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Abstract

Immigrants tend to be healthier than their native born peers on many factors, including obesity. However, to date, research has produced contradictory results about the potential contributors of this relationship as well as the magnitude of this phenomenon. This research examines weight assimilation, using both a pooled sample and a Mexican-American specific sub-sample of the *National Longitudinal Survey of Youth, 1997 cohort*, as adolescents transition to adulthood. The negative health assimilation hypothesis states that overtime, there is convergence in the health between immigrant generations and natives. Examining this relationship longitudinally, using growth curve models, I find continued divergence rather than convergence. Immigrant generations weigh less at the beginning of the study period and gain less weight as they enter adulthood compared to native generations (1). In addition to documenting this phenomenon descriptively, this research also examined the different contexts that could contribute to this relationship, concentrating specifically on emerging young adult socioeconomic status and residence. Inequality in socioeconomic status contributes to health disparities, such that those with lower socioeconomic status have worse health than those with higher socioeconomic status. Immigrant children and children of immigrants often have lower origin socioeconomic status than children of natives and they tend to make great strides over the educational attainment of their parents. In addition, increases in educational attainment mean that children of immigrants spend an extended period of time in one of the most influential socializing institutions they will encounter during this phase of their life, college. Using OLS regression when the respondents are in between the ages of 24 to 28, I find that own emerging socioeconomic status, measured as education, is important to all generations, but this is especially true among the second generation, even controlling for family of origin socioeconomic status (2). Lastly, I examine the relationship between parental co-residence and

weight using growth curve models. Strong immigrant families are suggested as one of the potential sources that allow immigrants and their children to overcome many of the disadvantages they face, such as disorganized neighborhoods and poverty. Also, immigrant children and children of immigrants are more likely to remain in their parents home longer and the implications this has on their adult outcomes differs from those found for children of natives. I find that non-parental co-residence is associated with weight gain among all generations, but only among the first and second generation is this weight gain not accounted for by partnering and childbearing (3). Other factors, perhaps related to acculturation and assimilation, drive this relationship for children of immigrants. These findings suggest that weight assimilation is a complex process, influenced by factors experienced in childhood, as suggested by the immigrants continued divergence in weight gain, and their immediate environment, as suggested by the importance of own emerging socioeconomic status and parental co-residence.

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Chapter 1: INTRODUCTION

The United States has experienced high levels of immigration for the last four decades, specifically from Latin America and Asia. In 2008 the Census Bureau made headlines as it announced that by the year 2050 the US is expected to be a minority majority country, with 54% of the population belonging to a minority group. This is attributable to the substantial increase in groups dominated by immigrants. The Hispanic share of the population is expected to double from 15% to 30% and the Asian population is expected to triple from 5% to 15%, while the percentages of blacks and Native American/Alaskan Natives will remain steady. However, the non-Hispanic white population will see its share decline from about 66% to 46% (U.S. Census Bureau, 2008). These projections indicate that immigrants and their children will have a significant impact on the health profile of the United States.

Healthy People 2010 focuses on reducing health disparities and increasing quality years of life, and it lists overweight as one of the leading health indicators. Overweight and obesity increase the probability of many types of health concerns, including cardiovascular disease, diabetes, respiratory disease, and joint issues (Daniels, 2006). Obesity and overweight also come with a high price tag. In 1998 they accounted for 9.1 % of medical spending, rivaling the costs of smoking (Warner, Hodgson, and Carroll, 1999). Obesity and overweight also incur indirect costs through lost productivity. Obesity during adolescence may be an especially important predictor of adult obesity, as the probability of continued obesity is greater the older the child (Guo et al., 2002). While the breadth of the disease burden of obesity is experienced in adulthood, those who were obese and overweight as children and stayed obese into adulthood experience earlier and more serious health concerns in adulthood than individuals with adult onset obesity (Daniels, 2006).

Research on immigrant health generally finds that immigrants have better outcomes than either non-Hispanic white natives or their native-born same-race/ethnic peers despite their low human and physical capital. This phenomenon has been termed the epidemiological paradox and has been found to apply to drinking, smoking, substance use, infant mortality, pregnancy outcomes, mortality, chronic conditions, and overweight and obesity. However, immigrants' health advantage tends to deteriorate with acculturation, even while human and physical capital tends to increase (Hummer et al., 2008; Markeides and Coreil, 1989; Palloni and Arias, 2006). The epidemiological paradox is usually explained using two prominent theories: positive selection of immigrants on health factors and negative health assimilation. The negative health assimilation hypothesis assumes that immigrants arrive with beneficial cultural orientations that promote healthier behaviors than their native-born peers. However, acculturation, the process by which immigrants assume the dominant culture of their receiving society, leads to the adoption of less healthy behaviors (Palloni and Arias, 2004; Hummer et al., 2008; Landale, Oropesa, and Gorman, 2000; Antecol and Bedard, 2006; Blumenthal, 2002; Carter, 2002; Fried and Nestle, 2002; Gordon-Larsen et al., 2003). This dissertation will focus on the latter of the two theories.

Consistent with the negative health assimilation model, obesity is associated with generation and duration of U.S. residence (Antecol and Bedard, 2005; Popkin and Udry, 1998) for adults and adolescents. However, some inconsistencies in the literature exist. Other research has found that among young children, children of immigrants have higher odds of overweight or obesity than children of natives (Van Hook, Baker, and Altman, 2009), and among Mexican ancestry adolescents, the first generation has higher odds of overweight than those born in the United States (Gordon-Larsen et al., 2004).

Immigration and Assimilation in the United States

Before describing the theoretical implications of assimilation for immigrant health, I first review the basic theoretical perspectives about immigrant assimilation in general. With prolonged exposure to the US, immigrants and their children assimilate and begin to more closely resemble the American mainstream in many aspects, including health. As such, general theories of assimilation are relevant to my research questions about obesity among children of immigrants. The US has largely been shaped by immigrants and their children. The US owes much of its early growth to the large influx of European immigrants at the beginning of the 20th century. Theoretical constructs have been developed to explain the process of immigrants' and their children's adaption to the US and these theories may provide insight as to why the health of immigrants changes with assimilation. Classical assimilation theory was developed in order to explain the process of how immigrants and their children begin to resemble the middle-class mainstream on several dimensions. This early wave of migration was followed by a second one that peaked during the late 1990s, which was largely brought on by the lessening of restrictive immigration policies in the 1960s, changes in international trade, and an increasing wage gap between developed and developing countries (Massey Durand, and Malone 2002).

This contemporary wave of immigrants differed from the first wave on several dimensions, including race, skill level, geographic dispersion, and replenishment (Alba and Nee, 2003; Portes and Rumbaut, 2001; Waters and Jiminez, 2005). Also, the industrial and manufacturing jobs that had provided the earlier wave of immigrants an advantage in economic assimilation have largely disappeared. These changes have led some immigrant scholars to question the utility of earlier assimilation theory for adequately describing the experience of this wave of immigrants. Segmented assimilation theory was developed in response to these

shortcomings (Portes and Zhou, 1993). Rather than a linear move to the middle class, immigrants and their children theoretically follow one of several potential pathways, including either assimilation to a largely racialized underclass or rapid social mobility largely brought on by cohesive families and ethnic communities.

Classical assimilation theory: straight line into the middle class.

Classical assimilation theory, as developed by Gordon (1964), predicts that, over several generations, immigrants and their descendants will come to resemble the mainstream core. This theory tends to assume a straight linear path into the mainstream, such that eventually descendants of immigrants will be indistinguishable from individuals who can claim a longer familial history in the United States. Early theories of assimilation viewed the process of entering the mainstream as Anglo conformity, whereby immigrants' descendants would abandon their own customs, beliefs, and history and adopt those of the Anglo-Saxon Protestant majority. Current assimilation scholars have updated this theory to try to incorporate a concept of the mainstream that is more diverse and dynamic, though the exact definition of it remains somewhat enigmatic (Alba and Nee, 2003).

The assimilation process involves several distinct dimensions that may happen at different paces or simultaneously: cultural (acculturation), structural, marital, identificational, attitude receptional, behavioral receptional, and civic. Acculturation, or cultural assimilation, is the process by which immigrant groups adopt the dominant cultural norms and behaviors, including language, dress, diet, etc (sometimes referred to as extrinsic acculturation). This dimension of assimilation is a necessary first step in the assimilation process and some even view it as an inevitable one (Alba and Nee, 2003; Gordon, 1964). However, acculturation may be the only dimension of assimilation to occur. Gordon warns that extreme forms of

discrimination that exclude groups from educational or occupational opportunities or extreme spatial isolation may make it impossible for some groups to fully assimilate. In this regard Gordon was referring to African-Americans, specifically those of Southern origin during the mid-1960s, though this tenet could be extrapolated to refer to unauthorized labor migrants of today.

Some argue that the racial composition and continued discrimination of contemporary waves of immigrants will make it difficult for them to assimilate into the middle class (Portes and Rumbaut, 2001; Portes and Zhou, 1993). However, Alba and Nee (2003) argue that social movements such as the civil rights movement, the Federal Fair Housing Act, and affirmative action have lowered some of the barriers between some racialized groups and the largely white middle class mainstream, thus allowing swifter acculturation and assimilation of immigrants and their children, perhaps even faster than among the largely white first wave of U.S. immigrants. In general, classical assimilation views immigrant groups as eventually assimilating to the American mainstream, though for some groups this may take much longer and may involve acculturation without full assimilation (Gordon, 1964).

Segmented assimilation: the divergent paths of the second generation.

Gordon (1964) describes how acculturation is inevitable, but discrimination may make full assimilation difficult if not impossible for immigrants and their offspring. Using race/ethnic and nativity categorization developed by Ogbu and Simmons (1998), immigrants are classified as voluntary minorities. Though they are minorities in their host societies and may experience increased difficulties and discrimination, they often maintain a dual frame of reference. Rather than just seeing the blocked opportunities they face relative to their native-born white peers in the US, immigrants also compare their American experiences with those that they could expect

to experience in their home countries. While discrimination may be prevalent, the US still affords immigrants with more opportunities relative to what they would have experienced back home. This insight, along with contemporary changes in the composition, skill level, and geographic dispersion of this wave of immigrants, has led many scholars to suggest new theoretical ways to view the assimilation process.

Segmented assimilation theory was developed to address these shortcomings. Rather than just uniformly assimilating to the largely white middle class mainstream, children of immigrants may assimilate to the largely racialized underclass present in many metropolitan areas or they may experience upward social mobility facilitated in large part by a closely knit immigrant family and community (Portes and Rumbaut, 2001). Low prestige jobs, confinement in poorer neighborhoods and schools, occupational segregation, and darker skin color may lead to blocked opportunities for immigrants and their children. As a response, children of immigrants may develop an oppositional stance towards mainstream society and experience downward assimilation. This theory thus emphasizes the importance of context, opportunities, and differences by ethnicity in the assimilation process.

Selective acculturation is one of the pathways identified by segmented assimilation theory. In this mode of adaptation, individuals deliberately preserve aspects of their homeland's culture, normally modifying them in some way to make them more suitable for life in their receiving society. Often, this form of acculturation is accompanied by the presence of a large ethnic enclave, which makes it easier to retain some aspects of their culture. The replenishment of immigrants allows for these ethnic enclaves to thrive (Waters and Jiminez, 2005). Tightly-knit immigrant communities may also aid parents in their ability to control their children, allow for a collective memory, and may provide increased employment opportunities to children who are

fluently bilingual. There is ample evidence to suggest that this form of acculturation may be the most beneficial for children of immigrants (Portes and Rumbaut, 2001; Portes and Zhou, 1993; Gibson, 2001; Portes and Hao, 2002). Language use, a common measure of acculturation, demonstrates that among children of immigrants, those who are fluent bilinguals have better educational aspirations and outcomes, less family conflict, more family solidarity, and less detrimental psychological outcomes (Portes and Hao, 2000; Portes and Rumbaut, 2001). The incredible success of the Vietnamese in New Orleans and Southern California, the Chinese in New York, and the Punjabi Sikhs in California are often attributed to selective acculturation and the presence of a cohesive ethnic enclave (Gibson, 1998; Portes and Rumbaut, 1996; Zhou and Bankston, 1998; Zhou, 1997; Mollenkopf et al., 2004; Portes and Rumbaut, 2001). Selective acculturation generally is associated with rapid social mobility. The speed of upward mobility differentiates this theory from classical assimilation theory, which assumes a slower linear progression to the middle class.

Contrary to selective acculturation, which is generally viewed as beneficial for children of immigrants, dissonant acculturation is normally associated with negative outcomes for children of immigrants. Dissonant acculturation is characterized by the faster acculturation of children of immigrants relative to their parents. Children of immigrants may also lose the cultural protection provided to them by their parents and ethnic community which helps shield them from the negative effects of living in a largely racialized and discriminatory society. This appears to be especially true for children of Mexican immigrants who are the most at risk for this type of assimilation (Portes and Rumbaut, 2001; Telles and Ortiz, 2008).

Often, children of immigrants acculturate faster, especially linguistically, than their parents due to their greater exposure of American culture through schools, media, and peer

groups. These children develop tastes and wants that are sometimes difficult for their immigrant parents to provide for them due to their economic disadvantage, spatial isolation, and structural segregation. Parents do not feel as deprived as their children despite the hardship they experience in the US because they may still be able to provide more and earn more than they would in their home country. Children, however, do not possess their immigrant parents' dual frame of reference and the blocked opportunities they face may lead them to develop an oppositional stance to the American mainstream. Lack of a cohesive ethnic community, along with dissonant acculturation, may lead to immigrant parents having as much difficulty controlling their children as they have difficulty in navigating the many American institutions that may aid them in this process. These children run the risk of being assimilated into the lowest rung of society. Thus, dissonant acculturation generally is associated with downward assimilation (Portes and Rumbaut, 2001).

Rather than being incompatible, these two theories actually speak to one another. Greater acculturation of immigrants and their youth, by which they adopt American ideals about consumption, habits, and other norms, but lack of structural assimilation, prevents economic integration (though the causality of this is arguable) and full assimilation. This lack of structural assimilation may in part lead to downward assimilation. Indeed, Gordon (1964) speaks of the importance of structural assimilation in the process of full assimilation. Education is a very important institution in this assimilation process and provides a gateway for many other types of assimilation, including structural assimilation. Indeed, Telles and Ortiz (2008) argue that educational assimilation is the linchpin in the process, the key experience that leads to occupational, spatial, and marital assimilation. However, unlike classical assimilation theory, which suggests that structural opportunities increase as acculturation increases, segmented

assimilation theory states that acculturation may stall structural assimilation, particularly as it relates to education.

Overview of the Three Studies

In this dissertation, I apply these theoretical ideas to weight and obesity. Past research suggests that classical assimilation theory, which assumes a straight line into the middle class, may not be applicable to the current wave of immigrants due to differences in immigrant replenishment, skin color, and skill level. These factors could have important implications for health. For example, those with lower educational attainment tend to have worse health due to differences in health care, behaviors, and different environments (Alder and Newman, 2000; Ross and Mirowsky, 1999). For children of immigrants from low socioeconomic origins or those who experience discrimination, assimilation to the health and health habits found among similarly situated natives groups should result in rapid declines in health and health behaviors. However, those who assimilate upwards, either by their own efforts or through more favorable family characteristics should do better. This implies that the context that assimilation takes for immigrant children and children of immigrants may moderate the association between assimilation and weight. The contexts that I focus on here are education and residence. Schools, especially college, are important socializing institutions. College attendance and graduation are indicators of economic assimilation and are necessary precursors to obtaining middle class status and reducing the social distance between children of immigrants and the middle class mainstream. Also, increases in education are associated with increases in self-efficacy and increased skills and knowledge which positively influence health (Ross and Mirowsky 2003). While many studies have documented the positive increase in weight across generations, few studies have examined the social contexts that contribute to these differences. The failure to

examine the variation in social contexts in which immigrants live may account for some of the inconsistent results.

In this project I use the *National Longitudinal Survey of Youth,* 1997 cohort, to examine how social contexts relate to Body Mass Index (BMI) assimilation as immigrant children and children of immigrants transition from adolescence to adulthood. All analyses examine both a pooled sample which controls for race/ethnicity, but does not divide the generations by race/ethnicity and a sub-sample that compares the first, second, and third generation or higher (hereafter, referred to as third generation) Mexican-Americans to third generation non-Hispanic whites and non-Hispanic blacks (hereafter referred to as whites and blacks). While the pooled sample includes all racial/ethnic groups for all generational groups, the sub-sample is restricted to Mexican-origin first, second, and third+ generation children, and non-Hispanic white and non-Hispanic black third+ generation children. In other words, first and second generation whites, first and second generation blacks, all non-Mexican Hispanics, and the residual other race/ethnicity category are excluded from the sub-sample.

I examine these two different samples for several reasons. First, there are power issues when dividing the generation groups by race/ethnicity in some of the analyses. Examining the pooled group allows me to answer some of the more specific questions about whether there are differences between the 1.0 generation and the 1.5, specific questions about home-leaving patterns or questions about the effect of education on BMI by generation. However, simply examining generation effects muddles the effect of assimilation and acculturation, since these effects differ by race/ethnicity. This point is stressed by segmented assimilation theory. Mexican-Americans are the largest group of immigrants in the U.S. and constitute roughly half of the first and second generation in the pooled sample (see appendix A for a breakdown of

race/ethnicity by generation). Examining both samples allows me to ask more precise questions while also examining whether the immigrant effects are largely influenced by Mexican-Americans.

I concentrate on the transition to adulthood for several reasons. First, for Asian and Latino immigrants, exposure to the U.S. environment during childhood and adolescence has important implications for adult BMI (Bates et al., 2008). Therefore, understanding the factors that influence adolescents' BMI would further our knowledge about adolescents and aid in preventing adult obesity. Second, the transition from adolescence to adulthood is a period marked by dramatic behavior changes, such as a rapid decrease in physical activity, decreased consumption of fruits and vegetables, and increased consumption of meals away from home (Gordon-Larsen, Nelson, and Popkin, 2004; Neslon et al., 2008; Mokdad et al., 1999; Tucker et al., 2005). Lastly, the transition from adolescence to adulthood is an important phase for children of immigrants, who may move away from their parental home and the cultural protection provided by it, and some may invest heavily in their human capital by attending college. Increases in physical and human capital move children of immigrants into the middle class mainstream and may have important and potentially positive influences on their health (Meich et al., 2006; McLaren, 2007; Drewnowski and Specter, 2004). Over the past two decades, much of the theoretical development and research on the adaptation of children of immigrants has focused on adolescents, but has fallen short of following them as they make their first crucial steps toward independence and the establishment of their lives as young adults (Alba and Nee, 2003). Both immigrant scholars and health scholars state that there is a dearth of research concerning this phase of the life course (Fulgini and Hardway, 2004; Rumbaut, 2005; Nelson et al., 2005).

Chapter 2 examines weight trajectories from adolescence to adulthood by generation and ethnicity. Past research has suggested that immigrant BMI converges to that of natives over time. However, these studies have relied on cross-sectional data rather than longitudinal data and may be conflating generational changes with cohort changes. I seek to assess whether the 1.0, 1.5 and second generations have BMIs that differ from the third generation as adolescents and whether this advantage is maintained as they enter adulthood. I also run analyses separately for boys and girls.

Chapter 3 examines socioeconomic status as a factor that contributes to the different context that children of immigrants (1.0, 1.5, and second generation) find themselves. Preliminary analyses suggest that the associations between socioeconomic status (SES) and BMI are very similar for the 1.0 and 1.5 generation. As such, and to preserve enough power to perform the interactions in this chapter, the 1.0 and 1.5 generation are combined into one group, the first generation. This chapter examines whether the young adults' own emerging socioeconomic status (defined here as college attendance) contributes to their BMI when they are in between the ages of 22 and 28. I examine whether the young adults' emerging SES is a unique contributor to weight change above and beyond the effect of family of origin SES. Children of immigrants make great strides over the often very low educational attainment of their parents and the effect of family of origin SES differs for children of immigrants compared to children of natives. Rather than the negative relationship between family of origin SES and BMI often found in many studies that do not focus on generation, research on immigrants suggests that the relationship between family of origin SES and BMI is either non-linear, non-existent, or positive (Van Hook and Balistreri, 2007; Meich et al., 2006; McLaren, 2007; Drewnowski and Specter, 2004). I examine whether emerging young adult socioeconomic status is negatively

associated with young adult BMI and whether this effect is greater for the first and second generation relative to the third.

Chapter 4 examines the relationship between leaving one's parental home and BMI using growth curve models. The development of young adult socioeconomic status and the transition to adulthood is often a bumpy road associated with many other transitions. Individuals attend college and develop an emerging socioeconomic status, leave their parents' home, move in with partners, and begin to define themselves as adults. In addition to these contextual transitions, health behaviors also change dramatically during this time period (Nielsen, Siega-Riz, and Popkin, 2002; Tucker et al., 2005; Wane et al., 2010; Larson et al., 2007). One of the most important transitions that many young adults experience during this time period is leaving the parental home. Home leaving may be especially important to children of immigrants as it separates them from the cultural protection provided by their parents. To test this idea, I examine the effect of home leaving on BMI during the transition to adulthood, while simultaneously considering the other transitions (partnering and college attendance) young adults are making at this time.

Chapter 2: BMI TRAJECTORIES DURING THE TRANSITION TO ADULTHOOD BY GENERATION

The United States has experienced high levels of immigration for the last four decades, specifically from Latin America and Asia. *Healthy People 2010* focuses on reducing health disparities and increasing quality years of life, and it lists overweight as one of the leading health indicators. Overweight and obesity increase the probability of many types of health concerns, including cardiovascular disease, diabetes, respiratory disease, and joint issues (Daniels, 2006). Research on immigrant health generally finds that immigrants have better outcomes than either white natives or their native-born same-race/ethnic peers despite their low human and physical capital; however, increasing acculturation is associated with converging health outcomes. This phenomenon has been termed the negative health assimilation and has been found to apply to drinking, smoking, substance use, infant mortality, pregnancy outcomes, mortality, chronic conditions, and overweight and obesity (Palloni and Arias, 2004; Hummer et al., 2008; Landale, Oropesa, and Gorman, 2000; Antecol and Bedard, 2006; Blumenthal, 2002; Carter, 2002; Fried and Nestle, 2002; Gordon-Larsen et al., 2003).

The integration of this current wave of immigrants is usually examined through the lenses of two different theories of assimilation: classical and segmented. Classical assimilation was developed to explain the integration process of the first wave of U.S. immigrants who entered prior to the 1960s and were largely white (Portes and Zhou, 1993). According to this theory, over time immigrants and their children become indistinguishable from other mainstream Americans. This theory assumes that all immigrant groups will assimilate eventually and views assimilation and acculturation as a generally positive thing (with the exception of health). Segmented assimilation theory, however, was developed to explain the most current wave of immigrant experiences. This theory states that this wave of immigrants differs from the first

wave in race/ethnicity and skill level, plus the de-manufacturing and hourglass economy in the United States has largely eliminated the low-skill jobs that provided economic opportunity to the first wave of immigrants. Immigrants may experience rapid social mobility largely brought on by cohesive families and communities or negative assimilation where immigrants and their children assimilate to the largely racialized underclass[1]. Immigrant health and obesity is yet one more indicator of the problems immigrants encounter, for as other situations improve for immigrants (economically or linguistically, for example) their health usually deteriorates. Obesity is an important indicator to focus on because is related to poor health, labor market, and educational outcomes (Daniels, 2006; Warner et al., 1999; Averett and Korenman 1999; Sorensen and Sonne-Holm, 1985).

This study incorporates life course stage and nativity to examine weight gain as adolescents enter adulthood, with a focus on those of Mexican ethnicity. While many studies have documented the positive increase in weight across generations, most of these studies are based on cross-sectional samples (see Van Hook and Balistreri, 2007 and Van Hook and Baker, 2010 for exceptions). Examining individuals over time allows for the examination of patterns of weight gain instead of inferring them from multiple cross-sectional waves of data. In this project I use the *National Longitudinal Survey of Youth 1997-2008* to examine changes in BMI among immigrants and the children of immigrants. I focus on comparisons by gender and ethnicity when sample size permits. For example, some analyses will compare 1.0, 1.5 and second generation youth to the third generation, controlling for race/ethnicity for both genders together and for males and females separately. Other analyses will take into account ethnicity by comparing first and second generation Mexican-Americans to third generation Mexican-Americans, whites, and blacks. I focus on Mexicans because they are the largest group of

1 These two theories are described in much greater detail in Chapter 1.

immigrants, have low socioeconomic status, and tend to be a heavier group especially among latter generations (Census, 2008; Gordon-Larsen et al., 2004; Telles and Ortiz, 2008). My key research aim for this chapter is to examine weight trajectories from adolescence to adulthood by generation and ethnicity. This paper differs from other published research by examining weight trajectories, focusing on ethnicity, and focusing on the transition to adulthood.

The Epidemiological Paradox, Immigrant Health, and Obesity

The assimilation theories discussed above have been successfully applied to many outcomes including educational attainment, occupation, residential patterns, living arrangements, marriage, education, and wages (Oropesa and Landale, 2004; Van Hook and Glick, 2007; Brown, 2005; Smith, 2003). For these outcomes, immigrants tend to come with an initial disadvantage or unique patterns that are attributed to cultural orientations retained from their countries of birth. Through continued acculturation, immigrants and their children become indistinguishable from other mainstream Americans and often overcome their initial economic disadvantage. However, health outcomes are different. Immigrants actually tend to have *better* health than their native-born peers, despite their economic disadvantage. This phenomenon is referred to as the epidemiological paradox and has been found for many health outcomes, such as mortality, chronic conditions, infant mortality, functional limitations, and overweight/obesity, across Asian, Hispanic, and black immigrant groups (Antecol and Bedard, 2006; Landale et al., 2000; Palloni and Arias, 2006; Cho, Frisbie, and Rogers, 2004; Popkin and Udry, 1998; Goel et al., 2004; Frisbie et al., 2007).

The immigrant paradox is usually explained using one of three theories: the healthy immigrant effect, salmon bias, and cultural/social protection. The healthy immigrant effect refers to the idea that migration is not a random process. Rather, migrants are selected from their

origin communities based on several factors (Rumbaut, 1997). In particular, unhealthy individuals may be less likely to migrate compared to healthier individuals due to the arduous and stressful process of international migration (Palloni and Arias, 2006). However, research in Mexico suggests that health explains little of the decision to migrate to the United States (Rubleclava et al., 2008). The salmon bias hypothesis is similar to the healthy immigrant effect, but concerns return migration rather than immigration, whereby less-healthy immigrants return to their country of origin. The cultural/social protection hypothesis is the idea that immigrants are believed to have cultural orientations that protect their health from the negative impact of their lower SES. These protective cultural factors are assumed to have been brought by immigrants from their countries of origin. As immigrants assimilate, they lose these protective factors and their health deteriorates.

Changes or generational differences in health or the weight status of immigrants and their children are usually understood using the negative health assimilation model. This idea corresponds most closely with the last explanation given above, namely that immigrants are healthier due to their cultural/social protection. Not only are the foreign-born healthier than the native-born, but this advantage also tends to deteriorate with increasing duration or generation in the United States (Antecol and Bedard, 2007; Popkin and Udry, 1998; Gordon-Larsen et al., 2004).

The negative health assimilation model posits that increased exposure to the American environment, where cheap energy dense foods are readily available and people are more likely to rely on cars and adopt fairly sedentary lifestyles, results in immigrants adopting these negative health habits (Van Hook and Balistreri, 2007; Lara et al., 2004; Antecol and Bedard., 2005). Among adults and adolescents, generational status and duration of US residence are positively

associated with BMI and overweight (Antecol and Bedard, 2005; Popkin and Udry, 1998; Kaplan et al., 2004). Using *Add Health* data, Popkin and Udry (1998) find that the prevalence of overweight increased with generation for both Hispanic and Asian boys and girls. Similarly, Antecol and Bedard (2006) find that among Mexican-American adults, the most newly arrived immigrants (those who have been in the United States for five years or fewer) have lower BMIs than immigrants who have been here longer and natives. For women, they find that immigrants catch up to natives' BMI within ten years and men close a third of the gap in 15 years.

