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Cleaning Up Their Act: The Impacts of Marriage and Cohabitation on Licit and Illicit Drug Use*

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Abstract

We use data from the National Longitudinal Survey of Youth to estimate changes in binge drinking, marijuana use and smoking surrounding young adults' first experience of cohabitation and marriage. We find that both marriage and cohabitation are accompanied by decreases in some risk behaviors for both men and women, and estimated reductions associated with marriage are generally largest. Smoking is much less responsive to these events than binge drinking and marijuana use. Women are more likely than men to quit engaging in some of these behaviors altogether, while reductions in the total volume of risky behaviors are often larger for men than women, in part because men engage in the behaviors more frequently.

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I. Theoretical Background and Past Research

A growing body of work (summarized in Waite 1995) links marriage to better health and decreases in health-risk behavior, particularly for men. Recent work has expanded the focus from marital status to include cohabitation and fertility (Bachman, Wadsworth, O'Malley, Johnston, and Schulenberg 1997; Umberson 1987, 1992). In this paper, we assess whether marriage and cohabitation affect binge drinking, marijuana use and smoking. All these substances have negative effects on health (National Institute on Drug Abuse 1999, 2001, 2002; National Institute of Alcohol Abuse and Alcoholism 2000), and illegal drug use entails the risk of incarceration. Thus, all involve risks to future well-being.

Theoretical Perspectives. Why might we expect either marriage or cohabitation to affect the use of these substances? Two theoretical perspectives suggest a causal relationship, but have differing implications for whether we would expect effects of marriage and cohabitation to be similar.

One perspective emphasizes culture—social definitions or norms that are well enough entrenched to be called "institutions." In this view, marriage entails a package of cognitive associations that transcend legal and religious rules. For example, most people believe that spouses should stay together for the long term, be monogamous, and treat each other with love. Many people associate marriage with a traditional gender regime specifying women's responsibility for housework and child rearing and men's responsibility for earning money and right to decision authority, although these associations may be changing. The cultural association we are interested in here is that marriage entails "cleaning up one's act" and eschewing behavior associated with the single life. Binge drinking, drug use, and possibly smoking may be seen as a more acceptable part of the "wilder single life," but be among the things one is expected to give up upon marriage. Thus, making the decision to marry may indicate a willingness to do this, and marrying may push an individual further in this direction than s/he would have gone otherwise.

Using this cultural or "institutions" perspective, Cherlin (1978) has written about remarriage as an "incomplete institution" in which norms are not clear, particularly those about the role of step-parents in rearing and disciplining children. We suggest that cohabitation may now hold a similar "incomplete institution" status. The norms surrounding it are less clear than for marriage because only in recent decades has cohabitation become a common living situation. Most people see cohabitation as entailing monogamy, but less long-term commitment than marriage. We suggest that it may also entail a notion that one should "clean up" or "straighten out" to some degree, but that the expectations are more ambiguous than with marriage.

A second relevant theoretical perspective is rational choice theory. The theory features self-interested actors exercising their individual preferences and complying with onerous norms only when the costs of not doing so exceed the benefits of violating the norms. When economists use this theory to talk about employment relations, they typically assume that, if effort is onerous, workers will "shirk" unless employers have in place a combination of

incentives (e.g. the knowledge one will be fired if effort is too low) and the monitoring necessary to enforce such incentives (Bulow and Summers 1986).

A rational choice view of marriage or cohabitation entails a similar dilemma for each spouse. In this view, partners used to using drugs are likely to prefer to cling to their old gratifying, substance-using ways from the single life so long as the other partner does not sanction this behavior and thus increase its costs. Yet, each partner might prefer that the other "clean up"—so as to reduce risks of the partner's health problems or legal penalties and possibly to enhance the nonpecuniary rewards of "respectability."

Co-residence is a characteristic of both cohabitation and marriage. One byproduct of co-residence is relatively easy monitoring of one's partner. It is difficult to hide smoking, binge drinking, or drug use in the household. Of course, one may engage in the behavior outside the house, but "tell-tale" signs (smells on the breath, being obviously drunk or high on drugs, unaccounted for money spent on substances) are often visible to one's partner. And, in any case, both marriage and cohabitation typically involve partners spending more of their social time together, which would allow observation of any substance use occurring within the social life.

Thus, either marriage or cohabitation increases the ease with which partners can monitor each other. If they engage in such monitoring, and in some way negatively sanction their partners if they are "caught" using drugs, then either cohabitation or marriage should reduce both partners' consumption. In common sense terms, the idea is that people may behave better when someone with the power to reward and sanction them is watching, and a characteristic of cohabitation and marriage is that a partner is often watching you. Indeed, in the terms of rational choice theory, a key feature of coresidence is that it reduces the costs of monitoring one's partner. To the extent that partners choose to use some of this power to reduce smoking, drinking, and drug use, we would expect marriage and cohabitation to have a similar effect in reducing substance use.

Rational choice theorists within both sociology (Friedman 1995) and economics (Willis 2000) have made arguments about the effects of coresidence on men and women's ability to monitor each other's parenting behavior. They both argue that incentives for either parent to engage in what the other regards as "good parenting" are reduced when couples break up and thus are less able to monitor the other's expenditures and other parenting behavior. Willis (2000) concludes that this may be one reason that divorced fathers often don't pay child support even when they care about the child's well being; they can't be sure the mother is spending the money on the child. Our argument here is parallel: the monitoring potential of coresidence may have powerful effects on risky behavior, and if this is the operative mechanism of the effects of marriage, then it should pertain to both marriage and cohabitation equally.

A Durkheimian stream of thinking in sociology sees marriage as a means of social integration into bonds with a spouse and sometimes extended family that promote social control (Laub, Nagin and Sampson 1998; Umberson 1987). The theoretical perspectives above can be seen as more specific theories of the mechanisms by which this integration could take place. Indeed, when proponents of the Durkheimian social control view talk about the actual mechanisms by which social integration would promote social control in the service of conventional norms, they deploy a mixture of monitoring and integration into bonds that promote conventional norms. Because monitoring (at least by the spouse) is equally possible in cohabitation and marriage, while the cultural norms of appropriate behavior that attach to the two

institutions may differ, we see one contribution of our analysis to be using differences in the effects of cohabitation and marriage to shed light on which of the mechanisms—if either—is operative.

