Weight Gain During the Transition to Adulthood among Children of Immigrants: Is Parental Co-residence Important?

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Abstract

Immigrants tend to be healthier than their native born peers, despite their low socioeconomic status and often precarious living situations. One common explanation for this is that immigrants bring cultural norms with them that protect themselves from their health hazardous environments. I examine BMI trajectories from adolescence to young adulthood, using the NLSY 97, and examine whether patterns of parental co-residence moderate or mediate the relationship between BMI and generation, focusing on Mexican-Americans. Home leaving may take children of immigrants away from the cultural protection of their parents and neighborhoods, but may also be associated with increases in young adult socioeconomic status through college attendance and employment. I find that home leaving is associated with increase in BMI for all generations, but this effect is stronger for the first and second generation. Additionally, only among the third or higher generation is this effect explained by family transitions, partnering and childbearing. Lastly, the reason for home leaving (partnering, college attendance, or other) and its association with BMI is examined.

INTRODUCTION

In this project, 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 to 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 chose 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 immigrant's better health and their lower likelihood to leave home relative to natives (Kanajanpan 1989; Goldscheider and Goldsheider 1989; Aquilio 1990; Palloni and Arias; 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.

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 or higher (both parents were born in the U.S.), in both the pooled and 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 (RAND). 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 adulthood. Even more troubling is that this pattern has worsened overtime. Fruit and vegetable consumption among adolescence 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 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 tenant 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 2004; 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 2004; 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 where 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 2004). Using the Youth Development Survey, Shanahan and colleagues (2004) 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 that 78% of young adults believe that developing beliefs and values independent from one's parents, 74% believe that achieving financial independence from one's parents, and 60% believe achieving residential independence from one's parents are necessary pre-cursors to obtaining adult status. This is quite high given that only 17% of young adults believe marriage, full-time employment, or owning a home 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 parent's 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; Mallett 2004; 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 (Goldman and Whitaker 2002; Ross and Mirkowsky 1999; Strecher, DeVellis, Becker, and Rosenstock 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 (Both 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 (Mollenkampf 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 2004; Mollenkopf et al 2004; 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; Fergusson and Woodward 2000; 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 non-Hispanic 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 decrease 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 U.S. 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, and 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 1.0 generation compared to children of natives.

H3. The greater likelihood of first generation immigrants (both generation 1.0 and 1.5) to reside with their parents partially explains why immigrants tend to weigh less than children of natives.

Home-leaving is also associated with other important predictors of adult status such as college attendance and partnering. In addition to home leaving, these factors may have important impacts on weight change. For example, prior research had demonstrated that university transitions are associated with weight gain. However other research, demonstrates that those who attend college have a lower BMI and growth in BMI than those who do not attend

college (Yang et al 2008). In order to understand this contradiction, I will examine college attendance using a growth curve model looking at both 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 off of the large body of literature that finds worse health outcomes among adults with less education (Ross and Mirkowsky 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.

METHODS

The data for this project continues to use the National Longitudinal Study of Youth (NLSY), 1997 cohort. I use the longitudinal file from 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 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 twelve).

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 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 fifteen 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 ten 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 height and weight are generally very close to each other, but issues arise if mis-reporting 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 mis-reported 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).

While there were differences in mis-reporting by generation results 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 Variable

The focus independent variable in this project, besides generation and ethnicity, is residential status. At every wave the NLSY has detailed information concerning the household roster. From this information I am able to determine who the respondent is living with at each wave and whether he/she changed residential status.

Unfortunately, the way the household roster was measured changed between waves. Waves 1 through 6 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 1-6. 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 than their migration variable captures this move, but if they moved without their parents and did not consider their current housing as permanent than their migration variable does not reflect this move. This captures individual 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 7-12), the household roster was changed to reflect current household composition rather than permanent, so it was possible to directly measure whether the respondent lived with his/her 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, parent's weight status, family status at wave 1, and gender. Mother's education and parent's 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 parent's 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 their parents house (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 their parent's house, 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 Coresidence 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 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 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 6, came back in wave 8 and subsequently moved out again in wave 10. The non-parental residence variable is set to 1 for waves 6 and 7 and waves 10 through 12, and the just-left-home variable equals 1 in waves 6 and 10.

