Union Formation, Social Disadvantage, and Health Risk Indicators in the 21st Century*

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Research demonstrates powerful associations between intimate union formation and health. Generally, existing studies suggest that union formation (and marriage in particular) is associated with lower mortality (Liu 2009; Molloy et al 2009) and better reports of physical and mental health (see Umberson, Crosnoe, and Reczek 2010 for a review). Because of the multitude of studies connecting marriage with better health over the past several decades, the association of marriage with health in the social science literature has arguably become accepted as a "social fact," leading to a belief among many social scientists and the public at large that marriage has universal benefits for health. However, recent empirical research suggests that the health benefits of union formation are highly dependent on a range of sociodemographic factors, as well as on which health outcomes are being studied. Such research challenges the conclusion that marriage has a causal positive impact on health and calls into question our very understanding of the mechanisms that link marriage to health.

To better understand the relationship between union formation and health, scholars must expand upon past research on both empirical and theoretical fronts. First, current theoretical frameworks for understanding the relationship between marriage and health are underdeveloped. Second, much existing work linking marriage to health uses data generalizable to adults in the 1980s or 1990s, and often utilizes data and/or methods that cannot assess causal relationships. Third, despite the burgeoning literature on variations in the benefits of union formation for health, there is a paucity of research regarding indicators of social disadvantage. This is surprising given the traditional focus on social stratification within sociology, and given current marriage promotion policies that often target low-income individuals.

In this study I aim to improve our understanding of the mechanisms that link marriage to health. First, I utilize a theoretical perspective that encompasses the nuanced relationship between union formation and health that is evident in contemporary research. Second, I utilize four waves of nationally representative longitudinal data, representative of a contemporary sample of adults who have transitioned into marriage during the 21st century. Moreover, I utilize fixed effects analyses to better assess whether there is a causal relationship between union formation and health. Third, I consider important variations in the impact of union formation on health by indicators of social disadvantage previously unexamined in the literature.

Union Formation and Health

Research in the U.S. consistently demonstrates that married individuals, on average, have better mental and physical health than the unmarried on a number of outcomes (Umberson and Williams 1999; Umberson, Crosnoe, and Reczek 2010; Waite and Gallagher 2000). For example, the married have lower mortality than the unmarried (Molloy, Stamatakis, Randall, and Hamer 2009), better self-reported health (Williams 2003), and a lower prevalence of depression and anxiety (Kamp Dush, Taylor, and Kroeger 2008). Cohabitors experience some, but not all benefits of marriage. For example, compared to individuals who are single or dating but not living with their partners, some research finds that cohabitors are less depressed (Ross 1995) and have greater levels of subjective well-being (Kamp Dush and Amato 2005). However, married individuals have lower rates of depression than do cohabitors, potentially because married individuals experience greater relationship stability, intimacy, and commitment in their relationships than do cohabitors (Brown 2000).

While cross-sectional analyses are unable to parse out selection effects, a plethora of longitudinal studies find that transitions into marriage are associated with better mental and

physical health outcomes over time. Studies that examine only transitions into marriage collectively indicate that marriage is beneficial for both mental and physical health among men and women (Marks and Lambert 1998; Simon 2002; Williams 2003; Williams and Umberson 2004). Studies that examine transitions into cohabitation in addition to transitions into marriage yield conflicting results. For example, while (Lamb, Lee, and DeMaris 2003) find that transitions into cohabitation have no significant impact on depressive symptoms, (Musick and Bumpass 2006) find that transitions into both marriage and cohabitation are generally beneficial for health.

Despite average associations of marriage with better health, much evidence suggests that the benefits of marriage are highly dependent on a range of factors, including marital quality (Williams 2003), well-being prior to the union (Frech and Williams 2007), age at union formation (Harris, Lee, and DeLeone 2010), and whether partners involved in the union are of the same race/ethnicity (Bratter and Eschbach 2006). For example, Williams (2003) finds that marriage is only beneficial for health if individuals are happy in their marriage. In fact, remaining in an unhappy marriage negatively impacts mental health, at times more so than would be the case if the respondent was divorced or never-married. In addition, Frech and Williams (2007) find that marriage is most beneficial for the mental health of those who were clinically depressed prior to their marriage.

Similar to this, (Lillard and Pannis 1996) find that marriage has more physical health benefits for unhealthy men than it does for healthy men. Further, Harris, Lee, and DeLeone 2010 find that marrying or cohabiting early (i.e. defined as prior to age 26) results in a variety of negative health outcomes for whites and blacks alike. Finally, evidence shows that the benefits of marriage for mental health are limited for those in some-types of interracial relationships, particularly historically stigmatized relationships, such as white/black partnerships (Kroeger and

Williams 2011), or those involving partners from different socioeconomic backgrounds (Bratter and Eschbach 2006). Finally, there is growing evidence that union formation actually has a negative impact on some health outcomes. For example, union formation appears to be associated with an increase in BMI for both married (Averett, Sikora, and Argys 2008; Kahn and Williamson 1990; Sobal, Rauschenbach, and Frongillo 2003) and cohabiting individuals (Burke, Beilin, Dunbar, and Kevan 2004). This growing body of research challenges the conclusion that marriage has a causal positive impact on health, therefore calling into question our understanding of the mechanisms that link marriage to health. As such, in this study I utilize a theoretical perspective that encompasses the nuanced relationship between union formation and health that is evident in contemporary research, in efforts to make better sense of the relationship between union formation and health.

Union Formation as a Mechanism of Social Control

For decades, scholars have attempted to develop a causal model that will explicate the process by which union formation influences health. Existing theoretical explanations for the marriage-health link generally address the benefits of marriage for health, citing resources that are protective of health, such as increases in social support (Turner and Marino 1994; Umberson 1987) and economic resources (Oppenheimer 2000; Waite 1995). Despite their utility in many contexts, such theoretical models do not adequately address the negative health effects of union formation, such as weight gain. A particularly promising avenue, but one that has received limited attention and empirical validation, focuses on the influence of union formation on health via the regulation of health behaviors that are important predictors of subsequent morbidity and mortality (Duncan, Wilkerson, and England 2006; Umberson 1987). Unlike conceptual models that are only equipped to explain the *benefits* of union formation (e.g. marital resource model),

this perspective easily accommodates the nuanced association of union formation with health found in contemporary US society.

Essentially, this theoretical framework posits that involvement in marriage and, to a less extent, cohabitation, provides individuals with meaning and obligation that serve to regulate health behavior. This regulation stems from two sources: 1) indirect regulation enforced via social norms, and 2) and direct regulation enforced through monitoring (Duncan, Wilkerson, and England 2006; Umberson 1987). Because of its more formal social contract, marriage is often thought to carry more weight than cohabitation with regards to regulating health behavior. Umberson was one of the first scholars to examine the marriage and health link using this perspective. For instance, Umberson (1987; 1992) uses cross-sectional and longitudinal data to compare negative health behaviors among the married versus divorced and widowed individuals. She finds that the married have the lowest rates of substance use and propensity for risk-taking behavior, while the divorced have the highest rates of these negative health behaviors. Research using longitudinal data from the Monitoring the Future (MTF) study (Bachman, O'Malley, Schulenberg, Johnston, Bryant, and Merline 2002; Bachman, Wadsworth, O'Malley, Johnston, and Schulenberg 1997) and the National Longitudinal Survey of Youth (NLSY) (Curran, Muthen, and Hartford 1998; Duncan, Wilkerson, and England 2006; Miller-Tutzauer, Leonard, and Windle 1991) suggests a reduction in drinking, smoking, and drug use following marriage and (to a lesser extent) cohabitation. For example, Bachman et al. (1997; 2002) find that both marriage and cohabitation that entails engagement reduce the use of alcohol, cigarettes, and drugs.