Past research on effects of marriage and cohabitation on smoking, drinking, and illegal drug use. Umberson (1987) used cross-sectional data from a national sample collected by Geerken and Gove in 1974-1975 to relate marital and parental status to levels of health-related behaviors. She found that divorced and widowed individuals engaged in riskier behaviors and had less orderly lifestyles than married people; in some cases these effects were larger for men than women, but most were of the same magnitude for both sexes. Having children at home was related to significant decreases in some of the risky behaviors.

In a later study, Umberson (1992) used data from the American's Changing Lives Survey to relate marital (this time including never married) and parenting status to a set of health behaviors. The bulk of Umberson's later analyses were also cross-sectional and produce similar results to her earlier study (1987), although the later analysis found no significant differences between the never married and married sample members. Longitudinal data on the small portion of the sample who changed marital status showed that a transition from married to unmarried status was associated with increases in risky health behavior while the transition from unmarried to married was not associated with significant changes in health related behaviors. These transition results are less likely to contain selection bias.

Bachman et al. (1997) used longitudinal data from the Monitoring the Future study to relate changes in drinking, cigarette smoking and drug use to marriage and other demographic states for young adults. Their analysis focused on changes between the study's baseline (the senior year of high school) and a follow-up wave. Their effort to deal with selection bias was to control for the 12th grade score measuring an individual's participation in the behaviors while assessing the relationship between marriage and the later behavior. Controlling for 12th grade behavior, they found a negative association between all types of substance use and marriage but no association between substance use and cohabitation. This suggests a causal effect of marriage. But a weakness of the study is that the controlled 12th-grade level was often many years prior to the marriage. Thus, an equally plausible interpretation of the finding is that those young people who "cleaned up their act" in the 4 or 5 years after high school graduation were more likely to select into marriage. We cannot tell whether the "clean up" was an effect of marriage, or even a close precursor that would be consistent with the decision to marry leading to the change a bit before marriage. A second weakness is that their high-school-senior sample is not fully representative of all youth; it leaves out those who drop out of high school.

As with the Bachman et al. (1997) study, the major critique of past work on salutary effects of marriage is selection bias. This has featured prominently in criticisms of Waite (1995) and Waite and Gallagher (2000). (See, for example, England 2001. See also Fu and Goldman [1996] for evidence that those with worse health and more risky behaviors are less likely to get married.) People who engage in healthier life styles and those with good health may be more likely to select into marriage (Fu and Goldman 1996). While much of the research reviewed by Waite (1995; Waite and Gallagher 2000) on the broadly salutary effects of marriage is open to this critique, Waite's own research with Lillard (Lillard and Waite 1995; see also Lillard and Panis 1996) is less susceptible to this critique because it assessed effects of marriage on men's health with annual longitudinal data, following the same individuals as they moved in and out of marriages, thus using individuals as their own control. It showed helpful effects of marriage on

men's health, but the mechanism remained unclear. Wu and Hart (2002) used longitudinal Canadian data, and showed that exiting either marriage or cohabitation was associated with decreases in physical and mental health.

Our paper will address the weaknesses of past research in two ways. Most important, we will deal with selection bias by using a longitudinal dataset, the National Longitudinal Survey of Youth (NLSY), and carefully examining the timing of changes in risk behavior surrounding life effects. For each of the events we examine, we draw data from an eleven-year window—five years before the life event through five years after the event. This provides a much sharper picture of the nature of changes surrounding the behavior. Second, by using risk behaviors as our dependent variables, we will help clarify the mechanisms underlying the salutary effects of marriage on men's health identified by Lillard and Waite's (1995) longitudinal analysis. If we find that marriage affects risky behavior, this may be one reason it affects men's health. Third, we will examine whether the behavioral effects of marriage and cohabitation differ by sex. If so, it might explain why the health effects of marriage are larger for men than women. Fourth, by using a nationally representative sample we include high school drop-outs who were missing from research from Monitoring the Future. Finally, we will compare the effects of marriage to those of cohabitation, which, as argued above, sheds light on the appropriate theory of causal mechanism—norms or monitoring.

II. Data and Methods

Our analysis utilizes data from the National Longitudinal Survey of Youth 1979 (see http://www.bls.gov/nls/nlsy79.htm) covering survey years 1979 through 1998. Although the NLSY did not ask questions about risk behaviors every year (see Table 1), we use all available data in our analysis. We begin with an examination of each pairing of life event and risk behavior. To illustrate our procedures, suppose we wish to track marijuana use between five years before and five years after marriage. The data records of each individual in the sample are examined to determine the year, if ever, in which his or her first marriage occurred.

[Table 1 here]

Suppose, as in Table 1, that the first marriage year is 1990. In this case, the individual contributes three observations to the data set, with the 1988 observation constituting a "t-2" observation of marijuana use, 1992 constituting a "t+2" observation of marijuana use, and 1994 contributing a "t+4" observation. Individuals with first marriages occurring in other years contribute different configurations of "before" and "after" observations. To account for the fact that our person-year observations are not completely independent from one another, we estimate standard errors using the Huber-White correction.

Pooling across cases, suppose that the resulting data scatter across the 11-year period surrounding marriage and cohabitation produce the best-fitting line segments depicted in Figure 1. Here we have distinguished the period between 60 and 12 months prior to the marriage (labeled "Pre-event" in Figure 1), the 24 months surrounding marriage and the 12 to 60 months "Post-event" period following marriage.

[Figure 1 here]

Substantial reductions in marijuana use in the two years surrounding marriage are depicted for both the men and women in the hypothetical data in Figure 1. But in the case of

women the annual rate of reduction in marijuana use is no greater than it had been in the four years prior to marriage. Are either or both of these reductions a "marriage" effect or are both merely the result of reductions in drug use that occur with age? For men, the hypothetical reduction in marijuana use surrounding marriage indeed appears sharper than during the pre-marriage period, but using only the reductions in the 24-month period surrounding marriage in some sense overstates the "true" reduction due to marriage.

We employ various analytic strategies to gauge the estimated impacts of marriage and cohabitation on drug use. We begin with simple models of change in risk behaviors between the pre- and post-event periods. Second, we estimate separate slopes for the "pre-event," "surrounding" and "post-event" line segments depicted in Figure 1 and test whether each is significantly different from zero. The slope of the "pre-event" segment represents a combination of maturation effects and anticipatory effects that extend more than 12 months prior to the first marriage and cohabitation events. The slope of the "post-event" segment allows for the possibility that the behavior change surrounding the events might have been temporary; people might regress to their "bad habits" after a short "clean up" right around the marriage or cohabitation. We pay particular attention to the slope of the "surrounding" line segment, and view it as a useful but perhaps biased estimate of the reduction in substance use during the 24-month period surrounding marriage and cohabitation.

