



Published in final edited form as:

J Health Soc Behav. 2012 ; 53(2): 263–275. doi:10.1177/0022146512445898.

Union Transitions and Changes in BMI among Adults in Mexico

Kammi K. Schmeer¹

¹The Ohio State University, Columbus, OH, USA

Abstract

This study utilizes nationally representative, longitudinal data from the Mexico Family Life Survey to examine the associations between union transitions and changes in body mass index (BMI) among adults in Mexico. Results from change score regression models ($N = 11,339$) indicate larger BMI gains for those entering a union than for those remaining single, net of baseline weight status and socioeconomic controls. Further, a significant moderating effect of baseline weight status suggests that overweight individuals entering a union gain almost two BMI points more than overweight single individuals during this three-year period. Individuals experiencing a union dissolution gain less BMI than those entering a union, but are predicted to lose BMI (as found in the United States) only if they are overweight before the transition.

Keywords

divorce; marriage; Mexico; obesity; union transitions

The rapid growth of overweight and obese populations in recent decades has spurred research across disciplines to better understand the causes of this serious health problem. Obesity has been linked with adverse health outcomes among adults in both developed and developing countries (The World Health Organization 2006). Although genetics and biology are important determinants of obesity, there is increasing interest in the study of social conditions and processes that may be associated with individuals' gains in body mass index (BMI) and increased risk of overweight (BMI = 25) and obesity (BMI = 30).

One way to assess the contribution of social conditions to individuals' BMI and risk of obesity is to study how changing social contexts are associated with concurrent changes in BMI. In this study, changes in marital status (transitioning into or out of a union) are explored in relation to changes in adult BMI over a three-year period. Although marriage has generally been linked to better health and health behaviors (Waite 1995; Waite and Gallagher 2000; Wood, Goesling, and Avellar 2007), it is evident, at least in the United States, that transitioning into a union is associated with increasing BMI among adults. Union dissolution, on the other hand, is associated with weight loss among U.S. adults (Averett, Sikora, and Argys 2008; Kahn and Williamson 1990; Sobal, Rauschenbach, and Frongillo 2003; The and Gordon-Larsen 2009). This research suggests that behavioral and other changes that occur with entering and leaving unions may contribute to changes in adults' BMI in the United States, but we know little about the effects of union transitions on adult BMI in other social contexts.

The goal of this study is to inform family and health research by exploring how union transitions impact changes in adult BMI in Mexico. Mexico presents a context distinct from the United States, with high marriage rates, relatively young age at first union, and low divorce rates. In this setting, the effect of transitioning into a union on individuals' BMI is particularly important to understand, given that it is a near universal transition that occurs early in the adult life course and, as such, has the potential to impact the future rates of adult obesity in Mexico. Union dissolution, although less common in Mexico, is also explored to determine if individuals experience weight loss when transitioning out of a union in the Mexican context as has been found in the United States.

In assessing the associations between union transitions and changes in adult BMI in Mexico, this study addresses the larger question of whether marriage and BMI theories developed in the United States are relevant in settings with nuptial and epidemiological contexts distinct from the United States. The findings also inform research on the social determinants of obesity in Mexico, where 70 percent of adults are overweight and 30 percent are obese (Cecchini et al. 2010). Because Mexicans account for a large part of the U.S. minority population (U.S. Census Bureau 2009), understanding the social determinants of obesity in Mexico may have important implications for U.S. obesity rates as well. The findings from this study point to future areas of research on the role that family processes may play in the obesity epidemic occurring in Mexico and around the world.

BACKGROUND

Union Status and BMI

There has been extensive research on the effects of marital status on health, and although the associations are not without caveats (i.e., marriage may benefit certain groups more than others and may be selective of prior health status), researchers and policy makers tend to agree that marriage is good for adult health (for a review of the literature to date, see Wood et al. 2007). A main theoretical explanation is the "social protection hypothesis," which posits that marriage improves health through higher levels of social support, social control, and resources among married compared with unmarried individuals (Waldron, Hughes and Brooks 1996).

However, studies of union transitions and BMI suggest that entering a union may carry some health risks, such as more rapid weight gain and a higher risk of obesity in adulthood (Averett et al. 2008; Sobal et al. 2003; The and Gordon-Larsen 2009). Several theoretical alternatives to the social protection hypothesis have been proposed to explain how the transition into a union may affect individuals' BMI. The "social obligation hypothesis" suggests that individuals entering a union may adopt more social eating behaviors and attend more social functions than their single counterparts, resulting in higher fat, energy-dense diets (Averett et al. 2008). Sedentary behaviors may also increase with union formation if married and cohabiting couples spend more of their leisure time engaged in inactive behaviors like watching TV (The and Gordon-Larsen 2009). Further, a "marriage market hypothesis" suggests that individuals may gain BMI when they enter a union because they are no longer "on the market" and thus have less incentive to control their weight (Averett et al. 2008).

In the United States, the transition out of a union has been found to be an important social transition as well and is more predictive of changes in BMI than entering a union (Umberson, Liu, and Powers 2009). However, unlike the transition into a union, dissolving a union is associated with BMI *loss* among adults (Averett et al. 2008; Rauschenbach, Sobal, and Frongillo 1995; Sobal et al. 2003; Umberson et al. 2009). This has been hypothesized to occur as individuals prepare to reenter the marriage market by purposefully losing weight

(Averett et al. 2008). This may be particularly relevant in contexts where divorce rates are high and individuals prepare to return to the dating/marriage pool even before their union dissolves (Lundborg, Nystedt, and Lindgren 2007). Upon exiting a union, individuals also may change their health behaviors due to reduced social control, by taking up smoking for example, which may result in weight loss (Lee et al. 2005).