However, both of these studies apply cross-sectional samples to examine whether increasing acculturation in the form of generation or duration is associated with convergence to the weight status of natives. This is a concern as different cohorts of individuals are taken from different time periods when overweight and obesity were less common in both the United States and in many of the sending regions. For example, the prevalence of overweight among Mexican resident women doubled (33% to 66%) over the course of a ten-year period, 1985 to 1995 (Rivera et al., 2004). Women who arrived prior to 1985 would be from a much thinner cohort than later immigrants, but they would also be older (age increases the risk of obesity). This may confound the relationship between duration and generation. Recent research questions whether immigrants actually converge to the levels of obesity and BMI found in natives. Parks and colleagues (2009) use pooled cross-sectional data from multiple years to examine both the level and increase in BMI for immigrant and native cohorts over a ten-year period. They find that immigrants are thinner than natives and both groups gain weight over time, but immigrants gained less weight than natives, leading to continued and growing divergence rather than convergence. Past research addressing health and immigrants has focused largely on adults (Antecol and Bedard, 2006; Park et al., 2009; Kaplan et al., 2004) and young children of

immigrants (Van Hook and Balistreri, 2007; Van Hook, Baker, and Altman, 2009; Van Hook and Baker, 2010). Along with the transition to adulthood and adolescence being important for the uptake and maintenance of healthy habits which will be addressed below, this is an especially critical time for assimilation as immigrants and children of immigrants make important steps toward independence such as completing high school, marrying, childbearing, attending college, and getting a job. Immigrants and children of immigrants may assimilate less than others, retaining more of their cultural orientations (such as continuing to speak Spanish, or marry/date others of similar ethnicity/generation) and limiting their contact with mainstream institutions such as college. These could have important implications for their health and assimilation that could stick with them as they enter adulthood.

Health behaviors and the transition to adulthood.

Experiences in adolescence have a significant impact on later adult health outcomes either directly, such as becoming less physically active or quitting smoking, or indirectly through their effect on educational and occupational outcomes (Link and Phelan, 1995; Nelson et al., 2008). Health habits, such as weight gain, physical activity, and diet undergo significant changes during this time period (Gordon-Larsen et al., 2004; Mokdad et al., 1999; Nelson et al., 2008; Tucker et al., 2005). This age has also been identified as a critical point for the adoption of negative health behaviors such as smoking, binge drinking, and marijuana use (Tucker et al., 2005).

This age period also represents an important time of increased risk for obesity. Between 1991 and 1998, 18-29 year olds showed the greatest percentage increase in obesity compared to all other adult age groups (Mokdad et al., 1999). More recent data also indicate a continuing increase in obesity from 1999 to 2004 for this age group (Ogden et al., 2002). These increases

follow adolescents into adulthood. Few obese adolescents move into the non-obese category as they enter adulthood and many non-obese adolescents become obese in adulthood (Gordon-Larsen et al., 2004).

This age group is also marked by an increase in poor dietary habits (Lien, Lytle, and Klepp, 2001; Larson et al., 2007). Daily fruit and vegetable consumption drops precipitously as adolescents move into adulthood. Roughly half of all 14-year-old boys and girls reported daily fruit and vegetable consumption at age 14, but this had dropped to about 20% when they were re-interviewed at age 21 (Lien et al., 2001). Larson and colleagues (2007) also show a significant decreased consumption of fruit and vegetables as adolescents approach adulthood. Additionally, this trend has worsened over time. Fruit and vegetable consumption among adolescence showed a significant decrease from 1999 to 2004. While fruit and vegetable consumption decrease, other poor dietary habits, such as fast food consumption, increase. Adolescents and young adults consume more fast food than any other age group (Paeratakul et al., 2003).

The Present Study

This chapter builds upon past research in two key ways: first, by focusing on comparison groups and, second, by examining patterns over time. Past research that examines weight and weight trajectories by generation either compared all immigrants to natives without making within ethnic comparisons, used broad ethnic categories (such as Hispanic or South Asian), or compared immigrants to native whites (Popkin and Udry, 1998; Gordon-Larsen, Pierra, and Harris, 2009; Sanchez-Vaznaugh et al., 2008; Balistreri and Van Hook, 2009). However, the research presented here examines changes across the whole sample controlling for race/ethnicity and examines within ethnic comparisons focusing on Mexican-Americans. I compare first and second generation Mexican-Americans to third generation Mexican-Americans, whites and

blacks. I focus on Mexicans for several reasons. They are the largest immigrant group in the US and given the close geographical distance as well as a long history of U.S. migration this group will likely continue to increase. Also, unlike many of the Asian immigrant groups who have prospered in the US, Mexican-Americans have struggled, as evidenced by decreasing rather than increasing educational outcomes by the second generation. Finally, this group also has very high levels of overweight and obesity especially by the third generation. Given the volume of Mexico-to-United States migration, understanding the health advantage of the first generation is highly significant. Immigrants make up a significant minority of the population and have better health than those with similar sociodemographic attributes. Also, immigrants, particularly Mexicans, have several factors that put them at risk for overweight and obesity, such as low SES and unsafe neighborhoods; therefore, this group may have exceptionally high rates of obesity compared to whites at later generation and duration (Smith, 2007; Meich et al., 2006; McLaren, 2007; Drewnowski and Specter, 2004). Accurately documenting this advantage and understanding the potential factors that contribute to it could help in lowering the level of overweight and obesity in the US.

Second, I examine weight trajectories to see whether the pattern of weight gain differs by generation. During the transition from adolescence to adulthood most individuals gain weight. Some of this weight gain is a natural occurrence as individuals complete puberty and arrive at their adult age while the rest is just gains in adiposity. Failing to examine individuals longitudinally as opposed to cross-sectionally can lead to erroneous conclusions about convergence and divergence in weight gain patterns by generation. If immigrants weigh less upon arrival to the US but their weight status converges to that of natives, then one would expect immigrants to show a significantly lower weight at baseline and a faster growth in weight

compared to the third generation. In addition, salmon bias can affect cross-sectional results. If lighter individuals were more likely to return to their home countries, this would make it appear that immigrant cohorts gained weight with increasing time in the country, even if individual immigrants did not gain weight over time.

Data and Methods

The data for this project come from the *National Longitudinal Study of Youth* (*NLSY*), 1997 cohort. The *NLSY* is a nationally representative random sample of approximately 9,000 youths who are followed annually for 11 years. This sample was derived from randomly selected households from 147 primary sampling units (metropolitan statistical areas, counties, or groups of counties). Any household containing a youth between the ages of 12 and 16 as of December 31, 1996 was considered eligible to participate in the study, whether the youth was away at school, hospitalized, incarcerated, or in any other type of institutional facility.

The original cohort consisted of 8,894 respondents who were initially interviewed. Attrition varied by waves, with the highest at 19% in wave 10. Roughly, 11% of the respondents attrite at each wave, though many were followed up at later waves. The data are organized into a person period file (N = 78,973 records) with one record contributed by respondents for each year they were interviewed. The analytic sample excludes 13% of the total possible records from waves in which respondents were not interviewed and an additional 15% who had invalid responses for the analytic variables for that wave. Appendix B gives a more thorough description of how respondents are excluded and included in the analytic sample.

Most interviews were conducted in person using a computer-assisted personal interviewing system (CAPI) device. This allowed respondents to respond to questions using the computer rather than telling information to an interviewer and may help obtain more accurate

responses to sensitive questions. Respondents who could not be contacted in person were given telephone interviews. Incentives to participate in the survey were offered at each round and were increased in round six and round 11.

Dependent variable.

BMI. Body mass index (BMI) is a commonly used measure to examine adiposity among individuals and is calculated as weight/height^2. I use reported height and weight. Though somewhat controversial, I use BMI in its raw form as opposed to transforming it into percentile BMI or BMI z-scores. Research that examines adolescents and children converts BMI into percentiles and z-scores to reduce bias due to differences in developmental phase (based on age in months) and differences in weight gain by developmental phase for boys and girls. However, the BMI percentile and z-score measures created by the Center of Disease Control (CDC) were created using cross-sectional samples of children and adolescents. As such it masks normal changes in weight related to peaks in height and non-linear peaks in BMI (Cole et al., 2003; Berkey and Colditz, 2006). The variability within this measure is large and represents a wide range of actual change in adiposity. For example, a one z-score increase in BMI over the course of a year is associated with an increase of 2.2 kg/m² to 8.9 kg/m² or a weight gain of 13.3 to 53.6 pounds, for a 15-year-old girl holding height constant (Berkey and Colditz, 2006). Also, the metric in time for this project is age in months, the same measure used by the CDC to calculate BMI z-scores, and estimates are collected on a yearly basis over the course of 12 years. Another concern is that percentile BMI standardizes across sex. Boys and girls enter puberty at different ages and boys tend to lose weight during this phase while girls gain weight (Wang, 2002). To examine any potential gender bias introduced by using raw BMI, I conduct all analyses on both the entire sample and then separately by gender.

Reported and measured height and weight are generally very close to each other, but issues arise if misreporting height and weight systematically differs by generational/ethnic groups. For example, Antecol and Bedard (2006) found in their study of nativity differences in BMI that immigrant women misreported their weight by a factor of 1.2%, while native women misreported by 2.3%. There were no nativity differences for men. In addition, when using reported height and weight to calculate BMI, it is better to leave it continuous. Using cut-offs to make classifications leads to serious miss-classification errors (obese vs. non-obese), but only small differences in BMI (29.5 vs. 30.0) (Stewart et al., 1987).

In preliminary analyses, I adjusted reported height and weight measures using the same technique used by Antecol and Bedard (2006). I found that, while there were differences in mis-reporting by generation, using either the corrected height and weight data or the un-corrected height and weight data produced similar results. As such, I use reported height and weight without correcting for the error between reported and measured height and weight.

Independent variables.

Generation.

Generational status is determined by respondents' and parents' responses to questions concerning place of birth. If respondents were born outside of the United States or its territories, then they are defined as the first generation. This question is asked in wave one, but has a high level of missingness. If respondents have an invalid response to this question, then they are asked again in waves five to 12 until a valid response is reached. Among the first generation, I further differentiate adolescents by age of arrival. Those arriving in the United States before age six are classified as belonging to the 1.5 generation, and those arriving age six or older as the 1.0 generation. The 1.5 generation arrived in the US before schooling, so they had prolonged

exposure to American schools and have spent most of their life in the United States (Rumbaut, 1995). Questions concerning age at arrival are asked in wave five, and if respondents had an invalid response, then they were asked in the following waves until a valid response was reached.

If the respondent was born in the US, but at least one parent was born outside the United States, then he/she is defined as the second generation. Parents' nativity status was asked in wave one, and there is no missingness on this variable. Lastly, if both the respondent and both parents were born in the US (or only one parent if there is only information available for one parent), then they are defined as the third generation. Thus, generation is measured using four dummy variables, 1.0 generation, 1.5 generation and second generation, and the third generation. Third generation is the reference category and is left out of the analyses. Therefore, the generational coefficients represent the difference between that generation and the third generation.

***Mexican ancestry*.**

Whether or not the respondent is of Mexican descent is determined using several indicators, including place of birth of the parent, and whether the parent or child self-identifies as having Mexican, Mexican-American, or Chicano ancestry. Unfortunately, the *NLSY* does not ask the respondent about their place of birth. Therefore, for the first generation, place of birth is inferred using parents' place of birth. If the respondents indicated that they are foreign-born and that their parent(s) were born in Mexico, then they are coded as a first generation Mexican immigrant. I realize that this introduces a level of uncertainty; however, it is highly unlikely that a large percentage of the foreign-born individuals with Mexican-born parents were born in places other than Mexico. Lastly, I determine Mexican ancestry for the third generation from questions

concerning specific ethnicity asked in wave three. If the respondents indicated that they were Hispanic and they listed their primary ethnic group as Mexican, Mexican-American, or Chicano, they are coded as having Mexican ancestry.

Age.

Age is measured in months and is centered at the first observation. Doing so allows for easier interpretation of the coefficients and represents the influence of a variable at baseline (e.g. 1997). A squared term is also entered into the model. Several interactions between the quadratic and generation were tested. None were significant so they were dropped from the model.

Mother's education ***in 1997.***

Parents' SES is proxied by mother's years of education. However, education of the main parental figure is used for individuals who reported that they did not live with their mother or other female parental figure. This is measured continuously.

Controls.

I control for several time varying and non-time varying controls. The non-time varying controls include parents' weight status, family status in 1997, the respondent's gender, and race/ethnicity (black, Mexican, other Hispanic, white, and other).

Parents' weight status is measured using three dummy variables: parent obese (BMI ≥30), parent overweight (BMI ≥25 and BMI <30) and parent BMI missing, with normal weight as the reference (BMI<25). Parents' height and weight are collected from the parent interview, but these responses have a high level of missingness (16% of the respondents have missing information for this item). Rather than excluding these respondents or dropping parent weight status as an analytic variable, a dummy variable indicating whether parent BMI is missing is used.

Family status in 1997 is measured using four dummy variables: two-parent family (reference), single-parent family, step-parent family, and other family type. If the respondent indicated living with either both biological or both adoptive parents, the code is having two parents (reference category). If the respondent indicated living with one biological parent or adoptive parent and one parent who was not biological or adoptive parent (either married or cohabiting with their biological/adoptive parent), then the code is living in a step family. If the respondent reported living with only one parent, then the code is living in a single-parent family. All other family types are captured by the residual category, other family type.

The time varying controls are obtained from each wave. These include marital status (single vs. married or cohabiting), pregnancy (I control for pregnancy status, and, in a separate analysis, I recode BMI to missing in waves that women reported they were pregnant), number of own children (both residential and non-residential), employment status, self-rated general health (1=excellent to 5=poor), and number of cigarettes smoked in that month. Table 1 presents descriptive statistics for the analytic sample.

Table 1. Descriptive Statistics for Analytic Variables

	Wave 1[1]		Person Record	
	Mean	Std Dev.	Mean	Std Dev.
BMI	21.70	4.07	24.96	5.49
1.0 Generation	0.020	0.140	0.026	0.159
1.5 Generation	0.021	0.143	0.027	0.162
Second Generation	0.090	0.286	0.116	0.320
Third or higher Gen.	0.868	0.339	0.829	0.376
White	0.711	0.453	0.536	0.499
Mexican-American	0.077	0.266	0.139	0.346
Other Hispanic	0.030	0.171	0.046	0.209
Black	0.147	0.354	0.253	0.435
Other	0.034	0.183	0.026	0.159
Age	178.13	17.58	248.20	45.63
Male	0.520	0.500	0.509	0.500
Female	0.480	0.500	0.491	0.500
Pregnant	0.003	0.054	0.021	0.144
Total Number of Children	0.007	0.090	0.301	0.709
Number of cigarettes per month	1.028	3.480	2.749	6.426
Single	0.999	0.030	0.787	0.410
Married or Cohabiting	0.001	0.030	0.213	0.410
Employed	0.513	0.508	0.706	0.477
Not Employed	0.482	0.500	0.282	0.450
Self Rated Health	1.889	0.878	2.051	0.927
Mother's Education	13.034	2.743	12.646	2.938
Parent's Weight Status				
Overweight	0.254	0.435	0.265	0.442
Obese	0.198	0.398	0.228	0.420
BMI Missing	0.137	0.344	0.133	0.340
Normal weight	0.411	0.492	0.373	0.484
Family Status in 1997				
Single Parent	0.255	0.436	0.302	0.459
Step-parent family	0.160	0.367	0.147	0.354
Other family type	0.006	0.076	0.006	0.080
(Two parents)	0.579	0.494	0.544	0.498
N	7,993		78,973	

[1]Wave 1 is weighted using custom weights

Pooled sample

Analysis

To examine BMI trajectories I use unweighted growth curve modeling techniques. Growth curve models are well suited for modeling baseline levels and the direction and magnitude of change in developmental outcome measures such as BMI (Heo et al., 2003). The models simultaneously estimate effects for Level-1 units (the multiple observations for each respondent across age) and Level-2 units (the respondent). The Level-1 model fits BMI as a function of age and age squared across the observations for each respondent and the Level-2 model fits the Level-1 intercepts and coefficients across all individuals as a function of respondents' fixed characteristics. The first equation estimates the associations of individual-level factors with the respondents' baseline BMI in 1997 (the "intercept" model), while the second equation estimates their associations with growth in BMI (the "slope" model). The Level-1 model is:

$$Y_{ij} = \pi_{0i} + \pi_{1i}\,\text{Time}_{ij} + \pi_{2i}\,\text{Time}_{ij}^{2} + \varepsilon_{ij}$$

where Y_{ij} is the individual i's BMI at time j; π_{0i} is individual i's true initial status when the value of time = 0; π_{1i} represents individual i's true rate of change during the time period under study. Time, measured as age in months, is centered around the mean age at the first wave, the average age of respondents at wave one. The quadratic term for time is π_{2i} and measures non-linear change in BMI. The error term, i.e., the proportion of individual i's outcome that is unexplained at time j is $\varepsilon_{ij.}$. The error term is assumed to be randomly distributed and independent with a mean of 0 and non-constant variance. Level-2 models inter-individual difference in change as a function of the adolescent's fixed characteristics.

The Level-2 model is:

$$\pi_{0i} = \gamma_{00} + \gamma_{01}\text{Generation}_i + \gamma_{02}\text{Family of Origin SES}_i + \mathbf{Z}_{0i} + \zeta_{0i}$$

$$\pi_{1i} = \gamma_{10} + \gamma_{11}\text{Generation}_i + \gamma_{12}\text{Family of Origin SES}_i + \mathbf{Z}_{1i} + \zeta_{1i}$$

$$\pi_{2i} = \gamma_{20} + \zeta_{2i}$$

where **Z** is a vector of control variables**.** To determine whether generational status is associated with BMI trajectories, I examine whether the 1.0, 1.5, or second generation have a lower baseline BMI (as indicated by the γ_{01} coefficients) and slower growth in BMI compared to children of natives (as indicated by the γ_{11} coefficients). In this model, age in months was the measure of time. Nested growth curve models are used to test the previously listed hypothesis. These models are run separately for the whole sample and the Mexican, white, and black sub-sample. The first model includes the race/ethnicity and generation variables. This allows me to examine whether generational differences exist before controls are entered in the model and the extent that the controls mediate or suppress the generational effects. The second model adds all control variables (Z) this allows me to examine the extent that controls mediate or suppress the generational coefficients. The third and final model adds mother's education. This allows me to examine the extent that low maternal education suppresses the generational coefficients even after controls are entered in the model. The log likelihood test is performed to see if including the variables in each additional model improves model fit.

For the Mexican, white, and black sub-sample, the 1.0 and 1.5 generations are combined due to sample size limitations. Preliminary analyses on the Mexican, white, and black sub-sample indicates a similar pattern in BMI between 1.0 and 1.5 generation Mexican-Americans. Lastly, past research has demonstrated important gender differences in health and assimilation, so I ran the analyses separately by gender (Antecol and Bedard, 2006; Popkin and Udry, 1998; Van Hook, Baker, and Altman, 2009; Van Hook and Baker, 2010).

Results

Tables 2a-5b present the growth curve models for the various groups. Table 2 shows the growth curve models for the whole sample controlling for race/ethnicity and gender. For ease in interpretability, I present graphs of the BMI trajectories by generation from 1997 to 2008 based on the full model in Figure 1. Model 1 in table 2 demonstrates that the 1.0 generation has a BMI that is, on average 1.31 lower than the third generation ($p<0.001$). For someone who is 65 inches tall, this is a difference of about 8 pounds. The 1.5 generation has a BMI that is about .5 lower ($p<0.1$), for someone 65 inches tall this is a difference of about 3 pounds. Additionally, both the 1.0 and 1.5 generation has an annual change in BMI that is about .08 lower than the third generation. Differences between rate of growth and baseline BMI for the second generation are not statically different than those found for the third generation. Model 2 adds controls. Including the controls significantly improves the model fit (chi square = 5,108, $p <0.001$) and this reduces the generation coefficients on both baseline and rate of growth, but rate of growth and the 1.0 generation baseline coefficients remain significant. Model 3 adds mother's education. Including this variable significantly improves the model fit (chi square = 38, $p <0.001$) and including this variable strengthens the coefficients for the immigrant generation on baseline (-1.16 for the 1.0 generation and -0.36 for the 1.5 generation). This suggests that the low maternal education of the immigrant generations suppresses some of the difference between the immigrant generations and the third generation. If the immigrant generations had the same maternal educational attainment as the third generation, they would be even thinner compared to the third generation.

Table 2a presents predicted baseline and rate of change for each generation group and the results of tests of the significance of group differences. Significant differences between groups

are tested using post-estimation commands that provide a chi-square test to determine whether the difference between two groups are significant without switching out the reference category. According to my first hypothesis one would expect the 1.0 generation to have the lowest baseline BMI, followed by the 1.5, then the second generation, with the third generation having the highest baseline BMI. Indeed, I do find that the 1.0 generation and the 1.5 generation have a significantly lower baseline BMI than the third generation, with the 1.5 generation falling between the 1.0 and the third generation. The difference between the immigrant generations and the third generation strengthen once controls and family of origin SES are entered into the model. This is especially true for the 1.5 generation, suggesting that once the relative disadvantage of this group is accounted for, they have a lower baseline BMI than the third generation. The difference in baseline BMI between the 1.0 generation and the 1.5 is small, but statistically significant. This pattern where the least acculturated are the healthiest is consistent with the literature on health and assimilation.

Table 2. Unweighted Growth Curve Models of the Relationship between BMI and Generational Status

	Model 1		Model 2		Model 3	
	Baseline	Rate of Change	Baseline	Rate of Change	Baseline	Rate of Change
Intercept	21.559 ***	0.6211 ***	21.180 ***	0.579 ***	21.384 ***	0.621 ***
Intercept^2		-0.0164 ***		-0.019 ***		-0.019 ***
1.0 Generation	-1.309 ***	-0.0809 *	-1.145 ***	-0.070 *	-1.166 ***	-0.073 *
1.5 Generation	-0.497 †	-0.0891 **	-0.346	-0.076 **	-0.358 *	-0.078 **
Second Generation	-0.059	-0.0187	-0.042	-0.016	-0.052	-0.018
(White)						
Mexican-American	1.244 ***	0.114 ***	0.739 ***	0.008	0.691 ***	0.006
Other Hispanic	0.745 **	0.05089 *	0.441 †	0.073 ***	0.422 †	0.063 ***
Black	1.424 ***	0.04042 ***	0.707 ***	0.037	0.697 ***	0.033
Other	0.191	-0.0146	0.275	-0.006	0.287	-0.004
Male			0.379 ***		0.380 ***	
(Female)						
Pregnant			1.728 ***		1.726 ***	
Total Number of Children			0.385 ***		0.380 ***	
Number of cigarettes per month			-0.018 ***		-0.018 ***	
Single			-0.390 ***		-0.389 ***	
(Married or Cohabiting)						
Employed			-0.030		-0.030	
Self Rated Health			0.146 ***		0.145 ***	
Mother's Education					-0.015	-0.003 *
Parent's Weight Status						
Overweight			1.172 ***	0.037 **	1.170 ***	0.037 **
Obese			2.667 ***	0.109 ***	2.659 ***	0.108 ***
BMI Missing			1.214 ***	0.024	1.203 ***	0.022
(Normal weight)						
Family Status in 1997						
Single Parent			0.477 ***		0.468 ***	
Step-parent family			0.023		0.016	
Other family type			0.162		0.188	
(Two parents)						
-2 Log Likelihood	360551		358010		357990.7	
VARIANCE COMPONENTS						
Intercept	15.815 ***		14.262 ***		14.249 ***	
Time	0.422 ***		0.414 ***		0.414 ***	
Time squared	0.003 ***		0.002 ***		0.002 ***	
With-in	3.166 ***		3.092 ***		3.092 ***	

† = p<0.1, * = p<0.05, ** = p<0.01, *** = p < 0.001

Pooled Sample, person year file; n=78,973

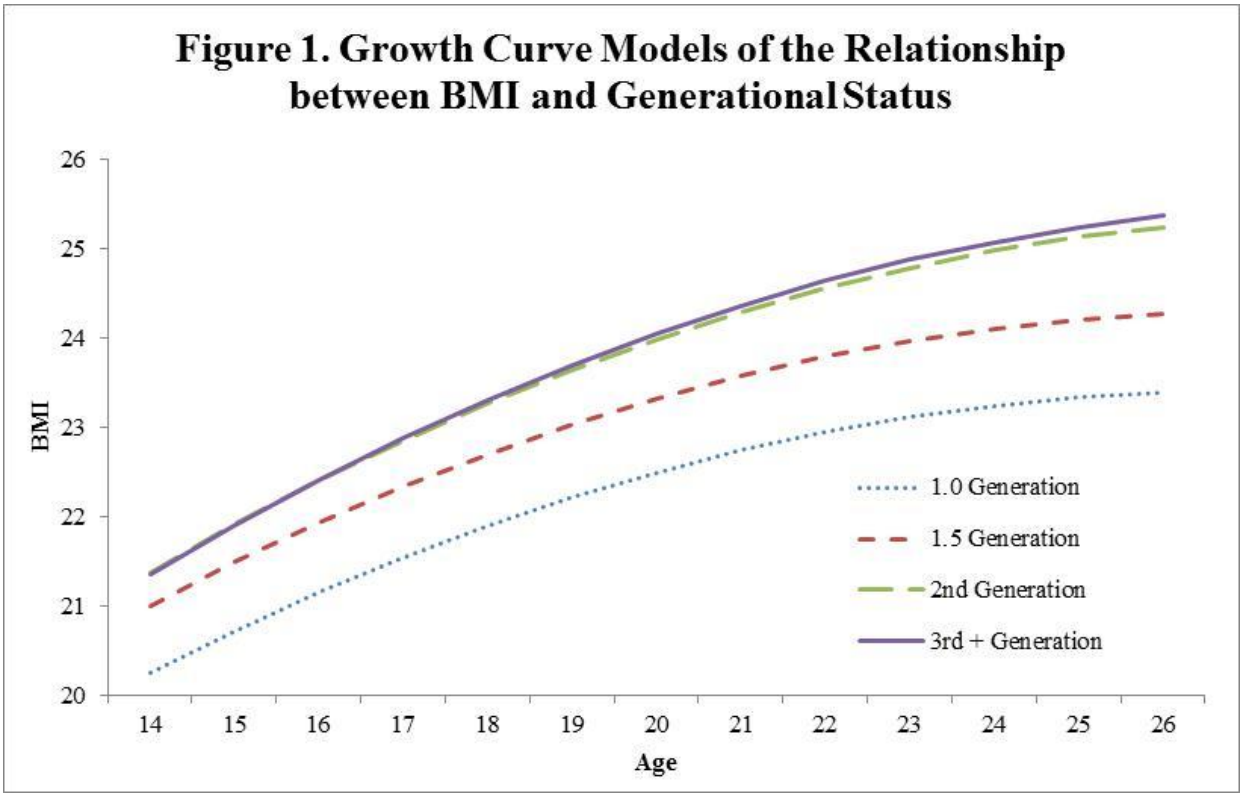


Table 2a. Adjusted BMI Trajectories by Generation

	Intercept	Rate of Change
1.0 Generation	20.09 A, B, C	0.48 B, C
1.5 Generation	20.79 C	0.50 C
2nd Generation	21.22	0.55
3rd + Generation	21.37	0.56

A= significantly different from 1.5 Generation

B= significantly different from 2nd Generation

C= significantly different from 3rd + Generation

Focusing attention on the rate of change, I find a similar pattern as described above for baseline BMI. Once controls are entered into the model, the 1.0 and 1.5 generation have a significantly slower rate of change than either the second generation or the third generation. This is contrary to the hypothesis that the immigrant generations would have a faster rate of change than the third or higher and eventual convergence in BMI between the immigrant generation and the third generation with increased time in the US. Rather, I find that the difference between the

immigrant and native generations increases with time.

