Marital Transitions and Short-Term Weight Changes*

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Abstract

Marital transitions cause changes in diet and activity patterns that affect weight. Marriage is linked to weight gain, while marital exit is linked to weight loss. But it is uncertain whether the weight changes that follow marital transitions are significant enough to affect health. We draw on the epidemiological literature to identify short-term weight changes linked to an increased risk of all-cause mortality. Using data from the National Longitudinal Survey of Youth '79, we test whether recent marriages, divorces and separations affect the odds of experiencing various mortality-linked weight changes. We find that marriage predicts large weight gain and transition to obesity, outcomes that are linked to greater mortality risk. Notably, only a minority of newlyweds experience either outcome in the first two years of marriage. We also find that marital exits do not predict greater incidence of hazardous weight change, including weight loss, in early adulthood and midlife.

Marital Transitions and Short-Term Weight Changes

Marriage predicts better health. Married people live longer, are less likely to suffer from disease, and take fewer risks with their health (Waite, 2009). But marriage also predicts weight gain – what one reporter calls “happy pounds, love chub or the marriage 15” (Ellin, 2010). Epidemiologists have identified obesity as a significant risk factor for death, disease, and disability (Adams et al., 2006). If marriage promotes weight gain, and therefore pushes people towards obesity, it could conceivably harm rather than help people’s health. Meanwhile, divorce predicts worse health, but it also predicts weight loss (Sobal, Rauschenbach and Frongillo, 2003). This weight loss could represent a return to a healthier weight, or it could represent the stress and unsettlement that come with an exit from a marriage. Despite all that scholars have learned about how marital trajectories affect people’s weight, the health effects of marriage-related weight changes remain uncertain.

In this paper, we study the effects of marital transitions on weight change in early and mid-adulthood. We draw on the epidemiological literature to identify four types of weight change linked to increased mortality risk. These are the onset of obesity, large weight gain or weight loss, and weight fluctuation. We examine how entering or exiting a marriage affects the incidence of these hazardous weight changes. Consistent with past research, we find that marriage promotes weight gain, including the risk of large weight gain and the onset of obesity. However, we do not find that exit from marriage predicts hazardous weight change, including weight loss. For some people, the weight gain attendant to marriage may be large enough to pose a health risk. But exiting a marriage in early adulthood or middle age does not predict hazardous weight change.

Theoretical Background

Marriage and weight

Marital statuses and transitions are strongly linked to weight. On the one hand, marriage affects weight as it does other facets of health. On the other hand, marriage selects for individuals, especially women, who meet societal norms related to weight. Sobal and colleagues call such processes “marital causation” and “marital selection,” respectively (Sobal, Rauschenbach and Frongillo, 1992). In models of marital causation, certain marital statuses or transitions predispose individuals to experience changes in their weight. In models of marital selection, the likelihood of transitions into or out of marriage varies with individuals’ body weight. Within each model, specific theories have emerged describing how marriage affects weight and vice versa.

Marital selection models describe how entry and exit from marriage depend on individuals' weight. The marital selection model is associated with the idea of the marriage market – a social arena in which individuals compete for mates (Averett, Sikor and Argys, 2008). Social stigma puts heavier individuals at a disadvantage in the competition for marriage partners. Practically, most people still marry within their lifetime. However, selection in the marriage market means that heavier women marry later in life and end up with less desirable partners (Averett et al., 2008). Weight may also affect the likelihood of divorce. People may be less satisfied with an overweight spouse, leading to lower marital quality and a greater risk of divorce (Boyes and Latner, 2009). Conversely, overweight individuals, aware of their stigmatized position in the marriage market, may set lower standards for their spouse and be more satisfied in their marriages (Sobal, Rauschenbach and Frongillo, 1995). Since weight-based selection seems important at the beginning of marriages, it could also intervene in the ending of marriages. But the evidence appears too conflicting to rule whether high body weight increases or decreases the risk of divorce.

Social stigma and marriage market processes make marriage less likely for heavier individuals. Marriage, in turn, affects body weight. Much of the theory in this area revolves around ideas of social roles and social control (Sobal et al., 1992; Umberson, 1992). The married role brings with it certain norms and obligations. Marriage promotes health by encouraging a decline in risk-taking behaviors, including smoking – a behavior associated with lower body weight (Duncan, Wilkerson and England, 2006). But, perhaps to the detriment of their health, married individuals are also obliged to eat more and exercise less (Sobal et al., 2003). Spouses monitor each other's behaviors to ensure compliance with these norms. In consequence, married men and women gain weight with marriage and are more likely to become obese (Averett et al., 2008). Cross-sectionally, married individuals weigh more, on average, than unmarried individuals, although this difference is due, in part, to age differences between the ever- and never married (Sobal, Hanson and Frongillo, 2009). Social control by spouses enforcing marital roles is a powerful explanation for these observations.

Deliberate social control by a spouse is only one of several possible effects marriage has on body weight. Social contagion may also be at work (Falba and Sindelar, 2008). One spouse may gain (or lose) weight by imitating the other, or as a result of a shared household environment (The and Gordon-Larsen, 2009; Jeffrey and Rick, 2002). Weight change following marriage could also be related to spouses' independent decisions. Exit from the marriage market can lead to lessened attention to diet and exercise, resulting in weight gain (Averett et al., 2008). Whatever the social mechanism, evidence shows real dietary changes accompanying the transition to marriage. Married people differ from never-married and divorced or widowed in their consumption of commercially prepared foods and in their intake of various food types (Kroshus, 2008). In a Greek sample, differences in diet mediate the link between marriage and body weight (Yannakoulia et al., 2008). Social roles, social contagion, and individual agency work through proximate factors such as diet to promote weight gain after marriage.