Duncan, Wilkerson, and England (2006) use data from the NLSY spanning an 11-year window to examine whether marriage and/or cohabitation cause a change in smoking, drinking,

or marijuana use. They use spline regression models to compare the slope of reduction in these behaviors surrounding marriage versus before marriage. They find that men and women experience significant declines in drinking behavior in the time surrounding marriage versus before marriage, and that men (but not women) also experience similar declines in marijuana use. They do not find a causal association between marriage and smoking behavior. Results for cohabitation are similar but less consistent.

More recently, scholars have focused on the negative impacts of social control for health behavior. For instance, in recent decades evidence has accumulated suggesting that union formation is associated with an increase in BMI for both married (Averett, Sikora, and Argys 2008; Kahn and Williamson 1990; Mullan Harris, Lee, and DeLeone 2010; Sobal, Rauschenbach, and Frongillo 2003; Umberson, Liu, and Powers 2009) and cohabiting individuals (Burke, Beilin, Dunbar, and Kevan 2004; The and Gordon-Larsen 2009). As with reductions in risky behaviors, this pattern likely reflects a process whereby union formation imposes social control (Umberson 1992) that leads to more regular joint meals/eating and the cessation of smoking more regular meals and the cessation of unhealthy behaviors such as smoking, both of which can potentially result in weight gain. In addition, union formation may increase social obligations that involve food (e.g., attending dinner functions (Averett, Sikora, and Argys 2008).

Because of my focus on a contemporary adult sample, one particularly attractive component of the union formation and social control perspective is its focus on health behaviors. That is, adults in their late 20's and early 30's are often not old enough to have accumulated chronic health issues. However, they are practicing behaviors that will influence their future morbidity and mortality. In the present study, I examine the impact of union formation on change

in BMI, binge-drinking behavior, tobacco use, and marijuana drug use. These indicators are all predictive of future morbidity and mortality (Centers for Disease Control and Prevention 2011). First, regarding BMI, overweight/obesity remains a serious epidemic within the United States. Approximately one-third of the US adult population is obese (Center for Disease Control 2010). The consequences of overweight/obesity can be severe, ranging from hypertension and sleep apnea to diabetes, cancer, and heart disease. Even small gains in body mass index during early adulthood can have serious consequences for future morbidity patterns. In fact, one study finds that each BMI unit gained in early adulthood increases the risk of developing Type 2 diabetes (Schienkiewitz et al. 2006).

Binge drinking is also an indicator of future health that is especially relevant to contemporary adult samples. Although college students commonly binge drink, 70% of binge drinking episodes involve adults age 26 years and older (CDC 2011). Binge drinking is associated with multiple health problems, including (but not excluded to) fatal injuries, alcohol poisoning, sexually transmitted disease, liver disease, and neurological damage.

Third, tobacco use, regardless of its form (i.e. cigarettes vs. smokeless tobacco such as chewing tobacco, dip, or snuff) is associated with multiple types of cancer and oral health issues. In fact, more deaths are caused each year by tobacco use than by all deaths from human immunodeficiency virus (HIV), illegal drug use, alcohol use, motor vehicle injuries, suicides, and murders combined (CDC 2011). Finally, regarding marijuana use, drug use contributes directly and indirectly to the HIV epidemic and presents many immediate health risks. Drug-induced deaths were more common than alcohol-induced deaths in 2007 (Xu, Kochanek, Murphy, and Tejada-Vera 2010).

Based on past research, I expect to find that marriage (and cohabitation, to a lesser extent) is associated with an increase in BMI and a decrease in binge drinking, tobacco use, and marijuana use.

Barriers to Causal Inference

Despite this large body of evidence regarding union formation, social control, and health risk indicators- the majority of existing research is representative of adults in the 1970's or 80's (Umberson 1987; 1992). Even more recent studies (Duncan et al. 2006; Umberson et al. 2009) use older data, representative of marriages occurring in the late 80s and early 90s. The one exception is restricted to analysis of early marriage (Mullan Harris, Lee, and DeLeone 2010). For example, Harris et al. use Waves 1 and 3 of Add health to explore the relationships among early marriage (prior to age 26), cohabitation, and health risk indicators. Moreover, much earlier research uses cross-sectional data (Umberson 1987; 1992; 2009). Cross-sectional data, while useful in many respects, is not well equipped for establishing causal relationships.

In addition, many studies that do longitudinally examine transitions into unions and health outcomes utilize the lagged dependent variable model to assess average change in the dependent variable over time between groups with different union experiences (see Musick and Bumpass 2006 for an exception). While this approach can work efficiently under certain circumstances, evidence from both real data and simulations suggests that the lagged dependent variable method often produces biased results, and that fixed effects regression analysis is more appropriate when modeling union transitions and subsequent health outcomes over time (Johnson 2005).

For example, Johnson (2005) explains that, because the lagged dependent variable model regresses the dependent variable on itself (measured at an earlier time), biased estimates can

result if the time 1 dependent variable is correlated the independent variable of interest, producing spurious significant effects of that independent variable on the outcome of interest. For example, using data from the National Survey of Families and Households, he illustrates that in the case of depressive symptoms, that because time 1 depression is correlated with subsequent divorce among married individuals, that the lagged dependent variable method produces a false significant effect of the transition to divorce. This bias is of serious concern in this case because error in measuring health outcomes could lead to conclusions that specific union transitions are good or bad for health, when in fact, they have no significant effects.

Fortunately, fixed effects regression analysis provides an optimal alternative for analyzing effects of union formation on health outcomes over time. Because fixed effects equations do not contain measures of the dependent variable on the right hand side of the equation, there are no concerns for biased estimates similar to those produced by the lagged dependent variable method. In the current study, I utilize fixed effects analyses and four waves of longitudinal data, representative of a contemporary adult sample that has transitioned into marriage/cohabitation largely in the 21st century.

The Importance of Social Disadvantage

Despite the burgeoning literature on variations in the benefits of union formation for health, there is a paucity of research regarding indicators of social disadvantage. Understanding variations in the health benefits of marriage and cohabitation by social disadvantage is important for various reasons. First, such research could inform current marriage policy initiatives in the US. Evidence that marriage is beneficial for health and well-being has been used to garner support for policies promoting marriage, especially among low-income single parents (Nock 2005; U. S. Department of Health and Human Services 1996). Since 2005, through the 2005

Deficit Reduction Act, the federal government has funded "$150 million each year for healthy marriage promotion and fatherhood," especially among low income single parents (U.S. Department of Health and Human Services 2005). Interestingly, no studies have actually examined whether marriage has the same health benefits for the socially disadvantaged as for the general population. Therefore, the findings of this study could inform future policy initiatives aimed at helping socially disadvantaged and marginalized populations.

In addition, understanding variations in the impact of union formation on health by social disadvantage could have important theoretical implications, adding insight to the body of literature concerned with socioeconomic health disparities. Reducing and eliminating health disparities has been a central priority of U.S. public health policy for the past two decades (U.S. Department of Health and Human Services, Healthy People 2000; 2010; 2020). Despite an abundance of research investigating socioeconomic status (SES) disparities in health, only modest progress has been made towards their elimination (Center for Disease Control 2011). Notwithstanding the recognition that socioeconomic disparities in health are *fundamental* causes of disease (Link and Phelan 1995), most scholars agree that policies and interventions aimed at reducing health disparities must be informed by a thorough understanding of the full range of mechanisms and processes through which they are produced (Aneshensel 2002). Existing research indicates substantial socioeconomic variation in the formation and dissolution of marital and cohabiting unions (Bramlett and Mosher 2002). For example, compared to their higher SES counterparts, the socially disadvantaged are more likely to marry early (which increases chance for marital disruption), less likely to have cohabitations result in marriage, and are more likely to have both cohabiting and marital unions end in dissolution (Bramlett and Mosher 2002). If there is socioeconomic variation in the health benefits of unions, in addition to the socioeconomic

differences already noted regarding union stability, then perhaps these patterns are somehow linked to socioeconomic health disparities.