Third, we estimate the difference in slope between the "surrounding" and "pre-event" line segments. If the "pre" slope reflects reductions in drug use resulting from maturation and other events unrelated to marriage and cohabitation, then the difference in slope between the "surrounding" and "pre" periods better reflects the causal impact of marriage itself.

All of our regressions are performed separately for men and women and control for age at event, race (nonHispanic Black and Hispanic, with white or other as the reference category), years of education completed by the time of the event, and dummy variables for the calendar year in which the event occurred. Our marriage and cohabitation models control for the presence of any children under 10 years of age in the household to avoid attributing to marriage or cohabitation what ought to be attributed to fertility. (Having children may also produce a "cleaning up one's act" effect.) Our marriage models control for possible cohabitation in the period before and after first marriage, and our cohabitation models control for possible marriage in the periods prior or subsequent to the onset of cohabitation. Since most cohabitations either break up or turn to marriage within a few years, these controls allow us to avoid attributing effects to cohabitation in "pre" to "post" comparisons that are really a result of marriages that followed on quickly from the onset of cohabitation. Surprisingly, however, we find that adjustments for subsequent marriage and for prior or subsequent cohabitation and the presence of children have little impact on our estimates.

We use logistic regression for models of whether *any* positive level of the risk behavior was reported but also present estimates from OLS regressions of event frequency (e.g., number of times in the last month the individual smoked marijuana). Because substantial fractions of our samples reported none of the risk behaviors we study, we also estimated our final model using a Tobit regression to account for the fact that our data are effectively truncated at zero.

III. Results: Effects of Marriage and Cohabitation on Substance Use

Descriptive statistics. Descriptive statistics on our samples are presented in Table 2. Sample sizes range from 2,106 person years based on 1,349 women who reported their smoking behavior before and after onset of first cohabitation to 12,419 person years based on 3,004 men whose binge drinking behavior is reported before and after first marriages. As shown in Table 1, the much larger numbers of person years for binge drinking results from the greater frequency of these questions in NLSY survey waves.

[Table 2 here]

The concentration of binge-drinking questions in earlier NLSY waves produces a lower mean age and earlier average calendar year in those samples than in the samples constructed for the other risk behaviors. Completed schooling averages about a year less in the cohabitation samples than in the marriage samples, reflecting the lower marriage rates of individuals with lower education.

Information on the frequency and incidence of reported risk behavior is shown in the bottom panels of Table 2. In almost all cases, the risk behaviors fall in going from the "before" to the "surrounding" to the "after" periods, reflecting an as-yet-undetermined combination of aging and the impact of the event in question. Daily cigarette consumption is similar for men and women, while the monthly frequency of binge drinking and marijuana use are often twice as high for men relative to women. Half of the men reported at least one binge drinking episode in the month preceding the interviews before their marriage or cohabitation, while close to half of cohabiting men and women reported smoking.

Pre- vs. post-event comparisons. We estimated various regression models of risk behavior surrounding marriage and cohabitation. We begin with a simple before vs. after look by pooling all of the "pre" (12 to 60 months prior to the event) and "post" (12 to 60 months after the event) years and estimating a logistic regression with dummy variables indicating whether the given person year is taken from the "surrounding" or "post" period, with the "pre" period dummy serving as the reference group. The first row of Table 3 shows the coefficients from the key "post" dummy variables, which contrast the log odds of engaging in the given risk behavior after versus before the event. Other controls are listed at the bottom of Table 3. Since the average "pre" observation is 37 months prior to the event and the average post observation is 39 months after, the log-odds changes reflected in these coefficients represent total change over 6.3 years.

[Table 3 here]

The estimated coefficients are quite large. Coefficients of -.30 imply a reduction in odd ratios of 26% over the six years, while coefficients of -.5, -1.0 and -1.5 imply respective odds ratio reductions of 39%, 63% and 78%. All of these coefficients are negative and statistically significant, and all of the marriage coefficients are larger than their corresponding cohabitation coefficients. In the case of binge drinking and marijuana use, most marriage coefficients are .3 to .5 more negative than cohabitation coefficients, suggesting an incremental odds-ratio reduction on the order of 25% to 40% over the course of the six-year period surrounding marriage relative to cohabitation. In the case of smoking, coefficient differences are smaller and do not always favor marriage relative to cohabitation.

To eliminate bias from unmeasured persistent differences across the individuals in our sample, we estimated fixed effects logistic models in which all estimates are based on within-person temporal differences from the person's own risk behavior averages. Sample sizes and thus

the precision of coefficient estimates drop, but, as can be seen in the second panel of Table 3, the coefficient estimates are always at least as large as the corresponding coefficients in the first panel of the table. Thus, it does not appear that persistent unmeasured heterogeneity across individuals imparts an upward bias to the simpler logistic estimates. However, it is still quite likely that these coefficients overstate the causal impact of marriage and cohabitation owing to their failure to account for the temporal decline in these risk behaviors that occur with age.

Pre-, surrounding- and post-event slopes. To describe risk trajectories before, surrounding and after the two events we present in Table 4 logistic spline regression coefficients and standard errors based on estimates of the slopes for the "pre-event", "surrounding" and "post-event" periods. Taking the example of binge drinking surrounding marriage for men (presented in the first column of Table 4), it can be seen that the log-odds of binge drinking decline by an insignificant -.031 per year across the 12 to 60 months preceding marriage, decline by a highly significant -.283 per year across the 24 months surrounding marriage, and increase by a marginally significant .047 per year across the 12 to 60-month period following marriage.

[Table 4 here]

Concentrating on the "surrounding" coefficients, one sees that the reductions in the odds of engaging in binge drinking and, in the case of marriage, marijuana use are often quite large. The largest coefficient, -.380, is for the risk of binge drinking for women surrounding marriage. A -.380 coefficient implies that the 2-year period surrounding marriage is associated with an annual decrease in the odds of binge drinking of 32% or a total odds reduction of 53% over the course of the 2-year period.[1] More typical coefficients are -.20, which translate into a 2-year odds ratio reduction of 33%, and -.30, which translate into a 2-year odds reduction of 45%.