In recent years, scholars have paid increasing attention to marital *transitions* over marital *status* as causes of weight change. Conceptually, observed weight differences by marital status may be the result of weight changes caused by marital transitions. Sobal and colleagues (2003) find that most stable marital trajectories are not associated with weight changes, while entry into marriage predicts a weight increase for women and exit from marriage predicts a weight decrease for men. Umberson, Liu and Powers (2009) find that marital transitions are more predictive of weight change that marital status; and that exit from marriage has a stronger effect on weight than entry into marriage. In their sample, continually married individuals steadily gain weight, while divorced and widowed individuals experience an initial weight loss and stop gaining weight in the long run. When individuals enter a marriage, they adjust to a higher caloric intake and a family lifestyle that may preclude time or motive for exercise. When individuals divorce or are widowed, depression and the absence of a spouse's earnings or household labor promote weight loss. Over the life course, these one-time adjustments to new dietary and activity regimes (Lee et al., 2005) may be more consequential for health than the effects of *being* married or single.

Research in the last two decades has shown that marriage and weight are dependent upon one another. The net effect of marital trajectories on weight is complicated. Married individuals weigh more on average and are more likely to be obese than unmarried individuals, but marriage selects for relatively thinner people. Weight differences between married and unmarried people appear to be a consequence of weight changes attendant to marital transitions. But the health consequences of marriage-related weight changes are vague. Umberson et al. (2009) argue that even small weight losses can be hazardous, and other research suggests that any weight gains might also predict worse health (Zajacova and Burgard, 2010). Still, in many studies it is unclear which effects of marriage on weight are substantively significant, and which are only tenuously related to health. Recent works in epidemiology have assessed how body weight affects health, finding that all-cause mortality is clearly associated with some changes in weight, and less so with others. We draw on this literature to identify weight changes that are likely to harm people's health.

Measures of body mass index and mortality risk

Body mass index (BMI), a measure of weight relative to height, is widely understood to relate to mortality risk, but the exact nature of this relationship remains elusive. Most epidemiological studies linking BMI to all-cause mortality tend to use one or more of three types of measures based on BMI. Table 1 below gives representative examples of such studies, organized by predominant type of measure and date of publication. The first type consists of categorical measures at a point in time. These are the familiar categories of "normal weight," "overweight," "obese" and so on, although exact definitions may vary (e.g., Stevens et al., 2002). Such studies tend to reproduce the finding of a J-shaped relationship between BMI and mortality risk, with excess mortality attributed to the underweight, overweight, and obese categories.

[Table 1 about here]

While studies are consistent in finding excess mortality among obese (BMI ≥ 30 kg/m^2)

individuals, results differ for lower-BMI groups. Generally, studies find the minimum of the J-shaped curve (i.e., the point of least mortality risk) to be between the middle of the “normal” category and the lower end of the “overweight” category (Adams et al., 2006; Flegal et al., 2005; Calle et al., 1999). Age affects the location of this minimum: the protective effects of mild overweight are more salient for older individuals (Stevens et al., 1998). At the other end of the BMI distribution, studies vary in their approach to the excess mortality incurred by the underweight. Some studies find an increased risk of mortality below a certain BMI threshold (usually 18.5 kg/m^2), but other work shows this risk to be largely explained by the effects of smoking and wasting diseases (Prospective Studies Collaboration, 2009; Wannamethee, Shaper and Walker, 2001). In a conservative interpretation of existing research, only the obese category of BMI is definitively linked to increased mortality, though this link has been demonstrated in certain studies for the overweight and underweight categories as well.

The second type of BMI measure addresses weight gain or loss over time. Since overweight and especially obesity are linked to increased mortality risk, researchers have long theorized that weight gain alone should predict greater mortality risk. Nevertheless, studies frequently support the opposite conclusion, that weight *loss* is predictive of greater mortality risk, while weight gain either has no effect or increases risk only in certain cases (Droyvold et al., 2005; Elliott et al., 2005). Indeed, given that the typical BMI trajectory in adulthood is a slow and sustained climb, weight loss appears to present a deviation from the norm that may well contribute to increased mortality risk.

Some researchers contest this interpretation, arguing that confounding factors (e.g., initial BMI, intendedness of weight change) work to make weight gain appear benign, and weight loss sinister, while within-individual weight changes retain the opposite effects, particularly for overweight persons (Berentzen and Thorkild, 2006; Simonsen et al., 2008). In any case, the literature is vague on what constitutes a risky weight loss (or gain). As the second block of studies in Table 1 shows, definitions of weight loss and gain can be absolute (exceeding a certain weight), categorical (representing movement from one weight category to another), or relative to initial BMI (Yaari and Goldbourt, 1999; Mikkelsen et al.; Myrskyla and Chang, 2009). It is difficult to judge in a study that does not observe mortality risk directly whether observed weight loss, for example, is truly a health hazard. Nevertheless, recent evidence suggests that *large* weight changes, especially over a short period of time, may increase mortality risk independent from the starting or ending weights.

A third type of BMI measure, quantifying weight fluctuations over a given time period, brings a new dimension to research on BMI and mortality. Weight fluctuation, whether because of yo-yo dieting or an underlying health condition, may well contribute to mortality risk. Furthermore, weight fluctuations predict future weight trends (Kroke et al., 2002). In recent years, several papers have introduced an easily scalable measure of weight fluctuations based on total weight change and sum of weight deviations across multiple observations. In these studies, weight fluctuating is defined as gaining or losing a small amount of weight (typically no more than 3 kg/m^2) over three or more observations while experiencing above-average weight changes in the interim (Diaz, Mainous and Everett, 2005). Studies using this measure find that weight fluctuations predict increased mortality risk independent of initial BMI (Rzehak et al., 2007). But other studies using different measures find either no relationship between weight fluctuations and excess mortality, or find such a relationship to be attenuated by confounding factors (Wannamethee, Shaper and Walker, 2002).

The epidemiological literature reveals that certain patterns of weight change predict a heightened mortality risk. Excess mortality is associated with being obese, and thus with becoming obese. Many findings on weight change and mortality also suggest that large weight losses and weight gains contribute to mortality risk. A third segment of this literature investigates the role of weight fluctuations over a period of time. Some studies find that weight fluctuations are associated with increased mortality risk, even when accounting for starting weight and net weight gains or losses. Each of these outcomes – the onset of obesity, large weight changes, and weight fluctuations – may be linked to mortality. Therefore, each may be treated as a substantive health outcome, but with the understanding that the ability of these measures to predict mortality risk remains open to revision.

