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Marital Status, Marital Transitions, and Body Weight*

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Abstract

We consider how marital status and marital transitions, important features of the social environment, influence weight change over time, and how these effects vary by age, race, and gender. Growth curve analysis of a four-wave national survey suggests that marital transitions are more important than marital status in predicting change in body weight, and that marital dissolution is more important than marital formation in affecting weight. Widowhood effects on weight loss are a particular concern for population health trends, especially among African Americans.

Body weight is clearly associated with health. Overweight and obesity contribute to type two diabetes, cardiovascular disease, some cancers (Hill et al. 2003; Krueger et al. 2004), and increased mortality (Breeze et al. 2006). Even modest weight gain is associated with increased morbidity and mortality risk (Breeze et al. 2006). Despite legitimate public health concerns about excessive weight gain, research suggests that weight loss is even more strongly associated with increased mortality risk, especially for those over age 65 (Locher et al. 2007).¹ Experts agree that a stable body weight in the trim to normal range is best for health (Breeze et al. 2006), with weight “cycling”—recurrent gains and losses—particularly harmful to health (Brownell and Rodin 1994). Many personal, social, and behavioral factors across the life course influence adult body weight (Baltrus et al. 2005). The present study focuses specifically on marital status and marital transitions as social factors that may influence body weight in adulthood.

Sociologists have long argued that marital status is a defining feature of the social environment (Waite 1995), and several studies point to the potential importance of marital status in affecting adults’ body weight. Past research suggests that marriage is associated with weight gain (Sobal, Rauschenbach, and Frongillo 2003; cf. Umberson 1992) and that divorce and widowhood (Sobal et al. 2003; Umberson 1992) are associated with weight loss, but results are inconsistent and limited in important ways. First, longitudinal studies are limited to two time points with a focus on absolute amounts of weight change (e.g., Sobal et al. 2003; Umberson 1992). These analyses are unable to demonstrate baseline differences in body weight in addition to the rate of change (how quickly one gains or loses weight) over

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¹Although weight loss has been associated with subsequent mortality (controlling for prior health status) (Wannamethee et al. 2005), poor health may also cause weight loss, particularly in later life (Diaz, Mainous, and Everett 2005).

time. Moreover, weight gain or loss between two time points may be temporary, and this can be observed only if respondents are interviewed at more than two time points over a significant period of time. A second limitation is that sociodemographic differences in the estimated effects of marital status and transitions on body weight are not typically analyzed. A few studies consider gender differences in the impact of marital status on weight (e.g., Sobal et al. 2003), but researchers have not addressed the possibility of race or age differences. This is important because both body weight and the prevalence and experience of different marital statuses vary significantly by race, age, and gender. Moreover, vulnerability to weight gain and loss may vary across groups. Third, previous research has not directly tested possible mechanisms through which weight gain or loss might occur. We address these limitations by using growth curve techniques to estimate trajectories of change in body weight over a 15-year period (assessed in 1989, 1994, and 2001), and in relation to marital status and marital transitions in a nationally representative sample of Americans.

BACKGROUND

The present study is grounded in the broader literature linking social involvement to better health and increased longevity (House, Landis, and Umberson 1988). The marital relationship is typically identified as the most important relationship for promoting health, presumably because being married enriches one's social environment in ways that promote better health (Waite 1995).² The "marital resource" model emphasizes that "marital status differences in health result from the greater economic resources, social support, and regulation of health behaviors that the married enjoy" (Williams and Umberson 2004:82). This "resource" explanation has been widely cited for decades, but recent research suggests that the benefits of marriage for health may have been overstated and that the married appear to be in better health than the unmarried largely because of the adverse effects of marital dissolution on health (Williams and Umberson 2004). This latter view, sometimes referred to as the "crisis" model, suggests that marital dissolution is stressful and undermines health. A crisis model is supported with evidence showing that the married and never married are quite similar in terms of health, that divorce and widowhood have deleterious effects on health, and that the effects of marital dissolution are largely transitory (e.g., Williams and Umberson 2004). Both the marital resource model and the crisis model suggest how marital status and marital transitions might influence patterns of weight change over time.

Marital Status, Marital Transitions, and Body Weight

Marital status shapes daily and long-term opportunities, constraints, and demands in a number of ways that may influence weight change. For example, the marital resource model suggests that the married are more likely to have access to a confidant (Umberson et al. 1996) and this could lead to accelerated weight gain because having a partner is associated with eating at more frequent and regular intervals (Jeffrey and Rick 2002) and because individuals tend to eat more when eating with other people (de Castro 2002). The married also experience greater regulation of health behavior, and this reduces the probability of smoking among the married compared to the unmarried (Umberson 1992). In turn, non-smokers weigh more than smokers (Flegal et al. 1995). On the other hand, the married enjoy greater economic resources (Waite 1995), and higher socioeconomic status is associated with reduced risk of being overweight (Baltrus et al. 2005). In sum, apart from the effects of economic benefits, the resource model suggests that the married would gain more weight over time than the unmarried.

²Although some scholars suggest potential selection effects into marriage (e.g., unhealthy individuals may be less likely to marry, Goldman 1993), most researchers utilize the causal framework to study the relationship between marriage and health.