This coding scheme allows for multiple home leavings, but it does not distinguish between the first or second time the respondent 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 her parents (1=first wave moved back in

with parents, 0=otherwise). The second variable indicates whether the respondent continued to live with his/her parents after moving back home. For the hypothetical respondent shown in Table 1, the first variable would equal 1 for wave 8 and the second variable would equal one for waves 8 and 9. 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 home-leaving 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:

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

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

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

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

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

$$\begin{aligned} Y_{ij} = {} & [\gamma_{00} + \gamma_{01}\,\text{Family of Origin SES}_i + \gamma_{02}\,\text{Generation}_i + \gamma_{03}\,\text{just-left-home}_{ij} + \gamma_{04}\,(\text{Generation}_i * \text{just-left-home})_{ij} + \mathbf{Z}_{ij}\,\gamma_{0i}] + \\ & [\gamma_{10} + \gamma_{11}\,\text{Family of Origin SES}_i + \gamma_{12}\,\text{Generation}_i + \gamma_{13}\,\text{just-left-home}_{ij} + \gamma_{14}\,(\text{Generation}_i * \text{just-left-home})_{ij} + \mathbf{Z}_{ij}\,\gamma_{1i}]*\text{Time}_{ij} + \\ & [\gamma_{20}]*\text{Time}^2_{ij} + \\ & [\gamma_{30} + \gamma_{31}\,\text{Generation}_i]*\text{Non-parental residence}_{ij} + \\ & [\varepsilon_{ij} + \zeta_{0i} + \zeta_{1i}\,*\text{Time}_{ij} + \zeta_{2i}\,*\text{Time}^2_{ij} + \zeta_{3i} * \text{Non-parental residence}_{ij}]. \end{aligned}$$

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; 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 1 through 6, 12 for wave 7, 0 for waves 8, 9, 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 the respondent continues to reside with their parents after they moved back home. For our hypothetical respondent, this would equal 12 for wave 7 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):

$$Y_{ij} = [\gamma_{00} + \gamma_{01} \text{Family of Origin SES}_i + \gamma_{02} \text{Generation}_i + \gamma_{03} \text{Duration}_{ij} + \gamma_{04} (\text{Generation}_i * \text{Duration}_{ij}) + \mathbf{Z}_{0i}] +$$
$$[\gamma_{10} + \gamma_{11} \text{Family of Origin SES}_i + \gamma_{12} \text{Generation}_i + \gamma_{03} \text{Duration}_{ij} + \gamma_{04} (\text{Generation}_i * \text{Duration}_{ij}) + \mathbf{Z}_{1i}]*\text{Time}_{ij} + [\gamma_{20}]*\text{Time}^2_{ij}$$
$$[\gamma_{30} + \gamma_{31} \text{Generation}_i]* \text{Non-parental residence}_{ij} +$$
$$[\varepsilon_{ij} + \zeta_{0i} + \zeta_{1i} *\text{Time}_{ij} + \zeta_{2i} *\text{Time}^2_{ij} + \zeta_{3i} * \text{Non-parental residence}_{ij}].$$

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, Williamson, and Stevens 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 the respondent was enrolled in college or living with a partner 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 6 and 7 and 0 for all other waves. The duration variable for college would equal 12 in wave 7 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. 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, an individual who leaves home to attend college would subsequently graduate and may continue to reside outside their parents' home after finishing college. This individual 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 their parents after wave 6 they would always be coded as non-parental residence and left home for college even after they moved in with their partner in wave 10. Additionally, if a respondent leaves home for a partner and does 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 specific sub-sample. However, due to sample size limitations only interactions with the second generation are tested. The first generation is dropped from this 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 one 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):