Marital transitions and hazardous weight changes

Transitions into and out of marriage affect weight, and, consequently, body mass index. Further, weight affects people's propensity to marry, and perhaps also their propensity to divorce. So the effects of marital transitions should be separated as much as possible from these selection effects. Net of selection effects, the literature suggests that marital transitions cause weight changes that go on to affect people's health. Particularly, certain changes in BMI are linked to greater risks of mortality. If marital history affects weight enough to make a difference in individuals' health, then it should have some effect on the incidence of mortality-linked BMI changes. Following the epidemiological literature, we count among these outcomes obesity, large weight gain or loss, and weight fluctuation. We also consider *any* weight gain and weight loss, as a way of aligning our results with prior studies that use continuous BMI outcomes. By focusing on the mortality-linked BMI outcomes, however, we can directly test the hypothesis that marital transitions affect people's weight in ways that are significant to their health.

We first aim to reproduce past findings on marital transitions and BMI change. In the literature on marriage and weight, entry into marriage consistently predicts weight gain and exit from marriage often predicts weight loss. We test whether marital formation predicts large weight gain (3 kg/m^2 or more over about two years) and the incidence of obesity. We also test whether marital dissolution predicts large weight loss and hazardous weight fluctuation (e.g., a large loss that is quickly reversed).

Hypotheses

H1. Marital formation predicts weight gain.

H2. Marital dissolution predicts weight loss.

H3. Marital formation predicts large weight gain and obesity.

H4. Marital dissolution predicts large weight loss and weight fluctuation.

Data and Methods

We use data from the National Longitudinal Survey of Youth ’79 (NLSY79). The NLSY79 is an ongoing survey of a nationally representative sample of men and women aged 14-22 in 1979. The survey was administered yearly up to 1994, and every other year since then. Our outcomes are based on respondent body mass index, which is constructed from self-reported height and weight (Averett et al., 2008). We use height data collected in 1985 and weight data collected at two-year intervals between 1986 and 2006. Therefore, we have up to 11 evenly spaced data points on BMI for each respondent. Because our measures of BMI change all require two or more observations, we have up to 10 evenly spaced data points per respondent for most of our outcomes.

We define six binary outcomes based on the BMI data. These outcomes measure the incidence of BMI changes, comparing BMI in a given year to BMI observed two (or, in the case of weight fluctuations, four) years later. The first two outcomes are any gain and any loss, where BMI must change by at least 1 kg/m^2 (about 7 lb. for a person 5'10" tall) over two years to be classified as a gain or loss. We also measure any large gain and any large loss, defined as a gain or loss of at least 3 kg/m^2 over two years, respectively (Myrskyla and Chang, 2009). We measure the incidence of obesity (BMI $\geq$ 30 kg/m^2) by checking whether a respondent who is not obese in a given year becomes obese by the time of the next observation.

For our sixth outcome, we measure the incidence of weight fluctuation using the method of Diaz and colleagues (2005). We define weight fluctuation as experiencing a net change in BMI of less than 3 kg/m^2 over four years (i.e., two subsequent observations), while experiencing an above-average sum of absolute deviations in the interim. We define the sum of absolute deviations as the sum of absolute changes between the first and second observations and the second and third observations. We calculate a sample-wide average of this sum for each year, establishing cutoffs for our measure of weight fluctuation. The average cutoff is 3.1 kg/m^2 (*sd* = 0.03). Then, the reference category consists of people who gained or lost at least 3 kg/m^2 over four years *or* people whose weight changes between three given observations were average or below average.

Our main independent variables are marital transitions. These variables are based on regular questions asking respondents to report up to three marital transitions since the date of their last interview. In each case, the date and type of marital transition are recorded. A complete marital history can be constructed from these transition questions. The NLSY79 also includes constructed variables on the timing of up to three marriages and up to two divorces. However, these variables offer no information on marital separations and dissolutions beyond the second divorce. Therefore, we use the original items on marital transitions to construct respondents' marital histories up to 2006. We include several time-variant controls in our analysis. We control for age, since BMI tends to increase over time in early and mid-adulthood (Clarke et al., 2009). To control for the effects of pregnancy on women's BMI, we measure whether the respondent is currently pregnant. We also measure whether the respondent has had another child since the date of the previous interview (Averett et al., 2008). Additionally, we control for the presence of any physical limitation restricting the respondent's ability to work or the kind of work she can do, as the onset of disability may predict weight gain (Liou, Pi-Sunyer and Laferrere, 2005).

To analyze the data, we first summarize the sample's characteristics and present descriptives on the incidence of marital transitions and weight changes. We use fixed effects logistic regression to predict the incidence of each type of weight change as a function of marital transitions and control variables (Allison, 1994). The fixed effects model allows us to net out the effects of all time-invariant characteristics. This analytic technique gets around some of the issues of selection into marital trajectories. However, a fixed effects logit can only be fitted to cases in which the outcome variable is not constant over time. For example, in a model of the incidence of obesity, we can only include cases in which the respondent is ever observed to *become* obese. This limitation constrains the sample size of many of our models.

In the main analysis, we regress BMI changes that occur between one observation and the next on marital transitions that occur in the year of the first observation or the year before it. Practically, this approach leads us to measure BMI a few months *before* the "recent" marital transition in some cases. Even so, we consider the transition to contribute to the overall BMI change between the two observations. In supplemental analyses, we fit models in which the independent variables are lagged by two years, eliminating this issue. While these analyses do away with the problem of BMI measurements following a “recent” marital transition, they also lose the power to detect short-term effects of marital transitions on weight.