The crisis model emphasizes the stress of marital dissolution (Williams 2003) and suggests possible mechanisms linking marital transitions to weight change. The loss of a partner creates many stresses including financial stress (Umberson, Wortman, and Kessler 1992). In turn, stress has physiological, psychological, and social consequences that may lead to weight loss or to weight gain (Greeno and Weng 1994). The stress of marital dissolution also contributes to psychological distress (Williams 2003), and high levels of distress are associated with weight loss in some individuals and weight gain in others (Greeno and Weng 1994). The stress of marital dissolution may also lead to a decline in physical health (Williams and Umberson 2004), and declining health is associated with weight loss (Losonczy et al. 1995). Marital dissolution may result in increased social isolation (absence of a confidant). In turn, living alone and managing all the tasks of procuring and preparing meals may mean eating less, contributing to weight loss (Umberson et al. 1992). In sum, past research provides reasons to expect marital dissolution to affect body weight, but there are different predictions about weight gain versus weight loss.

The resource and crisis models lead us to predict that marital status and marital transitions would affect weight trajectories in different ways. First, we predict that marital transitions—in or out of marriage—will be associated with more rapid weight change (i.e., more weight gain or loss over the same duration) than will continuous marital status because marital transitions are more likely to produce significant change in one's social environment—changes that may trigger weight gain or loss. Second, in light of recent research suggesting that the adverse effects of marital dissolution on mental and physical health dissipate in the first few years following divorce and widowhood (Williams 2003; Williams and Umberson 2004), we predict that the effects of marital dissolution on body weight will be temporary. Similarly, after an initial period of weight gain following the transition to marriage, any accelerated weight gain would level off over time. Finally, both body weight and the social experience of being married, divorced, widowed, or never married varies with age and by race and gender. We predict that marital status and marital transitions will affect body weight in different ways across these social groups.

Age—On average, body weight increases steadily with age for Americans, at least until around age 50 to 60, while later in the life course weight tends to decline, particularly after age 75 (Adams and Schoenborn 2006). In fact, among the elderly, weight loss is a greater concern for health than is weight gain (Locher et al. 2007). The aging process may collude with social factors to produce age differences in the impact of marital status and marital transitions on weight change. For example, the presence of a spouse may be more conducive to weight gain in mid-life when weight gain is most likely to occur. In contrast, social aspects of widowhood such as social isolation may have stronger effects on weight loss late in the life course when individuals are more susceptible to weight loss. Thus we expect that marriage will be associated with greater weight gain through mid-life and that being unmarried/marital dissolution will be associated with greater weight loss in later life.

Gender—The general pattern of aging and body weight is similar for men and women, although women tend to gain weight earlier than men (Adams and Schoenborn 2006). Marital status and marital experiences also differ by gender. Men are more likely to be married, and this becomes more likely with advancing age (U.S. Census Bureau 1999). Women are more likely to have a confidant outside of marriage, and men are more likely than women to name their spouse as their primary confidant (Umberson et al. 1996). Women are more likely than men to obtain and prepare food for families, tell or remind their spouse to do things to stay healthy, and monitor the health of loved ones (Umberson 1992). Although the transition into marriage has been associated with weight gain (Jeffery and Rick 2002), gender differences in this effect are inconsistent. Sobal and colleagues (2003) find weight gain only for women while Umberson (1992) reports that neither men nor women

gain weight following marriage. Some studies report that widowhood results in more weight loss for men than women (Sobal et al. 2003). These findings, as well as literature suggesting that the presence of a partner promotes a healthy lifestyle more for men than for women (Waite 1995), lead us to expect that marital status and marital transitions will influence weight change for men more than women.

Race—African Americans are heavier than white Americans, but the difference is much larger for women than for men (Baltrus et al. 2005). Compared to whites, African Americans are also less likely to be married and more likely to never marry (U.S. Census Bureau 1999). Marital dissolution undermines mental health more for whites than for blacks (Williams, Takeuchi, and Adair 1992), and widowhood increases mortality risk for elderly whites but not for blacks (Elwert and Christakis 2006). Compared to whites, blacks may have stronger ties outside of marriage—particularly religious ties and extended family ties (see a review in Elwert and Christakis 2006). Marital and non-marital ties may then play a different role in shaping the social environment of African Americans and whites (Williams et al. 1992) in ways that produce racial differences in the effects of marital status and transitions on body weight. Taken together, previous research suggests that marital status and transitions will have stronger effects on weight for whites than for blacks.

Trajectories of Change in Body Weight

Body weight (relative to height) can be analyzed as a continuous variable or in terms of weight categories (e.g., obese, underweight), and both operationalizations predict health and mortality (Krueger et al. 2004; Stevens et al. 1998). We analyze body weight as a continuous variable because we are interested in the impact of marital status and transitions on trajectories of change in body weight over time. Marital status may elicit gradual yet significant change in body weight over time, and this is best captured with analysis of a continuous weight measure. Small and gradual changes over a long period of time can result in substantial weight change over time, and past research suggests the health significance of studying even modest weight change (Breeze et al. 2006).

Growth curve analysis is uniquely suited to estimating how marital status and marital transitions shape or disrupt typical trajectories of change in body weight. This approach allows us to take into account that each individual begins the study with a different baseline level of body weight and that each individual's weight trajectory may differ in degree, direction, and rate of change over time. By extension, each marital status *group* will have a different mean baseline weight level and rate of weight change, which represent the average initial level and rate of change of the individuals belonging to that group. Direction of change is important because some marital statuses or transitions may result in weight loss while others result in weight gain. Rate of change is important because some statuses or transitions may be associated with a much faster rate of weight gain or loss over time. While a few studies have considered how a particular marital status or marital transition affects weight change between two time points, previous research has not addressed the important question of how marital status and marital transitions influence trajectories of weight change over time. We use growth curve analysis to address the following questions:

1. Are marital status and marital transitions associated with trajectories of change in body weight over time?
2. Do marital "resource" and "crisis" models provide explanations (e.g., financial strain, access to a confidant, smoking, psychological distress, physical health) for significant effects of marital status and marital transitions on weight trajectories?
3. Do the effects of marital status and marital transitions on weight trajectories depend on age, gender, or race?