Tables 3 and 4 replicate the second table separately for boys and girls, respectively, and Tables 3a and 4a give the predicted baseline and rate of change for each generation and tests for group differences. The generational patterns for girls and boys are similar to those found for the whole sample, but the significance levels vary. For girls, both the 1.0 and 1.5 generation have significantly lower rate of change, but only the 1.0 generation has a lower baseline BMI compared to the third generation once family of origin SES is controlled. For boys, once controls for family of origin SES are entered into the model, the only significant generational difference occurred between the 1.0 generation and the second and third generation in the case of baseline BMI and rate of change in BMI.

Table 3. Unweighted Growth Curve Models of the Relationship between BMI and Generational Status Among Boys

	Model 1		Model 2		Model 3	
	Baseline	Rate of Change	Baseline	Rate of Change	Baseline	Rate of Change
Intercept	21.228 ***	0.58400 ***	22.105 ***	0.644 ***	21.886 ***	0.633 ***
Intercept^2		-0.01347 ***		-0.022 ***		-0.022 ***
1.0 Generation	-1.665 ***	-0.08506 †	-1.262 **	-0.081 *	-1.225 **	-0.079 *
1.5 Generation	-0.568	-0.10060 *	-0.473	-0.058	-0.447	-0.054
Second Generation	-0.163	-0.03387	-0.115	-0.002	-0.098	-0.001
(White)						
Mexican-American	1.379 ***	0.12250 ***	0.740 **	0.094 ***	0.676 **	0.091 ***
Other Hispanic	0.876 *	0.03397	0.336	0.061 *	0.299	0.059 †
Black	2.064 ***	0.10240 ***	0.336 †	-0.036 *	0.308 †	-0.038 *
Other	-0.174	-0.06536	0.614	0.031	0.651	0.033
Total Number of Children			0.172 ***		0.170 ***	
Number of cigarettes per month			-0.013 ***		-0.013 ***	
Single			-0.308 ***		-0.307 ***	
(Married or Cohabiting)						
Employed			-0.061 *		-0.061 *	
Self Rated Health			0.144 ***		0.144 ***	
Mother's Education					-0.021	-0.001
Parent's Weight Status						
Overweight			1.181 ***	0.019	1.162 ***	0.019
Obese			2.396 ***	0.064 ***	2.373 ***	0.062 ***
BMI Missing			1.456 ***	0.000	1.433 ***	-0.001
(Normal weight)						
Family Status in 1997						
Single Parent			0.199		0.171	
Step-parent family			-0.253		-0.279	
Other family type			-0.790 *		-0.808 *	
(Two parents)						
-2 Log Likelihood	177967		177475.0		177468.000	
VARIANCE COMPONENTS						
Intercept	15.532 ***		14.367 ***		14.365 ***	
Time	0.405 ***		0.401 ***		0.402 ***	
Time squared	0.002 ***		0.002 ***		0.002 ***	
With-in	2.864 ***		2.855 ***		2.855 ***	

† = p<0.1, * = p<0.05, ** = p<0.01, *** = p < 0.001

Pooled Sample Boys, person year file; n=40,621

Table 3a. Adjusted BMI Trajectories by Generation, Boys

	Intercept	Rate of Change
1.0 Generation	20.66 B, C	0.55 B, C
1.5 Generation	21.44	0.58
2nd Generation	21.79	0.63
3rd + Generation	21.89	0.63

A= significantly different from 1.5 Generation

B= significantly different from 2nd Generation

C= significantly different from 3rd + Generation

Table 4. Unweighted Growth Curve Models of the Relationship between BMI and Generational Status Among Girls

	Model 1		Model 2		Model 3	
	Baseline	Rate of Change	Baseline	Rate of Change	Baseline	Rate of Change
Intercept	21.228 ***	0.58400 ***	21.136 ***	0.496 ***	21.308 ***	0.555 ***
Intercept^2		-0.01347 ***		-0.016 ***		-0.016 ***
1.0 Generation	-1.665 ***	-0.08506 †	-1.404 **	-0.073 †	-1.425 **	-0.078 *
1.5 Generation	-0.568	-0.10060 *	-0.351	-0.075 †	-0.367	-0.081 *
Second Generation	-0.163	-0.03387	-0.167	-0.028	-0.178	-0.031
(White)						
Mexican-American	1.379 ***	0.12250 ***	0.837 ***	0.059 *	0.796 **	0.045
Other Hispanic	0.876 *	0.03397	0.579 †	0.015	0.563 †	0.010
Black	2.064 ***	0.10240 ***	1.246 ***	0.056 **	1.236 ***	0.052 **
Other	-0.174	-0.06536	0.032	-0.052	0.040	-0.049
Pregnant			1.783 ***		1.779 ***	
Total Number of Children			0.552 ***		0.545 ***	
Number of cigarettes per month			-0.026 ***		-0.026 ***	
Single			-0.482 ***		-0.482 ***	
(Married or Cohabiting)						
Employed			0.032		0.032	
Self Rated Health			0.135 ***		0.135 ***	
Mother's Education					-0.013	-0.004 *
Parent's Weight Status						
Overweight			1.141 ***	0.057 **	1.139 ***	0.056 **
Obese			2.952 ***	0.159 ***	2.946 ***	0.157 ***
BMI Missing			0.980 ***	0.047 *	0.972 ***	0.044 †
(Normal weight)						
Family Status in 1997						
Single Parent			0.712 ***		0.706 ***	
Step-parent family			0.301		0.296	
Other family type			1.804 *		1.824 *	
(Two parents)						
-2 Log Likelihood	182007		179936.8		179924.6	
VARIANCE COMPONENTS						
Intercept	15.914 ***		13.850 ***		13.835 ***	
Time	0.433 ***		0.412 ***		0.412 ***	
Time squared	0.003 ***		0.003 ***		0.003 ***	
With-in	3.479 ***		3.332 ***		3.332 ***	

† = p<0.1, * = p<0.05, ** = p<0.01, *** = p < 0.001

Pooled Sample Boys, person year file; n=39,252

Table 4a. Adjusted BMI Trajectories by Generation, Girls

	Intercept	Rate of Change
1.0 Generation	19.78 B, C	0.39 C
1.5 Generation	20.69	0.41 C
2nd Generation	20.99	0.45
3rd + Generation	21.17	0.48

A= significantly different from 1.5 Generation

B= significantly different from 2nd Generation

C= significantly different from 3rd + Generation

Table 5 presents the results for the Mexican, white, and black sub-sample. This analysis compares those of Mexican ancestry by generation to third generation whites and blacks. Preliminary analyses indicated that the major generational difference for Mexican-Americans occurred between those born in the US and those born outside the US. Therefore, the 1.0 and 1.5 generation were combined to preserve sample size. Model 1 includes only the generation/ethnicity dummy variables, and indicates that native born Mexican Americans, both the second and third generation, are significantly heavier at baseline. They have a BMI that is about 1.2 higher in wave 1 than third generation whites. Additionally, they also have a higher annual change in growth of BMI compared to third generation whites. They gain about 0.1 BMI more every year than third generation whites. First generation Mexican-Americans have a minimally significantly higher rate of growth in BMI. Model 2 adds the controls variables. Including these variables significantly improves the model fit (chi-square = 4,098.2, $p < 0.001$). Including the controls reduces the positive generation coefficients for baseline and rate of growth. The coefficients for generation/ethnicity are nearly halved after including the controls and the significance is reduced for all generation/ethnic groups. Finally, Model 3 adds mother's education. Including this variable significantly improves the model fit (chi-square = 40.1, $p < 0.001$) and further reduces the positive coefficients for baseline and rate of growth in BMI for second and third generation Mexican-Americans. This suggests that some of the difference

between initial BMI and rate of change between second and third generation Mexican-Americans is due to their low maternal educational attainment. Interestingly, this does not seem to be true for first generation Mexican-Americans and will be explored in greater detail in Chapter 3.

Table 5a presents the predicted baseline and rate of change for each generation/ethnic group, and Figure 1 graphs the predicted BMI trajectories. Post-estimation tests using chi-square to test for differences between the different generation/ethnic groups are employed. Mexican immigrants have similar patterns of weight gain and baseline BMI to third generation whites and significantly lower baseline BMI than the second or third generation Mexican-Americans and blacks. The second and third generation Mexican-Americans follow BMI trajectories that more closely mirror that of blacks. These findings suggest that with increasing generational assimilation, Mexican-Americans begin to more closely resemble native blacks.

Figure 2. Growth Curve Models of the Relationship between BMI and Generational Status and Ethnicity

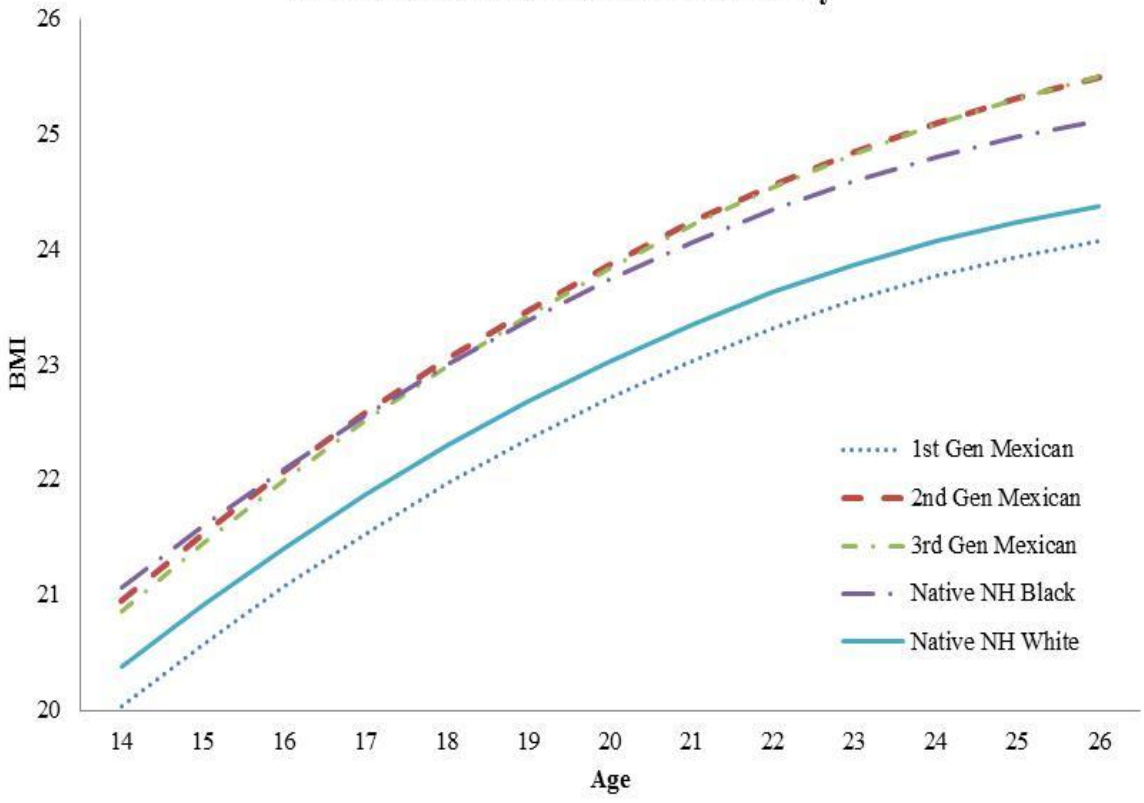


Table 5. Unweighted Growth Curve Models of the Relationship between BMI and Generational Status and Ethnicity

	Model 1		Model 2		Model 3	
	Baseline	Rate of Change	Baseline	Rate of Change	Baseline	Rate of Change
Intercept	21.602 ***	0.61780 ***	20.640 ***	0.576 ***	20.470 ***	0.552 ***
Intercept^2		-0.01605 ***		-0.019 ***		-0.019 ***
First Gen. Mex-Am	0.039	0.05637 †	-0.244	0.018	-0.181	0.050
Second Gen. Mex-Am	1.225 ***	0.09812 ***	0.714 ***	0.059 **	0.646 **	0.046 *
Third Gen. Mex-Am	1.290 ***	0.09531 ***	0.866 ***	0.067 **	0.696 ***	0.065 *
Third Gen. Black	1.447 ***	0.04269 ***	0.762 ***	0.012	0.759 ***	0.016
(Third Gen. White)						
Male			0.307 **		0.311 **	
(Female)						
Pregnant			1.709 ***		1.705 ***	
Total Number of Children			0.376 ***		0.369 ***	
Number of cigarettes per month			-0.019 ***		-0.019 ***	
Single			-0.409 ***		-0.409 ***	
(Married or Cohabiting)						
Employed			-0.021		-0.021	
Self Rated Health			0.138 ***		0.137 ***	
Mother's Education					-0.018	-0.004 *
Parent's Weight Status						
Overweight			1.196 ***	0.040 **	1.179 ***	0.040 **
Obese			2.645 ***	0.094 ***	2.630 ***	0.092 ***
BMI Missing			1.248 ***	0.018	1.243 ***	0.016
(Normal weight)						
Family Status in 1997						
Single Parent			0.423 ***		0.391 **	
Step-parent family			-0.055		-0.092	
Other family type			0.060		0.036	
(Two parents)						
-2 Log Likelihood	317119		315070		315049.6	
VARIANCE COMPONENTS						
Intercept	15.681 ***		14.559 ***		14.542 ***	
Age	0.429 ***		0.423 ***		0.423 ***	
Age Squared	0.003 ***		0.003 ***		0.003 ***	
With-in	3.229 ***		3.153 ***		3.153 ***	

† = p<0.1, * = p<0.05, ** = p<0.01, *** = p < 0.001

Mexican, white, and black subsample, person year file; n=68,073

Table 5a. Adjusted BMI Trajectories by Generation and Ethnicity

	INTERCEPT	SLOPE
1st Gen Mexican	20.29 A, B, C	0.60
2nd Gen Mexican	21.12 D	0.60 D
3rd Gen Mexican	21.17 D	0.62 C, D
Native NH Black	21.23 D	0.57
Native NH White	20.47	0.55

A=significantly different from the 2nd Gen Mexican
B=significantly different from 3rd Gen Mexican
C=significantly different from native NH Black
D=significantly different from native NH White

To examine gender differences, Tables 6a and 6b present the predicted baseline and rate of change for each group for boys and girls, respectively. Among boys, the first generation's trajectory is similar to that which is found for native whites (baseline = 20.9 and 20.65 and annual rate of change is 0.61 and 0.62 for whites and first generation Mexican-Americans, respectively). However, the second generation appears to be at especially high risk. They have the highest baseline BMI (21.61), significantly higher than all other groups except blacks, and a fast rate of change (0.69), significantly greater than both blacks and whites. Prior research has also documented the vulnerability of second generation boys in both baseline weight and weight gain for young children (Van Hook and Baker, 2010). Third generation Mexican-American boys have a similar baseline BMI (20.85) as whites and blacks, but have the fastest rate of change (0.7), significantly greater than both whites and blacks. For girls, the first generation also follows a BMI trajectory similar to that among whites (baseline BMI is 20.31 and 20.21 and annual rate of change is 0.47 and 0.47 for whites and first generation Mexican-Americans, respectively). In contrast to boys, second generation Mexican girls do not appear as vulnerable (baseline BMI is 20.89 and annual rate of change is 0.49). They do have a significantly higher

baseline BMI than whites but their rate of change is similar to that found for whites. Also, second generation girls have a significantly lower baseline than black girls. The pattern for third generation Mexican-American girls is similar to that found for the second generation (baseline BMI is 21.14 and annual rate of change is 0.49).

Table 6a. Adjusted BMI Trajectories by Generation and Ethnicity, Boys

	INTERCEPT	SLOPE
1st Gen Mexican	20.65 A	0.62 B
2nd Gen Mexican	21.61 B, D	0.69 C, D
3rd Gen Mexican	20.85	0.70 C, D
Native NH Black	21.08	0.56 D
Native NH White	20.90	0.61

A=significantly different from the 2nd Gen Mexican
B=significantly different from 3rd Gen Mexican
C=significantly different from native NH Black
D=significantly different from native NH White

Table 6b.Adjusted BMI Trajectories by Generation and Ethnicity, Girls

	INTERCEPT	SLOPE
1st Gen Mexican	20.21 B, C	0.47
2nd Gen Mexican	20.89 C	0.49
3rd Gen Mexican	21.14 D	0.49
Native NH Black	21.55 D	0.54 D
Native NH White	20.31	0.48

A=significantly different from the 2nd Gen Mexican
B=significantly different from 3rd Gen Mexican
C=significantly different from native NH Black
D=significantly different from native NH White

Discussion

Past research has demonstrated that immigrants' health deteriorates with increasing assimilation and eventually converges to the pattern found for natives. However, these findings

are based on examining cross-sectional samples of individuals by generation and duration and little research has examined how the health of immigrants changes over time. The research presented in this chapter expands upon past research by examining BMI trajectories by generation. In general, I find that the least acculturated (as indicated by generational status) have the lowest baseline and rate of change. However, rather than converging over time with natives, immigrants maintain their initial advantage and the disparity widens, favoring the immigrant generation.

This effect appears to be stronger for girls than boys, though gender interactions were not tested. This is similar to other research examining gender, acculturation, and health. This research tends to find that acculturation has a stronger beneficial effect on health for females compared to males (Lara et al., 2004). However, this differs from cross-sectional research on adults that finds that immigrant women's BMI converge to levels of natives with increasing duration, reaching that of natives after ten years (Antecol and Bedard, 2006). For males, they find the disparity reduces but does not converge; there was no convergence even after 15 years or more of U.S. duration. This result may be due to the fact that their study examined differences by duration in the U.S. cross-sectionally rather than longitudinally. Though they do factor in cohort effects, their research cannot control for possible salmon bias, a factor that does not play a role in my longitudinal analysis.

While I do not find that immigrants' BMI converge to that of natives over time, I do find evidence of generational assimilation. Increasing generation is associated with increasing baseline BMI and rate of change. Past research has also found generational assimilation in overweight among adolescents (Popkin and Udry, 1998).

Early theories of immigrant assimilation stated that over time immigrants and their

offspring will become indistinguishable from the American mainstream, often called straight line assimilation. Theories concerning acculturation and assimilation tend to be vague concerning how time should be measured, generationally or with U.S. duration. Assimilation as described by Gordon (1964) views assimilation as occurring over generations. Indeed, I do find generational convergence, such that the 1.0 generation has the lowest baseline and rate of change, followed by the 1.5 generation and the second generation has a trajectory similar to the third generation.

However, I also find that the immigrant generations maintain their initial advantage relative to natives and actually gain less weight during this time period than natives. Rather than catching up to the BMI of natives, I find continued and increasing divergence between immigrant generations and natives. Past research finds that experiences early on in life, influence diet and risk of obesity later in life (Krahnstoever, Francis, and Birch 2005; Skinner et al 2002; Mannella et al 2002; Fiorito et al., 2010). Immigrant generations may bring with them healthier habits that persevere even in the face of their new obesity-promoting environment. The importance of early life experiences on conditioning future risk of obesity are further validated by the finding that both the 1.0 and 1.5 generation have slower growth in obesity than natives, but the difference between the immigrant generations is not significant.

I also find that it is important to examine within ethnic generational differences in weight assimilation. I focus on Mexican-Americans and compare the first and second generation Mexican-Americans to the third generation Mexican-Americans, whites, and blacks. I find that the BMI trajectory of first generation Mexican-Americans is similar to that for whites and significantly different than second and third generation Mexican-Americans and blacks. This finding echoes the literature on the epidemiological paradox, wherein immigrants are not

significantly different from natives on measures of health despite their low SES (Hummer et al., 2006). This finding differs from other published research that uses the *Add Health* data, which shows first generation Mexicans as heavier than those born in the US. The *NLSY 97* is based on all households in the United States while *Add Health* is a school-based survey. Research has found that using school based samples to examine Mexican adolescent immigrants can lead to a serious under-count and severely bias one's results (Landale and Oropesa, 2009). The discrepancy between these findings and previous findings suggest that using a school-based sample may upwardly bias the prevalence of overweight among first generation Mexican-Americans.

Examining gender differences I find that among boys, second generation Mexican-Americans appear especially vulnerable with high baseline and rate of change. This is similar to other research that finds, among boys, that the second generation may have especially high rates of overweight (Van Hook and Baker, 2010). However, among girls, the pattern is quite different due mostly to the very high BMI of black girls and much lower BMI of second generation Mexican-Americans. Second generation Mexican-American girls have a baseline BMI that is in between the first and third generation Mexican-Americans and significantly lower than blacks.

The results of this chapter are largely descriptive. Future research would benefit by examining differences in mechanisms linking generational status to overweight, such as physical activity, sleep, or differences in activities as adolescents enter adulthood. It is surprising that the immigrant generations retain their initial advantage and that the difference between the immigrant generations and the native generations increases as they enter adulthood. Research on the transition to adulthood finds diverging paths for immigrants and children of immigrants as they enter adulthood compared to children of natives (Kasinitz et al., 2009). For example, the

first and second generations leave their natal home later, and some attend college while others go directly into the workforce. The next two chapters examine whether different pathways into adulthood account for the generational differences we see in this chapter.

Chapter 3: FAMILY OF ORIGIN SOCIOECONOMIC STATUS, OWN EMERGING SOCIOECONOMIC STATUS AND BMI BY GENERATION

The previous chapter found that immigrant generations have a significantly lower BMI in adolescence and slower growth in BMI as they transition into adulthood than the third generation. Within the first generation, those who arrived after the age of six have even slower growth in BMI and a lower adolescent BMI. Rather than convergence, which has been found in some cross-sectional studies, I find that there is continued divergence over time. Immigrants start off thinner and gain less weight than natives. Among the Mexican-American sub-sample, I find that the first generation has a significantly lower BMI than second or third generation Mexican-Americans, and the difference between whites and first generation Mexican-Americans on BMI was non-significant. This finding is consistent with literature concerning the Hispanic paradox, where less assimilated Latino/as have better health outcomes than those who are more assimilated and have health outcomes similar to whites.

However, I also find that the second generation has the highest adolescent BMI in both the full sample and the Mexican-American sub-sample. Among the Mexican-American sub-sample, second generation Mexican-Americans are at especially high risk; they have a high adolescent BMI and rate of change as they transition into adulthood and by the final wave they have one of the highest mean BMIs of any group. This is consistent with research on young children that finds that children of immigrants are heavier than children of natives (Van Hook and Baker, 2010; Van Hook, Baker, and Altman, 2009). This research suggests that this may be due to the difficulty parents have in navigating the obesogenic US environment, the extent that they view obesity as a health concern, and other factors that immigrant families often face such as food insecurity, working long hours, and living in more disorganized neighborhoods (Van

Hook and Balistreri, 2006; Massey, 1986; Portes and Rumbaut, 2001; Pong and Hao, 2007). This would explain the high adolescent BMI among the second generation, but does not explain the accelerated growth in BMI as they then transition into adulthood. As the second generation moves into adulthood they develop more autonomy and hence exert more decision-making about their diet and leisure time activities. The contexts in which these children find themselves could have important implications for their weight status.

One of the main contributors to variation in context among individuals is socioeconomic status. The epidemiological paradox, which is described in detail in the previous chapter, is paradoxical because immigrants tend to have far less physical, human, and social capital than natives, but equal or better health (Hummer et al, 2008). However, simply controlling for socioeconomic status may not make sense if the socioeconomic status-health relationship differs between groups. Recent research on obesity has suggested that socioeconomic status may moderate the negative health-assimilation relationship, such that those with the lowest socioeconomic status experience the most weight gain with assimilation while those with higher socioeconomic status experience no effect or improved outcomes (Van Hook and Balistreri, 2007; Sanchez-Vaznaugh et al., 2008; Baker, Balistreri, and Van Hook, 2008).

I examine two aspects of socioeconomic status: family SES during adolescence and emerging SES in young adulthood, defined as educational attainment with a focus on college attendance. Past research has not examined whether these factors vary by generation. However, among adults in general, these factors have been found to have unique and separate contributions on adult weight (Baum and Ruhm, 2009). While past research has not examined whether these factors vary by generation, there are several reasons to believe that this would be the case. Among immigrant children and children of immigrants, emerging SES may act differently than

family's socioeconomic status. As I argue below, socioeconomic status, especially education, reflects not only one's social position and access to resources (which is related to origin SES), but also may reflect experiences in key socializing institutions, such as college (which is reflected in emerging SES). Such institutions may be particularly influential among the children of immigrants, as they provide these individuals with the necessary tools to navigate their current environments and may also provide a thinner reference group to which they judge their own weight.

Socioeconomic status and health: Increasing wallets and decreasing waistlines.

Socioeconomic status is positively linked to many positive health outcomes, including lower prevalence of obesity. Link and Phelan (1995; Link et al., 2004) view SES, broadly defined as an individual's position in different social spheres, as a fundamental cause of disease. Socioeconomic status is an upstream factor, one that influences whether people become sick from the start. Those with fewer resources are less able to protect themselves from disease and more likely to live and be employed in health hazardous environments. Higher SES individuals can afford relaxing vacations, leisure time for physical activity, more nutritious foods, better housing, etc. Also, those with more resources are better able to deal with the negative consequences of sickness, such as medical costs, lost wages, and stronger social networks for physical and emotional support. Ross and Mirowsky (2003) view one aspect of SES, education, as particularly important for health, as opposed to other common measures of SES such as income, occupation, or wealth. While the relationship between obesity and SES is negative in general, the relationship is more complicated than the one found for other health outcomes.

Theories linking socioeconomic status and health.

Link and Phelan (1995) theorize that the socioeconomic gradient in health arises because

those with greater resources are more likely to become aware of new health risks and better situated to enact protective factors to avoid the risk. High SES individuals are more likely to respond, and respond more quickly to new information concerning health hazards and benefits. For example, prior to the 1960s the health risks of smoking were not well known and there was no socioeconomic gradient in smoking. However, as the health risks of smoking became known a gradient began to emerge as those with higher SES were less likely to start smoking and more likely to quit if they already did smoke (Ernster, 1988; Novotny et al, 1988). Those with low SES also tend to live in areas with more health hazards and less health benefits. For example, Gordon-Larsen and colleagues (2006) used geo-coded *Add Health* data and found that low SES individuals and minorities were more likely to live in census blocks that had fewer facilities for physical activity, such as parks, the YMCA, or fitness centers, compared to their more advantaged peers. The average education of a census block is positively associated with the number of facilities, and, holding SES constant, increases in the number of facilities had a positive, significant effect on physical activity and significantly reduced the odds of overweight. Similarly, other research has found that low income areas have 2.5 times more fast food outlets and fewer grocery stores than wealthier areas (Avcedo-Garcia et al., 2008; Riedpath et al., 2002).

Link and Phelan (1995) are less concerned about which element of socioeconomic status influenced health and more concerned about how people's positions in different spheres (education, income, gender, race, etc.) are related to a series of differential health risks and outcomes. Ross and Mirowsky (2003), however, view education as the most important factor influencing health and that education moderates the relationship between health and other socioeconomic status measures, such as income and economic hardship. Especially pertinent to research on young adults, education is the first marker of adult social status and acts as a main

avenue of upward mobility (Ross and Mirowsky, 2003). The process by which they say education influences health is through learned effectiveness, which includes the habits and skills of self-direction or a form of personal control over life events. Learned effectiveness influences economic prosperity, enables the adoption of a healthy lifestyle (regular exercise, restricting caloric intake, etc.) and mitigates the ill effects of personal economic hardship and neighborhood disorder. Although Ross and Mirowsky (2003) state that these effects are likely to snowball across the life course, I find evidence of the importance of higher education on BMI from a very young age in adulthood.

Ross and Mirowsky (2003) also dismiss the idea that social origins, not education, are the primary driver of the positive relationship between education and health. Those who come from better backgrounds are more likely to have a better health environment than those from lower origins and are also more likely to attend college, procure lucrative jobs, be embedded in more influential networks, and transfer wealth to their children. However, social origin does not perfectly explain individuals' educational attainments or their adult health statuses. Social origin only explains about 40% of the variation in educational attainment, and the influence of social origins on educational attainment is much weaker for non-white groups compared to whites (Hertz, 2003; Dunkin and Hodge, 1963). Minority groups are less able to transfer their socioeconomic status to their children than whites. Also, education is positively related to health after controlling for social origin, and within social origins education is positively related to health. In fact, those from lower status backgrounds benefit the most from education. In this sense, immigrant children and children of immigrants, who often have lower social origins than children of natives, should benefit the most from increasing education.

