore inconsistent with measures at later waves, so I excluded Wave I from my analysis. I used BMI as a measure of overweight and obesity. I created my BMI variables using height, weight, and age, which was calculated using respondent birthdate and date of interview. Since Wave II includes individuals under the age of 18, I used the guidelines established by the International Obesity Task Force (IOTF) for defining childhood obesity, so that comparable adolescent and adult weight categories could be constructed. Childhood weight categories were calculated using corresponding BMI cut offs for

adults, $25 \geq 29.9$ for overweight and ≥ 30.0 for obese. (Cole et al, 2000). Due to a small number of cases, I transformed the BMI variable for each Wave into a variable, “overweight,” that combines overweight and obese, coding respondents that fall into those weight categories as “1” and those within normal BMI range as “0”. A disaggregated logistic regression was run to account for any significance among just obese individuals, but this yielded even less significance (see [Appendix A](#)).

Ethnicity and Generational Status. Mexican-origin and non-Hispanic white individuals comprise the ethnic groups in this study. Generational status of Mexican-origin youth was determined using Add Health measures of respondent and parental nativity. First generation individuals are characterized by themselves and their parents both being foreign-born. Second generation are those born in the United States with foreign-born parents. Third generation individuals and their parents are both US-born (Frisco, Quiros, & Van Hook, 2016). For individuals born outside the United States to American parents, presumably due to military stationing, I code them as third generation. Prior to running analysis, I recoded my generation variable to combine 1st and 2nd generation as a variable for respondents with foreign-born parents since the 1st generation sample was so small (this recode only applies to Mexican-origin respondents since first and second-generation whites were removed from the sample). With this recode, my sample groups are Mexican-origin respondents with foreign-born parents, 3rd generation Mexican-Americans, and 3rd generation whites.

Gender. Gender (female= 0, male=1) is the independent variable in this study.

Sample Characteristics. In my descriptive tables (see [Results](#)), I highlight key characteristics of my sample *Family income* is a continuous variable included as a measure of socioeconomic status (range from \$0-\$999,999). *Parental education* is a self-reported ordinal

variable measuring the highest level of education achieved by respondent' parents (never went to school=0, 8th grade or less=1, 8th grade \geq high school graduate=2, business, trade or vocational school instead of high school=3, high school graduate=4, GED=5, business, trade or vocational school after high school=6, some college= 7, college graduate=8, professional training beyond a 4-year college or university=9). *Birthweight* is measured to the nearest pound and ranges from 3 to 12.

Analysis

Analyses were run using STATA version15. I estimated descriptive statistics using the commands *mean* with *standard deviation* and *summarize* for continuous and categorical variables respectively. I estimated logistic regression models using sex as the independent variable (male=1) and overweight/obese as the dependent variable (overweight/obese=1) and present odds ratio from these analyses. My descriptive statistics and regressions are unweighted. Limitations of the analysis and sample can be found in Discussion.

RESULTS

Table 1. Descriptive Statistics for the Total Sample (N=4,117)

	Frequency (%) / Mean	Standard Deviation
White (%)	89.41	--
Mexican-origin Children of Immigrants (%)	6.21	--
Mexican-origin, 3 rd Generation (%)	4.37	--
Age		
Wave II	16.04	1.61
Wave III	21.51	1.62
Wave IV	28.00	1.63
BMI (%)		
Normal		
Wave II	70.15	--
Wave III	53.22	--
Wave IV	39.71	--
Overweight/obese		
Wave II	29.85	--
Wave III	46.78	--
Wave IV	60.29	--
Sex (%)		
Male	47.29	--
Female	52.71	--

Average Household Income (thousand)	51.03	51.22
Parental Education Level	5.69	2.28
Birthweight	6.89	1.40

Source: National Longitudinal Study of Adolescent Health Wave II (1996), Wave III (2001-2002), and Wave IV (2008)

Table 1. shows descriptive statistics for the total sample in this study. The majority of respondents in this sample are third generation non-Hispanic whites, 89.41%, while 6.21% are Mexican-origin children of immigrants and 4.37% are 3rd+ generation Mexican-origin respondents. From Waves II-IV, the number of overweight or obese (overweight hereafter) respondents increase and in Wave IV they make up 60.29% of the sample. There are 5.42% more females in the sample than men. The average household income is \$51,030. The average parental level of education is approximately a completion of high school or a GED (the breakdown for the parental educational attainment can be found in the Methods section under *Sample Characteristics*.) The average birthweight, 6.89 pounds, falls within the classification of “normal birthweight.”