DATA AND METHODS

We analyze national longitudinal data covering a 15-year period. These data are from the Americans' Changing Lives (ACL) Survey conducted by the Institute for Social Research (House 2002). The original sample (ages 24–96 in 1986) was obtained using multistage stratified area probability sampling with an oversample of African Americans, persons over age 59, and married women with husbands over age 64. Face-to-face interviews lasting approximately 90 minutes were conducted in 1986 (N = 3,617), 1989 (N = 2,867), and 1994 (N = 2,398), with a phone interview in 2001 (N = 1,787). We limit our sample to the 1,500 non-Hispanic whites and African Americans whose marital status and transitions are traceable across the four waves of data. Other race-ethnic groups were heterogeneous and too small for valid comparisons. Respondents lost to follow-up were more likely to be lower socioeconomic status (SES), black, in poorer health, and either overweight or underweight. We estimated models that impute missing values for missing cases using full information maximum likelihood (FIML) methods. These results parallel those obtained from data that exclude missing cases, and we report final results that do not impute missing values. As a result, our analyses may lead to more conservative estimates about weight change over the life course, particularly in late life. For the total (weighted) sample analyzed at time one, about 9 percent was African American, the average age was 42.67, and 46 percent was male. Average level of education was 13 years, and average household income was \$34,216.

Measures

Body weight—Our primary dependent variable is measured with the body mass index (BMI), a standard measure in demographic and health research. This index is calculated as weight (in kilograms) divided by height-squared (in meters). Weight is based on self-reports and missing data on weight or height (T1–T4, N = 79, 55, 44, 46) are imputed with gender-specific median values. We examine the BMI as a continuous variable in growth curve analyses because we are focusing on trajectories and degrees of change in body weight over time (Denney et al. 2004). Change in the body mass index (BMI) over time is primarily due to change in weight rather than change in height and, for ease of discussion, we refer to the dependent variable as “body weight” and “weight.”

Marital status/transitions—Table 1 shows weighted descriptive statistics for the three sub-samples used to analyze (1) continuous marital status, (2) transitions out of marriage, and (3) transitions into marriage. Analyses of continuous marital status categories compare the continuously (over the T1–T4 period) divorced (N = 125, 15.38% black, all percentages are weighted), widowed (N = 138, 13.80% black), and never married (N = 102, 17.74% black) to those who were continuously married (the reference group, N = 696, 6.88% black) over the period from time one to time four. Analyses of transitions out of marriage compare those who transition from married to divorced (T1–T2, N = 36, 18.21% black; T2–T3, N = 48, 10.94% black; T3–T4, N = 53, 11.72% black) or widowed (T1–T2, N = 32, 11.89% black; T2–T3, N = 43, 4.80% black; T3–T4, N = 107, 9.98% black) to those who remain continually married (the reference group) over the study period. We control for transition to remarriage (T2–T3, N = 14, 2.78% black; T3–T4, N = 19, 11.84% black) in analyses of transitions out of marriage. Those who transition from unmarried to married (T1–T2, N = 61, 5.74% black; T2–T3, N = 71, 7.81% black; T3–T4, N = 53, 9.80% black) are compared to those who remain unmarried (the reference group, N = 365) over the period between time one and time four. Due to concerns about small sample size, discussion of race by widowhood interactions is restricted to those widowed from between time three and time four. Given the small number of African Americans making certain transitions, our results for effects of interactions with race should be viewed with caution.

Covariates—Covariates, measured at time one, include age (in years), age-squared (included as a quadratic term to test for nonlinear effects of age), gender (a dummy measure where 1 = male), education (years completed), household income (in \$1000s), and race (1 = African American, 0 = non-Hispanic white). In earlier analyses, we included a measure for number of children. This measure was not significantly associated with body weight in analyses and may be problematic in that we cannot distinguish between biological, foster, step, and adopted children with the ACL data. Thus, we do not include this measure in final analyses.

Explanatory mechanisms—We consider five mechanisms suggested by the marital resource and crisis models to help explain the impact of marital status and transitions on weight trajectories. A measure of personal access to a confidant was derived from a question asking whether respondents had anyone with whom they could share their most private thoughts and feelings (a dummy measure where 1 = yes). We consider whether individuals currently smoke (1 = yes). Financial stress is a standardized index based on responses to three questions (T1 $\alpha = .77$; T2 $\alpha = .80$; T3 $\alpha = .73$): (1) “How satisfied are you with (your or your family’s) present financial situation?” (1–5, “completely” to “not at all,” respectively), (2) “How difficult is it for (you or your family) to meet the monthly payments on your (family’s) bills?” (1–5, “not difficult” to “extremely difficult”), and (3) “In general, how do your (family’s) finances usually work out at the end of the month?” (1–3, “some money left over” to “not enough money”). Psychological distress is measured with an 11-item version of the Center for Epidemiologic Studies depression scale (CES-D; T1 $\alpha = .77$; T2 $\alpha = .80$; T3 $\alpha = .73$). Respondents were asked how often they experienced each of the following during the previous week: (1) “I felt depressed”; (2) “I felt lonely”; (3) “people were unfriendly”; (4) “I enjoyed life”; (5) “I did not feel like eating, my appetite was poor”; (6) “I felt sad”; (7) “I felt that people disliked me”; (8) “I could not get going”; (9) “I felt that everything I did was an effort”; (10) “my sleep was restless”; and (11) “I was happy.” Response options for each question were “hardly ever,” “some of the time,” and “most of the time.” Self-rated physical health is based on the question, “how would you rate your health at the present time?” (1–5, “poor” to “excellent”).