Why might social disadvantage moderate the impact of union formation on health risk indicators? Regarding BMI, the social control associated with marriage may impact lower SES individuals differently than their higher SES counterparts. Research shows that low SES individuals are more likely to eat an energy-dense, nutrient-poor diet, and that this is largely because this type of food is much more affordable than fresh nutrient-rich foods chronic stress has been connected to increased food consumption (Adam and Epel 2007). Therefore, following a union formation, if individuals are eating more regular meals, it is likely that low SES individuals will be eating more of the low-cost energy-dense food they are accustomed to, while those with a mid or higher SES may eat a mix of this energy dense food, and fresh produce that is high in nutrients but low in density. Regarding alcohol, tobacco, and marijuana use, research shows that marriage doesn't necessarily promote good or stop bad health behaviors, because spouses often share health behaviors (Meyler, Stimpson, and Peek 2007). More substance use among the socially disadvantaged increases the likelihood that spouses will enter the relationship both as substance users, so may be will reinforce rather than curb one another's habits. Because social disadvantage is complex and has various dimensions that may influence the relationship between union formation and health in ways that are unique from one another, in the current study I consider multiple indicators of social disadvantage during adolescence as moderators of the impact of union formation on health behavior later in life, including household poverty status, parent education, and household family structure.

Given the ways described above in which social disadvantage may moderate the impact of union formation on health risk indicators, I expect to find that the socially disadvantaged gain

more weight following union formation than their more advantaged counterparts, and that they experience a lower decline in their use of alcohol, tobacco, and marijuana.

Data and Method

I utilize data from the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative sample of young adults aged 24 to 32 by the final wave. The first wave of Add Health was collected in 1995, and included students in grades 7 through 12 from a sample of 145 U.S. middle, junior high, and high schools. In addition to conducting an in-school survey, there were separate in-home surveys given to both the respondents and their parents. Subsequent in-home interviews with the respondents were collected in 1996, 2001-2002, and 2007-2008. Parent interviews were not repeated beyond the first wave. The longitudinal sample contains data on 9421 respondents. Add health contains ample information on health, health behaviors, and sociodemographic background factors, and there is extensive information available regarding union formation. Moreover, the sample is especially contemporary, with the majority of union transitions occurring in the 21st century.

Appendix 1 details the sample selection for the current study. My analytic sample is drawn from individuals in the longitudinal sample, who were married by W4 or currently cohabiting at any of the four waves (N = 6448). From these individuals, I omit those who were either missing on the start date of their marriage or were married prior to the W1 interview (N = 112). In order to analyze transitions into marriage and changes in given health outcomes, it is necessary to observe individuals who marry in at least 1 wave when they are unmarried and in at least 1 wave when they are married. Because this requirement was not met among individuals who both entered and exited their first marriage in the same time period (N = 512) or among those without at least 1 observation on each dependent variable both before and after their

transition to marriage (N = 31), such individuals were excluded from the analysis. Finally, individuals who were missing on indicators of social disadvantage (N = 43) were excluded from the sample, bringing the analytic sample to N = 5750.

Key Variables

Union Formation. Table 1 details first marriage and current cohabitation involvement among men and women in the analytic sample between Waves 1 through 4. All respondents are never married and not currently cohabiting at Wave 1. Less than 1% of men or women form their first marriages between Waves 1 and 2. Between Waves 2 and 3, approximately 19% of men and 26% of women enter a first marriage. Between Waves 3 and 4, approximately 44% of men and 42% of women enter their first marriage. At Wave 4, 36% of men and 31% of women who are in the analytic sample have never married (meaning they were only observed in one or more current cohabitations, but not marriage). At Wave 4, approximately 94% of men and 91% of women are either never married (36.41% of men; 30.79% of women) or still in their first marriage (57.35% of men; 59.93% of women), whereas 6% of men and 9% of women have dissolved their first marriage. Individuals who eventually divorce are followed from W1 to the final wave of their first marriage. These estimates are reflected in the categories for relationship involvement at each wave. These categories indicate whether the respondent is married, cohabiting, or never married and not currently cohabiting at each wave. For simplicity sake, I refer to the never married and not currently cohabiting as "single."

[TABLE 1 ABOUT HERE]

Here we see that at Wave 2, less than 1% of men or women were married, while between 1 and 2% were currently cohabiting. At Wave 3, 60% of men and 51% of women are currently single. Approximately 21% of both men and women are cohabiting at Wave 3, while 19% of

men and 27% of women are in their first marriage. At Wave 4, between 5 and 6% of both samples are single, 31% of men and 26% of women are currently cohabiting, and 57% of men and 60% of women are in their first marriage. By Wave 4, 6% of men and 9% of women have been dropped from the sample due to dissolving their first marriage. Mean levels of relationship involvement are again reported in Table 2, though note that in table 2 estimates are adjusted for the complex survey design and reflect population-level estimates.

Body Mass Index. For Waves 2 through 4, BMI is calculated using height and weight measures taken by the interviewers themselves[1], with the formula used by the center for disease control: weight (lb) / [height(in)]^2 X 703 (www.cdc.gov). Because BMI is only elf-reported at Wave 1, I begin tracking BMI at Wave 2, when it is first measured. BMI is positively skewed at all Waves. Therefore in the regression analyses the natural log of BMI is modeled. Among both men and women, the average respondent was overweight at Wave 3 and nearing obesity at Wave 4, according to CDC cutoffs (Overweight: BMI>=25; Obese: BMI>=30).

R Binge Drinks on Average, Past Month. At each wave, respondents are asked a series of questions about their drinking behavior. If they have drank in the past month, they are asked, on average, how many drinks did they drink in one sitting on the occasions that they drank in the past month. Individuals who have not drank during the past month are given a code of 0 drinks. From this question, a dichotomous variable is created that indicates whether the number of drinks respondents drank in one sitting during the past month constituted binge drinking (4 or more drinks for women, 5 or more drinks for men). At Wave 1, 37% of men and 19% of women reported binge drinking on average. For men, reported binge drinking is highest at Wave 2

[1] When the measured height and weight were missing, these values were replaced with the height and weight reported by the respondent. Results did not change when omitting these self-reported cases.

(40%), whereas for women it is highest at Wave 3 (31%). For both men and women, binge drinking is lowest at wave 4 (30% and 21%, respectively).

Daily Tobacco Use, Past Month. I measure daily tobacco use with a dichotomous indicator, equal to 1 if the respondent reported tobacco use for each day in the past month. Tobacco use includes smoking cigarettes, as well as the use of smokeless tobacco, such as snuff or chewing tobacco. At Wave 1, 11% of men and 10% of women reported daily tobacco use. By Wave 4, 31% of men and 21% of women reported daily tobacco use in the past month.

Marijuana Use, Past Month. At each Wave, respondents are asked whether they have used any marijuana in the past month. For both men and women, marijuana use was highest at Wave 3 (28% and 19%, respectively). For women, marijuana use is lowest at Waves 1 and 4, whereas for men it is lowest at Wave 1.

Wave 1 Household Poverty Status is calculated from the household income-to-needs ratio (family income adjusted for household size) during adolescence (Wave 1)[2]. A ratio of less than 1.00 indicates poverty, 1.00 to 1.99 indicates near poverty. In my analysis I combine poor and near poor into one category, therefore differentiating between those who lived in poor/near poor households versus nonpoor households. At Wave 1, 42% of my analytic sample was living in or near poverty.

Wave 1 Household Family Structure. I measure family structure with an indicator of the type of household the respondent lived in at Wave 1. Categories include single parent household (25%), two-parent biological/adoptive family (58%), step-parent household (11%), multigenerational household (2%), and any other type of household that doesn't fit into the previous four categories (4%).

[2] Approximately 20% of the sample had missing data on income. For these cases, household income was imputed with from household welfare status and mother occupation. The results did not change when those missing on income were excluded from the analysis.

Wave 1 *Parent Education*. I measure parent education at Wave 1 with categories for less than high school education (11%), high school education (28%), some college (31%), and a bachelor's degree or higher (30%).

Time-Varying Controls. In all models, I control for whether the respondent is a parent. Respondents are considered a parent once they have had a live birth that was not given up for adoption/foster care etc. For women, I also control for whether the respondent was currently pregnant at the time of each interview.