Table 2 Descriptive Statistics by Ethnicity/Generational Status and Sex (N=4,117)

	White 3 rd +		Mexican-Origin 3 rd +		Mexican-origin 1 st & 2 nd	
	Male	Female	Male	Female	Male	Female
N=	1,746	1,935	80	100	121	135
BMI (%)						
Normal						
Wave II	69.70	72.04	58.75	70.00	59.50	65.19
Wave III	51.43	57.47	33.75	43.00	38.84	47.41
Wave IV	33.79	47.65	20.00	32.00	19.83	37.78
Overweight/obese						
Wave II	30.30	27.96	41.25	30.00	40.50	34.81

Wave III	48.57	42.53	66.25	57.00	61.16	52.59
Wave IV	66.21	52.35	80.00	68.00	80.17	62.22
Average Household Income (thousand)	52.62 50.87 ^{SD}	53.36 55.08 ^{SD}	42.39 22.55 ^{SD}	42.34 31.68 ^{SD}	29.93 26.12 ^{SD}	27.44 16.63 ^{SD}
Parental Education Level	6.01 2.06 ^{SD}	5.88 2.14 ^{SD}	4.96 2.49 ^{SD}	5.12 2.28 ^{SD}	2.67 2.33 ^{SD}	2.34 2.01 ^{SD}
Birthweight	7.05 1.43 ^{SD}	6.77 1.32 ^{SD}	6.76 1.59 ^{SD}	6.56 1.53 ^{SD}	7.12 1.51 ^{SD}	6.73 1.51 ^{SD}

Source: National Longitudinal Study of Adolescent Health Wave II (1996), Wave III (2001-2002), and Wave IV (2008)

*SD = Standard Deviation

Table 2. shows descriptive statistics for each ethnic/generational group by sex. There are more females than males in all groups. A larger percentage of males are overweight than females in each Wave and in each ethnic/generational group. First and second-generation Mexican-origin males in Wave IV have the highest prevalence of overweight, 80.17%, while white females in Wave II have the least, 27.96%. Whites have the highest average income, Mexican-origin of immigrants have the lowest, approximately half the income of whites. Highest parental education level is lowest among 1st and 2nd generation Mexican-origin individuals, average confers some high school as the highest level for the majority. Birthweight is fairly consistent across ethnic/generational group, though 1st and 2nd generation Mexican-origin males have highest mean birthweight, 7.12 pounds and 3rd+ generation Mexican-origin females have the lowest 6.56 pounds.

Table 3 Odds Ratios from Logistic Regression Models Estimating the Association between Gender and Overweight by Race/Ethnicity and Parental Nativity (Unweighted)

	White 3 rd +			Mexican 3 rd +			Mexican 1 st & 2 nd		
	W2	W3	W4	W2	W3	W4	W2	W3	W4
Sex (male=1)	1.12	1.28***	1.78***	1.64	1.48	1.88 ^M	1.27	1.42	2.25**

Notes: Regressions are unweighted since significance disappeared for Mexican-origin score in weighted models.

Source: National Longitudinal Study of Adolescent Health Wave II (1996), Wave III (2001-2002), and Wave IV (2008)

*p < 0.05

**p < 0.01

***p < 0.001

^M Marginally significant

Table 3. shows the relationship between sex and overweight/obesity. The first column shows this association among third generation non-Hispanic whites across Waves II-IV. In Wave II, weight did not have a significant relationship with sex, but in Waves III-IV males have a greater likelihood of being overweight than females (p=0.000 and p=0.000). The absence of significance in Wave II means that sex does not influence weight among white adolescents. The results in Waves III and IV indicate that sex impacts weight and that white males are more likely to be overweight than women as they age.

The second column in Table 3. shows the association between sex and weight for third generation Mexican-origin respondents. Waves II and III yield non-significant results, indicating that sex does not influence weight among adolescents and young adulthood, but by Wave IV sex is marginally associated with the odds of overweight (p=0.073). in Wave IV.

Table 3. shows results for Mexican-origin children of immigrants in the third column. In Waves II-III, the relationship between sex and overweight/obesity is not significant, indicating that sex does not play a role in overweight prevalence among first and second generation

Mexican-origin adolescents and young adults. In Wave IV, sex-differences in weight emerge and males are more likely to be overweight than females in their mid-late 20s ($p= 0.002$).