Analytic Strategy

We estimated growth curve models (i.e., multilevel models for change) to take advantage of four waves of data. Linear growth curve models allow key predictors to affect initial level and change in body weight over time. Initial level and rate of change in body weight are modeled as individually-varying growth parameters. Our models account for systematic variation in growth parameters attributable to age, race, gender, and other control variables. The structural parameters from this part of the model provide the basis for assessing effects of key variables on initial level and change in body weight. The major aim of our research is to evaluate the effects of changes in marital status on level of body weight at different time points, as well as possible differences by age, race, and gender in the effects of marital status transitions on weight. Changes in marital status between waves are modeled as time-varying covariates. The linear growth curve model we employed in this study can be specified as:

$$\begin{aligned}
 Y_{ij} &= \pi_{0i} + \pi_{1i}T_{ij} + \sum_{k < j} \tau_{kij}M_{kij} + \varepsilon_{ij} \\
 \pi_{0i} &= X_{0i}'A_0 + \xi_{0i} \\
 \pi_{1i} &= X_{1i}'A_1 + \xi_{1i} \\
 \tau_{kij} &= B_{kj}
 \end{aligned} \tag{1}$$

where Y_{ij} represents the outcome variable (i.e., body weight of individual i at time j) and where $j = 1, 2, 3$, or 4 index ACL waves one through 4, respectively. The term T_{ij} is the time

variable (coded 0, 3, 8, 15), and ε_{ij} is the level-one residual. The term M_{kij} denotes marital transitions occurring between ACL waves, with $k = 1, 2$, or 3 indexing transitions between T1–T2, T2–T3, and T3–T4, respectively. The terms π_{0i} and π_{1i} are the i th individual's latent intercept and slope, and τ_{kij} is the effect of marital transition k for individual i at time j . However, unlike the intercept and slope, these effects do not vary over individuals. The terms X_{0i}' and X_{1i}' are vectors of explanatory variables for the i th individual. For the analysis of marital status continuity effects, $M_{kij} = 0$, and we include variables for marital status continuity in X_{0i}' and X_{1i}' . Terms A_0 and A_1 are population-average (i.e., fixed) effects of X_{0i}' , and X_{1i}' and B_{kj} are the fixed effects of marital status transitions at time k on body weight at time j . Finally, the terms ξ_{0i} and ξ_{1i} are individual-specific (level-two) residuals. The linear mixed effects model above is estimated as a latent growth curve model using MPlus software (Muthén and Muthén 2007).³

RESULTS

Change in Body Weight over Time

We estimate marital status and marital transition effects in separate models presented in Table 2. Panel A presents the effects of continuous marital status, panel B presents the effects of transitions into marriage, and panel C shows the effects of transitions out of marriage. The means of the latent intercept and slope describe the average body weight growth trajectory of the specific reference group in the model. The coefficients of the marital continuity/transitions quantify the difference in the growth trajectories between that particular marital continuity/transition group and the reference group.

Marital Status and Body Weight

We first focus on the estimated effects of continuous marital status on body weight. These results are from models predicting initial levels (the latent intercept) and rates of change (the latent slope) in body weight and the effects of marital status on initial weight level and change. The continuously married comprise the reference group in panel A. Two models are presented. Model 1 presents results without controls for sociodemographic characteristics, and model 2 presents results that include sociodemographic characteristics as covariates. Model 1 reveals only one significant effect of marital status: Continuous widowhood moderates (dampens) change in weight so that this group experiences a net weight loss over time compared to the continuously married. A comparison of models 1 and 2 shows that, controlling for sociodemographic variables, none of the continuous marital status variables is significantly associated with baseline weight or with rate of weight change over time.

Transition into Marriage

We now consider how transitions into marriage influence body weight over time. Panel B presents results from models for weight trajectories varying by transition into marriage. The appropriate comparison group is individuals who remain unmarried throughout the study period (as those who marry or remarry transition from this group). The lower half of panel B shows the effects of baseline sociodemographic variables on the latent intercept and slope of the weight trajectory. The upper half of the panel presents the time-varying effects of the transition to marriage on weight at times two, three, and four; these coefficients are of most interest because they indicate the degree to which marital transitions are associated with weight change over time. For example, the coefficient of 1.129 for “unmarried to married T1–T2” suggests that, in comparison to the continually unmarried, the weight of those who

³These models can be estimated using several software packages due to the equivalence between linear latent growth curve models and multilevel models for change (e.g., Singer and Willett 2003).

marry between times one and two increases an additional 1.129 units by time four (BMI units translate into weight relative to height—e.g., for a 5'10" person weighing 170 pounds, a 1.129 unit translates to a weight gain of about eight pounds).

A comparison of results from models with and without controls for covariates reveals a striking difference. Without controls for covariates, we see significant and sustained weight gain following the transition into marriage, particularly for the T1–T2 and T2–T3 transitions on weight at time four. However, after controlling covariates, none of these effects is statistically significant. This suggests that the apparent effects of marriage on weight gain are entirely explained by sociodemographic variables.

Transitions out of Marriage and Body Weight

We now turn to the question of whether transitions out of marriage are associated with change in weight trajectories. Panel C presents results from models for weight trajectories varying by transitions from marriage to divorce and widowhood. The appropriate comparison group in this analysis is individuals who remain married throughout the study period (since the widowed and divorced transition from this group). Again, the lower half of the panel shows the effects of baseline sociodemographic variables on the latent intercept and slope of the weight trajectory. The upper half presents time-varying effects of marital transitions on weight at times two, three, and four. Panel C shows that transitions to divorce and widowhood are significantly associated with weight change.