Social selection is another posited explanation for the association between union status and BMI in the United States. Initial weight status is a particularly important selection factor to consider when studying the impact of union transitions on adult BMI. Lower BMI individuals may be more likely to enter a union and select into healthier unions (The and Gordon-Larsen 2009), while overweight or obese individuals may enter less healthy unions and/or have a higher risk of divorce or remaining single (Joung et al. 1998; Wade and Pevalin 2004). At the same time, initial weight status may influence subsequent weight gain, with the potential to bias results if left out of models. One early study suggested that overweight status at age 25 was correlated with greater weight gain over 10 years as compared to those who had normal BMI at age 25 (Williamson et al. 1990). A more recent study found that overweight status at age 25 was associated with weight loss and weight cycling in mid-adulthood (Waring et al. 2010). Although presenting contradictory findings, these studies suggest that individuals who are overweight may have distinct BMI trajectories from normal BMI individuals. Thus, union transitions may be associated with subsequent weight gain due to weight status before the transition rather than changes in the family environment or individuals' behaviors.

Applying Theories to the Mexican Context

In Mexico, as in many developing countries, union formation is virtually universal and occurs at a relatively young age (the mean age at first union was 22.7 in the year 2000) (Fussell and Palloni 2004). Unlike in the United States, Mexican marriages tend to be stable over time, as indicated by the low divorce rate of 9.8 divorces for every 100 marriages (United Nations 2006). Although cohabiting unions are less common than marriages (approximately 15 percent of Mexican women aged 20–29 were cohabiting in 2002), they are also relatively stable unions compared to those in the United States (Heaton and Forste 2007; Martin 2002).

In this setting, where marriage is less selective and unions are more stable than in the United States, entering a union may be protective of individuals' health status, including BMI, via the social protection hypothesis (Waldron et al. 1996). However, a more likely scenario is that entering a union will increase individuals' BMI in Mexico, as has been found in the United States, for a number of reasons. First, *familismo*, a cultural tradition of strong family ties and responsibilities (Cuellar, Arnold, and Gonzalez 1995), may mean increased social eating with social obligations (eating large family meals and attending social events around eating) when entering a union and, by extension, a larger family. Second, the marriage market hypothesis, where individuals in newly formed unions reduce efforts to maintain their weight because they are "off the market," may be particularly salient in Mexico where unions are stable and there is a low expectation for divorce and returning to the marriage market. Finally, an additional factor relevant in Mexico (but not in the United States) is that increasing economic resources are associated with higher BMI in Mexico (Buttenheim et al. 2010; Fernald 2007) because individuals with more economic resources tend to have higher fat and sugary diets and less active lifestyles (Rivera et al. 2004). Given that marriage is associated with gains in economic status (Waite and Gallagher 2000), increasing economic resources may be an additional pathway through which union formation increases individuals' BMI in Mexico.

The transition out of a union, although less common in Mexico than in the United States, is also important to consider with respect to change in adult BMI. However, the marriage market hypothesis, which has been used in U.S. research to explain why union dissolution reduces adult BMI, may be less relevant for adult BMI change in Mexico. In this low-divorce setting, individuals may be less likely to prepare for union dissolution than in the United States, showing smaller losses (if any) in BMI when exiting a union. On the other hand, the social pressure to be in a (new) union after a divorce/separation may mean that recently divorced/separated individuals make even more of an effort to lose weight (especially overweight individuals) to attract a new partner. If so, the transition out of a union in the Mexican context, although less normative than in the United States, may result in declines in BMI due to the social pressure to attract a new partner. An additional reason for losses in BMI among divorced/separated adults in Mexico may be the loss of economic resources and resulting decrease in high-calorie diets and sedentary behaviors.

Selection is another explanation to consider in the Mexican context. Although marriage is less selective by socioeconomic status in Mexico than in the United States, weight status (or high BMI) may be an important factor. There is little evidence to inform whether being overweight decreases one's chances of marrying or increases the risk of divorce in Mexico, but baseline weight status (along with other socioeconomic and demographic controls) will be included in the models to account for this potential confounding effect.

Study Contributions

As a first step in expanding union status and BMI research outside of the context of the United States and other developed countries, this study addresses three research questions: (1) How are union transitions associated with changes in adult BMI in Mexico? (2) Do changes in household resources mediate these associations? (3) Are the associations moderated by baseline weight status? In answering the first research question, the direction of the associations will inform which hypotheses may be operating in the Mexican context. Of particular interest is whether entering a new union is associated with increasing BMI (as has been found in the United States) or is more protective of healthy BMI in Mexico. Also of interest is whether union dissolution has a negative effect on BMI in this social context of stable unions and low divorce rates.

The second research question addresses the mediating effect of economic resources, which is relevant in countries like Mexico, where economic resources have a positive association with BMI. Change in economic resources is a potential pathway through which transitioning both into and out of a union may operate to affect changes in BMI.