$$\begin{aligned} Y_{ij} = {} & [\gamma_{00} + \gamma_{01} \text{ Family of Origin SES}_i + \gamma_{02} \text{ Generation}_i + \gamma_{03} \text{ Non-parental residence by Reason}_{ij} + \gamma_{04} (\text{Generation}_i * \text{Non-parental residence by Reason}_{ij}) + \mathbf{Z}_{0i}] + \\ & [\gamma_{10} + \gamma_{11} \text{ Family of Origin SES}_i + \gamma_{12} \text{ Generation}_i + \gamma_{03} \text{ Duration by Reason}_{ij} + \gamma_{04} (\text{Generation}_i * \text{Duration by Reason}_{ij}) + \mathbf{Z}_{1i}] * \text{Time}_{ij} + \\ & [\gamma_{20}] * \text{Time}^2_{ij} + \\ & [\varepsilon_{ij} + \zeta_{0i} + \zeta_{1i} * \text{Time}_{ij} + \zeta_{2i} * \text{Time}^2_{ij}]. \end{aligned}$$

RESULTS

Descriptive Findings

Table 1 presents summary measures on home leaving for the sample and by generation.

In accordance with past research, I find that the first generation is the least likely to leave their natal home during this time period (70% of the first generation ever leaves their natal home) and this is significantly different than the later generations. The second generation is more likely to leave home than the first, but less likely than the third or higher generation, 78% of the second generation ever leave home. The third generation is the most likely to leave home. 85% of the third or higher generation ever moves out of their parents' home during this time period. While home leaving is less likely for all children of immigrants, especially the first generation, the age of home leaving does not vary greatly by generation. Mean age when the respondent first left home is roughly 20.6 for the 1.0, 1.5, and 2nd generation, and 20 for the third or higher generation; this difference is not significant.

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, 40% return. The first generation is more likely than either the second or third or higher generation to return home (55% vs. 52% and 38%). These results are similar to those found in other large nationally representative data sets (Goldscheider and Goldcheider 1994; White 1994).

Table 2 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 confounding 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.

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 3 presents the growth curve models based on equation 4.1. Model 1 includes all the sample variables, except the home leaving variables. The second model adds the just-left-home and non-parental residence variables. 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. 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.

The third model adds the interactions between non-parental residence, home leaving and generation. 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 one 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, the effect of currently residing away from home is positively associated with BMI, but is mediated by the controls for marital status and number of children. The positive effect of home leaving on BMI for the third or higher 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 4 displays the results for the Mexican-American, NH black, and NH white sample. The results for this sample mirror those found for the pooled sample. 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 0.41 increase in BMI, and for the second generation, it is associated with a 0.21 increase in BMI. 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 NH blacks. For the second generations 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). Similarly, the total effect of first wave for NH blacks is not significant (b=0.06).

Approach #2: Duration Effects

Overall, the results suggest that the initial wave that the respondent moves out of their parents' home 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 parent's 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 5 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. Including the controls 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. Finally, Model 3 adds the interaction terms. 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 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 for the duration the individual resides away from home, but there is no change in the rate of growth in BMI.

Table 6 displays the results for the Mexican-American, NH black, and NH 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. Additionally, the interaction between third or higher generation and NH blacks and time since left 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 NH blacks.

Approach #3: Reasons for Leaving Home

The last aim of this project is to examine the context in which home leaving occurs. Table 7 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.

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. Neither attending college nor living with a partner are associated with a shift in BMI. Lastly, leaving home for other reasons is not associated with a shift in BMI or 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, where 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. 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. 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 0.31 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. Additionally, the interactions between leaving

for a partner and the second generation are significant and negative. Additional with-in generation analyses on the second generation indicate that they do experience an increase in the shift of 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 7 displays the results for the Mexican-American, NH black, and NH 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.

DISCUSSION

The results presented above point to three important findings. First, continuing to reside outside one's parent's home is associated with an increase in BMI. Second, for the third or higher 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.

These findings partially confirm my hypotheses. The first and third hypotheses were confirmed; however, my second hypothesis was not. Home leaving did not explain immigrant youths' lower BMI or slower growth in BMI relative to those born in the US. While immigrant youth and children of immigrants are more likely to gain weight than third or higher generations when they leave home, immigrant youth who leave home still have a significantly lower BMI than the third or higher generation. 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 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 or higher 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 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 (Mollenkampf 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 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, Bindler, Goets, and Daratha 2009; 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 decrease 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 is ultimately 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 towards more middle class values concerning exercise and diet (Ross and Mirkowsky 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, Williamson, and Stevens 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 or higher generation, supplemental models that only examined children of immigrants found a significant and positive effect of leaving home for a partner 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 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 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 (White 2000).