DISCUSSION

This study investigated the association between gender and overweight and obesity prevalence among Mexican-origin and white Add Health respondents from Waves II-IV, hypothesizing that in adolescence males will have higher prevalence of overweight or obesity than females and that in adulthood, women will have higher prevalence than men. Results from the logistic regression (Table 3) in this study neither support the hypothesis of a gender crossover nor do they indicate a significant relationship between gender and overweight among Mexican-origin individuals until Wave IV. Furthermore, the significant results in Wave IV were marginal for 3rd generation Mexican-origin respondents and both 3rd generation and children of immigrants demonstrated a higher overweight prevalence in men compared to women.

These results are surprising given what we know from the literature. Hispanic and specifically Mexican-origin boys have higher prevalence of obesity than girls (Van Hook & Baker, 2010; Frisco, Quiros, & Van Hook, 2016), but in adulthood women have higher prevalence than men (Baskin et al, 2005; Gillum & Sempos, 2005; Flegal et al, 2016). Early adult transitions in the life course such as entry into the workforce, marriage, and childrearing all offer explanations for gendered changes in weight among the Hispanic population living in the US. Parental nativity and generational status of Mexican-origin individuals in the US also impacts weight differences by gender. Some studies demonstrate a lack of association between generational status and weight. Gordon-Larsen et al (2003) found that overweight prevalence was fairly consistent across generational status among Mexicans in an Add Health sample. Van

Hook and Baker (2010) found that overweight had a stronger association with boys in childhood than girls and that the weight of foreign-born and US-born girls do not differ in weight characterization.

This study is not without limitations. My study uses complete case analysis, which created a small overall sample (N=4,117) and thus a small Mexican-origin subsample (N=436). This type of analysis may have led to my sample being biased and unrepresentative of the national population. Complete case studies generate missing cases for each variable and code them out of the final sample, limiting the sample and creating a systematic bias which leaves out certain member of a population. Many missing cases were generated from measure of socioeconomic status such as yearly income and highest parental education level; these missing cases are likely not an accident as lower socioeconomic status is under reported (Knol et al, 2010). Additionally, because my subgroups of Mexican-origin youth are so small, I may have lacked statistical power to find significant gender differences.

Another limitation has to do with the creation of a “children of immigrants” variable rather than keeping first and second generation Mexican-origin respondents separate. From the literature, we know that they are distinct weight differences at childhood and adulthood between first and second-generation individuals. Originally, I ran a disaggregated analysis with the generation, but this led to a small number of cases. I then dropped first generation individuals to account for differences in foreign-born versus US-born children of immigrants, but results from second generations alone were similar to the combined regression (see [Appendix A](#)) so I included “children of immigrants” in my sample in order to have the maximum number of cases.

Another limitation has to do with sampling frame and the use of Add Health in addressing overweight prevalence by gender across the life course. Previous research

demonstrates strong gender differences among Hispanics in the US in childhood and adulthood. Whereas, my study looked at the transition from adolescence to early adulthood, ages of participants starting from 12-21 in Wave II and ending at 24-32 in Wave IV. The ages of respondents in my sample may miss the effects of a gender crossover because not enough time has elapsed to reveal changes in overweight or obesity prevalence by gender. Additionally, childhood weights are absent in the dataset. The data collection of Wave V of Add Health is currently underway and may yield evidence of a crossover or at least a continued association between weight and gender.

There are many changes to consider in future studies. To address limitations of complete case analysis, missing data could be imputed. Imputing data could also rectify limitations with generational status among children of immigrants. Latent growth curve analysis could produce more technically precise estimates of weight trends over time. Additionally, variables related to key transitions in adulthood through the life course were not examined in the current study and should be considered as key variables in future studies. The literature demonstrates how timing and experiences related to family formations, leaving the familial home, college attendance, and entry into the workforce may impact gender differences in weight by ethnicity in adulthood. The literature indicates a relationship between gender and weight across the life course and these next steps may differ from results in this study and support the gender/weight association.

Though this study did not find a strong relationship between gender and overweight and obesity among Mexican-origin individuals living in the United States, it demonstrated a rise in overweight and obesity as age increases. Gordon-Larsen et al (2004) found the same phenomenon in their Add Health study. They also determined that obesity and overweight in adolescence is highly predictive of obesity and overweight in adulthood for both males and

females. This reinforces that overweight and obesity is should be a significant health concern in the United States. Understanding what factors contribute to obesity prevalence among Mexican-origin individuals in addition to the Hispanic population at large is necessary in order to develop effective and culturally competent strategies in combating this condition.