Finally, this study considers whether baseline weight status moderates the effects of union transitions on changes in BMI. Normal BMI individuals entering a union may have smaller gains in BMI if they select into healthier partnerships than those who are overweight at baseline. Alternatively, they may experience larger gains in BMI if they adapt new, unhealthy behaviors when entering a union compared to those already overweight (who may already have less healthy behaviors and thus experience less change in BMI upon entering a union). Baseline weight status also may moderate the effect of exiting a union if overweight individuals are preparing to return to the marriage market by losing more weight more than normal BMI individuals. If this is the case, we would predict larger BMI loss among overweight individuals, in particular, when transitioning out of a union compared with those entering union or remaining in a stable union. These ideas have not been proposed in past research, and thus the moderating role of baseline weight status in Mexico cannot be compared with findings from the United States.

Answering these research questions will inform family and health research by indicating whether key hypotheses developed in the United States about the risks of unions for adult BMI are applicable to Mexico. Further, these are critical questions to answer as concern over the obesity epidemic turns to developing countries and to understanding social contexts and processes that may put individuals on unhealthy BMI trajectories.

DATA AND METHODS

The data utilized in this study come from the Mexican Family Life Survey (MxFLS), a nationally representative longitudinal study of 8,440 households in 150 communities in Mexico. The first wave was collected in 2002 and a second wave, collected in 2005, followed the baseline households with a 90 percent retention rate (Parker, Rubalcava, and Teruel 2008). The sample consists of individuals 15 and older who have valid BMI data in 2002 and 2005 (pregnant women were dropped as having invalid BMI). Although this is a study of “adult” union transitions and change in BMI, individuals 15 to 17 years old at baseline (ages 18–20 in the second wave) are included because of the relatively young age at first union in Mexico. Models run without these adolescents showed similar results.

The final sample size is 11,339 after dropping cases with missing data on one or more independent variables (1,376 cases). Case-wise deletion was preferred over multiple imputation for dealing with the missing data due to the small percent of missing cases (Allison 2008). The missing individuals had a slightly lower (statistically significant) BMI in 2002 (26.3 vs. 27.2), but there was no difference in change in BMI for those missing independent variable data and those included in the analytical sample. An additional 13 cases were dropped because they were cases of prospective widowhood, an important group but too small to analyze in this sample.

Measures

In both waves, height and weight were measured by interviewers and BMI was calculated in the standard format: weight in kilograms divided by height in meters squared. The dependent variable, change in BMI, was created by subtracting BMI in 2002 from BMI in 2005 and capped at a minimum of –15 and a maximum of 15 BMI points to reduce the influence of outliers. Because the data utilized in this study were collected over a three-year period, the focus here is on short-term change in BMI. Assessing three-year changes in BMI is feasible, since BMI can be substantially altered over this period of time through changes in diet and exercise. Although this approach does not provide a view of the long-term effects of union status or transitions on BMI, it does allow for isolating the more immediate effects of union transitions on BMI and reduces confounding by the aging process or other unobserved time trends.

The independent variables of interest are changes in union status between 2002 and 2005. Individuals were classified in one of the following categories: entered a union, dissolved a union (divorced or separated), stable single (never in union), stable married, stable cohabiting, stable divorced/separated, or stable widowed. In analyses not shown here, transitions into first unions were separated from transitions into higher order unions and transitions into marriages from transitions into cohabiting unions. However, no significant differences were found between these different union transition groups (perhaps due to the small number of cases when disaggregated). Thus, for parsimony and to allow for an adequate number of transitions when including the interaction terms, these categories were combined into one variable representing the entrance into any union. This is less problematic in the Mexican setting, where cohabitation is relatively stable and socially supported and where higher order unions are infrequent. Those who exited a union consist of individuals who were in a union in 2002 and reported being divorced or separated in 2005.

Table 1 provides the means for the dependent and independent variables for the full sample and stratified by union status/transition categories. The sample mean age is 40, and more than 60 percent of the sample did not graduate from high school. The overweight problem in Mexico is evident in this sample, where more than 60 percent of the individuals were overweight at baseline. The average BMI gain is modest at 0.23 BMI points, but the sample variation is high (standard deviation = 3.29 BMI points). Based on the sample average weight (68 kg) and height (1.58 meters), a one point increase in BMI translates into a 6.6 pound weight gain. Because the majority of the sample has finished their linear growth (height), most of the change in BMI represents changes in weight.¹ Comparing across union status categories, the largest BMI gains were for individuals who entered a union, with an average gain of 1.78 BMI points (see Table 1).

The descriptive statistics for the union status categories (dummy variables) indicate that 6 percent of the sample made a prospective transition into (4 percent) or out of (2 percent) a union between 2002 and 2005 (see Table 1). Although representing a small percentage of the sample, the number of transitions captured here is large or larger than the number of transitions used in other studies of prospective union transitions (Sobal et al. 2003; Umberson et al. 2009). The largest group in the sample is stable married individuals (55 percent), followed by stable single individuals (21 percent). About 10 percent of the sample was stably cohabiting and another 10 percent was divorced, separated, or widowed at both waves.

The sample characteristics indicate that individuals who entered a union or were stable single are younger, healthier (i.e. lower BMI), and more highly educated than individuals in the other union categories. Baseline logged per capita household income is similar, on average, across these groups. However, change in income over time varies substantially, with those who entered a union having the largest income gains, followed by single individuals. Individuals who were stably divorced, separated, or widowed or who became divorced or separated between 2002 and 2005 reported the largest losses in income during this period (see Table 1). Given the positive association between income and BMI in the Mexican context, these differences in change in income may be one pathway through which union transitions are associated with changes in BMI.