From a policy standpoint, this suggests that young adults who move out of their parents' home, especially those not attending college, are particularly vulnerable to obesity-related health problems. It may therefore 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, preparing and choosing 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 than any other age groups (Nielsen, Siega-Riz, and Popkin 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 2008; Mollenkampf et al 2008; Goldsheider and Goldscheider 1989), as indicated by high rates of moving out of, and sometimes back into, one's parent's house. 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 moving out and time 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 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 are also more likely to move back in with their parents and receive financial support during this time period (Mollenkampf et al 2007; Furstenburg, Rumbaut, and Settersen 2004; 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 generation, 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.

Table 1. Coding Scheme for Home Leaving Variables

	Wave											
	1	2	3	4	5	6	7	8	9	10	11	12
First Wave Left Home	0	0	0	0	0	1	0	0	0	1	0	0
Currently Resides away from home	0	0	0	0	0	1	1	0	0	1	1	1
Time Since Left Home	0	0	0	0	0	0	12	0	0	0	12	24
Moved back with parents	0	0	0	0	0	0	0	1	0	0	0	0
Still lives with parents after moving back	0	0	0	0	0	0	0	1	1	0	0	0
Time Since Moved Back with parents	0	0	0	0	0	0	0	0	12	0	0	0
Left home for college	0	0	0	0	0	0	12	0	0	0	0	0
Left home for partner	0	0	0	0	0	0	0	0	0	0	12	24

Table 3. Pooled Sample for Effect of Just Left Home and 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 ***	21.357 ***	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 *	
(White)						
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 ***	
(Female)						
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 ***	
(Married or Cohabiting)						
Employed	-0.019		-0.018		-0.018	
Self Rated Health	0.138 ***		0.136 ***		0.136 ***	
Mother's Education	-0.013	-0.003 c	-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
(Normal weight)						
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	
(Two parents)						
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 ***	

Table 4. Effect of Just Left home and 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 ***	21.382 ***	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
(Third Gen. White)						
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 **	
(Female)						
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 ***	
(Married or Cohabiting)						
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)						
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					2.286	

Table 5. Pooled Sample for Effect of Non-parental Residence and Duration 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 †
(White)						
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 ***	
(Female)						
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 ***	
(Married or Cohabiting)						
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
(Normal weight)						
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	
(Two parents)						
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					3.128	

Table 6. Effect of Non-parental Residence and Duration 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
(Third Gen. White)						
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 **	
(Female)						
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 ***	
(Married or Cohabiting)						
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
(Normal weight)						
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	
(Two parents)						
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

2.267

Table 7. Effect of Non-parental Residence and Duration by Reason for Home Leaving and 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 Resasons			-0.047	-0.005	0.005	0.000
X Second Gen.					0.022	-0.003
(White)						
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 ***	
(Female)						
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 ***	
(Married or Cohabiting)						
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 ***	
(Normal weight)						
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
(Two parents)						
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					0.831	

Table 8. Effect of Non-parental Residence and Duration by Reason for Home Leaving and Generation/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
(Third Gen. White)		0.004		
Non-parental Residence by reason				
Left for a Partner			-0.003	0.039 *
Left for College			0.015	-0.030 c
Left for Other Resasons			-0.011	-0.004
Male	0.300 **		0.300 **	
(Female)				
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 ***	
(Married or Cohabiting)				
Employed	-0.022		-0.021	
Self Rated Health	0.136 ***		0.136 ***	
Mother's Education				
Less than High School	0.387 *	0.040 *	0.393 *	0.035 †
High School	0.324 *	0.032 *	0.329 *	0.027 †
Some College	0.514 **	0.026	0.517 **	0.024
(College)				
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
(Normal weight)				
Family Status in 1997				
Single Parent	0.386 **		0.387 ***	
Step-parent family	-0.121		-0.120	
Other family type	0.042		0.034	
(Two parents)				
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