APPENDIX A

Table 4 Odds Ratios from Logistic Regression Models Estimating the Association between Gender and Obesity by Race/Ethnicity and Parental Nativity (Unweighted)

	White 3 rd +			Mexican 3 rd +			Mexican 1 st & 2 nd		
	W2	W3	W4	W2	W3	W4	W2	W3	W4
Sex (male=1)	0.99	0.94	1.07	1.83	1.44	1.66 ^M	1.29	0.95	1.12

Notes: Regressions are unweighted since significance disappeared for Mexican-origin score in weighted models.

Source: National Longitudinal Study of Adolescent Health Wave II (1996), Wave III (2001-2002), and Wave IV (2008)

*p < 0.05

**p < 0.01

***p < 0.001

^M Marginally significant

Table 5 Odds Ratios from Logistic Regression Models Estimating the Association between Gender and Overweight by Race/Ethnicity and Parental Nativity (Unweighted)

	White 3 rd +			Mexican 3 rd +			Mexican 2 nd		
	W2	W3	W4	W2	W3	W4	W2	W3	W4
Sex (male=1)	1.12	1.28***	1.78***	1.64	1.48	1.88 ^M	1.33	1.35	2.22*

Notes: Regressions are unweighted since significance disappeared for Mexican-origin score in weighted models.

Source: National Longitudinal Study of Adolescent Health Wave II (1996), Wave III (2001-2002), and Wave IV (2008)

*p < 0.05

**p < 0.01

***p < 0.001

^M Marginally significant

BIBLIOGRAPHY

Amato, P. R., & Kane, J. B. (2011). Life-course pathways and the psychosocial adjustment of young adult women. *Journal of Marriage and Family*, 73(1), 279-295.

Bailey, M. J., & Dynarski, S. M. (2011). *Gains and gaps: Changing inequality in US college entry and completion* (No. w17633). National Bureau of Economic Research.

Baker, E., Balistreri, K. S., & Van Hook, J. (2009). Maternal employment and overweight among Hispanic children of immigrants and children of natives. *Journal of Immigrant and Minority Health*, 11(3), 158-167.

Barcenas, C. H., Wilkinson, A. V., Strom, S. S., Cao, Y., Saunders, K. C., Mahabir, S., ... & Bondy, M. L. (2007). Birthplace, years of residence in the United States, and obesity among Mexican-American adults. *Obesity*, 15(4), 1043-1052.

Baskin, M. L., Ard, J., Franklin, F., & Allison, D. B. (2005). Prevalence of obesity in the United States. *Obesity reviews*, 6(1), 5-7.

Bates, L. M., Acevedo-Garcia, D., Alegría, M., & Krieger, N. (2008). Immigration and generational trends in body mass index and obesity in the United States: results of the National Latino and Asian American Survey, 2002–2003. *American journal of public health*, 98(1), 70-77.

Brown, A., & Lopez, M. H. (2013). Mapping the Latino population, by state, county and city. *Washington, DC: Pew Research Center*.

Campos, B., Schetter, C. D., Abdou, C. M., Hobel, C. J., Glynn, L. M., & Sandman, C. A. (2008). Familialism, social support, and stress: Positive implications for pregnant Latinas. *Cultural Diversity and Ethnic Minority Psychology, 14*(2), 155.

Centers for Disease Control and Prevention. *Data & Statistics*. (2015, September 14). Retrieved April 27, 2017, from <https://www.cdc.gov/obesity/data/index.html>

Cole, T. J., Bellizzi, M. C., Flegal, K. M., & Dietz, W. H. (2000). Establishing a standard definition for child overweight and obesity worldwide: international survey. *Bmj, 320*(7244), 1240.

Elder Jr, G. H., Johnson, M. K., & Crosnoe, R. (2003). The emergence and development of life course theory. In *Handbook of the life course* (pp. 3-19). Springer US.

Flegal, K. M., Ogden, C. L., & Carroll, M. D. (2004). Prevalence and trends in overweight in Mexican-American adults and children. *Nutrition reviews, 62*(suppl_2), S144-S148.

Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010). Prevalence and trends in obesity among US adults, 1999-2008. *Jama, 303*(3), 235-241.

Flegal, K. M., Kruszon-Moran, D., Carroll, M. D., Fryar, C. D., & Ogden, C. L. (2016). Trends in obesity among adults in the United States, 2005 to 2014. *Jama, 315*(21), 2284-2291.

Franzini, L. Ribble, J.C., Keddie, A.M. (2001). Understanding the Hispanic paradox. *Ethn Dis, 11*(3), 496-518.