Statistical Methods

To assess the associations between union transitions and changes in individuals' BMI, change score regression models were estimated. The models regressed individuals' changes in BMI on changes in union status, which reduced bias due to time-invariant individual-level unobserved heterogeneity (Averett et al. 2008; Wooldridge 2000). To further reduce the influence of selection into these union transition categories, models controlled for individual, household, and community characteristics assessed at baseline and between 2002 and 2005 (see Table 1 for control variables). Age and gender were included to control for the effects of aging and differences in male/female BMI growth and gender norms.² Baseline weight status was included to control for differences in life course stage and aging, as well as selectivity into union status/transition categories. A dichotomous variable normal BMI was calculated using 2002 BMI and the international standard of less than 25 BMI for normal weight adults (The World Health Organization 2006).³ The 4 percent of the sample

¹The 15- to 18-year-olds may still be experiencing some height growth, affecting their change in body mass index (BMI). Models run with individuals 20 years and older indicated similar but stronger effects of union transitions on changes in BMI, suggesting that the links between union transitions and changes in BMI are mostly reflecting changes in weight.

²Gender and age interactions with union status/transition variables were not statistically significant.

³Overweight status for the 15- to 17-year-olds is calculated based on standardized BMI cutoffs for overweight by age and gender (Cole et al. 2000).

that was underweight (<18 BMI) was included in the normal BMI category. Including them as a separate category or excluding them from the analysis did not change the results. Baseline weight status was also used to create interaction effects between normal BMI and each of the union status/transition variables.

Several change score models were estimated with various sets of controls included. The first model included baseline control variables, and a second model added variables measuring change in household resources (moving to an urban area, change in the number of children, change in household size, and change in household income). The coefficients on the union transition variables can be compared across these two models to assess whether changing resources mediate the effects of union transitions on changes in BMI. Finally, a model was estimated with the interaction terms between normal BMI and each union stability/transition variable to evaluate the moderating effect of baseline weight status. The significance of all main and interaction effects was assessed through two-tailed tests of $p < .05$. All models were adjusted for clustering of individuals within households and communities, using the robust cluster command in Stata, to ensure accurate standard errors and hypothesis testing (Angeles, Guilkey, and Mroz 2005).

For all models reported, stable single was the union status reference category, following past studies of union transitions and BMI (Averett et al. 2008) and because it is the most relevant comparison group for those entering a union (similar age and life course stage). Other significant differences among the union status/transition categories were assessed and reported in the text but were not shown in the tables for brevity. The regression coefficients were also used to calculate predicted change in BMI to more clearly indicate how BMI was predicted to change among the sample individuals in the different union status categories and by baseline weight status.⁴

RESULTS

Table 2 shows the results from the change score models. The coefficients for the union status categories in model 1 indicate that individuals who entered a union, were stable married, were stable cohabiting, or were stable divorced/separated had significantly larger gains in BMI, on average, than stable single individuals. The largest gains occurred when entering a new union, with these individuals gaining, on average, one BMI point more than those who remained single (see Table 2, model 1). Additional significant differences ($p < .05$) not shown in Table 2 were found between those who entered a union and those who dissolved a union, were stable married, and were stable widowed, with individuals who entered a union gaining more BMI than those in the other union status categories.

Of the baseline control variables, age, gender, weight status, and total number of children in the household were significantly associated with subsequent changes in BMI. The baseline weight status coefficient shows that normal BMI individuals gained 1.5 more BMI, on average, than overweight individuals during this three-year period (see Table 2). This suggests that controlling for baseline weight status is important, since it is associated with short-term changes in BMI and is likely to influence union transitions.

Model 2 adds further controls for individuals' changing household resources, including: moving from a rural to an urban area and changes in the number of children, work status,

⁴Predicted BMI change was calculated based on the coefficients estimated in the corresponding regression model with the full set of control variables (including the change control variables) by setting the union status/transition variable of interest equal to one, the other union status/transition variables equal to zero, and all control variables at their actual values. Coefficients from the regression models that included the interaction effects were similarly used to calculate predicted BMI change among normal BMI and overweight individuals in different union status/transition categories.

household size, and household income during this three-year period. Of these change variables, only change in household size had a significant positive effect on BMI change.⁵ Comparing the union transition coefficients in model 1 with those in model 2 indicates only a small attenuation in the union transition coefficients with the inclusion of these variables. Thus, there is little evidence that change in resources is a main pathway through which union transitions affect changes in individuals' BMI.

The third question posed here is whether baseline weight status moderates the effects of union transitions on changes in BMI. Model 3 shows the regression coefficients when the interaction terms between normal BMI and the various union status/transition categories were included in the model. The results indicate a significant interaction effect between normal BMI and entered a union with stable single as the reference group (see Table 2, model 3). In this model, the entered a union coefficient represents the estimated change in BMI among overweight individuals (i.e., when normal BMI = 0) and shows almost a two point higher BMI gain (1.87) among overweight individuals entering a union compared to overweight single individuals (see Table 2, model 3). Further testing of differences across groups (results not shown) indicated that the interaction term between normal BMI and entered a union was significant when compared with all other union status/transition categories and that overweight individuals who entered a union gained significantly more BMI than overweight individuals in all other union categories. Significance testing also indicated that among normal BMI individuals, those who entered a union did not gain significantly more BMI than stable single individuals or those in other union categories. Thus, the large and significant difference in BMI gain by those who entered a union compared with stable single individuals was significant only among individuals who were already overweight at baseline.