Perhaps surprisingly, in no case are the reductions larger for men than women. In the case of binge drinking, the larger female coefficient is significantly different from the male coefficient for both marriage ($p<.015$) and cohabitation ($p<.001$). This greater effect for women is, in part, a function of the focus of these logistic regressions on transitions from some risk behavior to none. The frequency with which women reported engaging in these risk behaviors is typically much less than for men (Table 2), which increases their chances of stopping altogether. When the same model is estimated with an OLS regression, the male coefficients are more negative than the female coefficients for all three substances in the case of marriage, for marijuana and binge drinking this difference is significant at the .01 level.

Both binge drinking and marijuana use are more responsive to marriage than to cohabitation. In the case of binge drinking, the heightened reductions in risk amount to about .2 log-odds units per year, or a reduction in the odds of binge drinking in the 24 months surrounding marriage that is 33% larger than the analogous reduction around cohabitation. These differences are statistically significant for both men ($p<.000$) and women ($p<.058$). In the case of marijuana use for men, both of the "surrounding" coefficients are statistically significant for marriage, while neither of the corresponding coefficients is significant for cohabitation (the difference between the two sets of coefficients is also about -.2 log-odds units per year). By this accounting, marriage appears to produce more of a reduction in risky behavior than does cohabitation. Smoking behavior appears virtually unaffected by marriage and cohabitation; none of the "surrounding" time trends are statistically significant. We speculate below as to why this might be the case.

More highly educated respondents, and Black and Hispanic respondents reported engaging less often in all three risk behaviors. Age-at-event coefficients are generally positive, indicating that older cohorts are, ceteris paribus, more likely to engage in binge drinking and smoking.

Final noteworthy features of Table 4 are the coefficients on the marriage, cohabitation and fertility measures in the bottom panel of the table. Marriage coefficients in the cohabitation regressions are uniformly large and negative, indicating that years following onset of cohabitation in which the individual was married are associated with a much lower degree of risk behavior. In contrast, years prior to marriage in which the individual was cohabiting typically show higher rates of marijuana use and, for men, binge drinking than the pre-marriage years not involving cohabitation. This is further evidence that cohabitation does not produce the reductions in risk behavior produced by marriage. The presence of children in the household is generally associated with less risk behavior.[2]

Pre- vs. surrounding-event slopes. Although useful, the coefficients on the "surrounding" slopes of Table 4 are still likely to be upwardly biased by the temporal decline in risk behavior that occurs with age. Since the "pre" segment may also include this aging effect, the difference in slope between the "surrounding" and "pre" segments can perhaps be regarded as the least biased and most conservative estimate of the causal impacts of marriage and cohabitation on these risk behaviors.

Table 5 presents the key coefficients reflecting the additional reductions in risk behavior immediately surrounding marriage and cohabitation relative to the years leading up to the marriage or cohabitation. As with Table 4, all of these estimates in the top panel of Table 5 come from logistic spline regressions with the full set of control variables, but in this case we present coefficients and standard errors that reflect the size and statistical significance of the difference between the "surrounding" coefficient and the "before" coefficient.[3] The second panel in Table 5 repeats these regressions using OLS on the frequency of monthly (in the case of binge drinking and marijuana use) and daily (in the case of cigarette smoking) risk behavior. In contrast, the top panel's emphasis on stopping the behavior altogether, the bottom panel shows changes in the total volume of drug use. The final panel of Table 5 shows results from the same set of regressions using a Tobit model. Coefficients reflect the marginal effects evaluated at the means of all the variables.

[Table 5 here]

Binge drinking. By the accounting in Table 5, which is based on differences between surrounding and before spline slopes, marriage produces significant, sizable (~40% over two years) and roughly comparable decreases in the odds of binge drinking for men and women. For men, half of whom reported monthly binge drinking during the five years before marriage (Table 2), the -.251 coefficient translates into a reduction in the fraction engaging in monthly binge drinking from .50 to .37 -- a 25% reduction (Table 6). For women, their -.303 coefficient translates into a reduction in the fraction binge drinking from .27 to .15 -- a 44% reduction.

[Table 6 here]

Coefficients in the middle panel of Table 5 also show statistically significant reductions in the total number of binge drinking episodes for both men and women, but in this case the magnitude of the declines appears twice as large for men as for women, although this difference

is not significant (Table 7). The -.235 coefficient for men translates into a reduction of .47 binge drinking episodes per month over the two-year period surrounding marriage, which amounts to 21% of the 2.21 pre-marriage episode average shown in Table 2 (Table 6). The -.116 coefficient for women translates into a reduction of .23 episodes per month over the two years, which is 27% of their pre-marriage average. The Tobit results are very similar to the OLS results.

In contrast to marriage, the impacts of cohabitation on binge drinking are stronger for women than men. Women report statistically significant drops in both the amount of binge drinking and whether they engaged in any of it, while for men the binge drinking trajectories are no different than they had been during the 12 to 60-month period prior to marriage. The gender difference is significant ($p < .033$) in the logistic model but not in the OLS model. For women the reductions in binge drinking associated with cohabitation are comparable to those associated with marriage.

[Table 7 here]

Marijuana use. In the case of marijuana use, marriage coefficients are generally larger than cohabitation impacts. The only statistically significant impact is for men surrounding marriage, with both incidence and volume of use dropping by half over the course of the two years (Table 6). Both coefficients for men surrounding marriages are larger than corresponding coefficients for men surrounding cohabitation, although only in the OLS models for males are the differences statistically significant. While the same qualitative pattern holds for women as men, none of the coefficients, or coefficient differences, attains statistical significance.

Smoking. There are no significant reductions in smoking with either event for either sex. In fact, smoking trends are positive and significant in the case of marriage. Looking back to the "pre" and "surrounding" coefficients in Table 4, we see that the slope of the "surrounding" trajectory for women is flat, while the slope preceding marriage is quite negative. Thus, marriage appears to flatten a highly significant negative trajectory, producing the positive coefficient in Tale 5.

IV. Conclusion

Data from the National Longitudinal Survey of Youth suggest that marriage and, to a lesser degree, cohabitation are associated with reductions in binge drinking and marijuana use for both men and women. Smoking appears unresponsive to both of these events.

Our different methods provide a variety of impact estimates. Our preferred model focuses on the difference between reductions in risk behavior surrounding marriage or cohabitation compared with the period one to five years prior to these events. These results suggest significant reductions in binge drinking surrounding marriage for both men and women, reductions in binge drinking surrounding cohabitation for women, and reductions in marijuana use surrounding marriage for men. Smoking is not reduced by either event for either men or women.