We are mainly interested in the results from model 2 because they reflect marital transition effects net of sociodemographic confounders. For greater clarification, weight trajectories (based on model 2) for both groups are graphed in Figure 1. This figure suggests that those who transition from marriage to divorce between times one and two would experience weight loss by time two. However, those who transition to divorce over the period from time one to time two would regain enough weight over time so that their weight no longer differs significantly from that of the continually married at later time points. This pattern of effects suggests a short-term and temporary period of weight loss following divorce. This short-term effect is further supported by the absence of significant effects of divorce on weight over T2–T3 and T3–T4. Those who divorce between times one and two have been divorced for three years or less, but five years separate times two and three, and seven years separate times three and four.

Panel C also reveals significant effects of the transition to widowhood on weight, and these effects are included in Figure 1 (based on model 2). We see that, in contrast to steady weight gain among the continuously married, those who transition to widowhood would lose weight over time. Those who become widowed between times one and two would not experience significant weight loss over this three-year period, but weight loss is apparent over the five years between times two and three and would increase only slightly over the subsequent seven years from time three to time four. Moreover, the significant gap between the widowed and married is sustained over time. Those widowed between time three and time four also exhibit significant weight loss compared to those who remain married throughout the study period.

Explanations for Effects of Marital Status/Transitions on Weight Trajectories

We now attempt to explain the significant effects of marital transitions on weight trajectories discussed above. We consider five mechanisms that have been identified as central to the marital resource and crisis models: financial strain, having a confidant, psychological distress, smoking, and self-rated health. In order for a “mechanism” variable to qualify as a factor that mediates the relationship between marital transitions and body weight, the marital

transition must have a significant effect on the mechanism variable, and the mechanism variable must be associated with weight, controlling for the marital transition. We find that the transition to divorce (T1–T2 from Table 2) is associated with increased depression, financial strain, and probability of smoking. Although none of these “mechanisms” is a significant predictor of weight at time two, adding these variables to the model (from Table 2) reduces the effect of divorce on body weight by about 22 percent. The transition to widowhood (T2–T3 and T3–T4) is associated only with increased psychological distress. Although distress is not significantly associated with body weight, including distress in the model reduces the effect of widowhood on body weight by 19.55 percent at time three and 17.73 percent at time four. Due to small sample size and lack of significant effects, these results should be viewed only as suggestive, but direction of effects is consistent with predictions from the crisis model.

Group Variation in Effects of Marital Status and Transitions on Body Weight

Our third goal is to consider whether the effects of marital status and marital transitions on body weight vary across demographic groups. We evaluated this possibility by re-estimating the models presented in Table 2 and including interaction terms for each marital status and transition with: (1) age, (2) gender, and (3) race (with separate models estimated for sex, race, and age interactions).

Marital status—None of the interactions between continuous marital status and gender or age were significant predictors of level and change in body weight (results not shown; available upon request). Tests for interactions of continuous marital status with race, presented in Table 3, reveal a significant interaction of race with divorce on change in body weight. Results in Table 3 show that there are no marital status differences in weight for blacks or whites at baseline. Notably, however, blacks do exhibit higher baseline weight than whites. Moreover, African Americans who are continually divorced would experience more rapid weight gain over time than would their continually married peers while the weight gain for divorced and married whites would be similar. An additional test of the three-way interaction of gender, race, and continuous marital status (not shown; available upon request) suggests that this race difference in the link between divorce and weight change is more pronounced for women than for men.

Transition into marriage—We find no evidence of gender or age differences in the effects of getting married on weight trajectories. However, our results suggest that the transition into marriage affects weight trajectories in different ways for blacks and whites.

Table 4 shows a significant interaction of race with the transition into marriage on body weight for those who marry over the period from time one to time two and over the period from time two to time three. Figure 2 shows the predicted weight trajectories for blacks and whites. While black respondents begin with a higher body weight, both African Americans and whites who remain unmarried would steadily gain weight over time. However, compared to the continuously unmarried, African Americans who marry (T1–T2 and T2–T3) would exhibit significant weight loss for the first three to five years after they marry, with a subsequent weight increase. This increase would bring them back to the level of their unmarried peers, but, at least as indicated by those married by time two, their weight gain would lead them to catch up with, but not surpass, their unmarried peers and continue along a similar trajectory of weight gain. In contrast, whites who marry over the period from time one to time two would exhibit a significant weight increase which would stabilize by time three and follow the more modest upward trajectory of their unmarried peers by time four.

Transitions out of marriage—We found no significant interactions of age or gender with transitions out of marriage on weight trajectories (results not shown; available upon request). However, Table 5 shows that the impact of transitions out of marriage (widowhood and divorce) on body weight depends on race, and these race patterns are illustrated in Figure 3. Due to the small number of African Americans who become widowed prior to time three, we focus on race interactions only for those who become widowed over the period from time three to time four. Table 5 shows that the interaction of race with the transition to widowhood (from T3–T4) is a significant predictor of weight change, net of other covariates. The predicted weight trajectories shown in Figure 3 suggest that individuals who transition to widowhood after time three would exhibit weight loss over time, and this downward weight trajectory is steeper for African Americans than for whites. The significant race by transition to divorce (T1–T2) interaction suggests that the time one to time two transition to divorce would lead to less rapid weight gain by time four for blacks but more rapid weight gain by time four for whites (in comparison to their continually married counterparts).