Frisco, M. L., Quiros, S., & Van Hook, J. (2016). One Size May Not Fit All: How Obesity Among Mexican-Origin Youth Varies by Generation, Gender, and Age. *Demography, 53*(6), 2031-2043.

Galanti, G. A. (2003). The Hispanic family and male-female relationships: An overview. *Journal of Transcultural Nursing, 14*(3), 180-185.

Gallo, L. C., Penedo, F. J., Espinosa de los Monteros, K., & Arguelles, W. (2009). Resiliency in the face of disadvantage: do Hispanic cultural characteristics protect health outcomes?. *Journal of personality*, 77(6), 1707-1746.

Gillum, R. F., & Sempos, C. T. (2005). Ethnic variation in validity of classification of overweight and obesity using self-reported weight and height in American women and men: the Third National Health and Nutrition Examination Survey. *Nutrition journal*, 4(1), 27.

Gordon-Larsen, P., McMurray, R. G., & Popkin, B. M. (1999). Adolescent physical activity and inactivity vary by ethnicity: The National Longitudinal Study of Adolescent Health. *The Journal of pediatrics*, 135(3), 301-306.

Gordon-Larsen, P., Harris, K. M., Ward, D. S., & Popkin, B. M. (2003). Acculturation and overweight-related behaviors among Hispanic immigrants to the US: the National Longitudinal Study of Adolescent Health. *Social science & medicine*, 57(11), 2023-2034.

Gordon-Larsen, P., Adair, L. S., Nelson, M. C., & Popkin, B. M. (2004). Five-year obesity incidence in the transition period between adolescence and adulthood: the National Longitudinal Study of Adolescent Health. *The American journal of clinical nutrition*, 80(3), 569-575.

Harris, K.M., C.T. Halpern, E. Whitsel, J. Hussey, J. Tabor, P. Entzel, and J.R. Udry. 2009. The National Longitudinal Study of Adolescent to Adult Health: Research Design [WWW document]. URL: <http://www.cpc.unc.edu/projects/addhealth/design>.

Hedley, A. A., Ogden, C. L., Johnson, C. L., Carroll, M. D., Curtin, L. R., & Flegal, K. M. (2004). Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. *Jama*, 291(23), 2847-2850.

Kershaw, K. N., Albrecht, S. S., & Carnethon, M. R. (2013). Racial and ethnic residential segregation, the neighborhood socioeconomic environment, and obesity among Blacks and Mexican Americans. *American journal of epidemiology*, *177*(4), 299-309.

Knol, M. J., Janssen, K. J., Donders, A. R. T., Egberts, A. C., Heerdink, E. R., Grobbee, D. E., ... & Geerlings, M. I. (2010). Unpredictable bias when using the missing indicator method or complete case analysis for missing confounder values: an empirical example. *Journal of clinical epidemiology*, *63*(7), 728-736.

Kopelman, P. (2007). Health risks associated with overweight and obesity. *Obesity reviews*, *8*(s1), 13-17.

Lee, J. M., Pilli, S., Gebremariam, A., Keirns, C. C., Davis, M. M., Vijan, S., ... & Gurney, J. G. (2010). Getting heavier, younger: trajectories of obesity over the life course. *International journal of obesity (2005)*, *34*(4), 614.

Lei, L., & South, S. J. (2016). Racial and ethnic differences in leaving and returning to the parental home: The role of life course transitions, socioeconomic resources, and family connectivity. *Demographic research*, *34*, 109.

Markides, K. S., & Coreil, J. (1986). The health of Hispanics in the southwestern United States: an epidemiologic paradox. *Public health reports*, *101*(3), 253.

Markides, K. S., & Eschbach, K. (2005). Aging, migration, and mortality: current status of research on the Hispanic paradox. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *60*(Special_Issue_2), S68-S75.

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *Jama*, *311*(8), 806-814.

Ogden, C. L., Carroll, M. D., Fryar, C. D., & Flegal, K. M. (2015). *Prevalence of obesity among adults and youth: United States, 2011-2014* (pp. 1-8). US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics.

Palloni, A., & Morenoff, J. D. (2001). Interpreting the paradoxical in the Hispanic paradox. *Annals of the New York Academy of Sciences*, 954(1), 140-174.

Popkin, B. M., & Udry, J. R. (1998). Adolescent obesity increases significantly in second and third generation US immigrants: the National Longitudinal Study of Adolescent Health. *The Journal of nutrition*, 128(4), 701-706.