The clearest finding is of reductions in risk behavior surrounding marriage. Should we be worried that this finding reflects selection bias rather than a causal effect? We think not. The "clean-cut" crowd undoubtedly selects disproportionately into marriage, but that fact does not explain our finding here. Our estimates are based only on individuals who marry and compare their substance use before, around the time of, and after marriage. The other potential bias that

the skeptical reader might worry about is whether we have attributed an aging process to marriage. Most illegal and risky behaviors decline with age. Since our "pre-event" measures of risk behavior occurred at earlier ages, on average, than post-event measures, we were concerned that we might conflate attribute effects of aging to marriage. The models that we deem to most clearly eradicate this problem are those in Table 5 that show how much faster the reduction in the risk behavior is occurring in the period just surrounding the event compared to its rate in the period before. These models show clear effects of marriage.

It is possible that the lack of effects for smoking (for men or women of cohabitation or marriage) mean that smokers select other smokers as partners to a greater degree than is true for binge drinking or marijuana use. Since a smoker may be unlikely to try to persuade another smoker to quit, preferring a "truce" of smoking together, if "monitoring" is the mechanism, greater partner selection on smoking would be consistent with few effects of marriage or cohabitation on smoking. But our other evidence of the larger effects of marriage than cohabitation suggest that norms institutionalized into associations with marriage is the important mechanism. While informal norms (and formal regulations) have become dramatically more anti-smoking in the last two decades, the recency of these changes may not have allowed smoking to become as attached to cultural notions of the "wild single life" that one is expected to give up upon marriage as is true for the binge drinking and marijuana use, allowing couples in which both parties smoke to focus on other parts of the meanings of marriage. One might wonder if effects of marriage on smoking simply take too long to be captured here, or possibly occur only after having a child. However, the fact that the smoking slopes after the event as well as the estimated impacts of having a child in the household (Table 4), while negative, are never significant, argues against this interpretation.

What do the findings imply for theory? We conclude that it is strongly institutionalized norms associated with marriage rather than the opportunity that co-residence provides for monitoring one's partner that reduce behavior such as binge drinking and marijuana use. The social control provided by the "social integration" of marriage apparently works mostly through the normative expectations about how married persons behave. If monitoring were the key mechanism leading to the "clean ups" we observed, then we should find similar effects of cohabitation and marriage. But the effects of marriage are generally larger. Indeed, while there is some suggestion of smaller effects of cohabitation, some of our estimation techniques show no effects of cohabitation at all. (The one exception is significant effects of cohabitation for women's drinking. But it seems strained to interpret this as evidence of monitoring, because even absent the various models showing no effects, it is unlikely that men care more about their female partners' drinking than vice versa.) Cohabitation may be an "incomplete institution" with less clear expectations that spouses give up risky behavior. The less demanding informal norms surrounding cohabitation may be part of its appeal, while simultaneously explaining why it does less to get women or men to "clean up their act."

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Appendix on Dataset Construction

NLSY79 data from 1979 through 1998 were utilized in constructing the datasets. The risk behavior reports were taken from all the years in which they were asked (see Table 1). First marriage dates were calculated from the NLSY's date of first marriage variable. For each individual who had a date of first marriage in any year of the survey between 1979 and 1998, the most recent record of such a date was used. First cohabitation was calculated by using the date of the first NLSY interview in which an individual was recorded as living with a member of the opposite sex as a partner. After consultation with the NLSY staff at Ohio State University, we used the following variables to indicate if an individual was cohabitating in each year: i) in 1979 through 1981 the household roster information was used; ii) in 1982 through 1987, 1993, 1996, and 1998 a single variable indicating if the individual was living with a "partner of the opposite sex" was used; iii) in 1988 through 1992 and in 1994 two similar variables were used that each indicated living with a partner. In this last group of years two variables were used because of inconsistencies in the data; both of these variables exist in all of the years after 1982 but are identical in most years. Due to errors in skip patterns in 1988 through 1992 and in 1994, the variables were not identical. An indication of cohabitating on either variable was used to trigger inclusion of the interview date in the date of first cohabitation variable (if there was no indication of cohabitation in an earlier year).

A separate dataset was constructed for each risk behavior/event/gender combination (e.g., binge drinking and marriage for women). All individuals who experienced the event prior to the first observation of the risk behavior or had never experienced the event were dropped from the dataset. The person-based data records were then broken up into person-year data in which each non-missing value of risk behavior within five years of the event was turned into a separate observation. For the smoking and marijuana datasets, only individuals who experience first marriage or first cohabitation in 1984 or later were included. For binge drinking individuals that experienced first marriage or cohabitation in 1982 or later were included.

Gender and race were taken from the 1979 NLSY wave. The race variable in the survey has three categories: Black, Hispanic, and Other (which includes white). We made two dummy variables out of this variable leaving the Other group as the excluded category. Age was calculated at the time of the event. We used years of education in year of event if available. Because the year of marriage was not always in a survey year and because of missing data we used education from the years surrounding the event if it was not available in the year of the event. If education in year of event was not available we used the first available of: one year before event, one year after event, two years before event, or two years after event. If none of these were available then the variable was coded to missing.

Some of our analyses control for marriage, cohabitation and child-in-household status in each person year. The "child-in-household"' variable was created by using the household roster information in the given person year. A dummy variable was coded 1 if anyone living in the household was under the age of 10 and 0 otherwise. The married variable was also created from household roster information in the given person year. A person was coded as living with a spouse if they listed their relationship to anyone in the household as "spouse." The cohabiting variable was created using the same set of variables used to determine year of first cohabitation. Specifically, a dummy was coded 1 if the person indicated a cohabiting relationship in the given person year and 0 otherwise. An additional variable of "Cohabiting status unknown" was also

created because prior to 1987 not all respondents were asked about cohabitation status; only those living on their own (not with their parents, in dorms, or in military housing) were asked these questions. All individuals whose response to the cohabitation question in a given year was missing (for any reason) were coded as having an unknown cohabitation status. In our final datasets virtually all of those coded as missing were from the years 1982 to 1985. In these years the majority of respondents who were not living on their own were living with their parents.