Analyzing men and women separately, we fit two models for each outcome. First, we enter binary terms for each of three types of recent marital transitions: marriage, divorce and marital separation. Second, we add the control variables described above. The reference category consists of everyone who did not have a marital transition in a given two-year period, regardless of marital status. An alternative approach would fill the reference category only with people in a certain marital status, e.g., never married. But, over time, this category does not represent a stable point of reference. For example, at age 20 the “never married” category constitutes the majority of the sample, while at age 40 the same category dwindles to a minority much heavier, on average, than the rest of the sample. Thus, we test the effects of going through a recent marital transition versus being in any stable marital state. Since marital status is constant for most respondents in a given year, this effectively compares newly wedded or separated respondents to the average respondent in their cohort. This strategy also reflects recent findings that “marital transitions are more important than marital status in predicting change in body weight” (Umberson et al., 2009).

Results

The NLSY79 began with 12686 respondents aged 14-21 in 1979. We exclude 1903 respondents who contribute no information on BMI after 1986. Most of these respondents are part of an oversample that was discontinued after 1985. Because few respondents ever experience reunification following a separation or the death of a spouse, we exclude 184 ever-widowed and 427 ever-reunited individuals from the sample. We also exclude two respondents who did not report a marital status in 1979, and 59 respondents who never reported pregnancy and childbirth information between 1986 and 2006. We exclude two outlying cases in which respondents never reported a BMI of less than 50 kg/m^2. The remaining 10109 respondents contribute 110594 person-years at two-year intervals between 1986 and 2006. We delete 299 observations in which BMI exceeded 50 kg/m^2, and 24776 observations missing data on three of the time-variant controls: physical limitation, pregnancy, and the presence of a new child. Our final sample contains 85519 observations collected from 10109 respondents.

[Table 2 about here]

Table 2 describes baseline demographics for this sample, as well as data on marital history and BMI collected in 2006. Table 2 compares respondents by marital trajectory: respondents who never married, respondents who married and remained married, respondents who married and then divorced, and respondents who remarried (whether or not they remained in the second marriage). Of the 10109 respondents, 99 did not provide sufficient information to be assigned to one of these categories. In the entire sample, most people have entered a first marriage, and about half have left their first marriage by their mid-40s. In 2006, the average BMI in the sample is 28.7 kg/m^2, towards the upper end of the overweight category as defined by the Centers for Disease Control and Prevention. In the same year, 34% of the respondents are classified as obese, compared to 33% of all adults in the U.S. ages 20-74 in 2004 (Ogden et al., 2007).

[Figure 1 about here]

Table 2 shows that obesity is less prevalent among the continuously married than among the never married at midlife. Here, substantial selection effects likely obscure any contribution of marriage to weight gain. Figure 1 illustrates this by plotting average BMIs by year for each of the four marital trajectories. Among men, average BMIs are about the same for all marital trajectories in every year. But among women, there is a marked difference at the 1986 baseline between the average BMI of women who would remain never married and those who would stay in their first marriage. A comparison of average BMIs by marital trajectory in 2006 only reveals this pre-existing disparity, rather than differences in the slope of BMI over time. Furthermore, because marital transitions happen at varying ages, a plot of average BMIs such as Figure 1 smoothes over spikes and dips in BMI that occur over a person's life course.

[Figure 2 about here]

Rather than studying averaged BMI over time, we are interested in how the incidence of marital transitions affects the incidence of changes in BMI. Figure 2 plots the incidence of three marital transitions over time: marriage, separation and divorce. As the NLSY79 respondents age, they become less likely to experience a marital transition, mostly due to the decline in the incidence of marriage. A local spike in the incidence of marriages around 1998 reflects intersecting trends: a declining incidence of first marriage and an increasing incidence of remarriage. By comparison, the incidences of divorce and separation remain roughly constant between 1986 and 2006, with separations occurring at about half the rate of divorces.

[Figure 3 about here]

[Figure 4 about here]

The incidence of weight changes, like the incidence of marital transitions, changes as the NLSY sample ages. Figure 3 illustrates the incidence of weight gain (gaining 1+ kg/m^2 over two years) and weight loss (losing 1+ kg/m^2 over two years) between 1986 and 2004. Among both men and women, weight gains become less common and weight losses become more common over time. As Figure 1 shows, the typical BMI trajectory over the life course is one of steady but decelerating weight gain from early adulthood into middle age. Thus, it makes sense that weight gains from year to year should become rarer as the respondents age, while weight losses should appear more frequently. Figure 4 describes the incidence of weight changes further by plotting four types of mortality-linked weight changes: transition to obesity, a gain or loss in excess of 3 kg/m^2, and weight fluctuation. Unlike general gains and losses, mortality-linked changes exhibit stable incidences over time. The most common mortality-linked weight change is weight fluctuation, affecting over 1 in 10 men and nearly 1 in 5 women in a given year. Large gains are less common, and large losses and transitions to obesity are least common. In most years, fewer than 5% of men or women become obese.

How do marital transitions coincide with these weight changes? On average, entry into marriage overlaps with weight gain. Among women, average BMI after marriage is 0.7 kg/m^2 greater than average BMI before marriage, 24.2 kg/m^2 (p = .001, two-tailed test).When men in the sample marry, they experience an average increase in BMI of 0.6 kg/m^2, from an average BMI of 25.7 kg/m^2 before marriage ($p < .001$).Divorce coincides with smaller weight gains. Among both men and women, average BMI increases after a marital exit by 0.5 kg/m^2 (p = .04 for women; p = .007 for men). But since the typical BMI trajectory in adulthood is one of continuous weight gain, as illustrated in Figure 1, these smaller weight gains may represent a greater likelihood of weight loss relative to what might have happened had the same people remained married.

[Table 3 about here]

The weight selection into marital trajectories observed in Figure 1 leads us to use a fixed effects logit model to estimate the effects of marital transitions on the incidence of weight changes. In Table 3, we regress weight gains and losses on marriage, separation and divorce. Compared to respondents experiencing no marital transitions, a recent marriage increases the odds of weight gain for women by at least 40% and decreases women's odds of weight loss by at least 13%. For men, the effects of marriage are in the same direction but much smaller and not statistically significant. Inasmuch as marital transitions affect the incidence of weight gains and losses, they promote weight gain and discourage weight loss, as predicted in Hypothesis 1. This result lends support to the many theories – social control, social contagion, marriage markets, and others – explaining how marriage leads to weight gain.