To provide a clearer understanding of differences in changes in BMI across union status categories in both the main and interaction models, predicted change in BMI was calculated for each union status/transition category and is presented in Table 3. Predicted change in BMI represents the average change predicted across the sample using the coefficients estimated by the regression models (from Table 2), holding all control variables at their actual values. Also shown in Table 3 are the sample means for baseline BMI (in 2002) for individuals in each union status category, as well as predicted BMI in 2005 (calculated by summing the mean baseline BMI and the mean predicted BMI change for each union status group).

The second column in Table 3 indicates that those entering a union were predicted to gain almost one BMI point (0.89), holding all other variables at their actual values, while stable single individuals had little change in BMI over this period (-.03). The significant BMI gain that occurred among those entering a union resulted in an average predicted 2005 BMI of 25 (see column 3, Table 3), which is the cutoff for overweight. Although single individuals had a similar mean baseline BMI as those entering a union, they were predicted to remain, on average, in the normal BMI range during this three-year period (see column 3, Table 3). Those who exited a union gained significantly less BMI than those who entered a union, but still showed an average increase rather than decrease in BMI holding all else constant (see column 2, Table 3).

Columns 5 and 8 in Table 3 indicate the predicted gains in BMI for normal BMI and overweight sample individuals, respectively (based on calculations using the coefficients from model 3, Table 2). Across all union status categories, individuals with normal BMI

⁵Change in income was not significant in models that included no other change variables. Other measures of change in economic status (e.g., household assets) were also tested but were not associated with changes in BMI.

were predicted to gain BMI during this three-year period. Although single and recently divorced individuals with normal BMI at baseline appear to have gained less BMI than normal BMI individuals in other union status groups, these differences were not significant (based on significant testing of the results in model 3, Table 2).

The average predicted BMI gain among already overweight individuals who entered a union was estimated to be 1.27 BMI points, while overweight individuals in all other union categories were predicted to lose weight during this time (see column 8, Table 3). As previously noted, these differences were statistically significant (based on significance testing of union status differences in model 3, Table 2). When added to their already high BMI, overweight individuals entering a union were predicted to have an average 2005 BMI of almost 30, the cutoff for obesity (see column 9, Table 3). It is important to note, however, that both normal BMI and overweight individuals who entered a union were predicted to gain, on average, over one BMI point during this three-year period (see columns 5 and 8, Table 3), increasing the risk of overweight status (BMI = 25) among normal BMI individuals and obesity (BMI = 30) among overweight individuals.

DISCUSSION

This study aims to contribute to the growing body of literature examining the impact of union status and transitions on adult BMI. Although prospective change studies have been conducted with data from the United States, we know little about how union status and transitions relate to changes in BMI in developing country settings, where marriage is less selective, unions are more stable, and obesity rates are rising rapidly. This study used longitudinal, nationally representative data to assess how union status and transitions impacted changes in individuals' BMI in Mexico, whether household resources mediated the transition effects, and whether baseline weight status moderated the effects. The use of change score models, with additional controls for selection, provided strong empirical tests of these questions.

The results indicated important differences in three-year BMI change among individuals across union status/transition categories. Individuals who were single (never in union) during the three-year period had healthier changes in BMI when compared with individuals who entered a union, remained in stable marital or cohabiting unions, or were stably divorced/separated. Of particular importance is the finding that individuals similar to single adults (by age, baseline BMI, socioeconomic status, and other factors) who entered a union were predicted to gain, on average, almost one BMI point more than their counterparts who remained single and to shift from normal BMI to overweight status during this period. As suggested in the U.S. literature, the transition into a union may mean increasing social obligations, more sedentary time with partners, or less concern for body size when leaving the marriage market (Averett et al. 2008; The and Gordon-Larsen 2009). In Mexico, the effects of union entrance on changes in BMI may be exacerbated by the cultural norm of *familismo*, where entering a union means added social obligations and expectations within the nuclear and extended family.

Regarding union dissolution, the finding most consistent with the marriage market hypothesis proposed in U.S. research was that those who recently dissolved a union had similar changes in BMI as single individuals. Individuals exiting a union were also predicted to gain significantly less weight than individuals entering a union. However, unlike research in the United States (Umberson et al. 2009), individuals dissolving a union in Mexico were not predicted to lose weight. Once the moderating effect of baseline weight status was taken into account, overweight individuals who dissolved a union did show declines in BMI, on average, but no more than the declines experienced by overweight individuals in other union

status groups (except those who entered a union). These results suggest that in the Mexican context of stable unions, individuals may prepare less for reentering the marriage market and experience less short-term weight loss when leaving a union than in the United States.

A new hypothesis posited for the Mexican setting was that change in household resources may be a pathway through which entering a union increases adult BMI and exiting a union decreases adult BMI. Although individuals who entered a union did report larger increases in household income than those in other union status groups, and those dissolving a union experienced a decline in household income, change in household resources accounted for little of the union transition effects on changes in BMI. This suggests that in the Mexican context, union transitions may affect changes in BMI via social and behavioral mechanisms that are independent of changes in economic resources.

Addressing the third research question, this study found an important role of baseline BMI in moderating the effect of entering a union on changes in BMI. The interaction effects illustrated significant differences by baseline weight status between entering a union and other union status categories. This translated into over a one point gain in BMI, on average, among already overweight individuals who entered a union, while overweight single individuals and those in other union status categories were predicted to lose BMI during this period. Although individuals with normal BMI at baseline who entered a union also gained over one BMI point, their BMI change did not differ significantly from their single counterparts. The large predicted weight gain among overweight individuals entering a union is particularly disconcerting because the transition may substantially increase the risk of obesity in early adulthood.