Socioeconomic status and obesity.

While there is a well documented positive relationship between many indicators of health and SES, especially those related to mortality, the relationship between socioeconomic status and obesity is more complicated. Much research has demonstrated a negative relationship between obesity and SES, but these findings are not always consistent, varying by the socioeconomic indicator used and the demographic characteristics of the group examined.

Among children and younger adolescents, the relationship between socioeconomic status and obesity tends to be negative (Haas et al., 2003; Wang and Zhang, 2007). Family socioeconomic status may even moderate or mitigate the influence of many obesogenic factors such as having obese parents (Semmler et al., 2009), genetic propensity to develop obesity (Pigeyre et al., 2009), or neighborhood disorder (Power et al., 2009; Burdette, Wadden, and Whitaker, 2006). Factors such as parental monitoring, after school activities, sleep, physical activity, and diet, including soda consumption, have all been suggested as potential mechanisms linking low socioeconomic status of parents to child obesity (Lee et al., 2009; Miech et al., 2006; Van Hook, Baker, and Altman, 2009).

Among older adolescents and young adults, the relationship also tends to be negative, but this developmental period is somewhat complicated by the fact that both family origin and own emerging SES may influence obesity. Focusing on the transition to adulthood could also be particularly fruitful for understanding the factors that promote weight gain or obesity and also preventing obesity among adults. Adolescent obesity shows high rates of tracking into adulthood. Few obese adolescents move into the non-obese category as they enter adulthood and many non-obese adolescents become obese in adulthood (Gordon-Larsen et al., 2004). Experiences in adolescence have a significant impact on later adult health outcomes either

directly (becoming less physically active, quitting smoking, etc.) or indirectly through their effect on educational and occupational outcomes (Link and Phelan, 1995; Nelson et al., 2008).

Measures of SES tend to come from the household, family, or parents when examining children or younger adolescents. However, young adults have already started the process of attaining their own adult social status by entering the workforce and attending and finishing college, and while SES growing up influences the likelihood of college attendance for many young adults the correlation is not perfect. Ross and Mirowsky (2003) argue that educational attainment, not social origins, is the primary driving force between the positive health and socioeconomic status relationship. Therefore, young adulthood represents a key developmental phase to examine such an assertion.

Indeed, past research has found that emerging SES or young adult SES is significantly associated with obesity (Scharoun et al., 2008; Yang et al., 2008; Lee et al., 2009). Yang and colleagues (2008) use *Add Health* data to create a measure of SES that captures social standing among young adults (aged 18-26) by using education and occupation. They find that high SES, defined as having obtained a BA/BS or higher and working or enrolled in a BA/BS or graduate program, had lower odds of overweight compared to those who were inactive, or received no higher education and are working in a blue collar job. This held even after controlling for family SES, defined as parental occupation, family income, and maternal education, categorized by tercile.

Scharoun and colleagues (2008) expand upon this research by including more measures of own SES such as assets (own a vehicle, credit card, computer), public assistance use, and economic hardship (ability to pay rent/mortgage, have telephone service, etc.), and by examining race/ethnic variations, though they do not control for family of origin SES. They find a negative

relationship between schooling and obesity for women regardless of race/ethnicity, a negative relationship between economic hardship and obesity for white and Asian women, and a negative relationship between social advantage and obesity for Hispanic women. They find no significant differences by own SES for men.

Additionally, research that has examined the influence of mother's education and own education has found significant and independent effects on adult obesity for both measures. Own education explains some of the gap in BMI or obesity prevalence between those with low or high maternal education, but neither own nor maternal education fully explains the effect of the other and both are still significant when they are both entered into the model (Baum and Ruhm, 2009). Young adulthood may be an especially important time period to examine the relationship of own emerging SES on overweight as many children of immigrants make substantial gains over their parents' SES by attending college.

The immigrant exception? Socioeconomic status and obesity among the first and second generation.

Unfortunately, no research examines variation in the association of SES with obesity by nativity for young adults or adolescents, but prior research on older adults and young children provides some insight on expectations (Van Hook and Balistreri, 2007; Sanchez-Vaznaugh et al., 2008; Balistreri and Van Hook, forthcoming; Baker, Van Hook, and Balistreri, 2009). Among adults, prior research finds a positive-to-null relationship between education and BMI for the least acculturated immigrants (Sanchez-Vaznaugh et al., 2008). This finding is believed to be due to cultural orientations brought with them from their place of origin, where under-nutrition rather than over-nutrition tends to be a more serious health concern. So, being overweight can be seen as a sign of social standing (Sobal and Stunkard, 1989; Popkin, 1999).

In addition, the effect of assimilation or acculturation is moderated by socioeconomic status. Sanchez-Vaznaugh and colleagues (2008) use the *California Health Interview Survey* (*CHIS*) and find that among immigrants who arrived in the US within the last five years, those with the least and most education have the highest BMI. However, duration of U.S. residence is associated with a higher BMI among the least educated, but there is little change in BMI among the more highly educated. These two patterns result in a negative relationship between education and BMI that strengthens with increased duration of residence. This negative association is evident by the time immigrants have been in the US for 10 to 14 years and is still evident among those who have been in the US for 15 or more years and the native-US born.

Research among young children of immigrants finds similar results, where increasing acculturation (measured by parents' generation) is associated with higher BMI for children with low family SES (Van Hook and Balistreri, 2007). Further research conducted by Balistreri and Van Hook (2009) examines the potentially differing impact of family income and parental education on child's BMI in kindergarten and growth in BMI by parental nativity status for Hispanics and whites. The relationship between parental education and kindergarten BMI and growth is negative for whites and Hispanic children of immigrants. However, family income shows a relatively flat or positive gradient for Hispanic children of immigrants and a negative gradient for children of natives, especially among whites.

Drawing on segmented assimilation theory and other ideas about the pathways through which SES influences health (care, environment, and behaviors) suggests that this may be because immigrants are assimilating to the health patterns found among their destination class, that is, the class they are most likely to join. Past research suggests that education may be an important factor for the socialization of health behaviors (Ross and Mirowsky, 1999). Rather

than the potentially negative-to-null effect of family socioeconomic status found for children and immigrant adults, socioeconomic status, especially college attendance, may have a significant and negative impact on young adult BMI. This is because socioeconomic status, especially education, reflects not only one's social position and access to resources, but also may reflect experiences in key socializing institutions, such as college. This may be particularly relevant for the children of immigrants and may lead to socialization and acculturation toward the middle-class mainstream sensibilities about diet and exercise through increased interaction with middle-class peers in schools and colleges.

I hypothesize that not only will emerging SES be negatively related to weight for all generations, but that this relationship may even be stronger for children of immigrants compared to children of natives. Children of immigrants receive less help or money from their natal families, are more likely to face blocked opportunities (such as poor schools or neighborhoods), and are more likely to experience discrimination than white individuals from native-born families (Arnett, 2003; Portes and Rumbaut, 2001; Pong and Hao, 2007; Telles and Ortiz, 2008). Though children of immigrants tend to make huge educational strides over what their parents attain (Smith, 2005; Portes and Rumbaut, 2001), the lower material resources of immigrant parents mean that their children have less of a parentally-provided safety net to aid them during this time of rapid change. Schonei and Ross (2005) find that this form of support is especially important for young adults as parents continue to support them well into early adulthood. They estimate that parents spend about $38,000 for housing, education expenses, food, or direct cash assistance during the ages of 18 to 34, although assistance does decrease with age. These factors could lead to their own emerging socioeconomic status being more important than their parents. Indeed, Ross and Mirowsky (2003) suggest that education will have the biggest impact on health

for those with the lowest social origins.

Education is also an important factor in the assimilation process and is often cited as a reason why immigrant parents want to bring their children to the US or believe that the US is a better place for their children (Portes and Rumbaut, 2001; Telles and Ortiz, 2008; Kao and Tienda, 1999). Though education is admittedly an incomplete measure as many individuals have yet to fully obtain their adult socioeconomic status by their mid to late 20s, education represents an important indicator of future prospects. Indeed, college attendance is usually seen as a necessary precursor for entry into the middle class. Also, schools are important socializing institutions that may affect health behaviors and decrease the social space between immigrants and natives (Meyer, 1977; DiMaggio and Mohr, 1985; Telles and Oritz, 2008). While early life experiences have an important and long-lasting effect on future behaviors, socialization is an ongoing process and the institutions and people we interact with have important bearing on this process. Similarly, the period of young adulthood represents an important phase in the life course as individuals are re-inventing themselves and creating identities that are distinct from their family of origin (Elder, 1975; Shanahan, 2000).

Present Study

Past research and theory suggest that the effect of own compared to origin socioeconomic status may differ by generation. Past research on children has found that the effect of family SES on children of immigrant weight status is null-to-positive (Van Hook and Balistreri, 2007; Van Hook and Balistreri, 2009). Similar research on adults also suggests that there is a positive or null relationship between obesity and socioeconomic status. However, this relationship becomes more negative with increasing assimilation. I therefore hypothesize that:

H1a: The relationship between family socioeconomic status and BMI is significantly different for the first generation than it is for the third-or-higher generation.

H1b: The relationship between BMI and family socioeconomic status is positive to null for the first generation.

H1c: However, the gradient becomes more negative for the second generation and is strongest and most negative for the third generation.

Immigrant children and children of immigrants tend to have lower social origins than children of natives. According to Ross and Mirowsky (2003), this group has the most to gain, as far as health is concerned, by increasing their education. Also, children of immigrants tend to have less of a parentally-provided safety net during this transition, potentially increasing the importance of their own (Mollenkampf et al., 2008). Lastly, education, especially college, may be an important assimilating institution for immigrant children, allowing them to assimilate upwards where obesity is less prevalent by decreasing the social space between them and the mainstream middle class (Telles and Ortiz, 2008). I hypothesize that:

- **H2a**: The relationship between own emerging socioeconomic status is negative for all generations.

    1. Those with the lowest educational attainment will have the highest BMI across generations, net of family of origin SES.

    2. Those with the highest educational attainment will have the lowest BMI across generations, net of family of origin SES.

- **H2b**: However, the effect of own education will be stronger and negative for the first and second generation compared to the third generation.

Data and Methods

The data for this project come from the *National Longitudinal Study of Youth* (*NLSY*), 1997 cohort. This analysis uses data from wave 12 when respondents are in between the ages of 24 and 28. As is often the case in longitudinal surveys, the *NLSY* suffers from attrition and non-response. For example, 11% of the original 1997 sample was lost to follow up by 2008. Additional analyses were conducted to see how non-responders and those who left the sample differed from responders and those who stayed in the sample. Those who left the sample had a significantly lower BMI in 1997 than those who stayed in the sample (21.8 vs. 22.1, $p<0.05$). However, they did not differ on mother's education, completion of high school, generation, ethnicity, or age.

Analysis.

To test the hypotheses listed above I use nested OLS regression on both the pooled sample and the Mexican-American, white, and black sub-sample. The first model includes the generation and race/ethnicity dummy variables and all controls. This model provides a baseline and allows me to judge the extent that the generation coefficients change once own education and mother's education are entered into the model. Model 2 includes mother's education and own education. If the first and second generations have lower own and maternal education and own and maternal education is negatively associated with BMI then the negative difference between the first and second generation should strengthen. In the Mexican-American, white, and black sub-sample, the negative, but not significant, difference between first generation Mexican-Americans and third generation whites should strengthen, while the positive differences between

native born Mexican-Americans and third generation whites should decrease. Lastly, Model 3 includes interactions between generation and own and mother's education to examine whether the effect of these variables differ by generation. Nested F tests are used to determine whether including each set of variables improves model fit. Additionally, unlike the growth curve models presented in Chapter 2, all estimates have been weighted to correct for the sampling design of the survey. All variables for this analysis come from wave 12, unless otherwise noted.

Dependent variable.

BMI.

Body mass index (BMI) is derived using the same methods described in Chapter 2.

Independent variables.

Generation.

Generational status is derived using the same method described in Chapter 2.

Mexican ancestry.

Mexican ancestry is derived using the same method described in Chapter 2.

Emerging socioeconomic status.

This is a new variable introduced in this chapter. SES is harder to measure among young adults than older adults because many young adults have not yet completed their socioeconomic status attainment. However, following past research (Schraroun et al., 2009; Yang et al., 2008) and theories concerning the relationship between SES and health (Ross and Mirowsky, 2003), I use education as a measure of potential adult attainment. Education may be an important socioeconomic variable to examine for this age group, especially when looking at children of immigrants for the reasons listed previously. Education is measured using three dummy variables obtained from wave 12: less than a high school diploma, high school diploma or GED,

and currently enrolled in a four-year institution or received a bachelor's degree or higher.

I explored the effects of several variations of this measure, including distinctions between two-year and four-year college attendance, the number of months the respondent had been enrolled in a two-or four-year college, and whether those who received a GED were more similar to those with or without a high school diploma. Ultimately, many of the respondents who had ever attended a two-year college went on to attend a four-year college as well (34%) and the main difference appeared to be between those who attended a four-year college and those who did not. Measuring education as number of months enrolled had a similar effect as examining attendance. Enrollment is a continuous variable, while attendance is a dichotomous variable, derived from the enrollment data (coded as one if the respondent ever responded that they were enrolled in a four-year college). Attendance, rather than enrollment, was used because it does not bias the measure to the older respondents who have had longer to enroll in college.

Family of origin SES.

Parents' SES is measured by mother's education. Mother's education is derived using the same method described in Chapter 2.

Controls.

I control for several factors measured both during wave one and wave 12, and these are the same control variables listed in Chapter 2. The wave one controls include parents' weight status, family status in 1997, the respondent's gender, and race/ethnicity (black, Mexican, other Hispanic, white, and other). The wave 12 controls are marital status (single versus married or cohabiting), pregnancy (I control for pregnancy status, and in a separate analysis, I recode BMI to missing in waves that women reported they were pregnant), number of children, employment, self-rated general health (1=excellent to 5=poor), and number of cigarettes smoked in that

month. Table 1 reports the descriptive statistics for the analytic sample.

Table 1. Weighted Descriptive Statistics for the Analytic Sample

	Mean	Std. Dev.
BMI in 2008	26.930	5.864
BMI in 1997	22.082	0.049
Generation		
First Generation	0.046	0.209
Second Generation	0.092	0.289
Third Generation	0.862	0.345
Emerging SES		
Less than HS	0.085	0.279
X First Generation	0.005	0.072
X Second Generation	0.006	0.080
X Second Generation	0.048	0.002
Attend 4 year institution	0.449	0.497
X First Generation	0.021	0.144
X Second Generation	0.045	0.207
Family of Origin SES		
Mother's Education	13.015	2.801
Controls		
Age	316.499	17.503
Female	0.489	0.500
Male	0.511	0.500
White	0.710	0.196
Black	0.145	0.352
Mexican-American	0.080	0.272
Other Latino/a	0.034	0.180
Other	0.031	0.174
Number of children	0.693	1.023
Cigarettes per month	3.652	7.462
Never smoked	0.813	0.002
Past smoker	0.125	0.330
Current smoker	0.315	0.465
Pregnant	0.031	0.174
Single	0.487	0.500
Married or Cohabiting	0.513	0.478
Health	2.182	0.926
Employed	0.875	0.361
Parent's Weight Status in 1997		
Overweight	0.254	0.435
Obese	0.198	0.399
BMI Missing	0.143	0.351
Normal weight	0.404	0.480
Employed	0.859	0.377
Family Status in 1997		
Single Parent	0.257	0.437
Step-parent family	0.159	0.366
Other family type	0.006	0.080
Two parents	0.577	0.366

Weighted using custom weights for wave 12.
Pooled sample, wave 12 only; N=6,126

Results

Table 2 presents mean BMI at wave 12 by generation and own education and generation and mother's education; Ns are listed below the means. The first generation is significantly thinner (difference of 1.25 BMI) and the second generation significantly heavier than the third generation (difference of 1.12 BMI) among those with the lowest maternal education. The first generation also is significantly thinner among those with the second lowest maternal education quartile (difference of 1.39 BMI). Hypothesis 1a states that the effect of mother's education on BMI would differ between the first and later generations. The descriptive results suggest that this hypothesis is supported. The first generation has a lower BMI than later generations for those with low maternal education.

Table 2. Average BMI by Own Education and Mother's Education by Generation, Weighted

Own Education

	No HS		HS		Attend 4 year college	
	Mean	N	Mean	N	Mean	N
First Generation	26.93	52	26.55 *	156	24.88 * ł	133
Second Generation	29.65 *	67	28.47 *	336	25.55 * ł	306
Third Generation	27.57	485	27.61	2455	26.18 * ł	2123

Mother's Education

	1st Quartile		2nd Quartile		3rd Quartile		4th Quartile	
	Mean	N	Mean	N	Mean	N	Mean	N
First Generation	26.33 *	154	26.06 *	66	25.15 *	53	25.33	69
Second Generation	28.70 *	282	27.66	180	26.32 †	112	25.66 †	139
Third Generation	27.58	868	27.45	1916	27.00 †	1137	25.88 †	1150

*= significantly different from 3rd generation within education
ł =significantly different from HS within generation
†= signficantly different from 1st Quartile
Pooled sample, wave 12 only; N = 6, 126

Hypothesis 1b states that the relationship between mother's education and BMI is positive

to null for the first generation, though the relationship does appear to be negative. Indeed, I find that there are no significant differences in BMI by mother's education for the first generation. Hypothesis 1c states that the negative relationship between mother's education and BMI will strengthen with generation. However, the descriptive results suggest that the second generation's weight may actually be more sensitive to mother's education than the third generation's. Both the second and third generation have the lowest BMI among those with the highest maternal education within generation. The difference between the lowest and highest quartiles of mother's education is 3.04 BMI for the second generation and 1.7 for the third or higher generation. However, the second generation is significantly heavier than the third generation among those with the lowest maternal education. This may be due to confounding variables, such as own educational attainment. This possibility will be further explored in the multivariate analyses.

Hypothesis 2a states that own emerging socioeconomic status is negatively associated with BMI across all generations. Indeed, I find that within generation those who attend a four-year college are significantly thinner than those who only received a high school diploma or GED (referred to hereafter as high school). The difference in BMI between those with a high school diploma and those who attend college is 1.7 for the first generation, almost 3 for the second generation and 1.43 for the third generation. However, only among the second generations are those with less than a high school diploma significantly different from those with a high school diploma (with a difference in BMI of about 1.2). The main difference appears to be between those who attended a four-year college and those who did not.

Among the second generation, those with less than a high school diploma and those with a high school diploma are significantly heavier than the third generation (a difference in BMI of 2.08 and 0.86, respectively). Additionally, the first generation is significantly thinner than the

third among those with a high school diploma and among those who attend a four-year college, a difference in BMI of 1.06 and 1.3, respectively. This is in line with Hypothesis 2b which states that among children of immigrants, own emerging SES will have a larger impact, i.e. be more protective, on BMI than it will for children of natives. The second generation appears to be especially at risk; they have the highest BMI among the two lowest educational attainment categories, a place where many of the second generation find themselves. But among those who attend a four-year college, the second generation has a significantly lower BMI than the third generation, difference in BMI of 0.63.

Table 3 is the same as Table 2, but is based on the sub-sample that includes only Mexican-Americans and third generation blacks and whites. This enables me to examine country of origin differences within and to compare this ethnic group to whites, who disproportionately make up middle-class, mainstream America and blacks, who are commonly associated with the racialized underclass. The general pattern found among the full sample is replicated in the sub-sample. Among second generation Mexican-Americans, third generation Mexican-Americans, and whites, mother's education is negatively associated with BMI. In line with Hypotheses 1a and 1b, the association runs in the opposite direction for the first generation Mexican Americans. Those with the highest maternal education have the highest BMI, though these differences are small and not significant, most likely due to the small number of cases in these cells.

Table 3. Average BMI by Own Education and Mother's Education by Generation/Ethnicity, Weighted[\]

Own Education

	No HS		HS		Attend 4 year	
	Mean	N	Mean	N	Mean	N
First Gen Mexican	27.25	52	27.12	96	26.86 ł	37
Second Gen. Mexican	30.62 * ł	51	28.65 *	192	26.82 ł	199
Third Gen. Mexican	31.75 * ł	57	29.30 *	178	26.44 ł	95
Third Gen. Black	27.82	192	28.23 *	797	28.54 *	463
(Third Gen. White)	27.09	223	27.31	1373	25.83 ł	1495

Mother's Education

	1st Tercile		2nd Tercile		3rd Tercile	
	Mean	N	Mean	N	Mean	N
First Gen Mexican	26.85	95	27.71	50	27.49	38
Second Gen. Mexican	29.23 *	213	27.35 * †	77	26.69 †	56
Third Gen. Mexican	29.83 *	122	28.80 *	108	27.82 * †	100
Third Gen. Black	27.84	331	28.56 *	647	28.18 *	480
(Third Gen. White)	27.08	366	27.07	1093	26.13 †	1634

*= significantly different from 3rd gen. whites within education
ł =significantly different from HS within generation
†= signficantly different from 1st Quartile
Mexican, white, and black subsample, wave 12 only; N=5,401

Examining own education, those who attend college are significantly thinner than those who received only a high school diploma for every group except third generation NH blacks. This is in line with Hypothesis 2a. However, there are only 37 first generation Mexican-Americans who attend college. Therefore, care should be taken in interpreting results for this group due to power issues. The difference in BMI between those who went to high school and those who attend a 4 year college is 1.83 for second generation Mexican-Americans, 2.86 for third generation Mexican-Americans, and 1.48 for third generation whites. For third generation blacks the difference between those with a high school diploma and those who attend 4 year college is only 0.31. Additionally, second and third generation Mexican-Americans who

received less than a high school diploma are significantly heavier than those who received a high school diploma, a difference in BMI of 1.97 and 2.45, respectively. This is consistent with the negative gradient suggested by Hypothesis 2a. Also, among those who received less than a high school diploma, second and third generation Mexican-Americans have a significantly higher BMI than whites, a difference in BMI of 3.53 and 4.66, respectively. This partially supports Hypothesis 2b, since the influence of own education, at least on the low end of the spectrum, appears to have a stronger effect among second generation Mexican-Americans (but also third generation Mexican-Americans) than it does for third generation whites. Interestingly, among blacks, emerging socioeconomic status has no association with BMI, and those who attend college are the heaviest. Among blacks, emerging socioeconomic status appears to operate differently on BMI than it does for Mexican-Americans of any generation or whites.

In summary, and as suggested by past research, the first generation has a null-to-positive relationship with BMI and mother's education, but this relationship is relatively negative among the second and third generation. In addition, the descriptive statistics demonstrate college attendance is associated with a lower BMI for all groups examined. However, only among the second generation in the pooled sample and the second and third generation Mexican-Americans in the sub-sample are those who have less than a high school degree significantly heavier than those with a high school degree.

These general patterns are next examined in the nested multivariate regression models, controlling for the factors listed prior. Table 4 presents the regression coefficients on BMI for the full sample. The first model includes generation and controls. The results show that the first generation has a significantly lower BMI than the third generation, echoing the findings in the previous chapter. Model 2 adds the SES measures. Including these variables results in a

significantly better model fit. Net of controls, mother's education is negatively and marginally significantly associated with BMI. However, own education appears to have a stronger effect on young adult BMI than mother's education. Attending a four-year college is negatively associated with BMI compared to those who received only a high school diploma. Those who attend college have about 0.7 lower BMI than those who only received a high school diploma. For someone who is 65 inches tall it is a difference of a little over 4 pounds. This supports the findings in the descriptive analyses and Hypothesis 2a. Including these variables has only a minimal effect on the generation coefficients.

In order to test whether the influence of own or maternal education differs by generational status, interactions between own education, maternal education, and generational status are included in Model 3. Including these variables results in a significantly better model fit ($F = 2.37$, $p < 0.05$). A significant interaction indicates that this variable operates differently for this group compared to the reference group (third generation). Mother's education is only marginally significant for the third generation. Among the first and second generation the interactions with mother's education are positive, but fail to reach significance. Further analyses suggest that mother's education is not a significant predictor of young adult BMI within these generations, but the effect of mother's education for these generations is not significantly different than the effect for the third generation. This partially supports Hypothesis 1b. But, because the interactions are not significant this hypothesis is not fully supported.

Table 4. Weighted OLS Regression Models of the Relationship between BMI and Emerging SES, Family of Origin SES, and Generational Status

	Model 1	Model 2	Model 3
Intercept	25.165 ***	25.684 ***	25.650 ***
Generation			
First Generation	-1.515 ***	-1.533 ***	-1.245 *
Second Generation	-0.399	-0.377	0.196
Emerging SES			
Less than HS		-0.412	-0.482
X First Generation			0.024
X Second Generation			0.958
Attend 4 year institution		-0.686 ***	-0.532 **
X First Generation			-0.716
X Second Generation			-1.283 *
Family of Origin SES			
Mother's Education		-0.041 †	-0.091 **
X First Generation			0.079
X Second Generation			0.088
Adolescent BMI (asked in 1997)			
Age	0.019 ***	0.020 ***	0.020 ***
Male	0.931 ***	0.850 ***	0.834 ***
Black	0.640 **	0.583 **	0.595 **
Mexican-American	1.235 ***	0.988 ***	0.985 **
Other Latino/a	0.455	0.333	0.307
Other	0.226	0.246	0.288
Number of children	0.245 **	0.160 †	0.162 †
Smoking			
Cigarettes per month	-0.031 *	-0.035 *	-0.034 *
Past smoker	0.060	-0.053	-0.040
Current smoker	-0.269	-0.369	-0.375
Pregnant	1.033 *	1.029 *	1.017 *
Single	-0.265	-0.237	-0.238
(Married or Cohabiting)			
Health	1.271 ***	1.223 ***	1.219 ***
Employed	0.178	0.199	0.181
Parent's Weight Status			
Overweight	1.547 ***	1.512 ***	1.508 ***
Obese	3.555 ***	3.492 ***	3.493 ***
BMI Missing	1.681 ***	1.636 ***	1.645 ***
Family Status in 1997			
Single Parent	0.366 †	0.292	0.293
Step-parent family	-0.148	-0.261	-0.258
Other family type	0.784	0.714	0.773
Nested F		12.590 ***	2.370 *

† = p<0.1, * = p<0.05, ** = p<0.01, *** = p < 0.001
Pooled sample, wave 12 only; N = 6, 126

Turning to emerging socioeconomic status, Figure 1 presents predicted BMI by own education based off of the final model. Stars indicate significant differences within generation between those with a high school degree and those with either less than a high school degree or those who attended college. I find partial support for Hypothesis 2a and 2b. Within every generation, those who attend a four-year college are significantly thinner than those who only received a high school diploma. Among the first generation this effect is only marginally significant, while among the second and third generation it is significant and the strongest for the second generation. Similar to the descriptive statistics, the second generation is the only generation in which those who did not receive a high school diploma are significantly heavier than those who did, though only marginally. In support of Hypothesis 2b the interactions between education and second generation are significant and the gradient is negative. This suggests that the effect of own education is stronger for the second generation than it is for the third generation. However, I do not find that the effect of own education on BMI differs between the first and third generation, though the gradient is negative for both.