Hypothesis 2, however, finds no support for its prediction that marital dissolutions should lead to weight loss. Separations have no significant effects on weight changes, while divorces predict weight *gain* (or at least a lower likelihood of weight loss) among women. In contrast to theories positing that new divorcees consciously regulate their weight downward to improve their chances on the marriage market, our results show that divorces are not typically followed by weight loss, deliberate or not. Among other independent variables in these models, age is associated with greater odds of weight loss and lower odds of weight gain, as Figure 3 suggests. The onset of a physical limitation predicts greater odds of weight gain among men. A new child predicts short-term weight loss rather than weight gain, as does being pregnant. These effects likely represent the rebound from weight gain associated with pregnancy, or, for men, pregnancy-related gains of "sympathy weight."

[Table 4 about here]

So far, our analysis has used binary outcomes of weight gain and loss. In Table 4, we shift to using mortality-linked BMI changes as the outcomes. In general, the transition to marriage promotes weight gain. Table 4 shows that it also promotes *large* weight gain (at least 3 kg/m^2

over two years) for both men and women, and, for men, transition to obesity. This result supports Hypothesis 3. Not only does marriage foster weight gain, but it can do so to an extent that would increase newlyweds' risk of mortality. Still, this harmful effect of marriage is limited to a minority of newlyweds. Sixteen percent of newlywed women experience large weight gains in a given year, compared to 11% of other women. Seven percent of newlywed men experience large weight gains and 6% become obese in a given year, compared to 6% and 5% of other men, respectively. Whereas marriage predicts mortality-linked weight gains, divorces and separations have virtually no effect on the incidence of mortality-linked BMI changes. Hence, Hypothesis 4 finds no support. This result suggests that in early and mid-adulthood, marital dissolution neither harms nor helps people's health through its effects on weight.

In supplemental analyses, we repeat the fixed-effects models of Tables 3 and 4, lagging the independent variables by two years (results not shown but available upon request). Here we observe marital transitions' effects on BMI changes 2-4 years downstream, skipping over the short term effects described so far. At this time scale, divorces and separations have no significant effects on any of the outcomes. Marriages predict only weight loss among women, including large weight loss, suggesting some rebound from the weight gains women experience immediately after the marital formation. Other temporary influences on BMI – such as pregnancy and the arrival of a new child – also become insignificant predictors of weight change. Only age retains a consistently significant effect in these models, predicting a lower likelihood of weight gain and a higher likelihood of weight loss for both men and women.

Discussion

Marriage and divorce can have paradoxical effects on body weight. Generally, marriage improves health while divorce harms it. But, with respect to weight, the opposite seems to be true. Marriage fosters weight gain – related to known health risk factors such as obesity – while divorce can promote weight loss – the goal of many public health initiatives. Recent studies have used longitudinal data to confirm that this paradox exists. These studies, however, focus on a continuous measure of body mass index, and so cannot evaluate which BMI changes truly pose a health risk. The present study contributes to the literature on marriage and weight by examining whether marital transitions promote weight changes linked elsewhere to a heightened risk of all-cause mortality.

We begin by assessing the epidemiological literature on weight change and mortality. These studies identify three types of weight changes that could predict greater mortality risk. One is categorical change: gaining enough weight to become classified as obese. Another is gaining or losing a large amount of weight quickly (3+ kg/m^2 in two years, or about 21 pounds for a person 5’10” tall). A third is weight fluctuation: experiencing above-average swings in weight while returning to about the same BMI. We then test how three types of marital transitions – marriage, divorce and separation – affect the odds of each of these outcomes, relative to people who remain in any stable marital state. We also test how marital transitions affect the odds of any weight gain or weight loss of at least 1 kg/m^2 over two years, to compare our results with previous work using continuous measures of BMI.

We find that, as hypothesized, marriage is associated with weight gain. It is, however, an inconsistent predictor of weight gain. Among men, it predicts large gains and transition to obesity, but not small gains. Among women, it predicts small and large gains, but not the incidence of obesity. Indeed, we find evidence that women rebound from the weight gains of the first two years of marriage over the next two years. We also find that most newlyweds do not experience either large weight gain or the transition to obesity in the first two years of marriage. For a small minority, particularly those who become obese in consequence, marriage may bring a lasting increase in health risk through its effects on weight. But for most newlyweds, the years immediately following a marriage are accompanied by weight changes that are small, temporary, or both.

Why might the adjustment to married life have such a limited effect on weight? One possibility is that the diet and activity patterns of single and married people are more alike than previously thought. Social control theory argues that marriage leads people to eat a high-calorie diet and forgo exercise. But we are aware of no studies that show such lifestyle differences to mediate a marital effect on weight gain in a U.S. sample. Perhaps, by the time they marry, most of the respondents in our sample have already adopted a sedentary lifestyle that would be little affected by the transition to marriage. A related possibility is that we observe respondents later than the life course stage at which transitions into marriage might have the greatest effect on weight. While age in our sample ranges from 21 to 48, we cannot observe any teen marriages or early-20s marriages among older members of the NLSY79 cohort. If marriages occurring early in the life course have a more profound effect on weight than later first marriages or remarriages, our analysis would underestimate the typical effect of marital formation on weight gain.

Our other two hypotheses anticipate that exits from marriage will be associated with weight loss. Scholars have identified marital exit, particularly in later life, as contributing to weight loss. Weight loss, in turn, can predicted greater mortality risk, particularly when it is rapid or part of a series of weight fluctuations. We find that divorces and marital separations predict no increase in the incidence of weight loss outcomes, including large weight loss and weight fluctuation. Insofar as divorces and separations have significant effects on the likelihood of weight loss in the two years following the marital exit, they *discourage* weight loss, particularly among women. This finding disputes the theory that divorcees intentionally lose weight to improve their chances on the marriage market. It also suggests that some marital exits do little to harm health through their effects on weight.