There are several limitations to this study that should be noted. First, the results are based on a relatively small percentage of the sample experiencing prospective changes in union status. This is particularly problematic when estimating interaction effects for these groups, and thus the findings should be interpreted with caution. Further, the sample size did not allow for distinguishing among transitions into and out of cohabiting and marital unions or first compared with higher order unions. Second, the results reflect short-term changes in BMI (over a three-year period). Third, although baseline age and weight status are included as control variables, life stage and the aging process could account for some of the similarity across stable married, cohabiting, and divorced/separated individuals (as well as their differences compared to younger, single, and recently married individuals). However, since stable single individuals and those who recently entered a union were similar in age and life course stage, the aging process is unlikely to be confounding the significantly larger gain in BMI experienced by those entering a union compared with stable single individuals. Finally, the social and behavioral mechanisms linking union status/transitions and changes in BMI were not directly assessed in this study. Exploring the role of *familismo* and other social and behavioral pathways through which union transitions may affect individuals' BMI is an important area for future research.

These limitations notwithstanding, the findings from this study provide evidence that entering a union is associated with short-term BMI gains among adults in contemporary Mexico. Union dissolution does not, on average, result in BMI loss, suggesting that it is a less relevant social transition for changes in adult BMI in Mexico than in the United States. Entering a union is a social transition that is important to explore further, given that it occurs relatively early in the adult life course, is a transition relevant for most individuals, and may induce gains in BMI among already overweight individuals. Future research should evaluate these ideas in other non-U.S. settings and assess the mechanisms through which entering a union induces weight gain among adults in Mexico.

Acknowledgments

FUNDING

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Support for this project provided by a seed grant from the Initiative in Population Research at the Ohio State University which is supported by a grant from the Eunice Kennedy Shriver National Institute for Child Health and Human Development (R24-HD058484).

References

- Allison, Paul. Missing Data. In: Allison, P., editor. *Missing Data Workshop*. Columbus, OH: The Ohio State University; 2008. p. 88
- Angeles, Gustavo; Guilkey, David K.; Mroz, Thomas A. The Impact of Community-Level Variables on Individual-Level Outcomes: Theoretical Results and Applications. *Sociological Methods & Research*. 2005; 34:76–121.
- Averett, Susan L.; Sikora, Asia; Argys, Laura M. For Better or Worse: Relationship Status and Body Mass Index. *Economics and Human Biology*. 2008; 6:330–49. [PubMed: 18753018]
- Buttenheim, Alison; Wong, Rebeca; Goldman, Noreen; Pebley, Anne. Does Social Status Predict Adult Smoking and Obesity? Results from the 2000 Mexican National Health Survey. *Global Public Health*. 2010; 5:413–26. [PubMed: 19367478]
- Cecchini, Michele; Sassi, Franco; Lauer, Jeremy A.; Lee, Yong Y.; Guajardo-Barron, Veronica; Chisholm, Daniel. Chronic Diseases: Chronic Diseases and Development 3 Tackling of Unhealthy Diets, Physical Inactivity, and Obesity: Health Effects and Cost-Effectiveness. *Lancet*. 2010; 376:1775–84. [PubMed: 21074255]
- Cole, Tim J.; Bellizzi, Mary C.; Flegal, Katherine M.; Dietz, William H. Establishing a Standard Definition for Child Overweight and Obesity Worldwide: International Survey. *British Medical Journal*. 2000; 320:1240–43. [PubMed: 10797032]
- Cuellar, Israel; Arnold, Bill; Gonzalez, Genaro. Cognitive Referents of Acculturation: Assessment of Cultural Constructs in Mexican Americans. *Journal of Community Psychology*. 1995; 23:339–56.
- Fernald, Lia. Socio-Economic Status and Body Mass Index in Low-Income Mexican Adults. *Social Science & Medicine*. 2007; 64:2030–42. [PubMed: 17368895]
- Fussell, Elizabeth; Palloni, Alberto. Persistent Marriage Regimes in Changing Times. *Journal of Marriage and Family*. 2004; 66:1201–13.
- Heaton, Tim B.; Forste, Renata. Informal Unions in Mexico and the United States. *Journal of Comparative Family Studies*. 2007; 38:55–69.
- Joung, Inez MA.; Dike van de Mheen, H.; Stronks, Karien; van Poppel, Frans WA.; MacKenbach, Johan P. A Longitudinal Study of Health Selection in Marital Transitions. *Social Science and Medicine*. 1998; 46:425–35. [PubMed: 9460823]
- Kahn, Henry S.; Williamson, David F. The Contributions of Income, Education, and Changing Marital Status to Weight Change among US Men. *International Journal of Obesity*. 1990; 14:1057–68. [PubMed: 2086497]
- Lee, Sunmin; Cho, Eunyoung; Grodstein, Francine; Kawachi, Ichiro; Hu, Frank B.; Colditz, Graham A. Effects of Marital Transitions on Changes in Dietary and Other Health Behaviours in US Women. *International Journal of Epidemiology*. 2005; 34:69–78. [PubMed: 15231759]
- Lundborg, Petter; Nystedt, Paul; Lindgren, Bjorn. Getting Ready for the Marriage Market? The Association between Divorce Risks and Investments in Attractive Body Mass among Married Europeans. *Journal of Biosocial Science*. 2007; 39:531–44. [PubMed: 16978439]
- Martin, Teresa Castro. Consensual Unions in Latin America: Persistence of a Dual Nuptiality System. *Journal of Comparative Family Studies*. 2002; 33:35–55.
- Parker, Susan W.; Rubalcava, Luis N.; Teruel, Graciela. Working Conditions and Mental Health in Mexico: Evidence from MxFLS. 2008. Retrieved April 10, 2012 (<http://www.iadb.org/res/laresnetwork/files/pr313finaldraft.pdf>)
- Rauschenbach, Barbara; Sobal, Jeffery; Frongillo, Edward A. The Influence of Change in Marital Status on Weight Change over One Year. *Obesity Research*. 1995; 3:319–27. [PubMed: 8521148]