Reilly, J. J., & Kelly, J. (2011). Long-term impact of overweight and obesity in childhood and adolescence on morbidity and premature mortality in adulthood: systematic review. *International journal of obesity*, 35(7), 891.

Rubalcava, L. N., Teruel, G. M., Thomas, D., & Goldman, N. (2008). The healthy migrant effect: new findings from the Mexican Family Life Survey. *American Journal of Public Health*, 98(1), 78-84.

Shanahan, M. J. (2000). Pathways to adulthood in changing societies: Variability and mechanisms in life course perspective. *Annual review of sociology*, 26(1), 667-692.

Siega-Riz, A. M., & Popkin, B. M. (2001). Dietary trends among low socioeconomic status women of childbearing age in the United States from 1977 to 1996: a comparison among ethnic groups. *Journal of the American Medical Women's Association* (1972), 56(2), 44-8.

Sosa, E. T. (2012). Mexican American mothers' perceptions of childhood obesity: a theory-guided systematic literature review. *Health Education & Behavior*, 39(4), 396-404.

Suro, R., & Passel, J. S. (2003). The rise of the second generation: changing patterns in Hispanic population growth.

Thornton, P. L., Kieffer, E. C., Salabarría-Peña, Y., Odoms-Young, A., Willis, S. K., Kim, H., & Salinas, M. A. (2006). Weight, diet, and physical activity-related beliefs and practices among pregnant and postpartum Latino women: the role of social support. *Maternal and child health journal, 10*(1), 95-104.

Van Hook, J., & Baker, E. (2010). Big boys and little girls: gender, acculturation, and weight among young children of immigrants. *Journal of Health and Social Behavior, 51*(2), 200-214.

Van Hook, J., Baker, E., Altman, C. E., & Frisco, M. L. (2012). Canaries in a coalmine: Immigration and overweight among Mexican-origin children in the US and Mexico. *Social Science & Medicine, 74*(2), 125-134.

Viruell-Fuentes, E. A., Miranda, P. Y., & Abdulrahim, S. (2012). More than culture: structural racism, intersectionality theory, and immigrant health. *Social science & medicine, 75*(12), 2099-2106.

Wang, Y., & Beydoun, M. A. (2007). The obesity epidemic in the United States—gender, age, socioeconomic, racial/ethnic, and geographic characteristics: a systematic review and meta-regression analysis. *Epidemiologic reviews, 29*(1), 6-28.

Zarate, M. E., & Burciaga, R. (2010). Latinos and college access: Trends and future directions. *Journal of College Admission, 209*, 24-29.

ACADEMIC VITA

Carly M. Cherwony

carly.cherwony@gmail.com

czc5562@psu.edu

Education

Sociology (B.A.) and Biobehavioral Health (B.S.)

Dean's List (6 semesters)

Paterno Fellow

Schreyer Honors Scholar

Thesis Title

Gendered Obesity Prevalence Among Hispanics By Generational Status

Thesis Supervisor

Dr. Michelle L. Frisco

Work Experience

October 2017-present

Coding Assistant

Qualitative coding, using NVivo, for a study researching the promotion of Electronic Nicotine Delivery System (ENDS) products in college towns.

The College of Health and Human Development at the Pennsylvania State University

Bobbie L. Johannes, MPH

June 2017-present

Research Assistant

Compiles and assesses literature and preliminary data on a number of projects including those focused on high deductible health care plans disparities and chronic disease; workplace health programs; and disparities in Medicaid coverage.

The College of Health and Human Development at the Pennsylvania State University

Selena Ortiz, Ph.D.

November 2015-present

Research Assistant

Prepares field materials for the Promoting Healthy Development in Early Head Start early childhood obesity intervention; organizes incoming curriculum outcome and home-study records from 260 subjects across Pennsylvania and Wisconsin; behavioral coding.

Edna Bennet Pierce Prevention Research Center at the Pennsylvania State University
Michelle Hostetler, Ph.D.

May 2017-August 2017

Coding Assistant

Qualitative coding focus group transcripts for the Immigrant Health Project, focusing on parental attitudes on healthy eating and childhood obesity among Hispanic mothers.

Population Research Institute at the Pennsylvania State University

Michelle Frisco, Ph.D.

Community Service Involvement

Volunteering as a member of the Penn State chapter of the American Association of University Women

Volunteering with the Penn State student service organization, Serve State: Students for Philanthropy

Software Proficiency

SPSS, STATA, NVivo, Microsoft Office (Word, Excel, and PowerPoint)