Our finding that marital exits do not lead to weight loss comes with important caveats. First, we do not examine marital exits resulting from the death of a spouse. Widowhood is strongly associated with weight loss, and weight loss in later life poses a significant health risk. In our sample, very few respondents ever experience the death of a spouse, and no respondents are observed reaching age 50, let alone old age. It is possible that, like widowhood, divorces or separations from long-standing marriages in old age might foster large weight loss or weight fluctuation. But in early and mid-adulthood, judging by our results, weight loss does not follow marital exits. Since voluntary weight loss is difficult and rare, it is not surprising that we detect no "preparing for the marriage market" after a marital exit by losing weight. Rather, we suspect that divorces and separations in early to mid-life result in lifestyle adjustments not sufficient to produce weight loss, particularly when accounting for any stress-related weight gain caused by the strain of a marital exit (Torres and Nowson, 2007; Williams and Umberson, 2004).

Our analysis is limited in some important ways. First, we observe most of the respondents between their early 20s and their mid 40s. Thus, we have no data on the earliest marriages or later marital exits. Prior research suggests that these marital transitions might be the most consequential for weight changes. This could mean that we underestimate the typical weight changes resulting from entering or exiting a marriage over the whole life course. Second, our regression models compare people who experience certain marital transitions to people who experience no marital transitions in the same time period. This reference group changes over time: from mostly never-married in the early waves of the NLSY79, to mostly married in the later waves. The alternative approach, used in other studies with a fixed effects design, is to treat one marital status category as a reference group. Due to continual weight selection out of the “never married” and into other marital categories, this approach produces a reference group even more unstable with respect to mean weight over time. While we attempt to minimize this problem, we do not resolve it completely, complicating the interpretation of our results. Third, while our data have frequent measures of weight and marital transitions, they lack measures of diet, exercise habits, and other lifestyle factors that could mediate the effect marital transitions exert on weight. Therefore, we are unable to directly test the proposition that, in this sample, marital transitions are seldom accompanied by lifestyle changes significant enough to cause large changes in weight.

Despite these limitations, the current analysis furthers the study of marriage and weight by testing explicitly whether marital transitions lead to the kinds of weight changes that predict worse health. The fixed-effects design nets out the effects of all time-invariant characteristics that influence the likelihood of both marital transitions and weight changes. The categorical specification of the outcome variables allows us to separate mortality-linked weight changes from small weight gains or losses that are not known to affect health. Because our sample has frequent, regularly spaced observations of weight, we can study the immediate effects of marital transitions on the incidence of various types of weight changes. This feature of the data also means we can closely align our definitions of mortality-linked weight changes to those used in the epidemiological literature.

Conclusion

Marriage protects health, but it also predicts weight gain that potentially harms health. Previous research finds associations between marital formation and weight gain, and between marital exits and weight loss. But it does not evaluate to what degree these weight changes are significant for later health. Drawing on the conclusions of epidemiological studies on weight changes and mortality risk, we test whether marital transitions predict several types of mortality-linked weight changes. Among respondents to the National Longitudinal Survey of Youth ’79, we find entry into marriage to predict large weight gains and the transition to obesity. We also find that neither separations nor divorces predict a greater incidence of any mortality-linked weight change in young adulthood and midlife. While our findings align with theories of social control that explain how marital formation leads to weight gain, they also show that only a minority of newlyweds experience mortality-linked types of weight gain in the first two years of marriage. Further research should identify who is most at risk for large weight gains and the transition to obesity following a marital formation, and whether their health would indeed be protected if they did not experience these weight changes.

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Table 1. Selected studies on weight-based predictors of all-cause mortality risk

			Sample characteristics		
Authors	Year	Predictors of increased mortality risk	N	Country	Sex
Prospective Studies Collaboration	2009	Underweight (< 22.5 kg/m^2) and overweight (≥ 25 kg/m^2)	894576	Multiple	M and F
Adams et al.	2006	Overweight (≥ 25 kg/m^2) and obesity (≥ 30 kg/m^2)	527265	USA	M and F
Flegal et al.	2005	Underweight (< 18.5 kg/m^2) and obesity (≥ 30 kg/m^2)	36859	USA*	M and F
Myrskyla and Chang	2009	Weight losses (≥ 1 kg/m^2) from initial BMI of < 32 kg/m^2; Large weight gains (≥ 3 kg/m^2) from initial BMI of > 35 kg/m^2	13104	USA*	M and F
Mikkelsen et al.	1999	Weight gain or loss putting respondent outside of initial BMI category (in 2 kg/m2 increments)	15113	Denmark	M and F
Yaari and Goldbourt	1998	Extreme weight loss (≥ 5 kg)	9228	Israel	Men only
Rzehak et al.	2007	Weight fluctuations (< 3 kg/m^2 weight difference; above average sum of deviations)	1160	Germany	Men only
Diaz, Mainous and Everett	2005	Weight fluctuations (< 3 kg/m^2 weight difference; above average sum of deviations)	8479	USA*	M and F
Wannamethee, Shaper and Walker	2002	Weight loss or gain (≥ 4% of initial weight) followed by weight gain or loss, respectively.	5608	UK	Men only

* Nationally representative

Table 2. Descriptive statistics for entire sample and by marital trajectory as of 2006

	Mean (s.d.)				
	Entire sample	Continuously married	Divorced	Remarried	Never married
Baseline:					
Female	0.50	0.50	0.55†	0.53†	0.45†
Black non-Hispanic	0.16	0.15	0.18†	0.18	0.15
Hispanic	0.26	0.17	0.33†	0.20†	0.41†
In 2006:					
Age	45.41 (2.23)	45.45 (2.24)	45.51 (2.25)	45.35 (2.18)	45.35 (2.25)
Number of children	1.17 (1.21)	1.69 (1.17)	0.75 (1.01)†	1.13 (1.19)†	0.52 (0.98)†
Any physical limitation	0.10	0.07	0.14†	0.12†	0.12†
Net family income in $1000s	71.09 (74.70)	99.51 (85.51)	40.28 (42.49)†	74.55 (70.94)†	34.46 (44.67)†
Any college degree	0.30	0.40	0.23†	0.23†	0.22†
Never married	0.19	-	-	-	-
Currently married	0.58	-	-	0.72	-
Formerly married	0.23	-	-	0.28	-
Number of marriages	1.00 (0.76)	-	-	2.21 (0.50)	-
Number of separations	0.27 (0.51)	-	-	0.80 (0.70)	-
Number of divorces	0.38 (0.64)	-	-	1.30 (0.69)	-
Body mass index (BMI)	28.71 (6.07)	28.59 (5.91)	29.03 (6.68)†	27.99 (5.27)†	29.50 (6.65)†
Obese (BMI ≥ 30)	0.34	0.34	0.37†	0.28†	0.38†
N	10109	4020	1633	1917	2440