- Rivera, Juan A.; Barquera, Simon; Gonzalez-Cossio, Teresa; Olaiz, Gustavo; Sepulveda, Jaime. Nutrition Transition in Mexico and in Other Latin American Countries. *Nutrition Reviews*. 2004; 62:S149–57. [PubMed: 15387482]
- Sobal, Jeffery; Rauschenbach, Barbara; Frongillo, Edward A. Marital Status Changes and Body Weight Changes: A US Longitudinal Analysis. *Social Science and Medicine*. 2003; 56:1543–55. [PubMed: 12614704]
- The, Natalie S.; Gordon-Larsen, Penny. Entry into Romantic Partnership Is Associated with Obesity. *Obesity*. 2009; 17:1441–47. [PubMed: 19360012]
- The World Health Organization. Obesity and Overweight. 2006. Retrieved September 17, 2009 (<http://www.who.int/mediacentre/factsheets/fs311/en/index.html>)
- Umberson, Debra; Liu, Hui; Powers, Daniel. Marital Status, Marital Transitions, and Body Weight. *Journal of Health and Social Behavior*. 2009; 50:327–43. [PubMed: 19711809]
- United Nations. Divorce Statistics. 2006. Retrieved September 21, 2008 (<http://unstats.un.org/unsd/demographic/products/dyb/dyb2006/Table25.pdf>)
- U.S. Census Bureau, Population Division. Annual Estimates of the Hispanic Resident Population by Sex and Age for the United States: April 1, 2000 to July 1, 2009. Washington, DC: U.S. Census Bureau; 2009. (NC-EST2009-04-HISP)
- Wade, Terrance J.; Pevalin, David J. Marital Transitions and Mental Health. *Journal of Health and Social Behavior*. 2004; 45:155–70. [PubMed: 15305757]
- Waite, Linda J. Does Marriage Matter? *Demography*. 1995; 32:483–507. [PubMed: 8925942]
- Waite, Linda J.; Gallagher, Maggie. *The Case for Marriage: Why Married People are Happier, Healthier, and Better off Financially*. New York: Doubleday; 2000.
- Waldron, Ingrid; Elizabeth, Hughes Mary; Brooks, Tracy L. Marriage Protection and Marriage Selection—Prospective Evidence for Reciprocal Effects of Marital Status and Health. *Social Science & Medicine*. 1996; 43:113–23. [PubMed: 8816016]
- Waring, Molly E.; Eaton, Charles B.; Lasater, Thomas M.; Lapane, Kate L. Correlates of Weight Patterns during Middle Age Characterized by Functional Principal Components Analysis. *Annals of Epidemiology*. 2010; 20:201–09. [PubMed: 20159490]
- Williamson, David F.; Kahn, Henry S.; Remington, Patrick L.; Anda, Robert F. The 10-Year Incidence of Overweight and Major Weight-Gain in US Adults. *Archives of Internal Medicine*. 1990; 150:665–72. [PubMed: 2310286]
- Wood, Robert G.; Goesling, Brian; Avellar, Sarah. *The Effects of Marriage on Health: A Synthesis of Recent Research Evidence*. Princeton, NJ: Mathematica Policy Research, Inc; 2007.
- Wooldridge, Jeffrey M. *Introductory Econometrics: A Modern Approach*. Cincinnati, OH: SouthWestern College Publishing; 2000.

Biography

Kammi K. Schmeer is an assistant professor of sociology at The Ohio State University studying the influences of family and household dynamics on child and adult health in developing countries and in the United States. She is a faculty affiliate of the Initiative in Population Research and the International Poverty Solutions Collaborative.

Table 1
Variable Means for Full Sample and by Union Status 2002–2005, Mexican Family Life Survey (MxFLS)