Figure 1: Hypothetical trajectories of marijuana use "pre", "surrounding" and "post" marriage

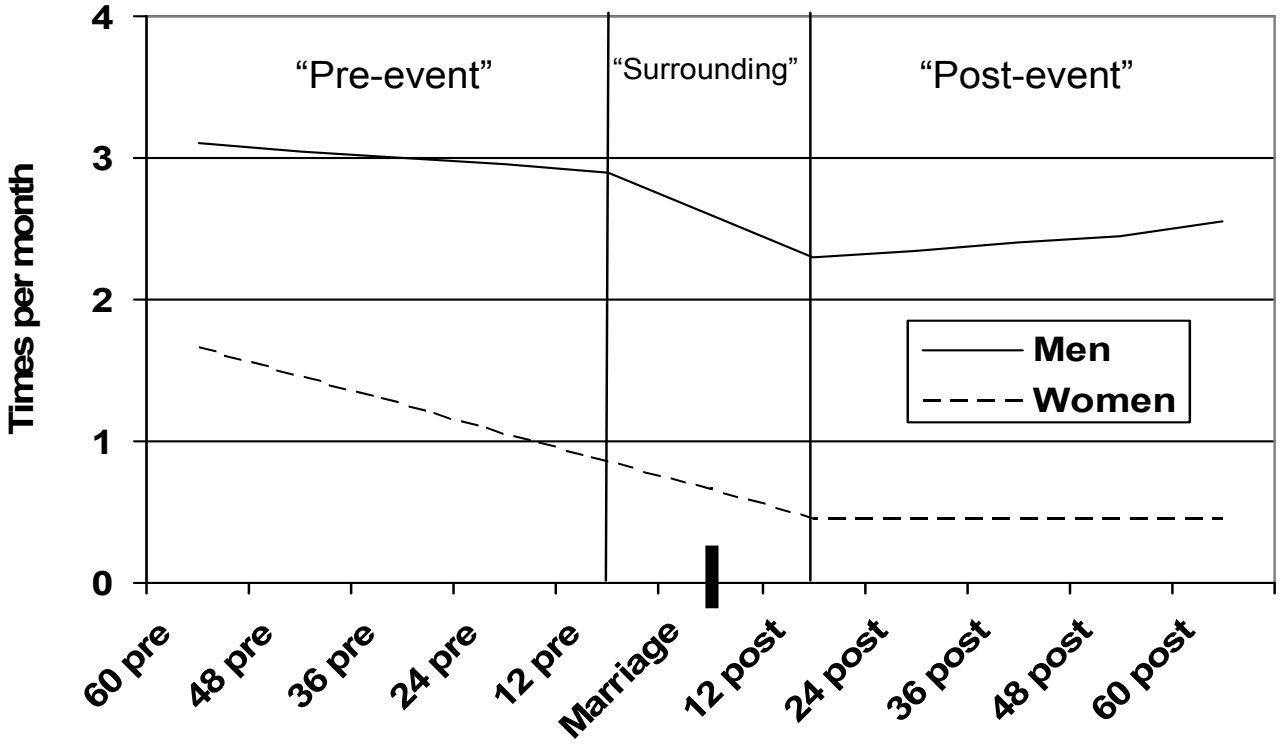

Table 1: Years in Which Risk Behavior Questions Were Asked in the NLSY79

	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98
Last month:																	
# of cigarettes smoked per day			**x**								**x**		**x**				**x**
# occasions 6+ drinks at once	**x**	**x**	**x**	**x**			**x**	**x**					**x**				
# of occasions used marijuana or hashish			**x**				**x**		**M**		**x**		**x**				**x**

Note: "M" denotes a hypothetical year of marriage (see text). x's denote years in which risk behavior questions were asked in the NLSY.

Table 2: Means, Standard Deviations, and Sample Size by Dataset

	Binge Drinking				Marijuana				Smoking			
	Marriage		Cohab		Marriage		Cohab		Marriage		Cohab	
	M	F	M	F	M	F	M	F	M	F	M	F
Age	25.05	24.43	25.79	25.08	27.52	27.17	28.08	27.69	28.23	27.94	28.74	28.43
	(3.40)	(3.49)	(3.51)	(3.69)	(4.00)	(4.14)	(3.91)	(4.17)	(4.18)	(4.36)	(4.08)	(4.35)
Calendar year	85.95	85.57	86.58	86.03	88.76	88.51	89.14	88.75	89.51	89.32	89.82	89.51
	(3.06)	(2.99)	(3.18)	(3.10)	(3.61)	(3.68)	(3.46)	(3.55)	(3.84)	(3.92)	(3.67)	(3.81)
Education	12.74	13.11	12.07	12.41	13.19	13.57	12.29	12.58	13.26	13.64	12.33	12.63
	(2.38)	(2.17)	(2.19)	(2.19)	(2.50)	(2.32)	(2.25)	(2.25)	(2.51)	(2.36)	(2.25)	(2.24)
Monthly frequency of risk behavior by period around event												
60 months before to 12 months before event	2.21	.86	2.68	1.18	2.98	1.50	4.30	2.07	5.65	4.77	7.95	7.53
	(3.30)	(2.02)	(3.62)	(2.41)	(8.49)	(5.82)	(9.93)	(6.59)	(9.44)	(8.39)	(10.86)	(10.41)
24 months surrounding event	1.78	.53	2.55	1.02	2.06	1.11	3.92	2.05	5.64	4.06	7.37	7.61
	(2.94)	(1.50)	(3.48)	(2.25)	(7.01)	(5.09)	(9.81)	(6.77)	(9.56)	(7.86)	(10.48)	(10.46)
12 months after to 60 months after event	1.60	.41	2.25	.83	1.60	.92	2.67	1.47	3.72	3.12	6.24	5.36
	(2.85)	(1.36)	(3.36)	(2.07)	(5.96)	(5.05)	(7.67)	(5.80)	(8.12)	(7.52)	(10.26)	(8.97)
Proportion of individuals participating in risk behavior by period around event												
60 months before to 12 months before event	.503	.270	.566	.338	.194	.120	.262	.167	.355	.346	.483	.478
	(.500)	(.444)	(.496)	(.473)	(.396)	(.325)	(.440)	(.373)	(.479)	(.476)	(.500)	(.500)
24 months surrounding event	.462	.194	.578	.303	.137	.082	.236	.147	.349	.285	.441	.456
	(.499)	(.396)	(.494)	(.460)	(.344)	(.275)	(.425)	(.355)	(.477)	(.452)	(.497)	(.499)
12 months after to 60 months after event	.418	.152	.511	.253	.102	.054	.165	.098	.222	.202	.350	.346
	(.493)	(.359)	(.500)	(.435)	(.303)	(.225)	(.371)	(.298)	(.416)	(.401)	(.477)	(.476)
Number of observations	12419	11060	7781	7372	5412	4360	3981	3290	3582	2856	2645	2106
Number of individuals	3004	2609	2052	1845	2299	1868	1669	1401	2278	1852	1619	1349