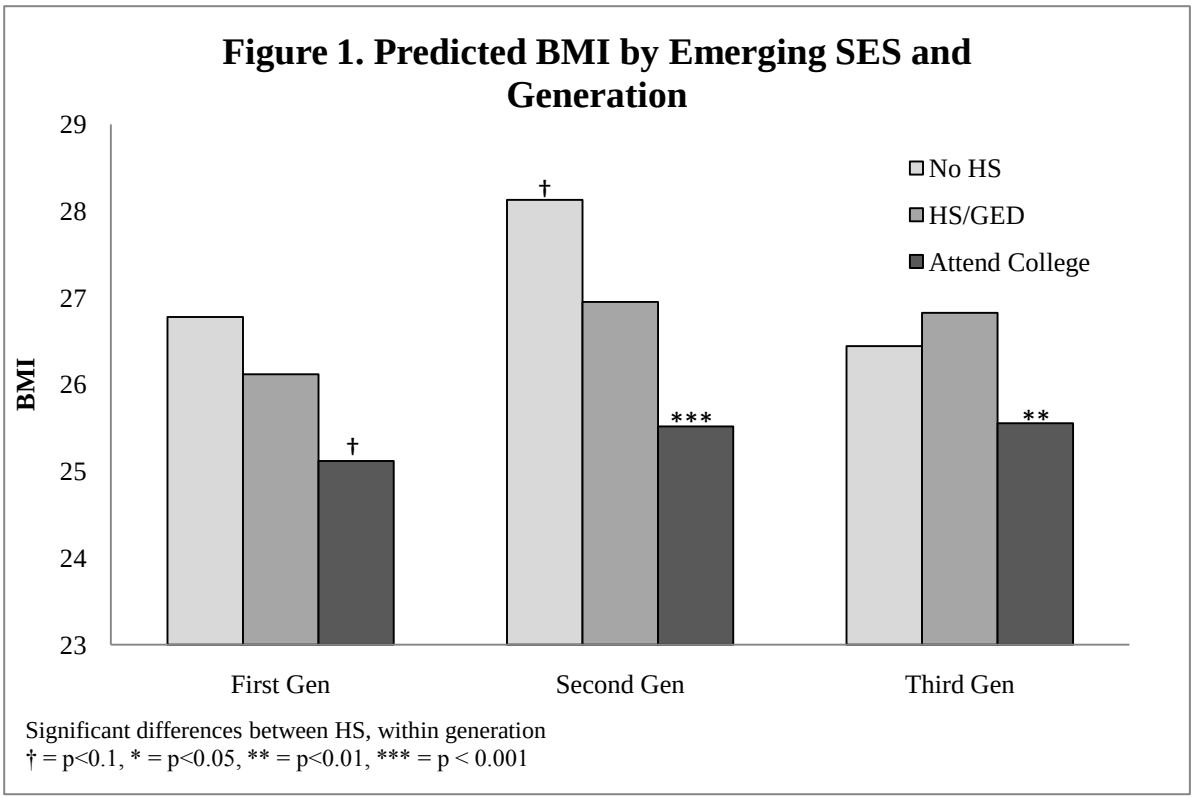


Table 5 presents the regression coefficients on BMI for the Mexican-American, white, and black sub-sample. Model 1 includes generation/ethnicity and the controls. The second and third generation Mexican-Americans and NH blacks are significantly heavier than third generation NH whites and there is no difference between first generation Mexican-Americans and whites. Model 2 adds SES measures, which significantly improve the model fit ($F = 8.91$, $p < 0.001$). Including the SES measures reduces the positive coefficients for the second generation to non-significance, suggesting that if the second generation had the same socioeconomic profile as whites, they would weigh roughly the same. The coefficients for the third generation Mexican-Americans and NH blacks are reduced, but they still retain their significant association with weight. Attending a four- year institution is negatively associated with BMI compared to receiving only a high school diploma. Also, mother's education is negatively, marginally associated with BMI.

Table 5. Weighted OLS Regression Models of the Relationship between BMI and Emerging SES, Family of Origin SES, Generational Status and Ethnicity

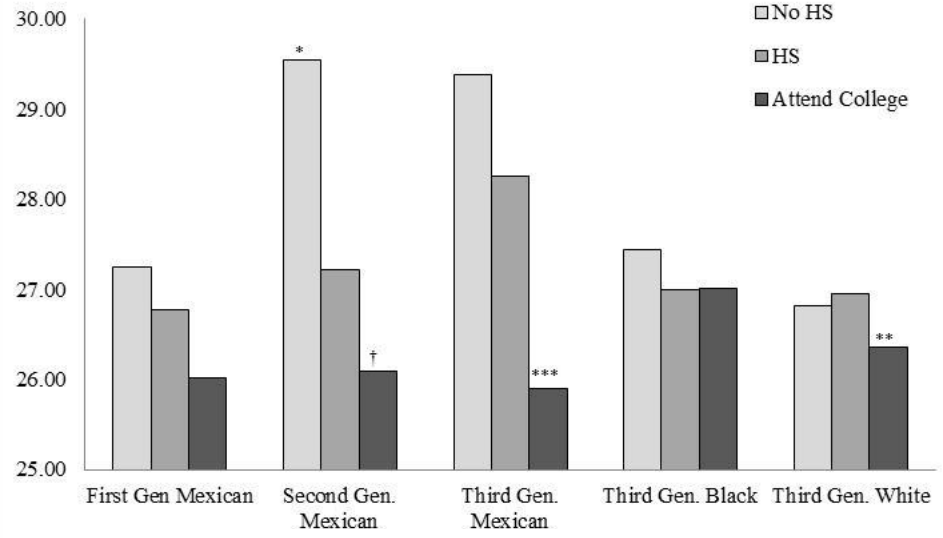
	Model 1	Model 2	Model 3
Intercept	25.265 ***	25.725 ***	25.820 ***
Generation/Ethnicity			
First Gen Mexican	-0.309	-0.737	-0.825
Second Gen. Mexican	0.667 †	0.339	1.699 †
Third Gen. Mexican	1.273 ***	1.125 **	2.277 †
Third Gen. Black	0.776 ***	0.705 **	0.114
Emerging SES			
Less than HS		-0.414	-0.638
X First Gen Mexican			-0.151
X Second Gen. Mexican			-0.450
X Third Gen. Mexican			-1.733 †
X Third Gen. Black			1.020
Attend 4 year institution		-0.572 **	-0.683 **
X First Gen Mexican			0.532
X Second Gen. Mexican			-0.869
X Third Gen. Mexican			-0.767
X Third Gen. Black			1.152 *
Family of Origin SES			
Mother's Education		-0.060 †	-0.066 *
X First Gen Mexican			0.001
X Second Gen. Mexican			0.046
X Third Gen. Mexican			0.039
X Third Gen. Black			0.049
Adolescent BMI measured in 1997			
Age	0.018 ***	0.019 ***	0.019 ***
Male	0.828 ***	0.759 ***	0.738 ***
Number of children	0.232 **	0.159 †	0.169 †
Smoking			
Cigarettes per month	-0.022	-0.025	-0.025
Past smoker	-0.031	-0.123	-0.119
Current smoker	-0.498 †	-0.588 *	-0.579 *
Pregnant	0.826	0.816	0.804
Single	-0.288	-0.262	-0.238
Health	1.298 ***	1.254 ***	1.236 ***
Employed	0.217	0.234	0.217
Parent's Weight Status			
Overweight	1.629 ***	1.602 ***	1.590 ***
Obese	3.439 ***	3.380 ***	3.386 ***
BMI Missing	1.677 ***	1.627 ***	1.631 ***
Family Status in 1997			
Single Parent	0.242	0.184	0.178
Step-parent family	-0.183	-0.280	-0.312
Other family type	1.026	1.011	1.047
Nested F		8.910 ***	3.400 ***

† = p<0.1, * = p<0.05, ** = p<0.01, *** = p < 0.001

Mexican, white, and black subsample, wave 12 only; N=5,401

Model 3 adds the interactions of generation/ethnicity with mother's education and own education. Including these interactions significantly improves model fit ($F = 3.40$, $p < 0.001$). The interactions between generation/ethnicity and mother's education are not significant. Further analyses indicate that the effect of mother's education is significantly, negatively associated with BMI only for whites. This supports Hypotheses 1b and 1c, but not 1a since the interactions fail to reach significance. Figure 2 graphs predicted BMI by own education and generation/ethnicity and the pattern is similar to the one found in the full sample. Significance tests are conducted within generation/ethnicity. Within generation, those who attended a four-year college are significantly thinner than those who did not, with the exception of NH blacks and first generation Mexican-Americans. Though the gradient for first generation Mexican-Americans is negative, the relationship is non-linear among NH blacks. The interaction between less than high school and third generation Mexican-Americans is negative and significant. These findings partially support Hypothesis 2a, but not 2b.

Figure 2. Predicted BMI by Emerging SES and Generation/Ethnicity



Significantly different from HS within Generation/Ethnicity
† $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Discussion

Immigrants and their children make up 23% of the US population and their number will continue to grow due to the continuing migration and higher fertility of many immigrant groups (*Census*, 2008; Dixon, 2006). As such, the health profile of the United States will be greatly influenced by the health of immigrants and their children. Past research on immigrant health finds that immigrants have better health, but with increasing assimilation, health tends to deteriorate, especially among those with low socioeconomic status. This research examines whether own emerging SES and family of origin SES is associated with BMI for immigrants and their children, and whether this relationship differs from the one found for the third generation.

Examining own emerging socioeconomic status, I find that those who attended a four-year college have a significantly lower BMI than those who never attended a four-year college across the different generation/ethnicity groups. The only exception is first generation Mexican-Americans, though the relationship for this group also appears to be negative. This finding differs from past research that tends to find a null or positive effect of socioeconomic status for the first or second generation. Common reasons given for this relationship include unfamiliarity with the U.S. environment, cultural orientations brought from their sending country which view excess weight as a sign of social standing, and unfamiliarity in viewing obesity as a health concern. However, the first generation in my sample attended college in the US, which is an important socializing institution and may serve to decrease the social distance between immigrants and natives. In this sense, those who attend college may acquire knowledge and skills that allow them to more effectively manage their weight. This may be especially important among children of immigrants, since their parents tend to have low educational attainments and

increases in education may help them navigate the American environment as adults.

While the effect of attending a four-year college is important for all generation/ethnic groups, this effect was most pronounced for the second generation. Also, this is the only generation in which those with less than a high school education are significantly heavier than those with a high school degree. The adjusted difference in BMI between those who have less than a high school degree and those who attend college is 1.17. For someone who is 65 inches tall, this is a difference of about 7 pounds. The difference between those with less than a high school degree and those who attend college among the second generation are even more pronounced for Mexican-Americans. The difference in BMI between these two groups is about 3.5, for someone 65 inches tall this is a difference of about 21 pounds. Emerging adult SES may be especially important for the second generation for several reasons. First, the second generation is more assimilated than the first generation. Therefore, the cultural protective factors that potentially contribute to the better health profile of the first generation may be absent or substantially diminished, making their own SES more important. Second, the lower material resources of immigrant parents mean that their children have less of a parentally-provided safety net to aid them during this time of rapid change, which may explain the difference between the second and third generation. The SES of children of immigrants then may have an even bigger impact on their health profile, and the gradient may appear earlier in adulthood than it does for the third generation.

Contrary to Hypothesis 2b, I do not find that emerging socioeconomic status is more important for the first compared to the third generation. Research on the epidemiological paradox finds that immigrants are healthier or have a health profile similar to white natives despite their low SES. In this sense, one would expect the relationship between SES and health

to not be as strong for immigrants compared to natives. However, I hypothesized that among immigrant children, attending college could have a bigger impact than among children of natives because immigrant children have lower social origins than children of natives, potentially increasing the importance of emerging SES. The cultural orientations brought with the first generation are commonly suggested as a potential factor contributing to their better health. These cultural orientations may strongly influence young adults' weight regardless of college attendance. Nevertheless, college attendance is still important to the first generation in the main effect; it just isn't more important than it is for natives.

Similar to past research, I find that the effect of family of origin socioeconomic status operates differently by generation (Van Hook and Balistreri, 2007; Van Hook and Balistreri, 2009; Sanchez-Vaznaugh et al., 2008; Sundquist and Winkleby, 2000), though interactions failed to reach significance. Among the third generation in the pooled sample and third generation whites in the sub-sample, family of origin SES is negatively associated with adult BMI, but among the first and second generations in the pooled and Mexican-American sub-sample, the association is not significant. Interactions between family of origin and generation or generation/ethnicity are positive, but fail to reach significance. Mother's education has no effect within the first and second generations, but this effect is not statistically different than the negative effect found for the third generation. These interactions are close to significant ($p=.110$ for the first generation and $p = 0.15$ for the second generation) and increases in power would probably result in a significant interactions. Additionally, family of origin SES is no longer significant for the third generation once controls for adolescent BMI are entered into the model. This suggests that family of origin SES influences BMI before adolescence for the third generation, but is not associated with change in BMI from adolescence to adulthood.

Overall, this research presented in this chapter finds that emerging adult socioeconomic status and family of origin socioeconomic status have important effects on health in young adulthood above and beyond their reciprocal influences on each other. Attending a four-year college is associated with lower BMI in adulthood. However, family of origin socioeconomic status is less important. College may be an important socializing institution for healthier eating and physical activity habits, and immigrant children and children of immigrants may assimilate to these healthier patterns. This suggests that, along with increasing the economic opportunities available to immigrant children and children of immigrants, college attendance may increase the health of children of immigrants, especially among the second generation.

Chapter 4: PARENTAL CO-RESIDENCE AND WEIGHT TRAJECTORIES BY GENERATION

The previous chapter demonstrated that young adult socioeconomic status, as indicated by college education, is an important predictor of BMI and a significant predictor of change in BMI from adolescence to young adulthood. This benefit is especially strong among the second generation in both the ethnicity pooled sample and the Mexican-American, white, and black sub-sample. However, it is somewhat difficult to interpret this finding because college attendance is so strongly associated with other life course transitions. The development of young adult SES and the transition to adulthood is often a bumpy road associated with many other events. Individuals attend college and develop an emerging SES, leave their parents' home, move in with partners, and begin to define themselves as adults. In addition to these contextual transitions, health behaviors also change dramatically during this time period (Nielsen et al., 2002; Tucker et al., 2005; Wane et al., 2010; Larson et al., 2007).

In this chapter, I focus on the effect of home leaving on BMI during the transition to adulthood while simultaneously considering the other transitions young adults are making at this time. One of the most important transitions that many young adults experience during this time period is leaving the parental home. Between the ages of 25 and 29 roughly 75% of young adults have left their natal home (Portes, 2003), and this is seen as an important indicator of achieving adult status among young adults themselves (Arnett, 2003). Leaving the parental home may result in either increases or decreases in obesity. On the one hand, leaving home is associated with higher levels of self-efficacy and mental health (Shanahan, 2000; Fulgini and Peterson, 2002) and may be indicative of a successful transition to adulthood (Schnaiberg and Goldenberg, 1989) and healthier lifestyle choices. On the other hand, when given greater

autonomy over food choices young adults may be more likely to choose less healthful foods and decrease their consumption of more healthful items. Indeed, the transition to young adulthood is associated with a significant decrease in fruit and vegetable consumption and young adults consume more fast food than any other age group (Nelson et al., 2005; Lien et al., 2001; Larson et al., 2007; Paeratakul et al., 2003).

Beyond exploring the relationship between home leaving and BMI, I examine whether this relationship varies by immigrant status. Children of immigrants, both the first and second generation, are less likely to experience pre-marital residential independence than children of natives (Goldscheider and Goldscheider, 1987). Furthermore, the effect of home leaving on other health outcomes varies by generation (Fulgini and Peterson, 2002). Cultural factors are often pointed to as an explanation for immigrants' better health and their lower likelihood to leave home relative to natives (Kanajanpan, 1989; Goldscheider and Goldsheider, 1989; Aquilio, 1990; Palloni and Arias 2004; Hummer et al., 2007; Lara et al., 2004). Among children of immigrants, residing with one's parents may result in slower acculturation and hence a slower uptake of obesity promoting behaviors. Continued residence in the parental home may explain the slower growth in BMI among immigrant generations relative to natives found in the second chapter.

In sum, I examine the extent that home leaving is associated with changes in weight during the transition to adulthood and whether this effect varies by generation. In doing so, I focus on differences among the first generation (foreign-born), second generation (has immigrant parents), and the third generation (both parents were born in the US)[2] in both the pooled and

2 Small Ns limit the analyses I can perform. In order to maintain enough power to examine generational differences, the 1.0 and 1.5 generation are collapsed into one single category, the first generation. Preliminary analyses suggest that the effect of home leaving on BMI is very similar between these two generations. Analyses that examined these generations found that both groups' coefficients approached significance and the difference

Mexican-American, white, and black sub-samples. In the following sections I describe the transition to adulthood as a particularly important phase for understanding the development and maintenance of obesity and overweight, the context and changes that take place during this phase, followed by a discussion on how home leaving may be associated with weight by generation.

Eating More and Exercising Less: Young Adulthood and Implications for Health

Diet, physical activity, and weight change drastically during the transition from adolescence to young adulthood (Gordon-Larsen et al., 2004; Mokdad et al., 1999; Nelson et al., 2008; Tucker et al., 2005). Experiences in adolescence have a significant impact on later adult health outcomes either directly (becoming less physically active, quitting smoking, etc.) or indirectly through their effect on educational and occupational outcomes (Link and Phelan, 1995; Nelson et al., 2008). The transition to adulthood has also been identified as a critical point for the adoption of negative health behaviors such as smoking, binge drinking, and marijuana use (Tucker et al., 2005). Understanding the pathways that lead to healthy or unhealthy behavior then becomes important for the development of early prevention programs.

This age period is marked by an increase in poor dietary habits (Lien, Lytle, and Klepp, 2001; Larson et al., 2007). Daily fruit and vegetable consumption drops precipitously as adolescents move into adulthood. In one study, roughly half of boys and girls reported daily fruit and vegetable consumption at age 14, but this dropped to about 20% when they were re-interviewed at age 21 (Lien et al., 2001). Adolescents and young adults consume more fast food than any other age group (Paeratakul et al., 2003). Furthermore, Larson and colleagues (2007) report that adolescents decrease their consumption of fruit and vegetables as they approach

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between them is small. Also, the second chapter indicates that both baseline BMI and rate of change in BMI growth is similar between these two groups.

adulthood. Even more troubling is that this pattern has worsened overtime. Fruit and vegetable consumption among adolescents decreased significantly from 1999 to 2004. While fruit and vegetable consumption decreased, other poor dietary habits, such as fast food consumption increased (Wane et al., 2010; Lien et al., 2001; Nielsen et al., 2002).

Though it is widely understood that parents influence their children's weight in childhood and adolescence, parents may continue to impact the health of their young adult children if they continue to live with them. For example, past research has found that family meals during adolescence are associated with increased consumption of fruits and vegetables and greater frequency of daily breakfast consumption as young adults (Larson et al., 2007). In other words, greater parental monitoring of diet is associated with a better diet at the time and beneficial diet patterns into adulthood.

Additionally, past research has extensively examined whether leaving for college and subsequently the parental home, is associated with weight gain. Commonly referred to as the "freshman 15," attending college is often associated with individual weight gain, especially during the first year of college. This increase is attributed to lower vegetable and fruit consumption, decreased physical activity, and increased consumption of fast food (Wane et al., 2010). This research suggests that a poorer diet may be associated with increased autonomy in food decisions that young adults experience as they move away to college. The lack of direct parental monitoring through family meals and indirect parental monitoring through their control of the food choices available to young adults may be at least partially responsible for the weight gain that individuals experience as they transition to a university setting. However, this research does not provide a comparison group of young adults who do not attend college. As such, it is difficult to tell whether college attendance is associated with more or less weight gain than other

activities and whether residing with one's parents has an important mediating or moderating effect.

Overall, prior research suggests that continued co-residence with parents may be beneficial to diet and hence result in slower weight gain among adults. However, a much broader tenet of literature discusses the complexities involved in the transition to adulthood, and how the role of home leaving influences feelings of self-efficacy, autonomy, mental health, and education. Moreover, these factors may vary for immigrant children and children of immigrants. Understanding how co-residence may be associated with health and health behaviors requires a more thorough examination of the transition to young adulthood, the meaning that co-residence with parents has for young adults, and the implications this may have for adult outcomes.

The Transition from Adolescence into Young Adulthood: A Period of Uncertainty

The historical increase in life expectancy and continued education, now well into adulthood, has resulted in an increase of the number of distinct life phases. In the early part of the 20th century, adolescence was a relatively short time period between childhood and adulthood, at the end of which individuals were seen economically, socially, and personally as adults. They were, for the most part, indistinguishable from other adults in their 30s and 40s (Furstenburg, Rumbaut, and Settersen, 2005; Hogan and Astone, 1986). However, the transition from adolescence to adulthood has become more ambiguous and prolonged. It tends to occur in a gradual, complex, and less uniform fashion. At the same time, early adulthood has become increasingly structured by institutions outside the family (Furstenburg et al., 2005; Hogan and Astone, 1986).

The period between the late teens and the late twenties is now often referred to as transitional or emerging adulthood. This period is distinct from the adolescent years in which

individuals are highly reliant on their natal families for support and socialization and are not legally seen as adults. However, this period is also distinct from adulthood. Many individuals have yet to experience the role transitions historically associated with markers of adult status, such as marriage, childbearing, career entry, economic independence, and education completion (Arnett, 1998; 2003). Also, many young adults do not feel as if they have entirely reached adulthood (Arnett, 2003; Shanahan et al., 2005). Using the *Youth Development Survey*, Shanahan and colleagues (2005) find that only about 60% of the 25 to 26 year olds in the study feel entirely like an adult most of the time. The context of this prolonged period of adulthood has been shown to have important effects on many outcomes for young adults, such as labor force participation, education, and health.

One of the most commonly indicated requirements for achieving adult status is independence from one's parents. Arnett (1998) found necessary pre-cursors to obtaining adult status are that 78% of young adults believe in developing beliefs and values independent from one's parents, 74% believe in achieving financial independence from one's parents, and 60% believe in achieving residential independence from one's parents. This is quite significant, given that only 17% of young adults believe marriage, full-time employment, or home ownership are necessary precursors of adult status.

However, while it is clear that young adults view independence as necessary for attainment of adult status, past literature demonstrates mixed effects of home leaving on many outcomes for young adults. Failure to achieve residential independence and returning to one's natal home as an adult has been referred to as "incompletely launched young adults" by Schnaiberg and Goldenberg (1989). The family literature suggests that this may be due to incomplete socialization of youth for adult roles, especially by parents (Schnaiberg and

Goldenberg, 1989). Adult children who return to their parents' home and children who never leave their parents' home have a lower educational attainment than those who left their parents' home and did not return (White and Lacy, 1997). Additionally, young adult children who never left their parents' home have higher rates of depression, are more likely to feel lonely, and have lower rates of self-efficacy compared to those who do not live at home (White, 1994; Shanahan 2000; Fulgini and Peterson, 2002). Continued residence with parents may stall the transition to adulthood, not allowing youths to develop the tools necessary to ensure maintaining or achieving a healthy weight, such as self-efficacy, education, and mental health (Goodman and Whitaker, 2002; Ross and Mirowsky, 1999; Strecher et al., 1986).

However, other recent research suggests that this perspective on home-leaving may be misguided. Returning home and lower rates of residential independence may be an adaptive strategy to an increasingly more demanding labor market and the reduction of jobs (White, 1994; Booth, Crouter, and Shanahan, 1999). While those who never left home or returned home had a lower educational attainment than those who left home permanently, the age at which one left home is also important. White and Lacy (1997) report that young adults who continue to reside with their parents until the age of 21 had a higher educational attainment than those who left their parents' home before the age of 21. Additionally, many parents now believe that their adult child will reside with them for a period of time and most parents are receptive to accepting their adult children in their homes (Booth et al., 1999).

Continued co-residence means that parents have more influence over the behaviors of their adult children than those who gain residential independence (Matras, 1990). This may explain the lower rates of binge drinking and marijuana use (White et al., 2006) and the higher educational attainment, at least for those who move out by the age of 22 (White and Nancy,

1997). Past literature is relatively silent about the effects of home leaving on diet, exercise, and weight. Nevertheless, research concerning the transition to college and literature on binge drinking and family meals suggest that leaving the parental home may be associated with weight gain.

Not all are chosen: Variation in the transition into adulthood by race/ethnicity and nativity status.

Besides having important implications for health, emerging adulthood experiences differ across groups and therefore may contribute to health disparities. Though much of the early research on emerging adulthood was carried out on largely white native-born samples (Mollenkopf et al., 2007), recent research has attempted to account for this obvious and large dearth in the literature by specifically examining how race/ethnicity and generation status influence pathways into adulthood (Arnett, 2003; Fussell and Furstenberg, 2005; Mollenkopf et al., 2005; Osgood et al., 2004; Portes and Rumbaut, 2001; Rumbaut, 2004; Fuligni and Pedersen, 2002; Fuligni and Hardway, 2004). However, most of this research is confined to specific regional areas or derived from a non-random sample (see Fussel and Furstenberg, 2004 for an exception). There are many reasons to think that the pathways for children of immigrants or minorities may differ from the experiences of the largely white middle class. Often these individuals receive less help or money from their natal families, are more likely to face blocked opportunities (such as poor schools or neighborhoods), and are more likely to experience discrimination than white individuals from native-born families (Arnett, 2003; Portes and Rumbaut, 2001; Pong and Hao, 2007; Telles and Ortiz, 2008).

As discussed earlier in the section on segmented assimilation theory, immigrant parents tend to have fewer resources, work longer hours, and provide less supervision to their children

during adolescence, and this may impact their children's pathways into adulthood. For example, children who receive less parental supervision and involvement are more likely to drop out of high school and have lower educational aspirations (Astone and McLanahan, 1991). Unfamiliarity with English and the lower educational attainment of most immigrant parents also makes it difficult for them to help their children with their homework. Children from low SES backgrounds and children with less parental supervision are also at an increased risk for an earlier pregnancy than their peers, which in turn is associated with lower educational attainment (Arnett, 2003; Woodward and Fergusson 2001; Rindfuss and St. John, 1983). Lastly, the lower material resources of immigrant parents mean that their children have less of a parentally-provided safety net to aid them during this time of rapid change. Schonei and Ross (2005) find that this form of support is especially important for young adults as parents continue to support them well into early adulthood. They estimate that parents spend about $38,000 for housing, education expenses, food, or direct cash assistance during the ages of 18 to 34, although assistance does decrease with age.

For many, young adulthood is marked by moving out of the parental home. But, residential patterns for children of immigrants differ greatly from those observed for children of natives, especially for those of Hispanic or Mexican descent (Balistreri, 2007; Goldscheider and Goldscheider, 1987; Van Hook and Glick, 2007; Fuligini and Pedersen, 2002). Aquilio (1990) finds that 54% of Mexican-American parents reside with their adult children compared to 40% of black and 28% of white parents. Additionally, differences in marriage patterns accounted for the black-white differential, but not the Mexican-American white differential. The greater co-residence of Mexican-American young adult children with their parents has been attributed to cultural preferences concerning family arrangements. Indicative of this cultural preference,

further research demonstrates that the extended co-residence with parents decreases with the duration of U.S. residence (Kanjanpan, 1989).

While continued co-residence with parents is greatest among the first generation and newly-arrived immigrants, this preference is also apparent among more settled immigrants and the second generation. Young adults among the second generation and the 1.5 generation (foreign-born individuals who arrived to the US as children) are more likely to remain in their parents' home than their similarly situated native-born peers (Goldscheider and Goldscheider, 1987; Fuligini and Pedersen, 2002), especially among Mexican and Cuban women (Goldscheider and Goldscheider, 1987). This research also finds that the reasons for and implications of later familial home leaving differ by generation and race/ethnicity. For young adults of European origin (largely native-born), remaining in the natal home is associated with depression and may represent a failed attempt of striking out on one's own (Fuligini and Pedersen, 2002). But among Latinos and Asian Americans, staying in one's natal home is not negatively associated with emotional well-being. These young adults often provide resources to their parents and continue to live with their parents out of feelings of familial obligations rather than desperation (Fuligini and Pedersen, 2002).

Home leaving may also have important implications for children of immigrants in the assimilation process. Living with one's parents may be associated with slower assimilation and greater selective acculturation (Portes and Rumbaut, 2001). Continued living with parents may mean continued use of parents' native tongue, greater participation in more cultural traditions, and continuing to live in communities of co-ethnics. Of course, when children of immigrants do leave their natal home, it is possible that they move to areas of similar ethnic concentration, as suggested by evidence on the highly mobile 1.5 generation (Goodwin-White, 2007). In addition,

not all immigrants live in ethnic enclaves. Immigrant parents may achieve middle class status and reside in the largely white suburbs (Alba, 1999), so their children may never have lived in an ethnic neighborhood and would therefore not leave one when they leave the parental home. Either way, Portes and Rumbaut (2001) demonstrate that children who remain in co-ethnic communities *or* with their parents are more likely to experience selective acculturation than children who leave the parental home and the ethnic community.