DISCUSSION

Marital status and marital transitions shape one's social environment in ways that influence health and health behavior (Waite 1995). While many decades of research emphasize the benefits of marriage for health ("resource model"), a growing body of evidence suggests that marital status differences in health outcomes largely reflect the adverse effects of marital dissolution ("crisis model") rather than the effects of marriage, per se (Williams and Umberson 2004). This research also indicates that the adverse effects of marital dissolution for health tend to dissipate with time (Williams and Umberson 2004).

We consider how marital status and marital transitions influence trajectories of change in body weight over time—an outcome associated with subsequent health and mortality (Krueger et al. 2004; Hill et al. 2003; Stevens et al. 1998). Our findings add to the growing body of evidence supporting a crisis model rather than a resource model. We find that marital transitions are more important than marital status in influencing weight trajectories. This is not surprising because transitions are especially likely to trigger change in one's lifestyle, outlooks, and values in ways that would promote health behavior change. We further find that transitions out of marriage (through divorce and widowhood) are more important than transitions into marriage in triggering weight change. Like many recent studies supporting the crisis model, we find that the effects of divorce on weight change are temporary. However, the estimated effects of widowhood on weight loss endure.

The effects of widowhood on weight loss are striking. Although widowhood is confounded with age and advanced age is associated with weight loss, age does not explain the effects of widowhood on weight loss. Of course, weight loss does become more likely with advanced age and the transition to widowhood may accelerate this natural process of weight loss. It is significant that the effect of widowhood on weight loss is even greater for African Americans than for whites—a special concern given racial disparities in health and mortality (Williams and Collins 1995). The social environment and health perspective suggests that widowhood results in many lifestyle changes that are conducive to weight loss. For example, the newly widowed may experience higher levels of stress in relationships and finances, increased social isolation, and more difficulty obtaining and preparing food (Umberson et al. 1992). Weight loss, especially in later life, signals increased risk for mortality, even when taking prior health status into account (Wannamethee, Shaper, and Lennon 2005). Weight loss associated with widowhood is a significant concern given recent evidence that the adverse effects of widowhood on health have increased over the past three decades, especially for African Americans (Liu and Umberson 2008).

Our results showing race differences in effects of marital status and transitions suggest that marital experiences shape the social environment in different ways for African Americans and whites—in ways that influence patterns of weight gain as well as weight loss. For example, being continuously divorced over the 15-year study period is associated with more rapid weight gain for African Americans than whites, the transition into marriage is associated with modest weight gain for whites and significant weight loss for blacks, and the transition to widowhood is associated with more accelerated weight loss for blacks. Selection processes may be partly responsible for race differences in results. Since blacks are less likely to marry, African Americans who marry may differ in important ways from whites who marry; for example, education may be more predictive of marriage for blacks than whites (Oppenheimer 2003). Other racialized aspects of the social environment (e.g., sources of stress, socioeconomic and neighborhood contexts; see Williams and Collins 1995) may play a role in shaping marital category and weight change processes. Explanations may also partly lie in cultural differences about the meaning and experience of different marital statuses (Elwert and Christakis 2006; Williams et al. 1992), as well as meanings attached to food and body weight (Sobal and Nelson 2003).

Although we find race differences in the effects of marital status and transitions on weight trajectories, we find no evidence of age or gender differences. Given physiological as well as social aspects of aging in relation to weight change, we expected that marital effects would be stronger at older ages. It may be that the presence of a partner, as well as the loss of a partner, shapes one's social environment in ways that influence eating patterns in similar ways across the life course. This is supported by de Castro's (2002) finding that eating with others increases the amount people eat just as effectively at older ages as at younger ages. Our results on gender are not surprising in light of a growing body of research showing that marital status affects the health of men and women in similar ways (e.g., Williams and Umberson 2004).

Family and health scholars suggest a number of reasons to expect marital status differences in weight trajectories. We analyzed some of the mechanisms suggested by the marital resource and crisis models to explain marital status and transition effects on weight. Marital status and marital transitions are significantly associated with most of these "mechanism" variables (e.g., financial strain, psychological distress), but they do not explain the effects of marital transitions on body weight. It may be that our measures were not adequate for assessing mechanisms of interest or that we failed to assess the most important mechanisms. Moreover, we did not have a sufficient sample size to test possible mechanisms separately for blacks and whites. Future research should investigate possible explanations for the effects of marital transitions, especially widowhood, on weight change for blacks and whites, information needed to design effective interventions and policies for at-risk populations. Moreover, given differential life expectancy by gender as well as race (especially the truncated life expectancy of black men), scholars should investigate gender and race differences in widowhood and weight loss processes. Future research should also consider mechanisms through which marriage influences weight change. Marriages vary greatly in quality (Williams 2003), and marital quality—both good and bad—may have stronger effects on weight change than does being married, per se.

Growth curve analysis of longitudinal data offered a unique opportunity to consider how marital status and marital transitions alter weight trajectories over time, but our data are limited in potentially important ways. First, sample size is small for some marital transitions, especially by race, and this limits our ability to assess those transitions. Second, recent work shows age, period, and cohort trends in body weight over time (Allman-Farinelli et al. 2008), and our model specification is limited in making such distinctions. Third, mortality and survey attrition are greater for those at the highest and lowest weight levels, possibly

leading to underestimation of observed effects. Finally, while our conceptual framework suggests causal effects of marital status and transitions on weight change, body weight may also influence selection into and out of certain marital statuses (Fu and Goldman 1996). Our study design provides some indirect evidence for our interpretations in that we use longitudinal data to follow marital status transitions and weight trajectories over a 15-year period, and in that growth curve techniques allow us to compare the initial weight of individuals who subsequently transition into or out of a particular marital status to their counterparts who do not make these transitions. This approach gives us more confidence in the present results than in previous results on this topic that rely on weight change between two data points or on data that do not take initial weight levels into account. However, we cannot rule out the possibility that body weight also influences marital transitions. Even with these limitations, the current study extends past research on this topic in several important ways: (1) National, longitudinal data allowed us to consider long-term consequences of marital status and transitions on weight trajectories, (2) growth curve analysis offered the opportunity to consider weight loss as well as weight gain and to take into account that groups vary in their starting point on weight and in their rate of weight change over time, and (3) the ACL oversample of African Americans allowed us to consider race differences in effects.