[TABLE 2 ABOUT HERE]

Analytic Method

I utilize fixed effects regression models (Allison 2009) to estimate within-individual change in outcomes of interest as a function of change in union status. The basic fixed effects regression equations is as follows:

$$y_{it} = \mu_t + \beta X_{it} + \gamma Z_i + \alpha_i + \varepsilon_{it}$$

where y_{it} is the dependent variable observed for individual i at time t, μ_t is the intercept allowed to vary with time, X_{it} refers to a row vector of time-varying regressors, Z_i refers to a row vector of time-invariant regressors, α_i refers to all unobserved individual-specific characteristics, and ε_{it} refers to random error associated with individual i at time t (Allison 2009). A central component of fixed effects regression analysis is that all time-invariant observed (contained in Z_i) and unobserved (contained in α_i) characteristics are automatically accounted, or controlled for. Therefore, the only covariates that are entered into a fixed effects regression equation are those that vary with time, such as income and education. This is in part advantageous, because there is no danger of omitted variables impacting results. However, this component of traditional fixed effects is also a drawback for scholars interested in examining subgroup variations regarding the

impact of transitions on specific outcomes. For example, one could speculate that time-invariant characteristics such as gender or race might condition the change in a dependent variable following a given transition, and therefore might be interested in estimating such parameters. As such, scholars who wish to examine subgroup differences regarding the impact of union transitions on health outcomes must do so with interaction terms (i.e. by interacting time-invariant variables with the time-varying indicators of interest).

When modeling fixed effects analyses that analyze change in an outcome over time, it is important to account for the impact of time in the regression models. Because the outcomes of interest are bound to change across waves as the respondents move from adolescence (in waves 1 and 2) to young adulthood (in waves 3 and 4), I include an indicator that is 0 at wave 1 and increases by 1 each consecutive wave. In all models I include this indicator for wave, plus wave^2 to allow for nonlinear changes in the outcomes. I do not model age in the analyses, because in fixed effects analyses that model change over time, age only varies by a linear transformation (i.e. age at time 2 is equal to age at time 1 plus a constant), and as such can create problems in the regression models (Treiman 2009).

In analyses modeling BMI as the outcome, the following equation is first estimated:

$$BMI_{it} = \beta UNION\ FORMATION_{it} + \beta WAVE_{it} + \beta PARENTAL\ STATUS_{it} + \beta\ PREGNANT_{it}$$

Then, in subsequent models, each time-invariant indicator of social disadvantage is interacted with the coefficients for union formation.

For analyses modeling change in the dichotomous indicators (binge drinking, daily tobacco use, and marijuana use) logistic regression is utilized. First, the following equation is estimated for each dichotomous indicator:

$$log(P(y_{it}= 1)/1- P(y_{it}= 1) = \beta UNION\ FORMATION_{it} + \beta WAVE_{it} + \beta PARENTAL\ STATUS_{it} + \beta\ PREGNANT_{it}$$

where P represents the probability that a given outcome has a value of 1 for individual *i* at time *t*. Then, as is the case with BMI, subsequent models interact the coefficients for union formation with each time-invariant indicator of social disadvantage. Note that in fixed effects logistic regression analyses that have more than two time points per person, conditional maximum likelihood estimation is utilized, meaning that the resulting model is a conditional logistic regression analysis (Treiman 2009).

Fixed Effects Regression Results

Table 3 presents the fixed effects estimates for the regression of log of BMI on union formation. Model 1 indicates that for both men and women, entering marriage is associated with a significant increase in the log of BMI. Entering cohabitation is also associated with a higher BMI, though the gains associated with cohabitation are lower in magnitude than is the case for entering marriage. Supplemental analysis suggests that the greater gains in BMI following marriage versus cohabitation are statistically significant ($p<.05$).

Model 2 interacts household poverty status at Wave 1 with union formation. Here we see that poor women experience a significantly higher increase in the log of BMI than do nonpoor women following both marriage (**.04** for poor women versus (.04 - .03)= **.01** for nonpoor women; $p<.001$) and cohabitation (**.02** for poor women versus (.02 - .02)= **.00** for nonpoor women; $p<.05$). In fact, nonpoor women do not experience any significant increase in body weight following cohabitation. Men from poor households experience a greater increase in the log of BMI than do their nonpoor counterparts following marriage (**.04** for poor men versus (.04

- .01)= **.03** for nonpoor men; p<.05). However, poor and nonpoor men do not differ regarding the weight gain that follows cohabitation.

Model 3 interacts parent education at Wave 1 with union formation. This model shows us that women whose parents have less than a high school education experience a greater increase in the log of BMI following marriage than do women whose parents have a college degree (**.05** for less than high school versus (.05 - .04)= **.01** for college degree; p<.001). However, there is no interaction between parent education and entering cohabitation. For men, there is no interaction between parent education and entering marriage. However, men whose parents have less than a high school education gain more weight following cohabitation than does any parent education category (**.05** for less than high school versus (.05 - .02) = **.03** for high school, (.05 - .04) = **.01** for some college, and (.05 - .03)= **.02** for college degree).

Model 4 interacts household family structure at Wave 1 with union formation. Women from single parent households experience a greater increase in the log of BMI compared to women from two parent households following both marriage (**.04** for single parent households versus (.04 - .02)= **.02** for two parent households; p<.01) and cohabitation (**.03** for single parent households versus (.03 - .03)= **.00** for two parent households; p<.001). In fact, women coming from two parent households do not experience any significant increase in BMI following cohabitation. There are no interactions between family structure and union formation among men.

[TABLE 3 ABOUT HERE]

Table 4 illustrates fixed effects logistic regression estimates for whether the respondent has binge drank on average during the last month. Entering marriage reduces the odds of binge

drinking on average by 69% for women and 65% for men, whereas entering cohabitation reduces the odds of binge drinking by 32% for women and 48% for men. Therefore, for both men and women, entering any union decreases binge drinking behavior, but marriage does so more dramatically than cohabitation (the differences described above between marriage and cohabitation are statistically significant for both men and women, $p<.05$).

Model 2 interacts household poverty with union formation, and the nonsignificant interaction terms suggest that binge drinking decreases similarly following union formation regardless of household poverty status at Wave 1. Model 3 interacts parent education with union formation. The negative and significant coefficients for First Marriage * College Degree tell us that men and women whose parents have less than high school education experience a smaller reduction in the log odds of binge drinking following marriage than do their counterparts with college educated parents. There are no interactions between parent education and cohabitation entry for men or women. Finally, Model 4 interacts household family structure at Wave 1 with union formation. For women, there are no interactions between family structure at Wave 1 with union formation. For men, however, respondents from single parent households actually experience a greater reduction in the log odds of binge drinking following marriage than do their counterparts from two parent households or multigenerational households. There are no interactions between family structure and entering cohabitation among men.

[TABLE 4 ABOUT HERE]

Table 5 presents the fixed effects logistic regression estimates for whether the respondent is a daily tobacco user. For men, marriage reduces the log odds of daily tobacco use by -.54. In other words, the odds of daily tobacco use following marriage decrease by 42%. For women the odds of daily tobacco use following marriage decrease by 57%. Entering cohabitation does not

significantly decrease the odds of daily tobacco use among men, and it actually increases the odds of daily tobacco use among women by 38%. As with binge drinking, there are no interactions between household poverty status and union formation with regards to daily tobacco use among men or women. However, men whose parents were college educated experienced a 1.10 greater reduction in the log odds of daily tobacco use than did their counterparts whose parents had less than a high school education ($p<.05$). Interactions of family structure with union formation in Model 4 indicate that women from single parent households experienced a greater reduction in the log odds of daily tobacco use than did their counterparts from step-parent households.

[TABLE 5 ABOUT HERE]

Table 6 illustrates the fixed effects logistic regression estimates for whether the respondent has used marijuana at all in the past month. For both men and women, entering marriage, but not cohabitation, reduces the odds of marijuana use. For men, entering marriage reduces the odds of marijuana use by 62%. For women, the odds of marijuana use are reduced by 57% following the entry into marriage. The pool of nonsignificant interaction terms suggests that all individuals experience the reduced odds of marijuana use that are associated with marriage, regardless of social background.