The Present Study

Young adulthood is a period marked by dramatic changes, such as home leaving, attending college and partnering. Past research has also demonstrated that transition to adulthood is associated with rapid gains in weight (Wane et al., 2010; Mokdad et al., 1999; Ogden et al., 2002; Gordon-Larsen et al., 2004) and changes in diet and physical activity patterns (Lein et al., 2001; Larson et al., 2007; Wane et al., 2010). Parental monitoring of diet is associated with higher levels of fruit and vegetable intake (Larson et al., 2007), lower uptake of other negative health behaviors; however, transitioning to a university is associated with weight gain (Wane et al., 2010). Together, this evidence suggests that those who continue to live at home may have a healthier diet than those who leave home. For immigrant youth, leaving home may also mean losing the cultural protection provided by their parents. These ideas lead to the following hypotheses:

H1: Home leaving is associated with weight gain. The beneficial impact of parental monitoring is lost and changes in diet are associated with weight gain.

H2: This association is greater for children of immigrants, in general, and largest for the first generation compared to children of natives.

H3: The greater likelihood of first generation immigrants to reside with their parents

partially explains why immigrants tend to weigh less than children of natives.

Home-leaving also is associated with other important predictors of adult status such as college attendance and partnering. In addition to home leaving, these factors may have an important impact on weight change. For example, prior research had demonstrated that university transitions are associated with weight gain. However, other research, including the results presented in the last chapter, demonstrates that those who attend college have a lower BMI and growth in BMI than those who do not attend college. In order to understand this contradiction, I will examine college attendance using a growth curve model looking at whether college attendance is associated with more or less weight gain compared to those who do not attend college, as well as whether the association between weight gain and college attendance is the result of leaving the natal home. Given the literature on college attendance and weight gain, I hypothesize that college attendance may be associated with initial weight gain (Wane et al., 2010). However, those who attend college may have a slower rate of change in the growth of BMI. This hypothesis is based upon the large body of literature that finds worse health outcomes among adults with less education (Ross and Mirowsky, 2003).

Lastly, home leaving is often associated with family transitions, such as marriage or cohabiting. In general, married individuals tend to have better health than unmarried individuals on many health indicators. However this is not true for overweight or obesity. Married individuals tend to be heavier than never married individuals, especially among men, and marriage is associated with an increase in weight (Kahn, Williamson, and Stevens, 1991; Schoenborn, 2004). Leaving the parental home may be associated with weight gain for those who leave to move in with partners. As such, the potential role of partnering as a moderating factor will be explored.

Data and Methods.

Like the analyses in the previous chapters, the data for this project continues to use the *National Longitudinal Study of Youth* (*NLSY*), 1997 cohort. I use the longitudinal file with annual waves of data assessed from 1997-2008. The original cohort consisted of roughly 8,894 respondents. Attrition varied by waves, with the highest at 19% in wave 10. Roughly, 11% of the respondents attrite at each wave, though many were followed up at later waves. The data are organized into a person period file (N = 78,005 records) with one record contributed by respondents for each year they were interviewed between the ages of 12 and 16 during the first wave and the ages of 24 to 28 by the last wave. The analytic sample excludes 13% of the total possible records from waves in which respondents were not interviewed and an additional 15% who had invalid responses for the analytic variables for that wave. Time is measured as age in months. However, for ease in interpretability annual changes in BMI are presented in the tables (i.e. coefficients and standard errors are multiplied by a factor of 12).

The new independent variable introduced in this chapter is residential status. At every wave the *NLSY* has detailed information concerning the household roster. From this information I am able to determine with whom the respondent is living at each wave and whether he/she changed residential status.

Unfortunately, the way the household roster was measured changed between waves. Waves one through six refer to the respondent's permanent household, rather than current household. Respondents away at college, away for temporary employment, in the military, or incarcerated may have indicated that they were living with their parents, when they were actually living away from home. To address this problem, several measures were taken to measure parental co-residence for waves one through six. First, I examined the type of dwelling the

respondents occupy. If they indicated that they live in a dorm, fraternity/sorority house, or military barracks, they were coded as not living with their parents. Second, I examined whether they reported living in a dorm at college for at least three terms. These respondents are coded as living away from home. This captures those who may have been at home on break when they were interviewed, though most interviews were conducted from September to May. Third, if they reported they were currently enrolled in college, considered their current residence temporary, and reported their current dwelling is rented, they were coded as living away from home. Lastly, those who previously reported that their past dwelling was permanent, their current dwelling is temporary, and they had not experienced a move since the last interview, are coded as living away from home. The migration questions for these earlier waves refer to whether there has been a change in address in their permanent dwelling. By examining migration I am able to exclude individuals who may have moved into temporary housing with their parents, from those who moved into temporary housing without their parents. If their household moved with them into temporary housing then their migration variable captures this move, but if they moved without their parents and did not consider their current housing as permanent then their migration variable does not reflect this move. This captures individuals who may have been away from home for work or other reasons, but did not consider their current residence permanent. Additionally, those who reported that they were incarcerated are coded as living away from home. In subsequent waves (waves seven through 12), the household roster was changed to reflect current household composition rather than permanent, so it was possible to directly measure whether respondents lived with their parents.

The time-varying controls included in this analysis are self-reported health, smoking, number of children, marital status, pregnancy, and employment. The non-time varying control

variables are mother's education, parents' weight status, family status at wave one, and gender. Mother's education and parents' weight status are interacted with time because they have a significant effect on the slope of BMI growth.

Methodologically, the question of home leaving poses a few problems. As stated earlier, the period of young adulthood is a state of flux. Individuals often move out of their parents' house multiple times and some may never move out. To allow for this complexity I modeled home leaving three different ways. First, I examine home-leaving as a time-varying dummy variable and a variable that indicates whether this is the first wave that the respondent reported moving out. This allows me to examine whether there is an initial increase in BMI when the respondent first leaves home and whether this elevation is maintained while they reside away from home. Second, I examine the amount of time that has passed since the respondent first left the parental home (time is measured in months). This allows me to examine whether moving out is associated with a change in the rate of growth in BMI. Third, I examine the reason the respondent moved out of the parental home, either to attend college or move in with a partner. In this analysis, I focus on the shift in BMI and the change in rate of growth in BMI as a function of home leaving. I describe these three approaches in greater detail below.

These questions are examined using nested growth curve models. The first model includes all analytic variables except home leaving. The next model includes the home leaving variables. This allows me to examine whether patterns in home leaving explain differences in BMI trajectories by generation (Hypothesis 2). Finally, Model 3 includes the interactions between home leaving and generation. This allows me to see whether the effect of home leaving differs by generational status (Hypothesis 3).

Approach #1: parental co-residence and home leaving.

Past research suggests that the first year of residential independence may be especially associated with weight gain (Wane et al., 2010). By examining the first wave that the respondent left home I am able to see if the first year the respondent leaves home is an especially susceptible one to weight gain. Figure 1 illustrates this hypothesis by comparing two individuals, one who never moved out of her parents' home with one who moved out at age 18. The individual who moved out gained the most weight during the first wave she left home and continued to weigh more than the person who did not leave home.

To capture this possible pattern in my models, I examined whether the effect of home leaving is associated with an initial shift in BMI and whether this shift in BMI is maintained. To do this, I use a time-varying dichotomous variable indicating whether the respondent resides outside the parental home (1=currently resides away from home, 0=lives with parents, referred to below as "non-parental residence"), and another dummy variable indicating that the respondent left the parental home in the given wave (referred to below as "just left home"). Because respondents can have multiple home leavings, the just-left-home variable is set equal to 1 for the first wave the respondent reported moving out of the home for that episode of residential independence. To illustrate, Table 1 presents the coding scheme for all home leaving variables for a hypothetical respondent who left home in wave six, came back in wave eight and subsequently moved out again in wave 10. The non-parental residence variable is set to 1 for waves six and seven and waves 10 through 12, and the just-left-home variable equals 1 in waves six and 10.

Table 1. Coding Scheme for Home Leaving Variables

	Wave											
	1	2	3	4	5	6	7	8	9	10	11	12
Approach #1												
Just Left Home	0	0	0	0	0	1	0	0	0	1	0	0
Non-parental Residence	0	0	0	0	0	1	1	0	0	1	1	1
Approach #2												
Just Left Home	0	0	0	0	0	1	0	0	0	1	0	0
Duration	0	0	0	0	0	0	12	0	0	0	12	24
Approach #3												
Non-parental Residence, College	0	0	0	0	0	1	1	0	0	0	0	0
Non-parental Residence, Partner	0	0	0	0	0	0	0	0	0	1	1	1
Non-parental Residence, Other	0	0	0	0	0	0	0	0	0	0	0	0
Duration, college	0	0	0	0	0	0	12	0	0	0	0	0
Duration, Partner	0	0	0	0	0	0	0	0	0	0	12	24
Duration, Other	0	0	0	0	0	0	0	0	0	0	0	0
Moved Back in with Parents												
Just Returned Home	0	0	0	0	0	0	0	1	0	0	0	0
Parental Residence, Returned Home	0	0	0	0	0	0	0	1	1	0	0	0
Duration, Returned Home	0	0	0	0	0	0	0	0	12	0	0	0

This coding scheme allows for multiple home leavings, but it does not distinguish between the first or second time respondents left home, nor does it distinguish between those who have moved back in with their parents from those who never moved out. Additional analyses examined whether moving back in with one's parents was also associated with a change in BMI. This is examined by creating two time varying variables. The first indicates the first wave that the respondent reports moving back in with the parents (1=just returned home, 0=otherwise). The second variable indicates whether the respondent continued to live with the parents after moving back home (1=parental residence, returned home, 0=otherwise). For the hypothetical respondent shown in Table 1, the first variable would equal 1 for wave eight and the second variable would equal 1 for waves eight and nine. This allows me to compare those who do not live with their parents, those who do live with their parents but had previously moved out, and those who have never left their parents home (the reference category).

Finally, to assess whether the effects of home leaving vary across generations, I included interactions between the home-leaving variables and generational status.

Preliminary analyses indicated that the growth curve model does not converge when both home leaving variables are added in the level one model. The goodness of fit statistics (AIC and BIC) indicate that the non-parental residence variable produces a better model fit than the just-left-home variable. Including this variable in the level-1 equation results in the following expression:

$$Y_{ij} = \pi_{0i} + \pi_{1i}\,\text{Time}_{ij} + \pi_{2i}\,\text{Time}^2_{ij} + \pi_{3i}\,\text{Non-parental residence}_{ij} + \varepsilon_{ij} \qquad \text{[Eq 4.1].}$$

I included fixed effects in four different level- 2 equations to determine their influence on the level- 1 coefficients, where:

$$\pi_{0i} = \gamma_{00} + \gamma_{01}\,\text{Family of Origin SES}_i + \gamma_{02}\,\text{Generation}_i + \gamma_{03}\,\text{Just-left-home}_{ij} + \gamma_{04}\,\text{Generation}_i * \text{Just-left-home}_{ij} + \mathbf{Z}_{0i} + \zeta_{0i}$$

$$\pi_{1i} = \gamma_{10} + \gamma_{11}\,\text{Family of Origin SES}_i + \gamma_{12}\,\text{Generation}_i + \gamma_{13}\,\text{Just-left-home}_{ij} + \gamma_{14}\,\text{Generation}_i * \text{Just-left-home}_{ij} + \mathbf{Z}_{1i} + \zeta_{1i}$$

$$\pi_{2i} = \gamma_{20} + \zeta_{2i}$$

$$\pi_{3i} = \gamma_{30} + \gamma_{31}\,\text{Generation}_i + \zeta_{3i}$$

Or in composite equation (by substituting the level-2 equations into the level-1 equation):

$$Y_{ij} = [\gamma_{00} + \gamma_{01}\,\text{Family of Origin SES}_i + \gamma_{02}\,\text{Generation}_i + \gamma_{03}\,\text{Just-left-home}_{ij} + \gamma_{04}\,(\text{Generation}_i * \text{Just-left-home})_{ij} + \mathbf{Z}_{0i}] +$$

$$[\gamma_{10} + \gamma_{11}\,\text{Family of Origin SES}_i + \gamma_{12}\,\text{Generation}_i + \gamma_{13}\,\text{Just-left-home}_{ij} + \gamma_{14}\,(\text{Generation}_i$$

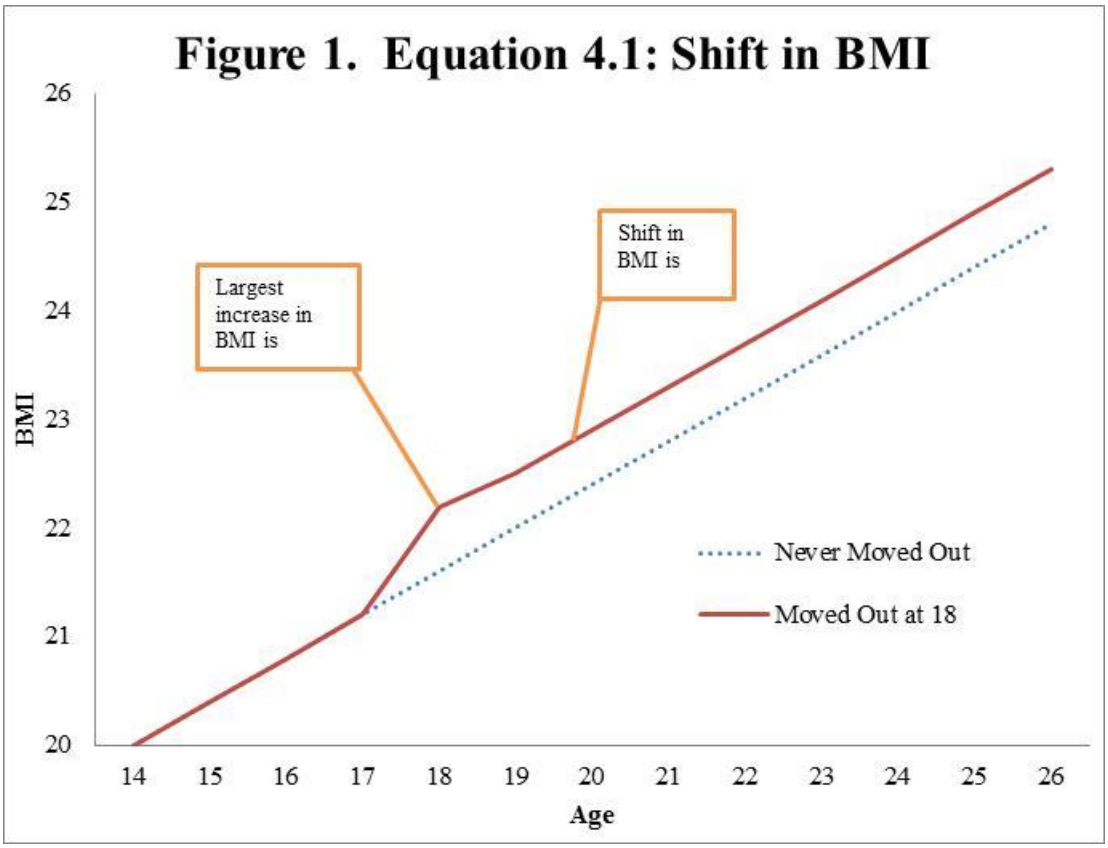
$$* \text{ Just-left-home})_{ij} + \mathbf{Z}_{1i}]*\text{Time}_{ij} +$$

$$[\gamma_{20}]*\text{Time}^2_{ij} +$$

$$[\gamma_{30} + \gamma_{31}\text{Generation}_i]* \text{Non-parental residence}_{ij} +$$

$$[\varepsilon_{ij} + \zeta_{0i} + \zeta_{1i}*\text{Time}_{ij} + \zeta_{2i}*\text{Time}^2_{ij} + \zeta_{3i}* \text{Non-parental residence}_{ij}].$$

This hypothesis is illustrated in Figure 1. I estimated this model for the whole sample and for the white, black and Mexican-American sub-sample.



Approach #2: duration effects.

I next examine whether the time since leaving home is associated with a change in the slope of BMI growth. This is important because home leaving may be associated with a change in the slope of the BMI trajectory (i.e., the rate of weight gain), beyond any initial change in

elevation of BMI. Figure 2 illustrates this hypothesis for two respondents: one who never moved out and one who moved out at age 18. At age 18, there is the initial shift in BMI. The non-parental residence variable captures this effect, and moving out is associated with a change in the shift or elevation of the BMI trajectory. However, moving out of the parental home is also associated with a change in rate of BMI growth, as demonstrated by the continued divergence in BMI over time between the respondent who did move out and the one who did not.

To model this possible pattern, I introduce a new variable indicating the time in months since the respondent left home (referred to below as "duration"). To create this variable, I subtract respondents' current age from their age when they first left home. The first wave the respondent moves out is equal to zero and increases by one for every month the respondent continues to reside outside the home. If the respondent moves back home with a parent, the duration variable is recoded to zero and the original slope of BMI is assumed. This coding scheme is displayed in Table 1 for the hypothetical respondent described above. The duration variable would equal 0 for wave one through six, 12 for wave seven, 0 for waves eight, nine, and 10, 12 for wave 11, and 24 for wave 12, assuming that the waves are exactly a year apart.

Additional analyses examined whether moving back in with parents is also associated with a change in the elevation and slope of BMI growth. This variable is created the same way as the duration variable. For respondents who moved back in with their parents, this variable increases with time as long as respondents continue to reside with their parents after they moved back home. For the hypothetical respondent, this would equal 12 for wave seven and 0 for all other waves (see Table 1).

Preliminary analyses indicated that the model does not converge when both home leaving variables are added in the level one model. The goodness of fit statistics (AIC and BIC) indicate

that the non-parental residence variable produces a better model fit than the duration variable. Thus, non-parental residence is added in the level-1 model and time since left home ("duration") is included only in the level-2 equation. The level-1 equation for this model then becomes:

$$Y_{ij} = \pi_{0i} + \pi_{1i}\,\text{Time}_{ij} + \pi_{2i}\,\text{Time}^2_{ij} + \pi_{3i}\,\text{Non-parental residence}_{ij} + \varepsilon_{ij} \qquad \text{[Eq 4.2].}$$

I included the fixed effects results in three different equations to determine the influence of the level-1 predictors. Where:

$$\pi_{0i} = \gamma_{00} + \gamma_{01}\,\text{Family of Origin SES}_i + \gamma_{02}\,\text{Generation}_i + \gamma_{03}\,\text{Duration}_{ij} + \gamma_{04}\,(\text{Generation}_i * \text{Duration}_{ij}) + \mathbf{Z}_{0i} + \zeta_{0i}$$

$$\pi_{1i} = \gamma_{10} + \gamma_{11}\,\text{Family of Origin SES}_i + \gamma_{12}\,\text{Generation}_i + \gamma_{13}\,\text{Duration}_{ij} + \gamma_{14}\,(\text{Generation}_i * \text{Duration}_{ij}) + \mathbf{Z}_{1i} + \zeta_{1i}$$

$$\pi_{2i} = \gamma_{20} + \zeta_{2i}$$

$$\pi_{3i} = \gamma_{30} + \gamma_{31}\,\text{Generation}_i + \zeta_{3i}$$

Or in composite equation (by substituting the level-2 equations into the level-1 equation):

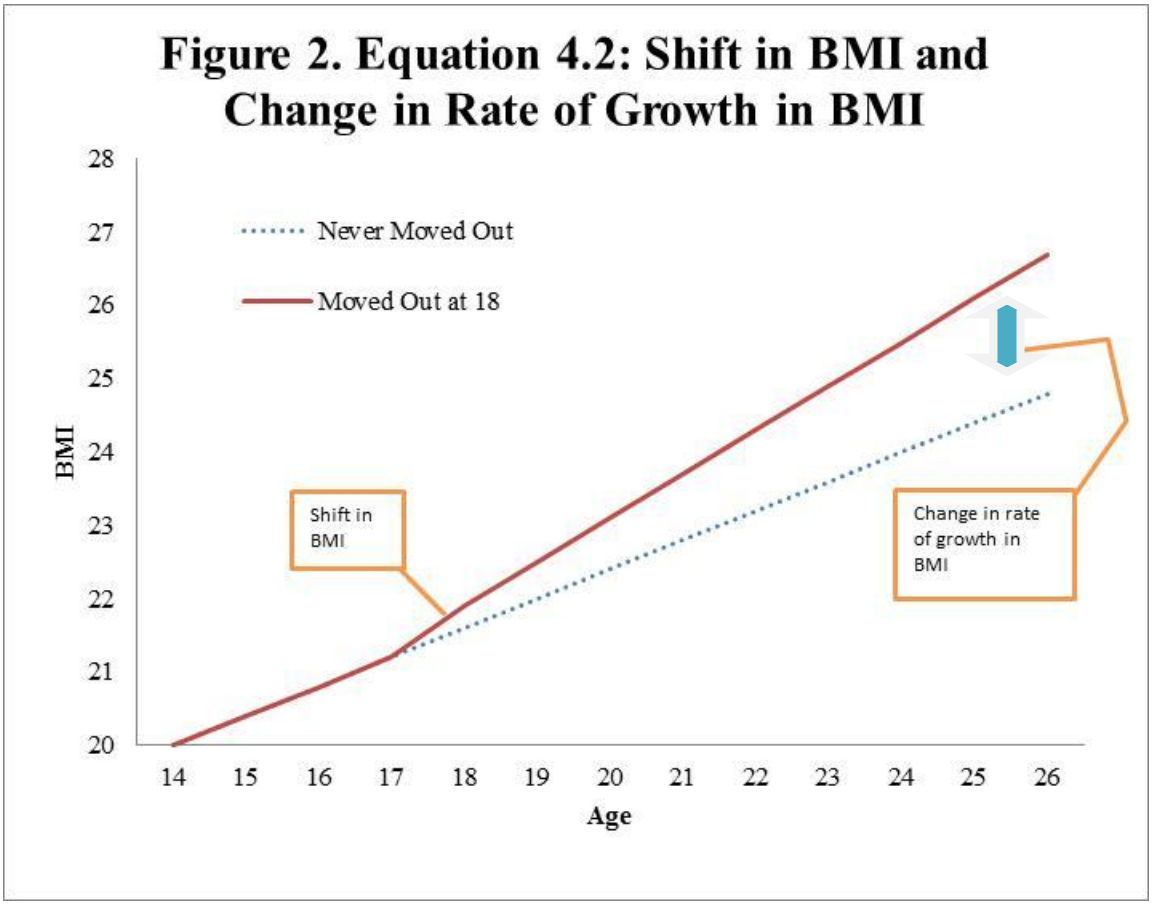
$$Y_{ij} = [\gamma_{00} + \gamma_{01}\,\text{Family of Origin SES}_i + \gamma_{02}\,\text{Generation}_i + \gamma_{03}\,\text{Duration}_{ij} + \gamma_{04}\,(\text{Generation}_i * \text{Duration}_{ij}) + \mathbf{Z}_{0i}] +$$

$$[\gamma_{10} + \gamma_{11}\,\text{Family of Origin SES}_i + \gamma_{12}\,\text{Generation}_i + \gamma_{03}\,\text{Duration}_{ij} + \gamma_{04}\,(\text{Generation}_i * \text{Duration}_{ij}) + \mathbf{Z}_{1i}]*\text{Time}_{ij} + [\gamma_{20}]*\text{Time}^2_{ij}$$

$$[\gamma_{30} + \gamma_{31}\,\text{Generation}_i]*\,\text{Non-parental residence}_{ij} +$$

$$[\varepsilon_{ij} + \zeta_{0i} + \zeta_{1i} * \text{Time}_{ij} + \zeta_{2i} * \text{Time}^2_{ij} + \zeta_{3i} * \text{Non-parental residence}].$$

This approach is illustrated in Figure 2.



Approach #3: reasons for leaving home.

Lastly, I examine whether the effect of home leaving on weight is moderated by where the respondents go when they leave home, specifically whether they live with a partner (living with either a spouse or boyfriend/girlfriend) or go to college. Among adults, college attendance is negatively associated with BMI. However, past research suggests that initial college attendance is a period of rapid weight gain. Those who attend college may gain weight initially, but have a slower growth in BMI. Additionally, while the effect of home leaving is unknown, past research consistently demonstrates that individuals with partners tend to weigh more than people without partners (Kahn et al., 1991; Schoenborn, 2004). Therefore, the effect of home leaving, when it

happens in the context of partnering, may be especially associated with increases in weight.

To examine these potentially mediating and moderating effects of partnering and college attendance, I focus on the initial reason that the respondent left home, either to attend college or move in with a partner. While this question is not explicitly asked in the survey, I infer this by examining whether respondents were enrolled in college or living with partners during the first wave they reported they were no longer living with their parents.

I used the same coding scheme described previously to create duration variables indicating the number of months since the respondent left home. The only difference in this analysis is that I created three different mutually exclusive duration variables indicating the time since leaving home for college, time since leaving home for partner, and time since leaving home for other reasons. I also used a modification of the non-parental residence variable indicating the reason for non-parental residence: non-parent residence and left for college, non-parent residence and left for partner, and non-parent residence and left for other reasons (ref. = still living with parents). For example, if the previous hypothetical respondent reported she left home the first time for college and the second time to live with a partner, then her person period record would be as follows: "non-parent residence and left for college" would equal 1 for waves six and seven and 0 for all other waves; the duration variable for college would equal 12 in wave seven and 0 for all other waves; "non-parent residence and left for partner" would equal 1 for waves 10, 11, and 12 and 0 for all other waves; and, the corresponding duration variable would equal 12 for wave 11, 24 for wave 12 and 0 for all other waves.

Only the initial reason for leaving home for that period of non-parent residence is examined. For example, individuals who leave home to attend college would subsequently graduate and may continue to reside outside the parental home after finishing college. These

individuals would always be coded as leaving home for college (as long as they did not move back in with their parents), even if they eventually are no longer attending college. If the previous hypothetical respondent never moved back in with parents after wave six, the respondent would always be coded as non-parental residence and left home for college even after moving in with their partner in wave 10. Additionally, if respondents leave home for a partner and do not move back in with their parents, they are always coded as non-parent residence and left for a partner even if that partnership ends in subsequent waves.

This analysis is conducted for the pooled sample and the Mexican, white, and black sub-sample. However, due to sample size limitations only interactions with the second generation are tested. The first generation is dropped from the third model. Additionally, I do not estimate Model 3, which includes the interactions between home leaving and generation, for the Mexican, white, and black specific sub-sample due to sample size constraints.

Preliminary analyses indicated that the model does not converge when all home leaving variables are added in the level-1 model. Because the home-leaving variables in this analysis are so interrelated, I opted to include all home leaving variables in the level-2 portion of the model rather than including some, but not others in the level-1 equation. The level-1 equation for this model is therefore expressed as:

$$Y_{ij} = \pi_{0i} + \pi_{1i} \text{Time}_{ij} + \pi_{2i} \text{Time}^2_{ij} + \varepsilon_{ij} \qquad \text{[Eq 4.3].}$$

I included fixed effects in two different equations to determine their influence on the level-1 coefficients, where:

$$\pi_{0i} = \gamma_{00} + \gamma_{01} \text{Family of Origin SES}_{i} + \gamma_{02} \text{Generation}_{i} + \gamma_{03} \text{Non-parental residence by Reason}_{ij} + \gamma_{04} (\text{Generation}_{i} * \text{Non-parental residence by Reason}_{ij}) + \mathbf{Z}_{0i} + \zeta_{0i}$$

$$\pi_{1i} = \gamma_{10} + \gamma_{11}\text{Family of Origin SES}_i + \gamma_{12}\text{Generation}_i + \gamma_{13}\text{Duration by Reason}_{ij} + \gamma_{14}$$

$$(\text{Generation}_i * \text{Duration by Reason}_{ij}) + \mathbf{Z}_{1i} + \zeta_{1i}$$

$$\pi_{2i} = \gamma_{20} + \zeta_{2i}$$

Or in composite equation (by substituting the level-2 equations into the level-1 equation):

$$Y_{ij} = [\gamma_{00} + \gamma_{01}\text{Family of Origin SES}_i + \gamma_{02}\text{Generation}_i + \gamma_{03}\text{Non-parental residence by Reason}_{ij} + \gamma_{04}(\text{Generation}_i * \text{Non-parental residence by Reason}_{ij}) + \mathbf{Z}_{0i}] +$$

$$[\gamma_{10} + \gamma_{11}\text{Family of Origin SES}_i + \gamma_{12}\text{Generation}_i + \gamma_{03}\text{Duration by Reason}_{ij} + \gamma_{04}(\text{Generation}_i * \text{Duration by Reason}_{ij}) + \mathbf{Z}_{1i}]*\text{Time}_{ij} +$$

$$[\gamma_{20}]*\text{Time}^2_{ij} +$$

$$[\varepsilon_{ij} + \zeta_{0i} + \zeta_{1i}*\text{Time}_{ij} + \zeta_{2i}*\text{Time}^2_{ij}].$$

Results

Descriptive findings.