† Significantly different ($p < .05$, two-tailed test) from continuously married group

Table 3. Odds ratios from fixed effect logit models, regressing incidence of BMI outcomes on recent marital transitions

	Women				Men			
	Any weight gain		Any weight loss		Any weight gain		Any weight loss	
Marriage	1.50***	1.41***	0.87*	0.83**	1.12*	1.05	0.90	0.93
Divorce	1.16*	1.12	0.70***	0.74***	1.16*	1.13	0.88	0.91
Separation	1.02	0.96	0.81	0.85	1.13	1.07	0.78	0.82
Age	-	0.96***	-	1.02***	-	0.97***	-	1.02***
Physical limitation	-	0.98	-	1.11	-	1.16*	-	1.00
New child	-	0.92***	-	1.20***	-	0.95**	-	1.05*
Pregnant	-	0.33***	-	6.50***	-	-	-	-
Cases	4217	4217	3510	3510	4150	4150	3000	3000
Log likelihood	-16085.5	-15866.8	-11145.5	-10822.5	-15165.8	-15056.0	-9010.7	-8986.7
Chi-square	85.8***	523.0***	30.1***	676.0***	13.5**	233.0***	8.7*	56.7***

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 4. Odds ratios from fixed effect logit models, regressing incidence of mortality-linked BMI outcomes on recent marital transitions

	Women							
	Large weight gain		Obesity		Large weight loss		Weight fluctuation	
Marriage	1.68***	1.62***	1.17	1.17	0.84	0.81	1.05	1.05
Divorce	1.13	1.10	1.04	1.02	0.69*	0.74	0.88	0.89
Separation	1.02	0.99	0.85	0.83	0.76	0.83	0.76*	0.77*
Age	-	0.98***	-	0.99*	-	1.04***	-	1.00
Physical limitation	-	1.03	-	0.85	-	1.04	-	1.08
New child	-	0.90**	-	0.92	-	1.16***	-	1.05
Pregnant	-	0.26***	-	0.31***	-	9.97***	-	1.23*
Cases	2392	2392	1344	1344	1695	1695	2637	2637
Log likelihood	-6665.7	-6598.8	-3614.3	-3594.4	-4168.2	-3928.1	-7963.5	-7958.9
Chi-square	59.1***	193.0***	3.0	42.7***	12.8**	493.1***	6.6	15.9*

	Men							
	Large weight gain		Obesity		Large weight loss		Weight fluctuation	
Marriage	1.27**	1.28**	1.26*	1.31**	0.80	0.85	0.93	0.96
Divorce	1.17	1.06	1.13	1.14	0.83	0.84	0.99	0.97
Separation	1.25	1.09	1.16	1.20	0.85	0.90	0.85	0.83
Age	-	0.98***	-	1.02***	-	1.04***	-	1.01**
Physical limitation	-	1.12	-	0.85	-	0.80	-	1.04
New child	-	0.89**	-	1.03	-	1.05	-	0.98
Cases	1615	1615	1446	1446	958	958	2121	2121
Log likelihood	-4106.8	-4094.4	-3817.3	-3810.3	-2301.5	-2279.6	-6069.8	-6064.5
Chi-square	10.9*	35.6***	8.3*	22.2**	4.4	48.3***	2.1	12.7*

* $p < .05$; ** $p < .01$; *** $p < .001$

Figure 1. Average BMIs over time, by marital trajectory as of 2006.

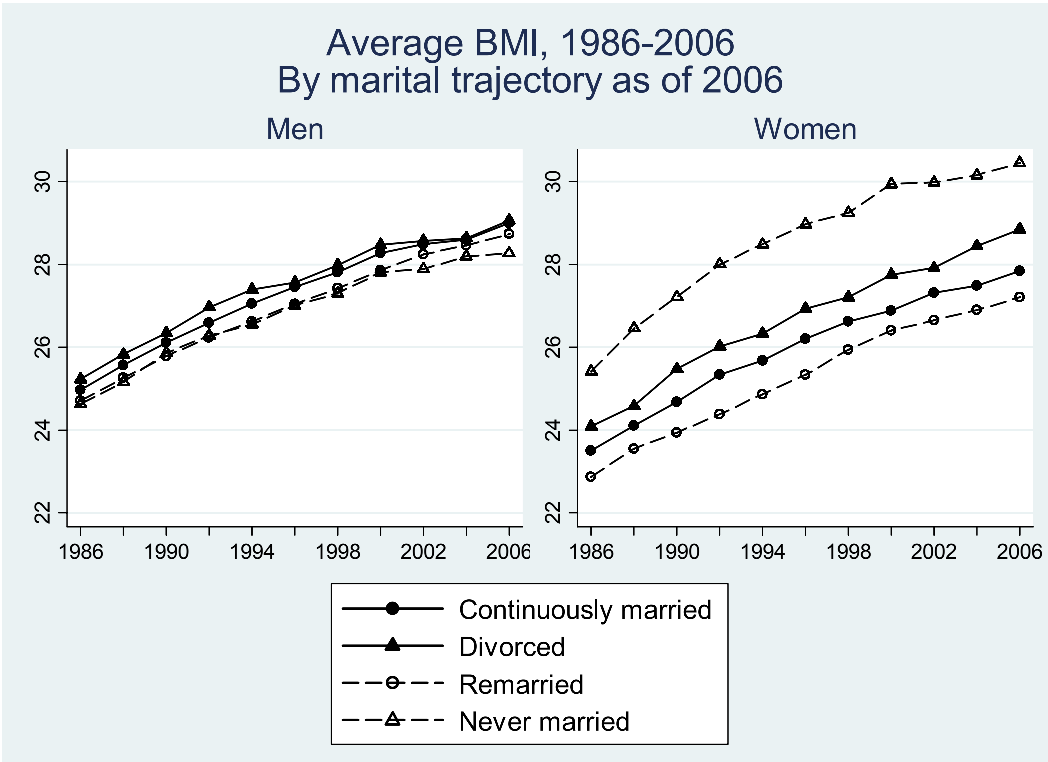

Figure 2. Incidence of marital transitions by year.