[TABLE 6 ABOUT HERE]

Discussion

This study utilized longitudinal data and fixed effects regression analysis to prospectively examine the impact of union formation on change in BMI, binge drinking, daily tobacco use, and marijuana use. In general, results suggest a causal relationship between marriage and health risk indicators. Entering marriage is associated with increases in BMI and decreases in binge

drinking, tobacco use, and marijuana use. Cohabitation is associated with increases in BMI and decreases in binge drinking, but does not decrease the odds of daily tobacco use or marijuana use. In fact, for women, cohabitation is associated with increased odds of daily tobacco use. These results are consistent with the theoretical framework linking marriage and (to a lesser extent) cohabitation to the regulation of health behaviors. Though we can never prove causality, the use of longitudinal data and fixed effects analysis in this study make it unlikely that the results are due to unobserved heterogeneity across individuals. It is possible, of course, that there are one or more time-varying indicators that should have been (and were not) controlled for across waves.

With regards to socioeconomic variation in link between union formation and health behaviors, the results suggest that the impact of union formation on change in BMI, binge drinking, and daily tobacco use is, in part, moderated by social disadvantage. In some, but not all cases, this pattern differed by gender and was stronger for entering marriage than for entering cohabitation. In contrast, the impact of union formation on marijuana use was not moderated by any of the social disadvantage indicators, suggesting that marijuana use declines following marriage regardless of social background. BMI was the only outcome for which the impact of union formation was moderated by all three indicators of social disadvantage. Findings suggest that men and women coming from socially disadvantaged backgrounds gain significantly more weight following union formation than do their more advantaged counterparts.

Of the three indicators of social disadvantage, parent education most consistently moderated the impact of union formation on change in health risk indicators. For example, men with college educated parents experienced a greater reduction in the odds of daily smoking versus men whose parents had less than a high school education, while men and women with

college educated parents experienced a greater reduction in the odds of binge drinking compared to those whose parents had less than a high school education. Women whose parents were college educated gained less weight following marriage than those whose parents did not finish high school. Men whose parents did not finish high school gained more weight following cohabitation than did men in any other parent education group.

Overall, these results provide preliminary evidence that in the case of BMI, binge drinking, and tobacco use, the impact of union formation on health risk indicators does vary by social disadvantage. This is but a first step towards our understanding of how socioeconomic background shapes the impact of union formation on health outcomes. Future research should assess whether these results extend to indicators of self assessed physical or mental health, or to chronic illness later in the life course. Moreover, this paper focused only on social disadvantage during adolescence. Future research should consider how indicators of social disadvantage in young adult (prior to union formation) shape the impact of marriage and/or cohabitation on health outcomes.

As in all analyses, there are limitations to this study. Specifically, there are some features of the data that might limit the generalizability of the findings. The 6-year gap in between Waves 2 - 3 and Waves 3 - 4 resulted in some bias regarding the nature of the relationships included in the sample. As detailed in Appendix 1, more than 1300 individuals who were excluded from the sample for not having any observed cohabitations or marriages actually did report a past cohabitation that happened to not be current at any of the interviews. Therefore, the results of this study may not be generalizable to all cohabitors, since so many respondents who cohabited were excluded from the analysis. Because the marriages reported generally had longer life cycles than the cohabitations, exclusion of marriages was less of a problem. However, there was some

bias among respondents who dissolved their first marriages. Over 500 respondents (about 50% of respondents who ended up dissolving their first marriages) were not included in the analysis because they entered and exited their first marriage in between waves.

Despite any limitations, this study makes theoretical and empirical contributions to the literature linking marriage to health. Future analyses should build upon the efforts made in this study to improve causal inference and theoretical framing with regards to our understanding of union formation and health.

References

Adam, Tanja C. and Elissa S. Epel. 2007. "Stress, eating and the reward system." *Physiology and Behavior* 91:449-458.

Allison, Paul D. 2009. *Fixed Effects Regression Models*. Thousand Oaks: Sage Publications.

Aneshensel, Carol S. 2002. "Commentary: answers and questions in the sociology of mental health." *Journal of Health and Social Behavior* 43:236-246.

Averett, Susan L., Asia Sikora, and Laura M. Argys. 2008. "For Better or Worse: Relationship Status and Body Mass Index." *Economics and Human Biology* 6:330-349.

Bachman, J.G., P.M. O'Malley, J.E. Schulenberg, L.D. Johnston, A.L. Bryant, and A.C. Merline. 2002. "The decline in substance use in young adulthood: Changes in social activities, roles, and beleifs.". Mahwah, NJ: Lawrence Erlbaum.

Bachman, J.G., K.N. Wadsworth, P.M. O'Malley, L.D. Johnston, and J.E. Schulenberg. 1997. *Smoking, drinking, and drug use in young adulthood.* Mahwah, NJ: Lawrence Erlbaum.

Bramlett, Matthew D. and William D. Mosher. 2002. "Cohabitation, Marriage, Divorce, and Remarriage in the United States." *Vital and Health Statistics, Series 23, Number 22*. Washington D.C.: National Center for Health Statistics.

Bratter, Jennifer and Karl Eschbach. 2006. "What about the Couple?' Interracial Marriage and Psychological Distress." *Social Science Research* 35:1025-1047.

Brown, S. L. 2000. "The Effect of Union Type on Psychological Well-Being: Depression among Cohabitors versus Marrieds." *Journal of Health and Social Behavior* 41:241-255.

Burke, Valerie , Lawrie J. Beilin, Diana Dunbar, and Melodie Kevan. 2004. "Changes in health-related behaviours and cardiovascular risk factors in young adults: associations with living with a partner." *Preventive Medicine* 39:722-730.

Center for Disease Control. 2010. "Overweight and Obesity." vol. 2010, edited by Center for Disease Control.

—. 2011.

Centers for Disease Control and Prevention. 2011. " CDC Health Disparities and Inequalities Report — United States, 2011."

Curran, P.J., B.O. Muthen, and T.C. Hartford. 1998. "The Influence of Changes in Marital Status on Developmental Trajectories of Alcohol Use in Young Adults." *Journal of Studies on Alcohol* 59:647-658.

Duncan, Greg J. , Bessie Wilkerson, and Paula England. 2006. "Cleaning up their Act: The Effects of Marriage and Cohabitation on Licit and Illicit Drug Use." *Demography* 43:691-710.

Frech, Adrianne and Kristi Williams. 2007. "Depression and the Psychological Benefits of Entering Marriage." *Journal of Health and Social Behavior* 48:149-163.

Harris, Kathleen Mullan , Hedwig Lee, and Felicia Yang DeLeone. 2010. "Marriage and Health in the Transition to Adulthood: Evidence for African Americans in the Add Health Study." *Journal of Family Issues*.

Johnson, David. 2005. "Two-Wave Panel Analysis: Comparing Statistical Methods for Studying the Effects of Transitions." *Journal of Marriage & Family* 67:1061–1075.

Kahn, H. S. and D. F. Williamson. 1990. "The Contributions of Income, Education, and Changing Marital Status to Weight Change among US Men." *International Journal of Obesity* 14:1057-1068.

Kamp Dush, C. M. and P. R. Amato. 2005. "Consequences of Relationship Status and Quality for Subjective Well-Being." *Journal of Social and Personal Relationships* 22:607-627.

Kamp Dush, Claire M., Miles G. Taylor, and Rhiannon A. Kroeger. 2008. "Marital Happiness and Psychological Well-Being across the Life Course." *Family Relations* 57:211-226.

Kroeger, Rhiannon A. and Kristi Williams. 2011. "Consequences of Black Exceptionalism? Interracial Unions with Blacks, Depressive Symptoms, and Relationship Satisfaction." *The Sociological Quarterly* 52:400-420.