Table 2 presents summary measures on home leaving for the sample and by generation. In accordance with past research, I find that the first and second generation is the least likely to leave their natal home during this time period and this is significantly different from the third generation. Also, the second generation is more likely to leave home than the first generation, but less likely than the third generation. The third generation is the most likely to leave home at every age group.

Table 2. Non-Parental Residence and Moving Back by Generation and Age

Non-Parental Residence	18 or less	19 to 21	22-24	25 or higher
First Generation	6.06	44.39 *	58.44 *	65.94 *
Second Generation	6.02	44.48 *	57.02 *	66.88 *
Third Generation	8.00	54.35	67.94	78.73
Parental Residence, Returned Home				
	18 or less	19 to 21	22-24	25 or higher
First Generation	26.20	26.08 *	27.39 *	26.87 *
Second Generation	25.87	29.45 *	29.98 *	32.68 *
Third Generation	26.85	29.11	30.04	31.59

*= signifcantly different at the p <0.05 from the third generation within age
Pooled Sample, person year file; n=78,973

As mentioned earlier, young adults often move in and out of the parental home. I allow for this fluctuation in living arrangements by measuring residence at each wave. Of those who ever leave their natal home, roughly 30% return. Returning home is more common among the third generation than it is for children of immigrants. This indicates that while the first and second generation are less likely to leave home than later generations; they are also less likely to return once they have left. These results are similar to those found in other large nationally representative data sets (Goldscheider and Goldcheider, 1994; White, 1994).

Table 3 displays mean BMI for those who left home compared to those who did not by age and generation. Table 2 suggests that those who leave home early, before the age of 21, have a slightly higher mean BMI than those who remain in their parents' home. However, those who leave home later, after the age of 23, have a lower mean BMI than those who remain in their natal home. However, these differences are not significant. In addition, this weak association between home leaving and BMI may be due to other suppressing variables that are associated with both home leaving and weight, such as family of origin SES, partnering, and race/ethnicity.

In order to examine this possibility, I estimate growth curve models to control for several confounding variables.

Table 3. Mean BMI by Parental Residence, Generational Status, and Age

	18 or less	19 to 21	22-24	25 or higher
First Generation				
Non-Parental Residence	22.51	24.41	25.60	26.06
Parental Residence	22.47	24.06	25.92	26.12
Second Generation				
Non-Parental Residence	23.37	25.40	26.80	27.55
Parental Residence	23.27	25.08	27.21	27.77
Third Generation				
Non-Parental Residence	23.01	25.03	26.52	27.29
Parental Residence	22.93	25.00	26.51	27.64

*= signifcantly different at the p <0.05 from the third generation within age
Pooled Sample, person year file; n=78,973

Approach #1: non-parental residence and home leaving.

I first present the results of the analysis that estimates the effects of non-parental residence and home leaving (Approach #1). Table 4 presents the growth curve models based on Equation 4.1. Model 1 includes all the sample variables, except the home leaving variables. Model 2 adds the just-left-home and non-parental residence variables and is associated with a significantly better fit (chi-square = 290.4, $p < 0.001$). This model demonstrates that currently residing away from home is associated with a significant shift in BMI. Those who live away from home have a 0.06 higher BMI than those who live with their parents. However, the first wave that the respondent moved out is significant and negatively associated with BMI. This means that individuals do not experience the greatest shift in BMI when they first move out. Rather, the weight they had prior to moving out is maintained during the first wave they moved out (-0.05 + 0.06 = 0.01), but there is an upward shift in BMI by the second wave the respondent has left home (0.06). Thus, home leaving has a lagged effect on BMI, though the effect of home

leaving is very small. The second wave that the respondent currently resides away from home is associated with a 0.06 shift in BMI, which is maintained for the duration they reside away from home. The effect of generation remains relatively unchanged once the home leaving variables are included in the model.

Table 4. Unweighted Growth Curve Models of the Relationship between BMI and Non-parental Residence and Having Just Left Home, by Generation

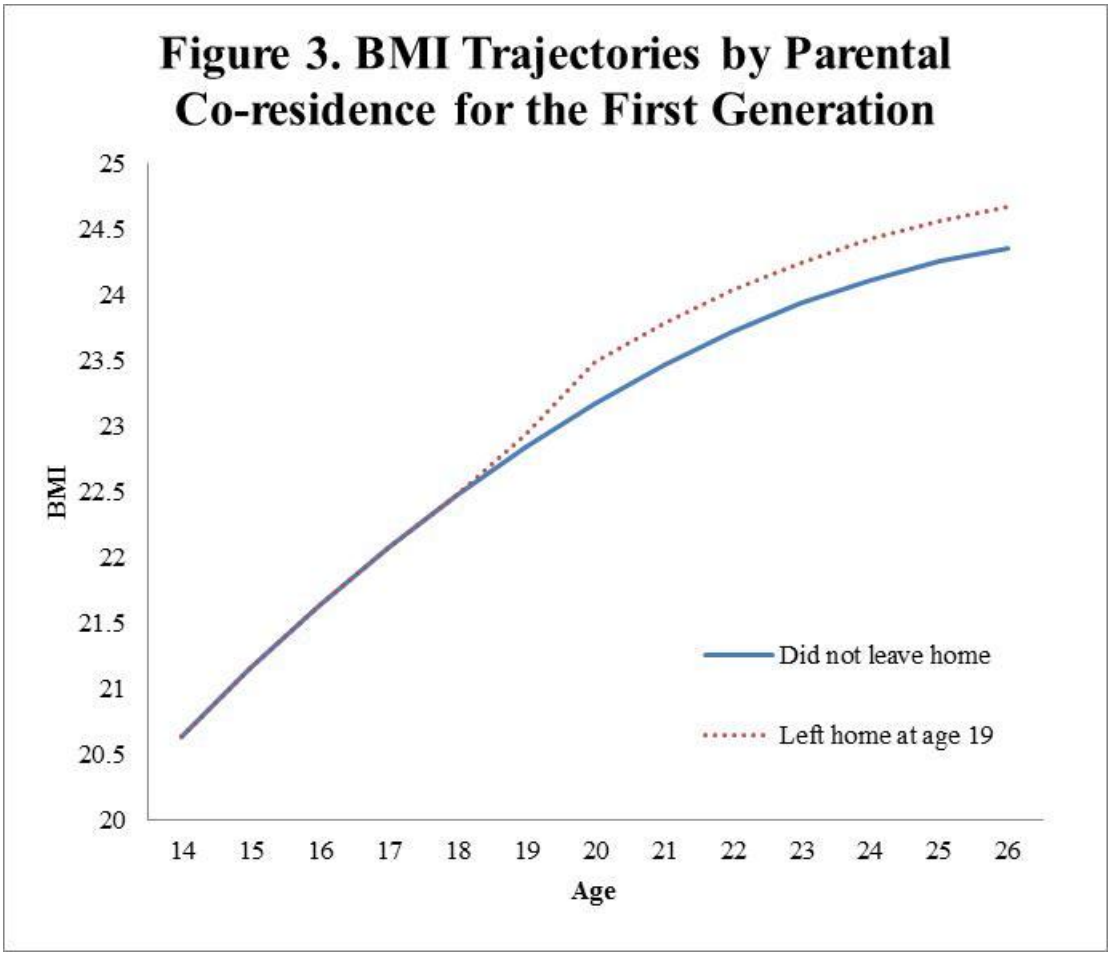
	Model 1		Model 2		Model 3	
	Baseline	Rate of Change	Baseline	Rate of Change	Baseline	Rate of Change
Intercept	21.363 ***	0.560 ***	21.357 ***	0.556 ***	21.355 ***	0.559 ***
Intercept^2		-0.019 ***		-0.019 ***		-0.019 ***
First Generation	-0.712 ***	-0.067 **	-0.715 ***	-0.068 **	-0.708 ***	-0.084 ***
Second Generation	0.021	-0.011	0.021	-0.011	0.026	-0.023
Just left home			-0.053 *		-0.030	
X First Gen.					-0.192	
X Second Gen.					-0.133	
Non-parental Residence			0.062 *		0.025	
X First Gen.					0.288 *	
X Second Gen.					0.201 *	
Mexican-American	0.503 **	0.058 ***	0.506 ***	0.058 **	0.507 **	0.058 ***
Other Hispanic	0.320	0.025	0.333	0.023	0.332	0.023
Black	0.709 ***	0.001	0.710 ***	0.001	0.711 ***	0.001
Other	1.064 *	-0.070	1.044 *	-0.066	1.045 *	-0.067
Male	0.337 ***		0.334 **		0.334 ***	
Pregnant	1.709 ***		1.701 ***		1.700 ***	
Total Number of Children	0.369 ***		0.365 ***		0.364 ***	
Number of cigarettes per month	-0.018 ***		-0.018 ***		-0.018 ***	
Single	-0.411 ***		-0.398 ***		-0.398 ***	
Employed	-0.019		-0.018		-0.018	
Self Rated Health	0.138 ***		0.136 ***		0.136 ***	
Mother's Education	-0.013	-0.003 †	-0.014	-0.003 *	-0.014	-0.003 *
Parent's Weight Status						
Overweight	1.154 ***	0.041 **	1.154 ***	0.040 **	1.154 ***	0.040 ***
Obese	2.674 ***	0.100 ***	2.670 ***	0.101 ***	2.670 ***	0.101 ***
BMI Missing	1.112 ***	0.000	1.111 ***	0.001	1.111 ***	0.001
Family Status in 1997						
Single Parent	0.417 ***		0.413 ***		0.413 ***	
Step-parent family	-0.036		-0.038		-0.038	
Other family type	-0.058		-0.118		-0.104	
-2 Log Likelihood	357990.7		357845.5		357844	
Variance Components						
Intercept	14.222 ***		14.168 ***		14.167 ***	
Time	0.413 ***		0.400 ***		0.400 ***	
Time squared	0.002 ***		0.002 ***		0.002 ***	
Non-parental Residence			0.688 ***		0.688 ***	
With-in Variation	3.092 ***		2.995 ***		2.995 ***	

† = p<0.1, * = p<0.05, ** = p<0.01, *** = p < 0.001

Pooled Sample, person year file; n=78,973

Model 3 adds the interactions between non-parental residence, home leaving and generation, including these variables does not result in a significantly better model fit. This may be due to the relatively small, though significant, effect sizes. In accordance with my previous

hypothesis, home leaving is associated with more weight gain for the first and second generations than the third or higher. Non-parental residence is associated with an additional 0.29 increase in BMI for the first generation and an additional 0.20 increase in BMI for the second generation (the interactions and the total effects are significant). The pattern for the first generation is illustrated in Figure 3, which plots the predicted BMI for a first generation individual who never left home versus a first generation individual who left home at the age of 19.



Including the interaction terms reduces the main effect of leaving home to non-significance. Because the third generation is the reference category, this means that leaving home is not associated with BMI for the third generation. Additional analyses indicate that

among the third generation, currently residing away from home is positively associated with BMI, but this effect is mediated by the controls for marital status and number of children. The positive effect of home leaving on BMI for the third generation appears to operate through family transitions undertaken during this time period. However, among the first and second generation, home leaving is significantly associated with weight gain even after family transitions are taken into account.

Table 5 displays the results for the Mexican-American, black, and white sample. The results for this sample mirror those found for the pooled sample. Including the non-parental residence variables significantly improves mode fit, but including the interactions reduces model fit. Non-parental residence is associated with an increase in BMI, but only for the first and second generation Mexican-Americans. For the first generation, non-parental residence is associated with a 0.44 increase in BMI, and for the second generation, it is associated with a 0.29 increase in BMI, a small, but significant increase. The main effect is not significant once the interactions are introduced to the model, indicating that the effect of non-parental residence is not significant for the third generation. Additionally, the interactions between the just-left-home variable and generation are also significant and negative for the second and third generation Mexican-Americans and blacks. For the second generation the interaction is negative, indicating that home leaving has a lagged effect on BMI and weight gain is not experienced until the second wave the respondent has lived away from home. For third generation Mexican-Americans, moving out of one's parents' home is associated with a decrease in BMI. However, the total effect is not significant (total effect = (main effect for just-left-home + interaction) + (main effect for non-parent residence + interaction), or (-0.27 + -0.04) + (0.15+ 0.01) = -0.14. Due to the way the variables are the coefficient for just-left-home and non-parental residence must be added in

order to examine the effect of just-left-home, because they are not mutually exclusive. Similarly, the total effect of first wave for blacks is not significant (b = 0.06). This means that within the respective generation/ethnic groups the effect of just-left-home is not significantly different from zero though the effect is significantly different from the reference group.

Table 5. Unweighted Growth Curve Models of the Relationship between BMI and Non-Parental Residence, and Having Just Left Home, by Generation and Ethnicity

	Model 1		Model 2		Model 3	
	Baseline	Rate of Change	Baseline	Rate of Change	Baseline	Rate of Change
Intercept	21.383 ***	0.551 ***	21.382 ***	0.549 ***	21.380 ***	0.552 ***
Intercept^2		-0.019 ***		-0.019 ***		-0.019 ***
First Gen. Mex-Am	-0.345	0.004	-0.339	0.001	-0.336	-0.020
Second Gen. Mex-Am	0.570 **	0.046 *	0.576 **	0.045 *	0.585 **	0.031
Third Gen. Mex-Am	0.485 *	0.053 **	0.487 *	0.053 **	0.495 **	0.044 *
Third Gen. Black	0.683 ***	0.004	0.685 ***	0.004	0.680 ***	0.007
Just left home			-0.045		-0.037	
X First Gen. Mex-Am					-0.216	
X Second Gen. Mex-Am					-0.292 *	
X Third Gen. Mex-Am					-0.273 *	
X Third Gen. Black					0.131 *	
Non-parental Residence			0.040		0.015	
X First Gen. Mex-Am					0.413 *	
X Second Gen. Mex-Am					0.271 *	
X Third Gen. Mex-Am					0.149	
X Third Gen. Black					-0.046	
Male	0.300 **		0.296 **		0.297 **	
Pregnant	1.706 ***		1.698 ***		1.695 ***	
Total Number of Children	0.369 ***		0.366 ***		0.362 ***	
Number of cigarettes per month	-0.019 ***		-0.019 ***		-0.019 ***	
Single	-0.409 ***		-0.401 ***		-0.399 ***	
Employed	-0.022		-0.020		-0.020	
Self Rated Health	0.136 ***		0.134 ***		0.135 ***	
Mother's Education	-0.018	-0.004 †	-0.018	-0.004 *	-0.018	-0.004 *
Parent's Weight Status						
Overweight	1.210 ***	0.045 ***	1.212 ***	0.044 **	1.211 ***	0.044 ***
Obese	2.650 ***	0.096 ***	2.646 ***	0.097 ***	2.646 ***	0.097 ***
BMI Missing	1.087 ***	0.007	1.088 ***	0.007	1.089 ***	0.007
(Normal weight)						
Family Status in 1997						
Single Parent	0.386 **		0.381 **		0.380 **	
Step-parent family	-0.121		-0.123		-0.124	
Other family type	0.042		-0.002		0.017	
(Two parents)						
-2 Log Likelihood	315049.6		314934		314932	
Variance Components						
Intercept	14.404 ***		14.402 ***		14.400 ***	
Age	0.420 ***		0.410 ***		0.410 ***	
Age Squared	0.003 ***		0.003 ***		0.002 ***	
Non-parental Residence			0.677 ***		0.676 ***	
With-in	3.106 ***		3.036 ***		3.035 ***	

† = p<0.1, * = p<0.05, ** = p<0.01, *** = p < 0.001

Mexican, white, and black subsample, person year file; n=68,073

Approach #2: duration effects.

Overall, the results suggest that the initial wave that respondents move out of their parents' homes is not associated with a significant increase in BMI. Instead, BMI is higher for those who continue to reside outside their parents' home after the first wave compared to those who reside with their parents. However, Equation 4.1 does not consider the effects of duration spent outside of the parental home on BMI. To consider this possibility, I use Equation 4.2. Introducing the "duration" variable helps assess whether home leaving is associated with a change in the rate of growth of BMI. Table 6 presents the growth curve models for this equation.

As in the previous analysis, Model 1 includes all the sample variables, except the home leaving variables. The second model adds the home-leaving variables (non-parental residence and duration). None of the home leaving variables are significantly associated with BMI and including these variables does not significantly improve the model fit. Including the controls of marital status and number of children reduces these effects to non-significance. The effects of generational status remain relatively unchanged after the addition of the home leaving variables, suggesting that differences in home-leaving do not explain generational differences in weight. Finally, Model 3 adds the interaction terms, including these interactions does not improve the model fit. The only interactions to approach significance are those for the second generation. For this group, non-parental residence is associated with a significant shift in BMI. The interaction between time since respondents left home ("duration") and the second generation is marginally significant and negative; however, the total effect (i.e., the main effect + interaction) is not significant. These results so far suggest that home leaving is associated with a shift in BMI after the first wave the respondent lives away from home and is maintained while the individual resides away from home and both approaches suggest that these effects are stronger

for the first and second generation than they are for the third.

Table 6. Unweighted Growth Curve Models of the Relationship between BMI and Duration of Non-Parental Residence, by Generation

	Model 1		Model 2		Model 3	
	Baseline	Rate of Change	Baseline	Rate of Change	Baseline	Rate of Change
Intercept	21.363 ***	0.560 ***	21.356 ***	0.557 ***	21.356 ***	0.558 ***
Intercept^2		-0.019 ***		-0.019 ***		-0.019 ***
First Generation	-0.712 ***	-0.067 **	-0.715 ***	-0.068 **	-0.709 ***	-0.084 ***
Second Generation	0.021	-0.011	0.021	-0.012	0.013	-0.009
Non-parental Residence			0.033	-0.002	0.008	0.001
X First Gen.					0.166	0.040
X Second Gen.					0.153 *	-0.055 †
Mexican-American	0.503 **	0.058 ***	0.507 **	0.058 ***	0.508 ***	0.057 **
Other Hispanic	0.320	0.025	0.334	0.022	0.335	0.021
Black	0.709 ***	0.001	0.711 ***	0.000	0.712 ***	0.000
Other	1.064 *	-0.070	1.043 *	-0.066	1.044 *	-0.067
Male	0.337 ***		0.335 ***		0.335 ***	
Pregnant	1.709 ***		1.701 ***		1.700 ***	
Total Number of Children	0.369 ***		0.368 ***		0.368 ***	
Number of cigarettes per month	-0.018 ***		-0.018 ***		-0.018 ***	
Single	-0.411 ***		-0.400 ***		-0.400 ***	
Employed	-0.019		-0.018		-0.018	
Self Rated Health	0.138 ***		0.136 ***		0.136 ***	
Mother's Education	-0.013	-0.003 †	-0.014	-0.003 †	-0.014	-0.003 †
Parent's Weight Status						
Overweight	1.154 ***	0.041 **	1.155 ***	0.040 **	1.155 ***	0.040 **
Obese	2.674 ***	0.100 ***	2.671 ***	0.101 ***	2.671 ***	0.101 ***
BMI Missing	1.112 ***	0.000	1.112 ***	0.000	1.112 ***	0.001
Family Status in 1997						
Single Parent	0.417 ***		0.413 ***		0.412 ***	
Step-parent family	-0.036		-0.038		-0.039	
Other family type	-0.058		-0.098		-0.088	
-2 Log Likelihood	357990.7		357995		358001	
Variance Components						
Intercept	14.222 ***		14.169 ***		14.167 ***	
Time	0.413 ***		0.400 ***		0.400 ***	
Time squared	0.002 ***		0.002 ***		0.002 ***	
Currently Resides Away from Home			0.689 ***		0.690 ***	
With-in Variation	3.092 ***		2.995 ***		2.995 ***	

† = p<0.1, * = p<0.05, ** = p<0.01, *** = p < 0.001

Pooled Sample, person year file; n=78,973

Table 7 displays the results for the Mexican-American, black, and white sample, which mirror those found for the pooled sample. The main effects of home leaving are not significant. Including the home leaving variables in the models slightly reduced the coefficient for rate of

growth in BMI for the second generation Mexican-Americans, consistent with my second hypothesis. However, this coefficient is still significant after including the effect of home leaving. The interaction between first generation and non-parental residence is marginally significant and similar to the results found in the previous analysis, the effect of leaving home on BMI is worse for this group. Additionally, the interaction between third generation blacks and time since leaving home is negatively associated with weight gain. Leaving the parental home is associated with a 0.03 decrease in annual rate of growth in BMI for blacks.

Table 7. Unweighted Growth Curve Models of the Relationship between BMI and Duration of Non-Parental Residence, by Generation and Ethnicity

	Model 1		Model 2		Model 3	
	Baseline	Rate of Change	Baseline	Rate of Change	Baseline	Rate of Change
Intercept	21.383 ***	0.551 ***	21.381 ***	0.550 ***	21.384 ***	0.547 ***
Intercept^2		-0.019 ***		-0.019 ***		-0.019 ***
First Gen. Mex-Am	-0.345	0.004	-0.338	0.001	-0.342	-0.014
Second Gen. Mex-Am	0.570 **	0.046 *	0.576 **	0.045 †	0.568 **	0.047 *
Third Gen. Mex-Am	0.485 *	0.053 **	0.487 *	0.052 **	0.483 *	0.057 **
Third Gen. Black	0.683 ***	0.004	0.685 ***	0.004	0.673 ***	0.014
Non-parental Residence			0.015	0.000	-0.012	0.019
X First Gen. Mex-Am					0.292 †	0.007
X Second Gen. Mex-Am					0.127	-0.044
X Third Gen. Mex-Am					0.006	-0.021
X Third Gen. Black					0.049	-0.055 *
Male	0.300 **		0.297 **		0.297 **	
Pregnant	1.706 ***		1.698 ***		1.696 ***	
Total Number of Children	0.369 ***		0.368 ***		0.367 ***	
Number of cigarettes per month	-0.019 ***		-0.019 ***		-0.019 ***	
Single	-0.409 ***		-0.402 ***		-0.401 ***	
Employed	-0.022		-0.020		-0.021	
Self Rated Health	0.136 ***		0.134 ***		0.134 ***	
Mother's Education	-0.018	-0.004 †	-0.018	-0.004 *	-0.018	-0.004 *
Parent's Weight Status						
Overweight	1.210 ***	0.045 ***	1.212 ***	0.044 ***	1.211 ***	0.044 ***
Obese	2.650 ***	0.096 ***	2.646 ***	0.097	2.646 ***	0.097 ***
BMI Missing	1.087 ***	0.007	1.089 ***	0.007	1.090 ***	0.007
Family Status in 1997						
Single Parent	0.386 **		0.381 **		0.381 **	
Step-parent family	-0.121		-0.124		-0.124	
Other family type	0.042		0.016		0.007	
-2 Log Likelihood	315049.6		315052		315053	
Variance Components						
Intercept	14.404 ***		14.402 ***		14.402 ***	
Age	0.420 ***		0.410 ***		0.409 ***	
Age Squared	0.003 ***		0.003 ***		0.002 ***	
Non-parental Residence			0.677 ***		0.680 ***	
With-in	3.106 ***		3.036 ***		3.035 ***	

† = p<0.1, * = p<0.05, ** = p<0.01, *** = p < 0.001

Mexican, white, and black subsample, person year file; n=68,073

Approach #3: reasons for leaving home.

The last aim of this chapter is to examine the context in which home leaving occurs. Table 8 presents growth curve models of BMI that take into account both home leaving and type of transition, specifically focusing on whether home leaving was the result of partnering or

attending college. As in the first two analyses, Model 1 includes all the sample variables, except the home leaving variables. The second model adds the three duration variables by reason the respondent left home (to attend college, live with a partner, or other), and the three dummy variables indicating non-parental residence by the reasons listed above. Including these variables does significantly improve model fit

Table 8. Unweighted Growth Curve Models of the Relationship between BMI and Reason for Non-Parental Residence, by Generation

	Model 1		Model 2		Model 3	
	Baseline	Rate of Change	Baseline	Rate of Change	Baseline	Rate of Change
Intercept	21.363 ***	0.560 ***	21.404 ***	0.560 ***	21.351 ***	0.561 ***
Intercept^2		-0.019 ***		-0.019 ***		-0.019 ***
First Generation	-0.712 ***	-0.067 **	-0.712 ***	-0.066 **	-	-
Second Generation	0.021	-0.011	0.020	-0.010	0.331	-0.010
Non-parental Residence by reason						
Left for a Partner			-0.028	0.030 *	0.006	0.034 *
X Second Gen.					-0.200 †	-0.094 *
Left for College			0.014	-0.032 *	0.020	-0.022
X Second Gen.					0.314 *	-0.099 *
Left for Other Reasons			-0.047	-0.005	0.005	0.000
X Second Gen.					0.022	-0.003
Mexican-American	0.503 **	0.058 ***	0.503 **	0.057 ***	0.504 **	0.057 ***
Other Hispanic	0.320	0.025	0.319	0.025	0.321	0.024
Black	0.709 ***	0.001	0.707 ***	0.002	0.709 ***	0.002
Other	1.064 *	-0.070	1.063 *	-0.070	1.062 *	-0.072
Male	0.337 ***		0.337 ***		0.336 ***	
Pregnant	1.709 ***		1.707 ***		1.705 ***	
Total Number of Children	0.369 ***		0.360 ***		0.358 ***	
Number of cigarettes per month	-0.018 ***		-0.018 ***		-0.018 ***	
Single	-0.411 ***		-0.406 ***		-0.406 ***	
Employed	-0.019		-0.019		-0.019	
Self Rated Health	0.138 ***		0.137 ***		0.137 ***	
Mother's Education	-0.013	-0.003 †	-0.014	-0.002	-0.014	-0.002
Parent's Weight Status						
Overweight	1.154 ***	0.041 **	1.154 ***	0.040 **	1.153 ***	
Obese	2.674 ***	0.100 ***	2.674 ***	0.100 ***	2.674 ***	
BMI Missing	1.112 ***	0.000	1.112 ***	-0.001	1.113 ***	
Family Status in 1997						
Single Parent	0.417 ***		0.417 ***		0.417 ***	0.041 ***
Step-parent family	-0.036		-0.036		-0.036	0.101 ***
Other family type	-0.058		-0.093		-0.072	-0.001
-2 Log Likelihood	357990.7		358017			
Variance Components						
Intercept	14.222 ***		14.166 ***		14.163 ***	
Time	0.413 ***		0.410 ***		0.410 ***	
Time squared	0.002 ***		0.002 ***		0.002 ***	
With-in Variation	3.092 ***		3.067 ***		3.066 ***	

† = p<0.1, * = p<0.05, ** = p<0.01, *** = p < 0.001

Pooled Sample, person year file; n=78,973

Leaving home to attend college is associated with a *decrease* in the rate of growth in BMI. However, leaving home to live with a partner is associated with a faster rate of growth in BMI compared to those still at home; though both effects are small in magnitude. Neither

attending college nor living with a partner is associated with a shift in BMI, however. Lastly, leaving home for other reasons is not associated with a shift in BMI or the rate of growth in BMI.

Overall, the effect of partnering is similar to that found for previous studies, in which married individuals tend to be heavier than never married individuals. The research presented here indicates that this effect accumulates over time. The effect of college attendance is similar to research on adults, in which those with more education have a lower BMI than those with less education. However, it differs from other research on young adults that examines weight gain during college attendance. This other research found a significant increase in weight gain when young adults left home to attend college. However, this research very rarely provides a non-university reference group (Wane et al., 2010). The research results presented here demonstrate that all young adults gain weight during this time period, but those who leave home to attend college gain weight at a slower rate compared to those who did not leave home to attend college.