Table 3: Logistic Regression Models of Change in Risk behaviors Before vs. After Marriage and Cohabitation

	Binge Drinking				Marijuana Use				Smoking			
	Marriage		Cohab		Marriage		Cohab		Marriage		Cohab	
	M	F	M	F	M	F	M	F	M	F	M	F
After vs. Before	**-.504** [c]	**-.733** [c]	**-.212** [c]	**-.303** [c]	**-.990** [c]	**-.988** [c]	**-.634** [c]	**-.588** [c]	**-.424** [c]	**-.607** [c]	**-.386** [c]	**-.417** [c]
	(.054)	(.075)	(.057)	(.065)	(.105)	(.140)	(.089)	(.116)	(.114)	(.130)	(.102)	(.126)
Cases	12171	10877	7571	7203	5315	4272	3878	3219	3517	2787	2574	2062
Fixed effect logit After vs. Before	**-.731** [c]	**-1.023** [c]	**-.289** [c]	**-.555** [c]	**-1.437** [c]	**-1.256** [c]	**-.969** [c]	**-1.176** [c]	**-1.107** [c]	**-.700** [b]	**-.902** [c]	**-.455** [a]
	(.077)	(.096)	(.076)	(.084)	(.185)	(.225)	(.132)	(.178)	(.331)	(.299)	(.239)	(.255)
Cases	7073	4798	4531	3952	1003	575	1077	610	356	308	335	288

[a] indicates $p \leq .10$, [b] indicates $p \leq .05$, [c] indicates $p \leq .01$

Standard errors are given in parentheses. Huber White corrections have been made for the first regression. The first regression controls for age at event, education, Hispanic, Black, and dummies for calendar year of event. Both models include a dummy variable for child under 10 living in the house. In both cohabitation analyses a dummy for being married is included, while in the analyses of marriage there is a dummy for cohabiting and another that indicates cohabiting status is unknown.

Table 4: Annual Change in Log-Odds of Risk Behavior Before, Surrounding, And Following Marriage And Cohabitation

	Binge Drinking				Marijuana Use				Smoking			
	Marriage		Cohab		Marriage		Cohab		Marriage		Cohab	
	M	F	M	F	M	F	M	F	M	F	M	F
Before event	-.031	**-.078** [c]	-.004	.027	**-.087** [a]	**-.120** [a]	**-.119** [b]	**-209** [c]	**-.124** [b]	**-.243** [c]	**-.143** [b]	-.065
	(.022)	(.029)	(.028)	(.031)	(.047)	(.072)	(.047)	(.062)	(.060)	(.073)	(.059)	(.068)
24 months around event	**-.283** [c]	**-.380** [c]	-.023	**-.204** [c]	**-.366** [c]	**-.343** [c]	-.102	-.152	-.017	.052	.061	-.083
	(.038)	(.053)	(.047)	(.048)	(.076)	(.113)	(.078)	(.107)	(.088)	(.105)	(.090)	(.099)
After event	**.047** [a]	.049	**-.097** [c]	.029	-.052	-.042	-.073	.028	-.064	-.060	-.062	-.022
	(.025)	(.035)	(.033)	(.038)	(.047)	(.066)	(.047)	(.066)	(.041)	(.050)	(.041)	(.051)
Child	-.046	**-.365** [c]	-.040	**-.401** [c]	.134	-.224	**.185** [a]	**-.254** [b]	.106	-.105	.090	-.157
	(.055)	(.075)	(.064)	(.075)	(.106)	(.138)	(.100)	(.130)	(.109)	(.111)	(.108)	(.115)
Married	NA	NA	**-.382** [c]	**-.549** [c]	NA	NA	**-.646** [c]	**-.736** [c]	NA	NA	**-.365** [c]	**-.309** [b]
			(.075)	(.083)			(.126)	(.162)			(.133)	(.143)
Cohabiting	**.324** [c]	.068	NA	NA	**.365** [c]	**.419** [c]	NA	NA	.070	.200	NA	NA
	(.085)	(.095)			(.129)	(.158)			(.156)	(.159)		
Cohabiting unknown	**-.316** [c]	**-.249** [c]	NA	NA	**-.495** [c]	**-.792** [c]	NA	NA	-.129	**-.448** [c]	NA	NA
	(.059)	(.076)			(.134)	(.194)			(.119)	(.136)		
Age	**.028** [b]	**.055** [c]	.002	.015	.004	.007	**-.049** [b]	.005	**.042** [a]	**.064** [b]	.034	**.083** [c]
	(.014)	(.017)	(.017)	(.017)	(.024)	(.032)	(.024)	(.029)	(.023)	(.027)	(.026)	(.027)
Education	**-.087** [c]	**-.152** [c]	**-.065** [c]	**-.098** [c]	**-.127** [c]	**-.120** [c]	**-.052** [b]	**-.050** [a]	**-.334** [c]	**-.298** [c]	**-.291** [c]	**-.304** [c]
	(.013)	(.018)	(.017)	(.018)	(.022)	(.030)	(.023)	(.030)	(.026)	(.031)	(.030)	(.033)
Hispanic	-.099	**-.838** [c]	**-.257** [b]	**-.456** [c]	**-.365** [b]	**-.645** [c]	**-.647** [c]	**-.551** [c]	**-.618** [c]	**-.939** [c]	**-.820** [c]	**-1.113** [c]
	(.080)	(.107)	(.101)	(.114)	(.150)	(.213)	(.155)	(.197)	(.150)	(.160)	(.163)	(.179)
Black	**-.791** [c]	**-1.024** [c]	**-.907** [c]	**-.739** [c]	**-.345** [c]	**-.423** [b]	**-.539** [c]	.032	-.175	**-.327** [b]	**-.343** [c]	**-.247** [a]
	(.071)	(.103)	(.077)	(.101)	(.121)	(.171)	(.109)	(.161)	(.118)	(.138)	(.121)	(.145)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	.034	.065	.038	.042	.052	.064	.065	.065	.115	.107	.095	.110
N	12171	10877	7571	7203	5315	4272	3878	3219	3517	2787	2574	2062

[a] indicates $p \leq .10$, [b] indicates $p \leq .05$, [c] indicates $p \leq .01$, NA indicates variable not applicable and therefore not included in regression. Huber-White standard errors are given in parentheses.