Lamb, K.A., G.R. Lee, and A. DeMaris. 2003. "Union Formation and Depression: Selection and Relationship Effects." *Journal of Marriage and Family* 65:953-962.

Lillard, Lee A. and Constantijin W. A. Pannis. 1996. "Marital Status and Mortality: The Role of Health." *Demography* 33:313-327.

Link, Bruce and J. Phelan. 1995. "Social Conditions as the Fundamental Causes of Disease." *Journal of Health and Social Behavior* 35:80-94.

Marks, Nadine F. and James D. Lambert. 1998. "Marital Status Continuity and Change Among Young and Midlife Adults." *Journal of Family Issues* 19:652-686.

Meyler, D., J.P. Stimpson, and M.K. Peek. 2007. "Health Concordance within Couples: A Systematic Review." *Social Science & Medicine* 64:2297-2310.

Miller-Tutzauer, C., K.E. Leonard, and M. Windle. 1991. "Marriage and Alcohol Use: A Longitudinal Study of 'Maturing Out.'." *Journal of Studies on Alcohol* 52:434-440.

Molloy, G.J., E. Stamatakis, G. Randall, and M. Hamer. 2009. "Marital Status, Gender and Cardiovascular Mortality: Behavioural, Psychological Distress and Metabolic Explanations." *Social Science and Medicine* 69:223-228.

Mullan Harris, Kathleen , Hedwig Lee, and Felicia Yang DeLeone. 2010. "Marriage and Health in the Transition to Adulthood: Evidence for African Americans in the Add Health Study." *Journal of Family Issues*.

Musick, Kelly and Larry L. Bumpass. 2006. "Cohabitation, Marriage, and Trajectories in Well-Being and Relationships." in *California Center for Population Research Working Paper Series (CCPR-003-06).*

Nock, Steven L. 2005. "Marriage as a Public Issue." *The Future of Children* 15:13-32.

Oppenheimer, Valerie K. 2000. "The Continuing Importance of Men's Economic Position in Marriage Formation." in *The Ties That Bind*, edited by L. J. Waite and A. de Gruyter.

Ross, C. E. . 1995. "Reconceptualizing Marital Status as a Continuum of Social Attachment." *Journal of Marriage and Family* 57:129-140.

Simon, Robin W. 2002. "Revisiting the Relationships among Gender, Marital Status, and Mental Health." *American Journal of Sociology* 107:1065-1096.

Sobal, Jeffery, Barbara Rauschenbach, and Edward A. Frongillo. 2003. "Marital Status Changes and Body Weight Changes: A US Longitudinal Analysis." *Social Science and Medicine* 56:1543-1555.

The, N.S. and P. Gordon-Larsen. 2009. "Entry Into Romantic Partnership Is Associated With Obesity." *Obesity* 17:1441-1447.

Treiman, Donald J. 2009. *Quantitative Data Analysis: Doing Social Research to Test Ideas*. San Francisco, CA: Jossey-Bass.

Turner, R. Jay and Franco Marino. 1994. "Social Support and Social Structure: A Descriptive Epidemiology." *Journal of Health & Social Behavior* 28:306-319.

U. S. Department of Health and Human Services. 1996. "The Personal Responsibility and Work Opportunity Reconciliation Act of 1996." vol. 2010.

U.S. Department of Health and Human Services. 2005. "The Healthy Marriage Initiative." vol. 2010.

Umberson, D. . 1987. "Family Status and Health Behaviors: Social Control as a Dimension of Social Integration." *Journal of Health and Social Behavior* 28:306-319.

Umberson, Debra , Hui Liu, and Daniel Powers. 2009. "Marital Status, Marital Transitions, and Body Weight." *Journal of Health and Social Behavior* 50:327-343.

Umberson, Debra and Kristi Williams. 1999. "Family Status and Mental Health." Pp. 225-253 in *Handbook of the Sociology of Mental Health*.

Umberson, Debra, Robert Crosnoe, and Corinne Reczek. 2010. "Social Relationships and Health Behavior Across the Life Course." *Annual Review of Sociology* 36:139-157.

Waite, L. J. 1995. "Does marriage matter?" *Demography* 32:483-507.

Waite, Linda J. and Maggie Gallagher. 2000. *The Case for Marriage: Why Married People are Happier, Healthier, and Better off Financially*. New York: Doubleday.

Williams, Kristi. 2003. "Has the Future of Marriage Arrived? A Contemporary Examination of Gender, Marriage, and Psychological Well-Being." *Journal of Health and Social Behavior* 44:470-487.

Williams, Kristi and Debra Umberson. 2004. "Marital Status, Marital transitions, and Health: A Gendered Life Course Perspective." *Journal of Health and Social Behavior* 45:81-98.

Xu, Jiaquan , Kenneth D. Kochanek, Sherry L. Murphy, and Betzaida Tejada-Vera. 2010. "Deaths: Final Data for 2007."

Table1. First Marriage and Cohabitation Involvement among Analytic Sample

	Total Sample (N = 5750)	Men (N = 2483)	Women (N = 3267)
First Marriage Formation			
First Marriage W1-W2	0.64%	0.32%	0.89%
First Marriage W2-W3	23.17%	18.85%	26.45%
First Marriage W3-W4	42.97%	44.42%	41.87%
Never Married at W4	33.22%	36.41%	30.79%
First Marriage Dissolution			
Dissolved by W3	0.26%	0.04%	0.43%
Dissolved by W4	7.70%	6.20%	8.85%
First Marriage Not Dissolved	58.82%	57.35%	59.93%
Never Married at W4	33.22%	36.41%	30.79%
Relationship Involvement by Wave			
Wave 1			
Currently Single	100.00%	100.00%	100.00%
Currently Cohabiting	0.00%	0.00%	0.00%
Currently in First Marriage	0.00%	0.00%	0.00%
Wave 2			
Currently Single	97.91%	98.59%	97.40%
Currently Cohabiting	1.44%	1.09%	1.71%
Currently in First Marriage	0.64%	0.32%	0.89%
Wave 3			
Currently Single	55.17%	60.13%	51.39%
Currently Cohabiting	21.03%	20.70%	21.27%
Currently in First Marriage	23.55%	19.13%	26.91%
Attrition Due to Divorce	0.26%	0.04%	0.43%
Wave 4			
Currently Single	5.37%	5.76%	5.08%
Currently Cohabiting	27.84%	30.65%	25.71%
Currently in First Marriage	58.82%	57.35%	59.93%
Attrition Due to Divorce	7.97%	6.24%	9.27%

Table 2. Population-Adjusted Means and Standard Errors for All Variables In Analysis

	Men		Women	
	Mean	Standard Error	Mean	Standard Error
Union Involvement at Wave 2				
Married	0.001	0.001	0.003	0.001
Cohabiting	0.009	0.003	0.014	0.003
Single	0.990	0.004	0.984	0.004
Union Involvement at Wave 3				
Married	0.120	0.010	0.201	0.015
Cohabiting	0.241	0.012	0.249	0.012
Single	0.638	0.015	0.551	0.019
Union Involvement at Wave 4				
Married	0.588	0.015	0.649	0.015
Cohabiting	0.347	0.014	0.293	0.014
Single	0.065	0.006	0.058	0.006
Dependent Variables				
Body Mass Index*				
Wave 2	23.219	0.150	22.644	0.149
Wave 3	26.718	0.173	26.329	0.208
Wave 4	29.273	0.194	28.697	0.227
R Binges on Average When Drinks, Past Month				
Wave 1	0.370	0.021	0.191	0.011
Wave 2	0.404	0.019	0.244	0.016
Wave 3	0.383	0.016	0.314	0.013
Wave 4	0.295	0.014	0.205	0.011
Daily Smoking Past Month				
Wave 1	0.108	0.013	0.097	0.011
Wave 2	0.148	0.013	0.146	0.014
Wave 3	0.309	0.015	0.241	0.016
Wave 4	0.308	0.015	0.205	0.013
Any Marijuana Use Past Month				
Wave 1	0.147	0.013	0.116	0.009
Wave 2	0.176	0.013	0.159	0.013
Wave 3	0.276	0.015	0.190	0.012
Wave 4	0.198	0.012	0.113	0.009
Time-Varying Control Variables				
R has at least 1 Biological Child				
Wave 1	0.006	0.003	0.017	0.003
Wave 2	0.011	0.003	0.036	0.005
Wave 3	0.183	0.012	0.311	0.016