CONCLUSION

Several studies conclude that getting married contributes to weight gain (e.g., Sobal et al. 2003). Our results suggest that this effect is largely explained by sociodemographic variables. We do see some weight gain following marriage among whites, but this is a short-term effect.⁴ Although public health concerns about overweight and obesity lead researchers to focus on social predictors of weight gain, there is little evidence to support the view that marriage, per se, is of much significance in promoting weight gain. On the other hand, marital dissolution through widowhood is a significant concern for weight loss, particularly among African Americans. Given that even modest weight loss is associated with increased mortality risk (Breeze et al. 2006), sociologists should direct more attention to social factors that deter weight loss following widowhood and to the reality that the most important factors may differ for African Americans and whites. These results add to growing evidence that sociologists should be more concerned with the adverse consequences of marital dissolution than with the presumed benefits of marriage for population health.

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⁴Short-term weight loss following divorce may be triggered by increased stress (Greeno and Weng 1994; Williams 2003) or by an intentional effort to improve physical appearance to attract a new partner (Hays and Ross 1987).

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Biographies

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FIGURE 1.
Weight Trajectories (in BMI units) for the Continually Married and Those Who Transition from Married to Divorced or Widowed

FIGURE 2.
Weight Trajectories (in BMI units) for the Continually Unmarried and Those Who
Transition from Unmarried to Married by Race

FIGURE 3.
Weight Trajectories (in BMI units) for the Continually Married and Those Who Transition from Married to Divorced or Widowed by Race

Weighted Means and Standard Deviations for Body Weight (in BMI units) and Sociodemographic Covariates in the Analysis for Each Subsample

TABLE 1

	Marital Status Continuity		Transitions into Marriage		Transitions out of Marriage	
	Mean	SD	Mean	SD	Mean	SD
Body weight T1	25.93	4.80	25.41 [†]	4.24	25.76	4.99
Body weight T2	26.44	5.05	26.10	4.70	26.24	5.12
Body weight T3	26.98	5.09	26.58	4.56	26.81	5.25
Body weight T4	27.69	5.48	27.57	4.73	27.49	5.71
Age T1	43.23	13.10	42.41	12.95	42.77	13.59
Male	.50	.50	.38 [†]	.42	.49	.53
African American	.09	.29	.13 [†]	.29	.08	.28
Education in years T1	13.07	2.58	12.79 [†]	2.47	13.06	2.62
Household income T1 (1000s)	35.98	23.79	21.29 [†]	16.26	38.84 [†]	24.97
N	1,061		515		985	

[†] $p \leq .05$ (Two-tailed tests for comparing means of specific marital transitions group to marital continuity group)

TABLE 2

Growth Curve Models Predicting Body Weight (in BMI units) by Marital Status and Transitions

Model 1					Model 2				
Panel A: Marital continuity (0 = continually married T1–T4) (N = 1,061)									
	Latent Intercept	Latent Slope	Latent Intercept	Latent Slope		Latent Intercept	Latent Slope	Latent Intercept	Latent Slope
Continually never married T1–T4	–.170	.048				–.612	.000		
Continually divorced T1–T4	.718	.035				–.142	.018		
Continually widowed T1–T4	.828	–.157***				.275	–.023		
Age	—	—				.033**	–.006***		
Age-squared	—	—				–.004***	.000*		
Male	—	—				.468	–.017		
Black	—	—				1.511**	.010		
Education	—	—				–.182**	.007*		
Family Income (\$1,000s)	—	—				–.020**	–.001		
Mean	26.153***	.104***				26.659***	.122***		
Variance	23.189***	.040***				21.377***	.033***		
Panel B: Transitions into marriage (0 = continually unmarried T1–T4) (N = 515)									
	Weight T2	Weight T3	Weight T4	Weight T2	Weight T3	Weight T4	Weight T2	Weight T3	Weight T4
Unmarried to married T1–T2	.595	.749	1.129*				.433	.128	–.110
Unmarried to married T2–T3	—	.467	1.317*				—	–.113	.028
Unmarried to married T3–T4	—	—	.903				—	—	.187
	Latent Intercept	Latent Slope	Latent Intercept	Latent Slope	Latent Intercept	Latent Slope	Latent Intercept	Latent Slope	Latent Slope
Age	—	—					.064***	–.007***	
Age-squared	—	—					–.005***	.000	
Male	—	—					.238	–.034	
Black	—	—					1.656**	.017	
Education	—	—					–.147	.010*	

Panel B: Transitions into marriage (0 = continually unmarried T1–T4) (N = 515)

	Weight T2	Weight T3	Weight T4	Weight T2	Weight T3	Weight T4
Family Income (\$1,000s)	—	—	—	—	—	—
Mean	26.148***	.086***	.086***	26.496***	.133***	.133***
Variance	26.303***	.057***	.057***	23.709***	.044***	.044***