Unexpectedly, including the home leaving variables in the model does not reduce the coefficient for rate of growth in BMI or shift in BMI among the first or second generation. This means my second hypothesis is not confirmed. In other words, the slower weight gain observed for children of immigrants cannot be explained by their tendency to remain living at home longer.

To explore whether the effects of home leaving differ by generation, Model 3 adds interaction terms between home leaving by reason and generation. However, due to sample size constraints, only the interactions for the second generation are interpretable. For this model, the first generation is not included in the analytic sample and the model log likelihood is not presented. The interactions indicate that college attendance is an important predictor of BMI for the second generation. Leaving to attend college is associated with an upward shift in BMI but a

decrease in the rate of growth. Those who move out to attend college experience a 0.33 increase in the shift of BMI, but a 0.12 decrease in the annual growth of BMI. This means that while they do experience an initial increase in BMI, this increase disappears after about three years at which point they experience a slower growth in BMI relative to those who did not leave home to attend college. This is illustrated in Figure 3 for two second generation individuals, one who left home at age 19 to attend college and one who remained at home. These results are similar to those found in the previous chapter, where emerging socioeconomic status is negatively associated with young adult BMI, especially for the second generation. Additionally, the interactions between leaving for a partner and the second generation are significant and negative. Additional within-generation analyses on the second generation indicate that they do experience an upward shift in BMI when they leave home for a partner. However, this effect only manifests after a year away from home and is not associated with a change in the growth of BMI.

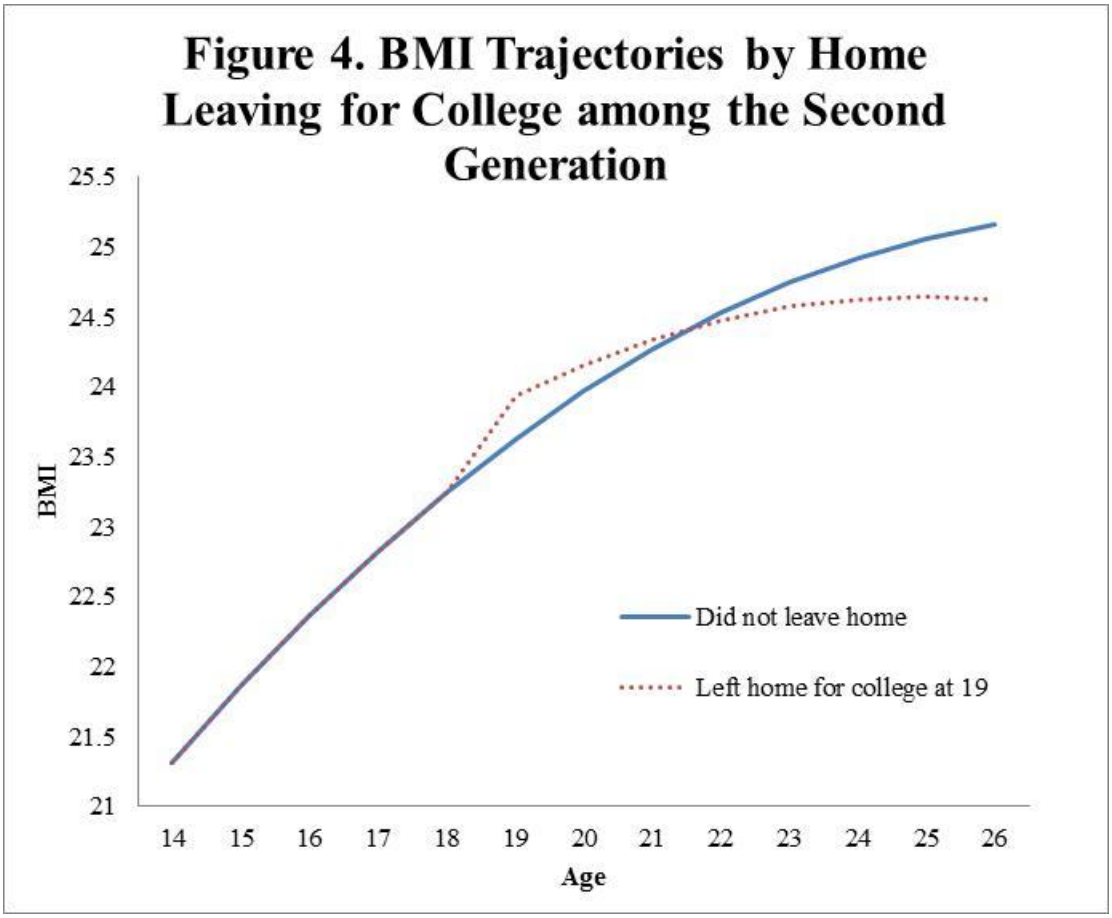


Table 9 displays the results for the Mexican-American, black, and white sample. Results for this sample mirror those found for the pooled sample. However, sample size limitations mean that I am unable to interact the home leaving variables by generation/ethnicity. Partnering is positively associated with the rate of growth in BMI and college attendance is negatively, moderately associated with the rate of growth in BMI.

Table 9. Unweighted Growth Curve Models of the Relationship between BMI and Reason for Non-Parental Residence, by Generation and Ethnicity

	Model 1		Model 2	
	Baseline	Rate of Change	Baseline	Rate of Change
Intercept	21.383 ***	0.551 ***	21.391 ***	0.554 ***
Intercept^2		-0.019 ***		-0.019 ***
First Gen. Mex-Am	-0.345		-0.342	0.002
Second Gen. Mex-Am	0.570 **	0.004	0.570 **	0.046 *
Third Gen. Mex-Am	0.485 *	0.046 *	0.486 *	0.052 **
Third Gen. Black	0.683 ***	0.053 **	0.681 ***	0.006
Non-parental Residence by reason				
Left for a Partner			-0.003	0.039 *
Left for College			0.015	-0.030 †
Left for Other Reasons			-0.011	-0.004
Male	0.300 **		0.300 **	
Pregnant	1.706 ***		1.703 ***	
Total Number of Children	0.369 ***		0.357 ***	
Number of cigarettes per month	-0.019 ***		-0.019 ***	
Single	-0.409 ***		-0.410 ***	
Employed	-0.022		-0.021	
Self Rated Health	0.136 ***		0.136 ***	
Mother's Education	-0.018	-0.004 †	-0.018	-0.003
Parent's Weight Status				
Overweight	1.210 ***	0.045 ***	1.210 ***	0.045 ***
Obese	2.650 ***	0.096 ***	2.651 ***	0.096 ***
BMI Missing	1.087 ***	0.007	1.088 ***	0.007
Family Status in 1997				
Single Parent	0.386 **		0.387 ***	
Step-parent family	-0.121		-0.120	
Other family type	0.042		0.034	
-2 Log Likelihood	315049.6		315075.0	
Variance Components				
Intercept	14.404 ***		14.494 ***	
Age	0.420 ***		0.421 ***	
Age Squared	0.003 ***		0.003 ***	
With-in	3.106 ***		3.151 ***	

† = p<0.1, * = p<0.05, ** = p<0.01, *** = p < 0.001
Mexican, white, and black subsample, person year file; n=68,073

Discussion

The results presented above point to three important findings. First, continuing to reside outside one's parental home is associated with an increase in BMI. Second, for the third generation this effect operates solely through family transitions (partnering and having children). But among the first and second generation, leaving home is associated with a significant gain in

weight and this effect remains significant even after accounting for family transitions. Third, moving out to live with a partner is associated with faster growth in BMI, while moving out for college is associated with a slower growth in BMI, especially among the second generation. However, these effects should be interpreted cautiously as some of these effects are relatively small in magnitude.

These findings partially confirm my hypotheses. The first and third hypotheses were confirmed; however, my second hypothesis was not. While immigrant youth and children of immigrants are more likely to gain weight than third generations when they leave home, immigrant youth who leave home still have a significantly lower BMI than the third generation. In other words, home leaving did not explain immigrant youths' lower BMI or slower growth in BMI relative to those born in the US. Other factors besides home leaving should be examined to see if they account for immigrant youths' slower growth in BMI, relative to natives. Rather than household level factors, other individual factors, such as fast food consumption, binge drinking, experiencing financially difficult times, or age at first birth should be explored. These factors have been demonstrated to be associated with obesity and vary by generation.

Nevertheless, home leaving remains a significant factor, though small in magnitude, in predicting weight gain for the first and second generation (as indicated by the significant interactions and total effects). Remaining in the parental home may be more protective to children of immigrants than children of natives. First, past research has found that when immigrants and children of immigrants live in intergenerational households, they may view these living arrangements more positively than the third generation. These children are more likely to contribute financially to the household (Van Hook and Glick, 2002) and less likely to see their continued residential dependence as indicative of a failed transition into adulthood (Fulgini and

Peterson, 2002) than their native peers.

Additionally, living at home with parents may be protective for children of immigrants because they are in the process of acculturating. Research on children of immigrants and immigrant youth as they transition to adulthood describes the difficulties they experience as they try to define themselves in terms of both their cultural heritage and their American identities. Continuing to reside with one's parents and in ethnic communities is associated with slower or selective acculturation (Mollenkopf et al., 2007; Portes, 2002). This selective acculturation, or successful integration of cultural orientations into the assimilation process, may protect immigrant youth from the often precarious contexts in which they grow up. These include unsafe neighborhoods, poverty, and low parental monitoring due to extensive parental employment. Lower acculturation may also protect against developing poor dietary habits (Hubert, Snider, and Winkleby, 2005; Gordon-Larson et al., 2003; Unger et al., 2004), which are especially prevalent in the contexts described above (Miech et al., 2006; Power et al., 2010; Burdette, Wadden, and Whitaker, 2006). Thus, among children of immigrants, continuing to reside with one's parents may result in the slower adoption of unhealthy behaviors prevalent during this life course phase, such as increased consumption of fast food, soft drinks, and energy dense foods and a decreased consumption of fruits and vegetables (Nielsen et al., 2002).

However, continuing to reside in one's parents' house may also hinder the accumulation of young adult socioeconomic status, especially as it relates to education. Among the second generation, college attendance ultimately is associated with lower rates of obesity. Initially, leaving home results in an upward shift in BMI regardless of the reason for leaving home, but, those who leave home to attend college have a slower rate in change of growth in BMI. Ultimately, those who leave home to attend college end up with a lower BMI despite the fact that

they initially gain weight when they first leave home. Attending college may result in socialization toward more middle class values concerning exercise and diet (Ross and Mirowsky, 1999). This may be especially important to the second generation as it exposes them to these values at the same time that they lose the cultural protection of their parents.

Similar to past research (Kahn et al., 1991; Schoenborn, 2004), I find that moving in with a partner was associated with an increase in BMI relative to those who moved into other residential situations or those who remained at home. This was also the most common reason for home leaving for all generational groups. Though this effect was the largest among the third generation, supplemental models that only examined children of immigrants found that leaving home for a partner also had a significant and positive effect on BMI. Further research would benefit by examining the ethnicity of the respondent's partner. Children of immigrants who move in with co-ethnics may experience slower acculturation, resulting in slower growth in BMI. Failing to control for this variable may explain why the effect was not as large for the first and second generation.

Additionally, further research would benefit from examining the timing and sequences of transitions as well as the type of union formed. It would be interesting to know whether attending college before partnering moderates the positive effect of partnering. Roughly 10% of the sample indicated that at some point in time they were cohabiting and an additional 10% indicated that at some point in time they were married. Cohabiting relationships are often less stable and are often associated with less personal investment than marriages. As a result, those who cohabit may be less likely to change their behaviors as a result of their new residential status relative to the married. For example, past research has found that married individuals generally experience better health than the unmarried (with the exception of obesity), but this protective

effect does not extend to those in cohabiting partnerships (Waite, 1995; Waite and Gallagher, 2000).

From a policy standpoint, this research suggests that young adults, especially those not attending college, who move out of their parents' home are particularly vulnerable to obesity-related health problems. It therefore may be beneficial to target this group for interventions. Reaching this population is more difficult than those in university settings since their lives are not as structured by outside agents. However, classes during high school that better prepare young adults for the health trials of residential independence may help reach this group. Past research has indicated that among the challenges young adults face, choosing and preparing healthy foods are issues. Young adults are more likely to consume meals and snacks away from home, particularly energy dense foods such as pizza, cheeseburgers, and salty snacks, and they are more likely to consume soft drinks more than any other age groups (Nielsen et al., 2002; Lane et al., 2008; Lee et al., 2007). Interventions that promote healthy eating and drinking water instead of soft drinks may curb the significant gain in weight experienced during this time period.

The period of young adulthood is marked as a period of rapid change and flux (Arnett, 2003; Mollenkopf et al., 2008; Goldsheider and Goldscheider, 1989), as indicated by high rates of moving out of, and sometimes back into, one's parental home. The high level of residential mobility for this group makes it challenging to examine its impact on changes in weight. Several equations and models were run, treating the effects of time and moving out in different ways in order to account for this complexity.

Nevertheless, more could be done to explore the complex effects of home leaving among young adults. For example, the results presented above focused on home leaving rather than

home returning. Supplemental analyses find that returning back to one's parents' home is also associated with a shift in BMI. This suggests that even among those who move back in with their parents, the initial weight gain experienced from moving out is maintained after they move back home. Returning to one's parents' home may indicate a stalled or failed transition to adulthood (Schaniberg and Goldenberg, 1989). Past research indicates that a stalled or failed transition to adulthood is negatively associated with mental health outcomes, feelings of self-efficacy, and inter-generational conflict (Fulgini and Peterson, 2002). This research indicates it may be associated with poor health outcomes as well and the beneficial effect of parental monitoring may not extend to those who experience a period of residential independence.

Research has indicated that recent cohorts of young adults are more likely to experience pre-marital residential independence relative to earlier cohorts. However, they also are more likely to move back in with their parents and receive financial support during this time period (Mollenkopf et al., 2007; Furstenburg et al., 2005; Hogan and Astone, 1986). Continued residency with parents and greater parental financial support during this phase relative to earlier cohorts may mean that parents may have a greater influence on the health of their young adult children, especially among those who co-reside with their young adult children. Leaving the parental home is associated with weight gain among all generations, but only for children of immigrants is this experience attributable to reasons other than changes in family status. This suggests that among the first and second generation the effect of home leaving operates through other avenues besides family transitions, such as acculturation and assimilation.

Chapter 5: CONCLUSIONS

This dissertation presents new evidence about the relationship between weight change and the transition to adulthood for children of immigrants. I sought to examine whether BMI trajectories differ by generation, whether emerging young adult socioeconomic status moderated the change in BMI for children of immigrants, and whether home leaving is related to change in BMI as adolescents become adults. I did this using the *National Longitudinal Study of Youth* 1997 cohort, which is a large nationally representative sample of adolescents who were in between the ages of 12 and 16 as of December 31, 1996 and contains an oversample of black and Hispanic youth. This survey provides yearly information over a 12-year period about weight and height, college attendance, and household composition.

Three major findings emerged from my analyses. First, I find that rather than converging to the BMI of natives over time, immigrant generations maintain their initial advantage and in fact gain *less* weight during this time period than natives. Second, I find that emerging young adult SES is an especially important predictor of weight *change* during this time period, especially for the second generation, while family of origin SES is predictive only of adolescent BMI. Lastly, I find that leaving the parental home is associated with weight gain for all generations. Among the third generation, this effect operates primarily through family transitions, such as partnering and having children. But among the first and second generation, this relationship remains even after adjusting for family transitions, suggesting that factors related to acculturation may play a role.

Theoretical Implications

By examining differences in weight and weight change during the transition to adulthood, this research resonates with many aspects of current theories of immigrant assimilation, health

disparities, and life course theories concerning the transition to adulthood. Assimilation theories discuss the process by which immigrants and their children begin to resemble American mainstream society, and the implications this has on their educational attainment, occupation, and health. The two commonly used theories to discuss the immigrant assimilation process, in general, are classical assimilation and segmented assimilation, which are discussed in detail in Chapter 1. I find support for both theories.

Segmented assimilation theory stresses the importance of context during assimilation. Factors such as social class, ethnic cohesiveness, and race/ethnicity structure the assimilation process allowing some individuals entry into the largely white middle class and others are confined to the racialized underclass (Portes and Zhou, 1993; Portes and Rumbaut, 2001). Indeed, I find that native born Mexican-American youth (both second and third generation) have weight trajectories that more closely resemble third generation blacks, where obesity is very prevalent, than either whites or first generation Mexican-Americans (Chapter 2). In this sense, increasing generational assimilation for Mexican-American results in downward assimilation, where they more closely resemble third generation blacks than whites. However, structural assimilation, in the form of college attendance, negates the positive association between ethnicity and BMI for native born Mexican-Americans. College educated Mexican-Americans were statistically similar to college educated whites and significantly thinner than blacks of any education. This suggests that successful entry into the middle class mainstream, in the form of college attendance, reduces the increased risk of obesity experienced by many native born Mexican-Americans. I hypothesize that this may be the result of acquisition of new skills and knowledge that allow one to more effectively manage one's weight (described as learned effectiveness by Ross and Mirowsky), as well as a potentially thinner comparison group.

Also, in line with segmented assimilation I find parental co-residence to be an important factor in weight assimilation (Chapter 4). Non-parental residence was associated with increases in BMI for all generations, but only among the first and second generation is this not completely accounted for by childbearing and partnering. This suggests that other factors, perhaps related to acculturation and assimilation, drive the relationship between parental co-residence and weight for children of immigrants. It is often argued that retaining certain aspects of one's origin culture protects against non-beneficial patterns of assimilation, such as unhealthy behaviors (Lara et al., 2004). Strong immigrant families and communities often are pointed to as a great source of social capital for children of immigrants. Researchers suggest that these cohesive families results in accelerated assimilation into the middle class and protects against the often precarious environments that many immigrants find themselves (Portes and Rumbaut, 2001). Continued co-residence with parents may result in slower acculturation. Among children of immigrants, this may be especially important as the cultural protection provided to them by their parents wane when they move away and they find themselves in a new food environment.

I also find support for classical assimilation theory. As described by Alba and Nee (2003), this theory states that over time children of immigrants and their offspring will become indistinguishable from the American middle class mainstream. Measuring assimilation as generation (Chapter 2) I do find convergence in BMI. The 1.0 have the lowest BMI and growth, followed by the 1.5 generation and then those born in the U.S. However, I do not find that continuous exposure to the U.S. or duration is associated with BMI assimilation among the immigrant generations. Rather than catching up to native generations' BMI over time the immigrants generations gain less weight than natives, as evidenced by their slower growth in BMI over the study period. Immigrants continued advantage suggests that experiences early in

life may condition future risks of obesity even when there have been drastic changes in one's environment.

Research on obesity prevention suggests that current environment and early life experiences condition our current consumption habits and risks of obesity. Factors experienced early in life, even pre-natally (Mennella et al., 2001) have important implications for preferences and patterns later in life (Fiorito et al., 2010; Skinner 2002; Davison and Birch, 2002). Past research has found that soda consumption and exposure to vegetables early in childhood predicts consumption of not only these items later on, but also the intake of other items such as milk and fruits (Fiorito et al., 2010; Skinner 2002). Additionally, the family environment that parents create through their own physical activity and diet influences their child's current risk of obesity and diet as well as their future risk and diet (Larson et al., 2007; Davison et al., 2010; Davision and Birch 2002).

However, other research suggests that many of the dietary decisions individuals make on a daily basis are subconscious and largely influenced by one's current environment (Wansink, Payne, and Werle 2008; Wansik, Painter, and Lee, 2006; Wansink and Payne, 2008). The U.S. is often referred to as having an obesogenic environment. Foods and beverages are conveniently available at nearly every commercial establishment and in many schools, portion sizes are large, and there is abundance of cheap calorie dense foods available (Wansink 2006; Crister 2004; Nestle 2000). This obesogenic environment is often suggested to be at fault for the increase in obesity among the more assimilated and the increase in obesity in the U.S. over last 50 years. The research presented in Chapter 2 supports the idea that individuals who are exposed to healthful eating and activity habits at a young age may be more successful at navigating their environment later in life. This idea is further validated by the findings that while the 1.0

generation has a lower baseline BMI compared to the 1.5 generation, their growth in BMI is similar. Early life experiences, even before the age of six (in the case of the 1.5 generation), condition weight gain during adolescence and young adulthood.

While the results from Chapter 2 are suggestive that early life experiences are important for predicting weight later in life, the results from Chapter 3 and 4 suggest that one's current environment is also important for understanding changes in weight during this developmental phase. Parental monitoring of diet is associated with healthier food choices (Larson et al., 2007) and young adults rely heavily on pre-prepared meals that tend to be calorie dense, such as pizza, cheeseburgers, and ice cream, when they live away from home (Nielson et al., 2002). All generations experience weight gain when they leave their parent's home. Additionally, BMI and growth in BMI is lower among those who attend college across generation, even controlling for family of origin SES. The findings from this dissertation suggest that early life experiences may help individuals navigate their current environment (Chapter 2), but also that early life experiences do not completely negate the importance of the environment on the risk of obesity, as suggested by Chapters 3 and 4.

Future Research

The argument between the importance of early life experiences versus current food environments in influencing our diet and risk of obesity would benefit from a more thorough examination of weight assimilation among immigrants. Examining weight gain from adolescence to adulthood for similarly situated individuals from immigrant's home countries would help in identifying the importance of early life experiences and current environment. Recent research on Mexicans suggests that Mexican born individuals in the US have much higher levels of overweight than Mexican residents who are most likely to emigrate to the U.S.,

but still live in Mexico. This suggests that the current environment is important. However, the Mexican born individuals in the US have lower levels of overweight compared to their second generation counterparts (Van Hook et al., 2010), suggesting that early life experiences are also important. This suggests that Mexican immigrants may have established healthier patterns than those in their home country. Since diet and risk of obesity change drastically from adolescence to adulthood, most likely as a result of both early life factors and environment, the above research would benefit from a longitudinal analysis of these changes. Measuring changes in diet and obesity for immigrants and individuals in their home countries would allow one to examine the relative importance of environment and early life experiences.

Further research would also benefit by examining the specific mechanisms that lead to the patterns found in the previous chapters and a more detailed account of the context in which young adults find themselves. For example, in the second chapter I find that adolescent immigrants maintain their initial advantage in BMI as they transition into adulthood and actually gain less weight than the third generations. This chapter was largely descriptive. It would be interesting to know whether diet or physical activity accounted for the first generation's initial advantage and their continued advantage relative to higher generations. Additionally, in the third chapter, I find college attendance to be an important predictor of BMI change, especially for the second generation. I suggest that this may be due to socialization of better health habits. Unfortunately, the *NLSY 97* does not have yearly measures of diet and physical activity, so this means I cannot empirically test this question. Lastly, I find that leaving the parental home is associated with weight gain among the first and second generation. It would be informative to know how neighborhoods influence this effect. Perhaps, when the first and second generations leave their parental homes they lose not only the cultural protection afforded to them by their

parents and families, but also the cultural protection provided to them by their neighborhood. Also, while partnering did not have as large of an impact on the first and second generation as it did on the third or higher, it is still an important predictor. It would be interesting to examine whether their partner's characteristics such as ethnicity, generation, and socioeconomic status moderated or mediated the effect of partnering on weight gain.

From a policy perspective this research suggests that early life experiences, current environments, and on-going socialization are all important factors in predicting overweight and obesity. Early life factors, even before the age of six, may explain immigrant generations lower BMI and growth in BMI relative to natives. Understanding the early life experiences that result in better health among immigrants could help in preventing obesity in other populations. Additionally, this research suggests that college attendance is associated with a lower BMI and less growth in BMI, especially among Mexican-American youth. Along with a having a more educated population, increases in college attendance may result in a healthier population as well. However, college attendance is relatively rare among those most at risk for developing obesity (Mexican-Americans, blacks, and those with low socioeconomic origins). This suggests that interventions and prevention programs that target individuals when they are still in high school or even younger may prove fruitful in reducing obesity. The increase in BMI when young adults leave home, especially for those not in structured institutional settings such as college, suggests that young adults are ill prepared to make healthful choices on their own. Classes in high school or even middle school that teach youths about grocery shopping, food preparation, and making healthy choices when purchasing prepared foods would reach those who do not attend college and before they left their parents home. Reducing obesity in the US would be best approached by interventions that targeted early life experiences and current environments.

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Appendix A. Unweighted N by Generation and Race/Ethnicity

	1.0 Generation	1.5 Generation	2nd Generation	3rd Generation
White	39	36	138	3572
Black	15	15	79	1690
Mexican-American	79	98	381	376
Other Hispanic	21	16	96	183
Other	16	20	105	41

Appendix B. MISSINGNESS ON THE ANALYTIC SAMPLE

The original cohort consisted of 8,894 respondents who were initially interviewed. Attrition varied by waves, with the highest at 19% in wave 10. Roughly, 11% of the respondents attrite at each wave, though many were followed up at later waves. The data are organized into a person period file (N = 78,793 records) for Chapters 2 and 4; with one record contributed by respondents for each year they were interviewed. Growth curves allow for the maximum amount of information to be used from each respondent even when there are issues of attrition. Because the data are organized in a person period file, individuals that are missing key information or missing all together in one wave, but have complete information in a subsequent wave are included in the analytic sample. For example, each respondent can contribute up to 12 person period cases. Respondents who have missing information, such as BMI or any of the time varying controls, on waves 6, 7, 8, 9, but have complete information on waves 1 through 5 and 10 through 12 contribute 8 person period cases. Missing information between the waves is interpolated by the growth curve models. However, some control measures and independent variables are taken from the first wave of data.

The non-time varying controls are parental weight status, mother's education, and family status in 1997. Parental weight status is coded so that missingness does not influence the analytic sample; a dummy variable for missing parental weight status is included in all models.

Family status in 1997 has no missingness and does not influence the analytic sample. The only non-time varying variable that influences sample selection is mother's education. In NLSY 97 about 10% of the sample is missing on mother's education. If individuals are missing on this variable than they are excluded from all analyses because this is an important independent variable in several analyses. This is different than the time varying variables that just exclude individuals if they are missing information for that particular wave. Additionally in the person period file, respondents must also have complete information on whether they are currently living with their parents or not (non-parental residence) for each wave. However, information on co-residence has low levels of missingness at each wave. All respondents who are left in the person-period file, after excluding those who are missing on the time-varying controls, have complete information on residence.

Lastly, Chapter 3 uses OLS regression on wave 12 to examine the effect of education by generation on BMI. Unlike the analyses that use growth curve models and a person period file, this Chapter includes only individuals who had complete information in wave 12. This Chapter focuses on education, thus individuals must have complete information on education. However, similar to parental residence, individuals who have complete information on BMI and the controls are not missing on education. Therefore, no individuals are excluded from the analytic sample due to missingness on education.

Appendix Table below demonstrates how individuals are included in the analysis by wave. The first wave has 8,984 potential cases. Of these cases 337 are missing on the dependent variable, BMI. Additionally, 352 cases are missing on generation that are not missing on BMI. Another 234 cases are missing on ethnicity that are not missing on BMI or generation. 834 cases are missing on mother's education that are not missing on BMI, generation, or ethnicity. Lastly,

10 additional cases are missing on the other controls in wave 1. For wave 1 this means that about 19% of the sample is lost due to missing data on the analytic variables.

Appendix Table 2. Missingness in the Analytic Sample

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 7	Wave 8	Wave 9	Wave 10	Wave 11	Wave 12
Lost to Follow-up	0	598	777	904	1104	1089	1231	1482	1646	1425	1566	1494
Missing BMI	337	177	107	73	69	218	230	261	239	233	161	334
Missing Generation	352	211	158	100	0	34	8	7	23	7	6	8
Missing Ethnicity	234	220	214	223	224	216	210	198	194	198	195	200
Missing Mother's Education	834	796	779	789	751	737	742	689	692	704	703	710
Missing on Other Controls	10	20	23	35	35	36	59	88	102	101	93	112
Total Sample	**7217**	**6962**	**6926**	**6860**	**6801**	**6654**	**6504**	**6259**	**6088**	**6316**	**6260**	**6126**

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