Wave 4	0.513	0.017	0.609	0.017
R is Pregnant at Time of Interview				
Wave 1	---	---	0.002	0.001
Wave 2	---	---	0.015	0.003
Wave 3	---	---	0.054	0.006
Wave 4	---	---	0.084	0.006
Indicators of Social Disadvantage at Wave 1				
Wave 1 Household Poverty Status				
Near poor or Poor HH	0.421	0.018	0.433	0.015
Non Poor HH	0.579	0.022	0.567	0.020
Wave 1 Parent Education				
Less than High School	0.116	0.013	0.120	0.015
High School	0.276	0.015	0.295	0.016
Some College	0.307	0.016	0.288	0.014
College Degree or More	0.302	0.020	0.297	0.021
Wave 1 Family Structure				
Two Parent Biological/Adoptive HH	0.580	0.017	0.582	0.017
Single Parent HH	0.254	0.014	0.252	0.013
Step Parent HH	0.108	0.008	0.093	0.007
Multigenerational HH	0.017	0.004	0.032	0.004
Other Type of HH	0.041	0.004	0.042	0.005
Population N	5288280		5940072	
Sample N	2483		3267	

Note: All estimates account for complex survey design; *BMI first measured by interviewer at W2, W1 BMI was self-reported by adolescent and therefore not used in analysis

Table 3. Fixed Effects Regression Estimates for the Log of BMI on Union Formation

	Model 1		Model 2		Model 3		Model 4	
	Men	Women	Men	Women	Men	Women	Men	Women
Wave	0.22***	0.21***	0.22***	0.21***	0.22***	0.21***	0.22***	0.21***
	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
$Wave^2$	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***
	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Union Formation								
R Enters First Marriage	0.03***	0.03***	0.04***	0.04***	0.03**	0.05***	0.02**	0.04***
	0.005	0.005	0.006	0.006	0.010	0.009	0.008	0.007
R Enters Current Cohabitation	0.02***	0.01**	0.02**	0.02***	0.05***	0.02*	0.02**	0.03***
	0.005	0.004	0.006	0.006	0.011	0.010	0.007	0.007
R has 1 or More Children	-0.00	0.03***	-0.00	0.03***	-0.00	0.03***	-0.00	0.03***
	0.004	0.004	0.004	0.004	0.005	0.004	0.004	0.004
R is pregnant at Interview		0.06***		0.06***		0.06***		0.05***
		0.006		0.006		0.006		0.006
Union Formation * W1 HH Poverty Status								
(Poor/Near Poor HH = REF)								
First Marriage * Non Poor			-0.01*	-0.03***				
			0.006	0.006				
Cohabitation * Non Poor			-0.00	-0.02*				
			0.007	0.007				
Union Formation * W1 Parent Education								
(Less than HS = REF)								
First Marriage * High School					0.00	-0.00		
					0.011	0.010		
First Marriage * Some College					-0.01	-0.02		
					0.010	0.010		
First Marriage * College Degree					-0.01	-0.04***		
					0.010	0.010		
Cohabitation * High School					-0.02*	-0.00		
					0.012	0.012		

Cohabitation * Some College					-0.04***	-0.01		
					0.012	0.012		
Cohabitation * College Degree					-0.03**	-0.02		
					0.012	0.012		
Union Formation * W1 HH Family Structure								
(Single Parent HH = REF)								
First Marriage * Two Parent HH							0.00	-0.02**
							0.008	0.007
First Marriage * Step Parent HH							0.01	-0.01
							0.011	0.011
First Marriage * Other HH							0.03	-0.01
							0.017	0.016
First Marriage * Multigenerational HH							0.00	-0.01
							0.020	0.018
Cohabitation * Two Parent HH							-0.01	-0.03***
							0.008	0.008
Cohabitation * Step Parent HH							0.02	-0.01
							0.012	0.013
Cohabitation * Other HH							-0.03	-0.00
							0.018	0.016
Cohabitation * Multigenerational HH							0.00	0.01
							0.023	0.019
Constant	2.94***	2.92***	2.94***	2.92***	2.94***	2.92***	2.94***	2.92***
	0.009	0.008	0.009	0.008	0.009	0.009	0.009	0.008
Observations	7,269	9,376	7,269	9,376	7,269	9,376	7,269	9,376
Respondents	2483	3267	2483	3267	2483	3267	2483	3267
F	1344.54***	1202.09***	961.31***	907.70***	613.58***	607.77***	518.51***	517.69***

Note: reported models do not directly adjust for complex survey design because the command for linear fixed effects regression does not support commands that adjust for survey weights. However, sensitivity analyses with change score models between the first and last wave support results of the fixed effects analysis, shown above. ***p<.001; **p<.01; *p<.05

Table 4. Fixed Effects Logistic Regression Estimates for Binge Drinking on Average in Past Month on Union Formation

	Model 1		Model 2		Model 3		Model 4	
	Men	Women	Men	Women	Men	Women	Men	Women
Wave	0.25*	0.93***	0.24*	0.92***	0.22*	0.92***	0.26*	0.93***
	0.110	0.113	0.110	0.114	0.111	0.114	0.109	0.112
Wave ^{2}	-0.01	-0.14***	-0.01	-0.14***	-0.00	-0.13***	-0.02	-0.14***
	0.037	0.037	0.038	0.038	0.039	0.038	0.036	0.037
Union Formation								
R Enters First Marriage	-1.05***	-1.16***	-0.95***	-0.92***	-0.42	-0.98**	-1.50***	-0.86***
	0.164	0.152	0.198	0.174	0.335	0.327	0.271	0.219
R Enters Current Cohabitation	-0.65***	-0.39**	-0.56**	-0.43*	-0.42	-0.20	-0.80***	-0.55*
	0.125	0.130	0.172	0.179	0.313	0.261	0.213	0.220
R has 1 or More Children	-0.32*	-0.73***	-0.34*	-0.75***	-0.36*	-0.80***	-0.32*	-0.75***
	0.159	0.134	0.158	0.137	0.165	0.138	0.156	0.134
R is pregnant at Interview		-0.14		-0.11		-0.14		-0.13
		0.236		0.238		0.233		0.231
Union Formation * W1 HH Poverty Status								
(Poor/Near Poor HH = REF)								
First Marriage * Non Poor			-0.15	-0.40				
			0.198	0.215				
Cohabitation * Non Poor			-0.18	0.08				
			0.221	0.209				
Union Formation * W1 Parent Education								
(Less than HS = REF)								
First Marriage * High School					-0.49	0.08		
					0.381	0.336		
First Marriage * Some College					-0.64	-0.05		
					0.386	0.364		
First Marriage * College Degree					-1.00**	-0.65*		
					0.356	0.327		

Cohabitation * High School					-0.05	-0.23		
					0.413	0.308		
Cohabitation * Some College					-0.35	-0.20		
					0.355	0.292		
Cohabitation * College Degree					-0.45	-0.21		
					0.366	0.349		
Union Formation * W1 HH Family Structure (Single Parent HH = REF)								
First Marriage * Two Parent HH							0.56*	-0.39
							0.275	0.251
First Marriage * Step Parent HH							0.72	-0.34
							0.365	0.387
First Marriage * Other HH							0.39	-0.20
							0.567	0.395
First Marriage * Multigenerational HH							1.84*	1.29
							0.913	0.771
Cohabitation * Two Parent HH							0.22	0.20
							0.241	0.275
Cohabitation * Step Parent HH							0.16	0.46
							0.412	0.353
Cohabitation * Other HH							-0.34	0.31
							0.447	0.607
Cohabitation * Multigenerational HH							2.21**	-0.31
							0.689	0.811
Observations	5,992	6,036	5,992	6,036	5,992	6,036	5,992	6,036
Respondents	1522	1538	1522	1538	1522	1538	1522	1538
Chi-square	184.96***	292.72***	191.56***	298.63***	205.52***	307.38***	201.62***	298.13***