	Union Transitions 2002–2005					Stable Union Status 2002–2005				
	All	Entered Union	Dissolved Union	Single	Widow	All	Entered Union	Dissolved Union	Single	Widow
	<i>N</i> = 11,339	<i>n</i> = 435	<i>n</i> = 188	<i>n</i> = 2,338	<i>n</i> = 1,088	<i>n</i> = 6,208	<i>n</i> = 560	<i>n</i> = 522		
Percentage of sample by union status ^a	100	4	2	21	10	55	5	5		
Dependent variable										
Change in body mass index (BMI)	.23	1.78	−.05	.68	.37	.003	.20	−.53		
Baseline controls										
Age	39.58	22.62	42.68	24.16	38.46	44.04	45.65	64.05		
Male	.40	.45	.26	.45	.40	.42	.23	.22		
Normal BMI ^b	.37	.65	.30	.62	.33	.27	.33	.32		
Total children	2.57	.32	3.43	.12	3.00	3.26	3.44	5.07		
Less than elementary education	.38	.11	.39	.13	.42	.44	.45	.77		
Some secondary education	.25	.26	.22	.25	.28	.25	.25	.17		
High school degree	.31	.51	.36	.52	.27	.26	.25	.05		
Some college +	.06	.12	.03	.10	.03	.05	.05	.01		
Indigenous	.14	.12	.14	.11	.14	.15	.10	.16		
Logged per capita household income	5.39	5.65	5.25	5.55	5.07	5.42	5.42	4.78		
Controls 2002–2005										
Moved to urban area	.03	.05	.01	.03	.03	.04	.02	.04		
Change in number of children	.22	.65	.60	.07	.32	.22	.11	.25		
Change in work status	−.02	−.07	.15	.07	−.04	−.04	−.09	−.09		
Change in house-hold size	.30	−.37	.32	.31	.35	.33	.35	.29		
Change in household income	−.19	.16	−.40	.08	−.02	−.26	−.48	−.74		

^a Percentages across union categories do not add to 100 percent due to rounding.

^b Means significantly different: Entering union and single stable *more* likely to be normal weight and have *higher* mean change in BMI than rest of sample. Dissolved union, stable married, stable cohabiting, and stable divorced/separated/widowed *less* likely to be normal weight and have *lower* mean change in BMI than rest of sample.

Table 2

Ordinary Least Squares Regression of Change in Body Mass Index (BMI) on Union Transitions/Stability 2002–2005, Mexican Family Life Survey ($N = 11,339$)

Variables	Models		
	(1)	(2) ^a	(3) ^b
Union transition/stable categories (reference: single stable)			
Entered a union	1.01 ** (.18)	.92 ** (.17)	1.87 ** (.27)
Entered union × Normal BMI			-1.48 ** (.36)
Dissolved a union	.21 (.33)	.16 (.29)	.27 (.41)
Dissolved a union × Normal BMI			-.33 (.51)
Married stable	.32 * (.11)	.27 * (.12)	.29 (.15)
Married stable × Normal BMI			-.029 (.12)
Cohabiting stable	.44 * (.20)	.39 (.21)	.33 (.20)
Cohabiting stable × Normal BMI			.23 (.20)
Divorced/separated stable	.52 ** (.15)	.48 ** (.15)	.35 (.18)
Divorced/separated stable × Normal BMI			.44 (.30)
Widowed stable	.28 (.21)	.21 (.22)	.16 (.23)
Widowed stable × Normal BMI			.19 (.37)
Baseline controls			
Age	-.029 ** (.0024)	-.029 ** (.0027)	-.030 ** (.0027)
Male	.33 ** (.068)	.35 ** (.067)	.33 ** (.066)
Normal BMI	1.53 ** (.17)	1.52 ** (.17)	1.55 ** (.19)
Total number of children	.058 ** (.014)	.067 ** (.016)	.066 ** (.016)
Primary education	-.16 (.11)	-.19 (.11)	-.18 (.11)
Some secondary education	-.13 (.10)	-.15 (.11)	-.14 (.10)
High school degree	-.077 (.12)	-.098 (.13)	-.088 (.13)
Indigenous ethnicity	-.10 (.14)	-.10 (.15)	-.10 (.15)
Logged per capita household income	-.0017 (.0078)	-.012 (.016)	-.012 (.016)
Change household resources			
Moved to urban area		.30 (.23)	.30 (.22)
Change in number of children		.049 (.035)	.048 (.035)
Change in work status		-.045 (.076)	-.050 (.076)
Change in household size		-.064 * (.028)	-.063 * (.028)
Change in household income		-.011 (.015)	-.011 (.015)
Constant	.39 (.24)	.48 (.30)	.47 (.31)
Adjusted R^2	.081	.082	.083

Note: Robust standard errors in parentheses.

^aResults not shown here indicated other significant differences across union categories ($p < .05$): those who entered a union gained significantly more BMI than those who dissolved a union, were married stable, or were widowed stable.

^bResults not shown here indicated Normal BMI × Entered a union was significantly different than the normal BMI interaction effects for all other union categories.

*
 $p < .05$.

**
 $p < .01$.

Table 3

Baseline Body Mass Index (BMI), Predicted Change in BMI, and Predicted 2005 BMI by Union Transition/Stability Category

	All Individuals			Normal BMI in 2002			Overweight in 2002		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Union Category	2002	2002-2005	BMI	2002	2002-2005	BMI	2002	2002-2005	BMI
	Δ in BMI^a		Δ in BMI^b			Δ in BMI^b			Δ in BMI^b
Entered a union	24.1	.89	25.0	21.8	1.34	23.1	28.4	1.27	29.7
Dissolved union	27.7	.13	27.8	22.4	.88	23.3	30.1	-.34	29.8
Single stable	24.5	-.03	24.5	21.5	.94	22.4	29.6	-.61	29.0
Cohabiting stable	27.5	.37	27.9	22.2	1.50	23.7	30.1	-.28	29.8
Married stable	28.3	.24	28.5	22.6	1.20	23.8	30.4	-.32	30.1
Divorced/separated stable	27.6	.46	28.1	22.1	1.73	23.8	30.3	-.26	30.0
Widowed stable	27.6	.18	27.8	22.0	1.29	23.3	30.2	-.45	29.8

^a Calculated from model 2, Table 2.

^b Calculated from model 3, Table 2.