Figure 1. Equation 4.1. Shift in BMI

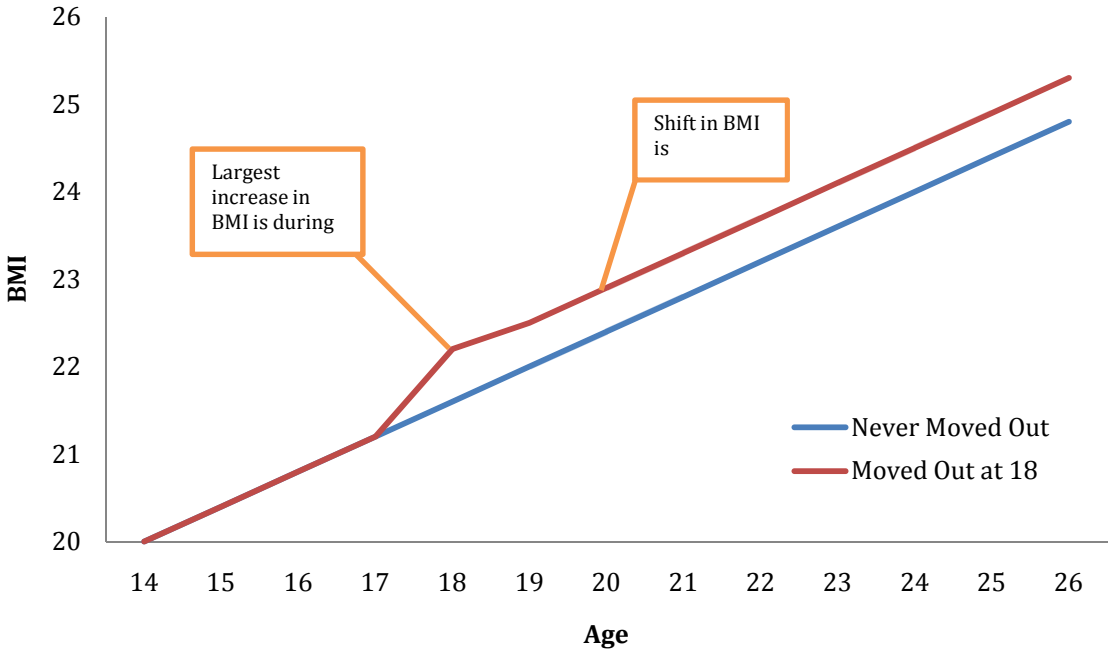

Figure 2. Equation 4.2 Shift in BMI and Change in Rate of Growth in BMI

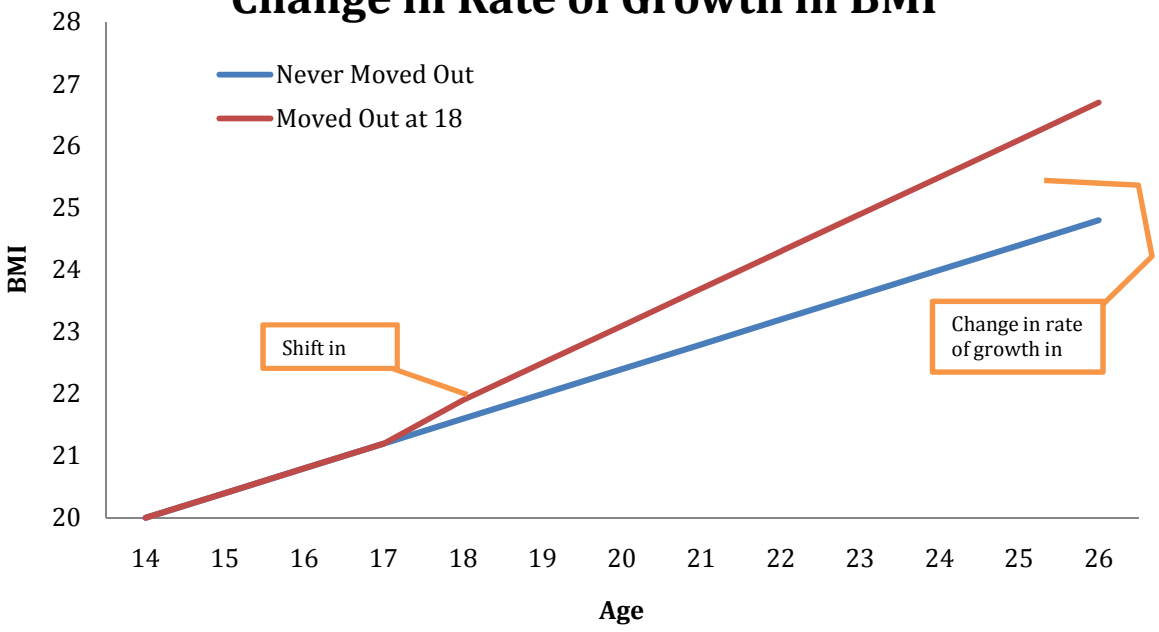