Note: All estimates account for complex survey design; ***p<.001; **p<.01; *p<.05

Table 5. Fixed Effects Logistic Regression Estimates for Daily Tobacco Use in Past Month on Union Formation

	Model 1		Model 2		Model 3		Model 4	
	Men	Women	Men	Women	Men	Women	Men	Women
Wave	1.49***	1.67***	1.49***	1.67***	1.48***	1.65***	1.49***	1.67***
	0.175	0.178	0.174	0.179	0.173	0.178	0.176	0.179
Wave ^{2}	-0.19***	-0.26***	-0.19***	-0.26***	-0.19***	-0.25***	-0.19***	-0.26***
	0.049	0.058	0.049	0.059	0.048	0.059	0.050	0.059
Union Formation								
R Enters First Marriage	-0.54*	-0.85***	-0.57+	-0.86***	0.42	-0.95	-0.76	-1.07***
	0.236	0.219	0.325	0.248	0.527	0.630	0.408	0.316
R Enters Current Cohabitation	-0.12	0.32*	-0.10	0.55*	0.72	0.12	0.00	0.34
	0.173	0.148	0.264	0.210	0.464	0.390	0.302	0.314
R has 1 or More Children	0.31	-0.44+	0.31	-0.45	0.30	-0.49*	0.33	-0.51*
	0.234	0.236	0.249	0.240	0.235	0.238	0.235	0.239
R is pregnant at Interview		-1.12***		-1.15***		-1.17***		-1.12***
		0.313		0.316		0.316		0.319
Union Formation * W1 HH Poverty Status								
(Poor/Near Poor HH = REF)								
First Marriage * Non Poor			0.06	0.02				
			0.310	0.286				
Cohabitation * Non Poor			-0.04	-0.41				
			0.340	0.316				
Union Formation * W1 Parent Education								
(Less than HS = REF)								
First Marriage * High School					-1.05	0.39		
					0.534	0.618		
First Marriage * Some College					-1.07	0.23		
					0.550	0.653		
First Marriage * College Degree					-1.10*	-0.34		
					0.529	0.693		
Cohabitation * High School					-0.91	0.43		
					0.530	0.488		

Cohabitation * Some College					-0.91	0.29		
					0.531	0.405		
Cohabitation * College Degree					-1.01*	-0.06		
					0.503	0.505		
Union Formation * W1 HH Family Structure								
(Single Parent HH = REF)								
First Marriage * Two Parent HH							0.32	0.07
							0.374	0.399
First Marriage * Step Parent HH							0.28	1.25**
							0.655	0.451
First Marriage * Other HH							-0.46	0.95
							0.846	0.753
First Marriage * Multigenerational HH							-0.10	1.04
							0.965	0.577
Cohabitation * Two Parent HH							-0.24	-0.14
							0.352	0.414
Cohabitation * Step Parent HH							-0.34	0.46
							0.549	0.607
Cohabitation * Other HH							1.24	0.13
							0.699	0.707
Cohabitation * Multigenerational HH							-0.37	0.60
							0.723	0.793
Observations	3,358	3,202	3,358	3,202	3,358	3,202	3,358	3,202
Respondents	852	821	852	821	852	821	852	821
Chi-square	610.42***	432.28***	610.47***	438.41***	614.33***	438.51***	617.74***	449.01***

Note: All estimates account for complex survey design; ***p<.001; **p<.01; *p<.05

Table 6. Fixed Effects Logistic Regression Estimates for Any Marijuana Use in Past Month on Union Formation

	Model 1		Model 2		Model 3		Model 4	
	Men	Women	Men	Women	Men	Women	Men	Women
Wave	0.88***	1.03***	0.87***	1.03***	0.86***	1.03***	0.90***	1.04***
	0.132	0.131	0.134	0.130	0.131	0.133	0.131	0.130
Wave ^{2}	-0.12**	-0.21***	-0.12**	-0.21***	-0.11**	-0.21***	-0.13**	-0.22***
	0.040	0.044	0.042	0.043	0.041	0.045	0.040	0.043
Union Formation								
R Enters First Marriage	-0.97***	-0.84***	-0.91**	-0.93***	-0.80	-1.10*	-0.87*	-0.76**
	0.256	0.187	0.296	0.266	0.433	0.523	0.348	0.263
R Enters Current Cohabitation	-0.22	-0.07	-0.08	-0.14	-0.30	-0.23	-0.26	-0.29
	0.165	0.161	0.217	0.209	0.390	0.321	0.243	0.242
R has 1 or More Children	-0.51**	-0.78***	-0.53**	-0.77***	-0.55**	-0.82***	-0.48**	-0.81***
	0.177	0.163	0.180	0.160	0.181	0.156	0.173	0.158
R is pregnant at Interview		-1.98***		-1.99***		-2.02***		-1.94***
		0.355		0.357		0.356		0.348
Union Formation * W1 HH Poverty Status								
(Poor/Near Poor HH = REF)								
First Marriage * Non Poor			-0.09	0.16				
			0.321	0.304				
Cohabitation * Non Poor			-0.24	0.14				
			0.261	0.237				
Union Formation * W1 Parent Education								
(Less than HS = REF)								
First Marriage * High School					-0.12	0.33		
					0.435	0.544		
First Marriage * Some College					-0.07	0.58		
					0.497	0.587		
First Marriage * College Degree					-0.38	-0.09		
					0.463	0.604		
Cohabitation * High School					0.18	0.25		
					0.466	0.392		

Cohabitation * Some College					0.25	0.20		
					0.402	0.370		
Cohabitation * College Degree					-0.22	0.09		
					0.429	0.399		
Union Formation * W1 HH Family Structure								
(Single Parent HH = REF)								
First Marriage * Two Parent HH							-0.03	-0.26
							0.355	0.305
First Marriage * Step Parent HH							-0.22	0.53
							0.600	0.403
First Marriage * Other HH							-0.84	0.45
							0.737	0.523
First Marriage * Multigenerational HH							-0.32	0.67
							0.942	0.813
Cohabitation * Two Parent HH							0.19	0.27
							0.274	0.344
Cohabitation * Step Parent HH							-0.13	0.59
							0.356	0.477
Cohabitation * Other HH							-0.9	0.95
							0.527	0.615
Cohabitation * Multigenerational HH							0.13	-0.72
							0.604	0.808
Observations	3,762	4,019	3,762	4,019	3,762	4,019	3,762	4,019
Respondents	962	1,034	962	1,034	962	1,034	962	1,034
Chi-square	157.23***	240.33***	159.86***	240.61***	159.07***	243.86***	159.54***	249.92***

Note: All estimates account for complex survey design; ***p<.001; **p<.01; *p<.05

Appendix 1. Sample Selection for Current Study

Condition	N Dropped	Sample Size
Full Longitudinal Sample	---	9421
Keep Rs Who Answered W4 Relationship History Questions	226	9195
Keep Rs who either have married by W4 or who are currently cohabiting at any of the four waves*	2747	**6448**
Married Prior to Wave 1 OR Has missing Marriage Dates	112	6336
Entered and Exited First Marriage Between Waves**	512	5824
Missing on Moderators	43	5781
Did not have at least 1 observation on all Dependent Vars before and after the transition	31	**5750**

Note: *Because of the short life cycle of the average cohabitation, and because there are approximately 6 years between interviews 2 and 3, and 7 years between interviews 3 and 4- there are many cohabitations that begin and end between waves, and hence are left unobserved in the data. For example, 52.31% of those in who are never married and not currently cohabiting in any wave report having been in at least 1 cohabitation by wave 4, but the cohabitation was not current at any of the interviews and therefore could not be included in the current analysis

**Approximately half of all respondents who ended their first marriage both married and divorced/separated between waves, and as such, half of first marriages that ended in divorce are not represented in the data.