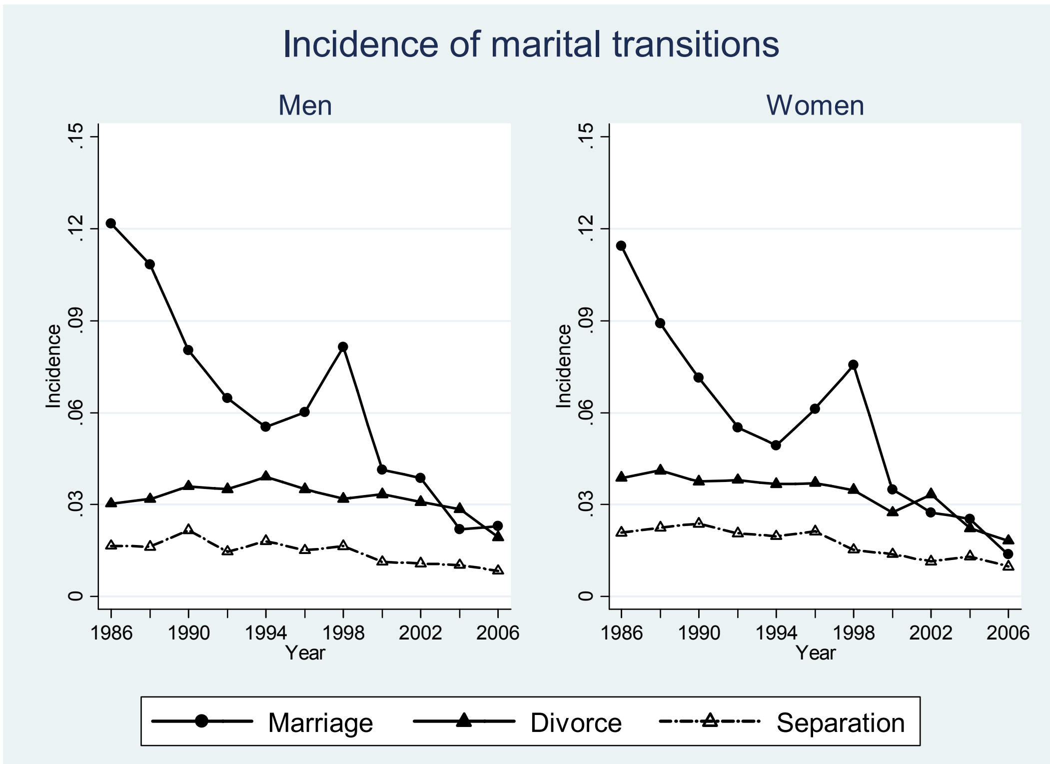

Figure 3. Incidence of BMI gains and losses by year.

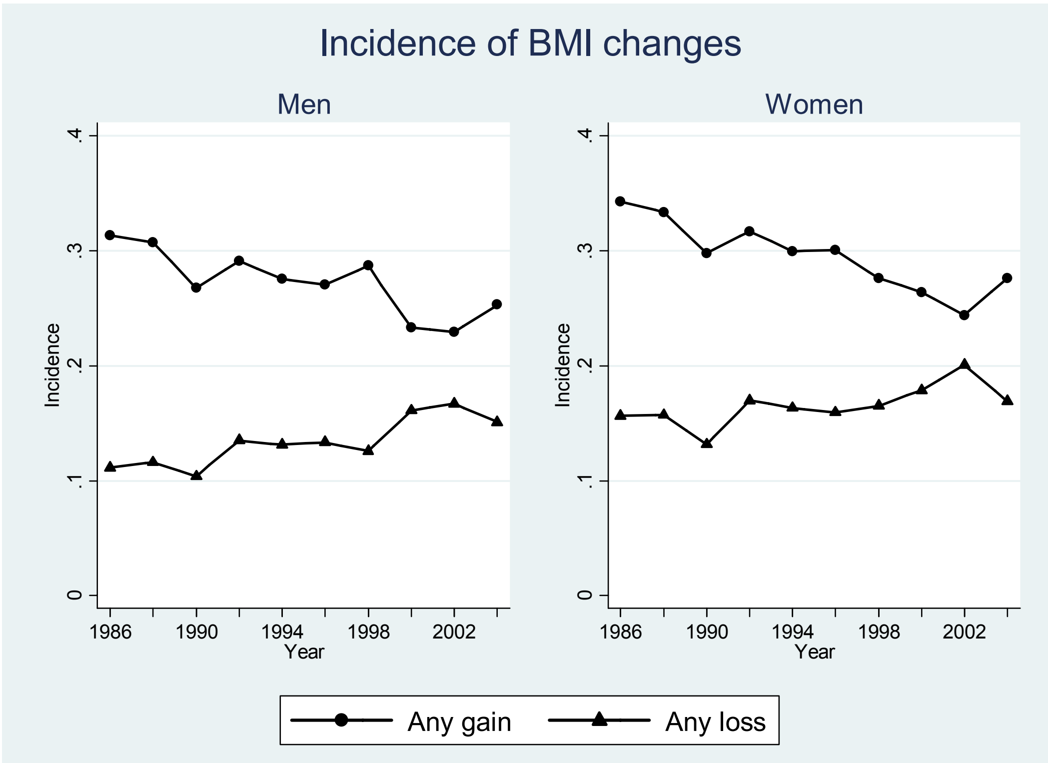

Figure 4. Incidence of mortality-linked BMI changes by year.