Figure 3. BMI trajectories by home leaving for the first generation

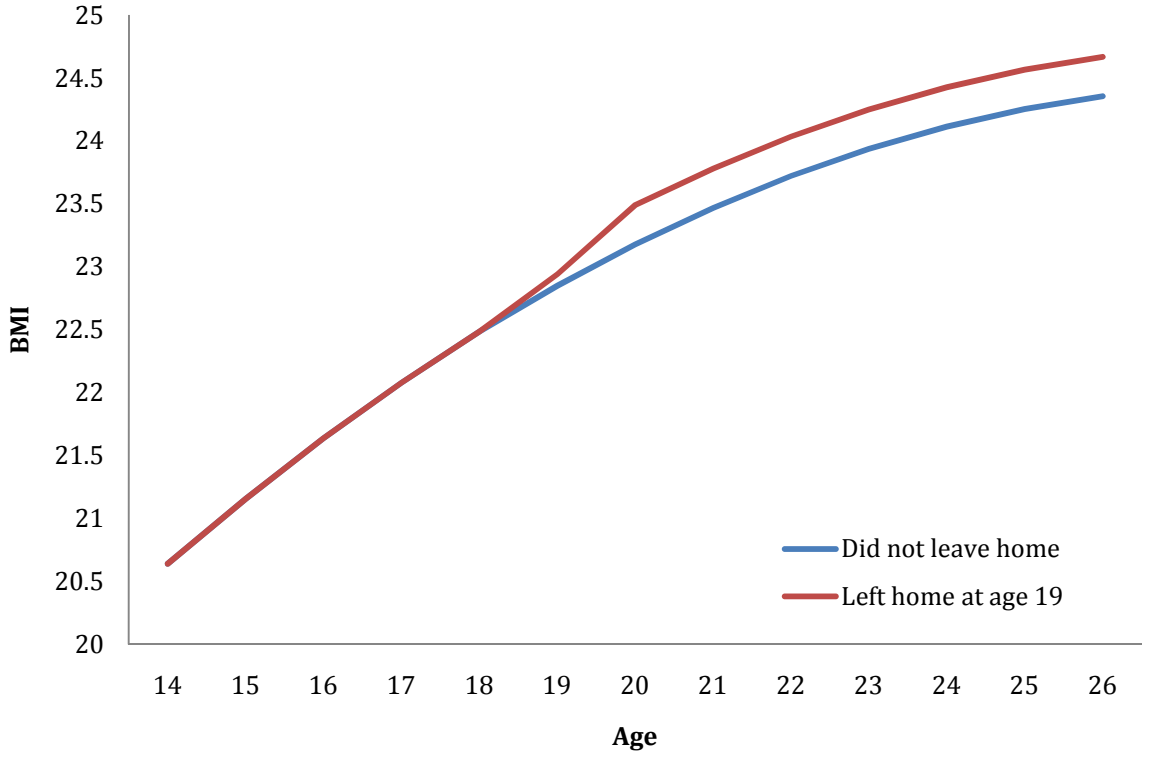

Figure 4. BMI trajectories by home leaving for college among the second generation