Panel C: Transitions out of marriage (0 = continually married T1–T4) (N = 985)

	Weight T2	Weight T3	Weight T4	Weight T2	Weight T3	Weight T4
Married to divorced T1–T2	-.553	.300	1.754**	-.734*	-.186	1.415
Married to divorced T2–T3	—	.025	.523	—	-.483	-.287
Married to divorced T3–T4	—	—	.331	—	—	-.725
Married to widowed T1–T2	.444	-1.098**	-2.742***	.051	.104	-.505
Married to widowed T2–T3	—	-1.543***	-2.985***	—	-.712*	-1.295*
Married to widowed T3–T4	—	—	-2.040***	—	—	-.993***
Remarried T2–T3	—	—	—	—	.005	-1.466
Remarried T3–T4	—	—	—	—	—	-.197

	Latent Intercept	Latent Slope	Latent Intercept	Latent Slope
Age	—	—	.041***	-.006***
Age-squared	—	—	-.003***	.000*
Male	—	—	.635*	-.012
Black	—	—	1.937***	-.019
Education	—	—	-.291***	.002
Family Income (\$1,000s)	—	—	-.020**	.000
Mean	26.231***	.104***	26.272***	.133***
Variance	22.731***	.000	20.928***	.032***

* $p \leq .05$;** $p \leq .01$;*** $p \leq .001$ (two-tailed tests). Age, education and household income are all centered at group means.

Table 3

Growth Curve Model Predicting Interaction Effects of Marital Continuity and Race on Body Weight (in BMI units) ($N = 1,061$)

	Latent Intercept	Latent Slope
Marital continuity (0 = continually married T1–T4)		
Continually never married T1–T4	.230	.003
Continually divorced/separated T1–T4	–.609	–.023
Continually widowed T1–T4	–.258	–.006
Marital continuity $\times$ race (0 = continually married T1–T4, white)		
Continually never married T1–T4 $\times$ black	–1.975	–.002
Continually divorced/separated T1–T4 $\times$ black	1.325	.111*
Continually widowed T1–T4 $\times$ black	1.711	–.045
Age	.033**	–.006***
Age-squared	–.004***	.000*
Male	.452	–.016
Black	1.284**	–.002
Education	–.181**	.006*
Family Income (\$1,000s)	–.020**	–.001
Mean	26.675***	.123***
Variance	21.166***	.032***
R-Square	.092	.268
Model fit index	CFI = .997; TLI = .994; RMSEA = .023.	

* $p \leq .05$;

** $p \leq .01$;

*** $p \leq .001$ (two-tailed tests)

Age, education and household income are all centered at group means.

Table 4

Growth Curve Model Predicting Interaction Effects of Transitions into Marriage and Race on Body Weight (in BMI units) ($N = 515$)

	Weight T2	Weight T3	Weight T4
Transition into marriage (0 = continually unmarried T1–T4)			
Unmarried to married T1–T2	.745*	.312	.176
Unmarried to married T2–T3		.442	.493
Unmarried to married T3–T4			–.038
Transition into marriage $\times$ Race (0 = continually unmarried T1–T4, white)			
Unmarried to married T1–T2 $\times$ black	–1.534*	–.806	–1.266
Unmarried to married T2–T3 $\times$ black		–1.825*	–1.482
Unmarried to married T3–T4 $\times$ black			1.095
	Latent Intercept		Latent Slope
Age	.064***		–.007***
Age-squared	–.005***		.000
Male	.240		–.034
Black	1.704***		.032
Education	–.146		.010*
Family Income (\$1,000s)	–.012		.000
Mean	26.477***		.128***
Variance	23.713***		.044***
R-Square	.105		.274
Model fit index	CFI = .999; TLI = .998; RMSEA = .014		

*
 $p \leq .05$;

**
 $p \leq .01$;

 $p \leq .001$ (two-tailed tests)

Age, education and household income are all centered at group means.

Table 5

Growth Curve Model Predicting Interaction Effects of Transitions Out of Marriage and Race on Body Weight (in BMI units) ($N = 985$)

	Weight T2	Weight T3	Weight T4
Transition out of marriage (0 = continually married T1–T4)			
Married to divorced T1–T2	–.492	–.114	2.563**
Married to divorced T2–T3		–.734	–.572
Married to divorced T3–T4			–.744
Married to widowed T1–T2	.075	.564	.257
Married to widowed T2–T3		–.360	–1.068
Married to widowed T3–T4			–.691*
Transition out of marriage $\times$ race (0 = continually married T1–T4, white)			
Married to divorced T1–T2 $\times$ black	–.832	–.375	–2.977*
Married to divorced T2–T3 $\times$ black		1.233	1.536
Married to divorced T3–T4 $\times$ black			.011
Married to widowed T1–T2 $\times$ black	–.127	–1.770	–2.877*
Married to widowed T2–T3 $\times$ black		–3.050**	–1.957
Married to widowed T3–T4 $\times$ black			–1.305*
Remarried T2–T3		.032	–2.232
Remarried T3–T4			–.315
	Latent Intercept		Latent Slope
Age	.041***		–.006***
Age-squared	–.003***		.000*
Male	.636*		–.012
Black	1.921***		.007
Education	–.290***		.001
Family Income (\$1,000s)	–.020**		.000
Mean	26.276***		.127***
Variance	20.911***		.031***
R-Square	.112***		.243***
Model Fit Index	CFI = .991; TLI = .984; RMSEA = .031		

* $p \leq .05$;

** $p \leq .01$;

*** $p \leq .001$ (two-tailed tests)

Age, education and household income are all centered at group means.