Table 5: Logistic and OLS Models Comparing Annual Slopes of Risk behavior in the Surrounding vs. Before Event Periods

	Binge Drinking				Marijuana Use				Smoking			
	Marriage		Cohab		Marriage		Cohab		Marriage		Cohab	
	M	F	M	F	M	F	M	F	M	F	M	F
Logistic model of whether engaged in the behavior in "surrounding" versus "pre" years												
	-.251 [c]	**-.303** [c]	-.019	**-.230** [c]	**-.279** [b]	-.224	.017	.057	.107	**.295** [a]	.204	-.018
	(.053)	(.071)	(.069)	(.071)	(.111)	(.169)	(.115)	(.155)	(.134)	(.161)	(.138)	(.148)
Cases	12171	10877	7571	7203	5315	4272	3878	3219	3517	2787	2574	2062
OLS model of amount of risk behavior in "surrounding" versus "pre" years												
	-.235 [c]	**-.116** [b]	-.059	**-.153** [b]	**-.745** [b]	-.112	.173	.346	-.103	**1.070** [b]	.241	-.242
	(.080)	(.051)	(.103)	(.077)	(.291)	(.216)	(.422)	(.343)	(.457)	(.421)	(.714)	(.599)
Cases	12171	10877	7571	7203	5315	4272	3878	3219	3517	2787	2574	2062
Tobit model of amount of risk behavior in "surrounding" versus "pre" years – marginal effects at means												
	-.301 [c]	**-.158** [c]	-.047	**-.183** [c]	**-.564** [b]	-.155	.115	.178	.130	.800	.489	-.236
	(.081)	(.041)	(.117)	(.070)	(.258)	(.204)	(.403)	(.292)	(.587)	(.567)	(.888)	(.945)
Cases	12171	10877	7571	7203	5315	4272	3878	3219	3517	2787	2574	2062

[a] indicates $p \leq .10$, [b] indicates $p \leq .05$, [c] indicates $p \leq .01$

Note: coefficients are obtained from spline regressions in which the slope for the 24-month period surrounding the event is subtracted from the slope for the period between 60 and 12 months prior to the event. Significance test show whether the slope of the "surrounding" period differs from the slope of the "pre" period. Controls include age at event, education, Hispanic, Black, dummies for calendar year of event, whether a child under 10 living in the house. In addition, in the analyses of cohabitation a dummy for being married is included while in the analyses of marriage there is a dummy for cohabiting and another that indicates cohabiting status is unknown.

Huber-White standard errors are given in parentheses.

Table 6: Summary Table of Impacts Of Marriage and Cohabitation on The Incidence and Volume Of Binge Drinking, Marijuana Use And Smoking

	Marriage impacts				Cohabitation impacts			
Risk behavior	Men		Women		Men		Women	
	Whether any	Times per month/day	Whether any	Times per month/day	Whether any	Times per month/day	Whether any	Times per month/day
Binge drinking								
Base rate[1]	.50	2.21	.27	.86	.57	2.68	.34	1.18
Two-year estimated impact[2]	-.13	-.47	-.12	-.23	ns	ns	-.10	-.30
Two-year percentage impact[3]	-25%	-21%	-44%	-27%	ns	ns	-30%	-26%
Marijuana use								
Base rate[1]	.19	2.98	.12	1.50	.26	4.30	.17	2.07
Two-year estimated impact[2]	-.09	-1.49	ns	ns	ns	ns	ns	ns
Two-year percentage impact[3]	-45%	-50%	ns	ns	ns	ns	ns	ns
Smoking								
Base rate[1]	.36	5.65	.35	4.77	.48	7.95	.48	7.53
Two-year estimated impact[2]	ns	ns	.13	2.14	ns	ns	ns	ns
Two-year percentage impact[3]	ns	ns	+39%	+45%	ns	ns	ns	ns

Notes:
Binge drinking and marijuana rates are times per month. Smoking rates are cigarettes per day.
ns = coefficient not statistical significant at .10 level
[1] Mean fraction engaging in behavior or mean amount of behavior in period before the event from Table 2.
[2] In the case of "whether any," the estimated impact is calculated as: [2ß (p*(1-p))], where ß is the logistic coefficient and p is the mean fraction engaging in behavior before the event. In the case of "times per month/day", the estimated impact is calculated as twice the OLS coefficient.
[3] Two year estimated impact divided by the base rate.

Table 7: Summary table of significant differences between impacts for men and women and differences between impacts for marriage and cohabitation

	Binge Drinking				Marijuana Use				Smoking			
	Gender Difference*		Marriage/Cohab Difference**		Gender Difference*		Marriage/Cohab Difference**		Gender Difference*		Marriage/Cohab Difference**	
	Marr	Cohb	Male	Female	Marr	Cohb	Male	Female	Marr	Cohb	Male	Female
Logistic model of whether engaged in the behavior in "surrounding" versus "pre" years												
	ns	p< .033	p< .006	ns	ns	ns	ns	ns	ns	ns	ns	p< .076
OLS model of amount of risk behavior in "surrounding" versus "pre" years												
	ns	ns	ns	ns	p< .081	ns	p< .084	ns	p< .059	ns	ns	p< .041

Notes:
ns = coefficient not statistical significant at .10 level
*Gender differences calculated from fully interacted models. Significance level shown is that of the difference in slope of the "surrounding" segment as opposed to the "pre" segment.
**Marriage/Cohabitation differences calculated from an interacted model. Interactions with variables that only appear in one of the separate equations (being married, cohabitating, and cohabitating unknown) were not included. In addition, a few of the dummies for calendar year had to be combined because some years only had first marriages and not cohabitations. Significance level shown is that of the difference in slope of the "surrounding" segment as opposed to the "pre" segment.

[1] A -.380 logit coefficient translates into an odds ratio of .684 – a 32% reduction per year. A -.380 annual log-odds reduction maintained for 2-years translates into an odds ratio of .468 – a 53% reduction over the 2-year period.

[2] The marriage variable in the cohabitation models can be positive for years before or after cohabitation. Similarly, the cohabitation variable in the marriage models can be positive before or after marriage. The spline coefficients change relatively little when the marriage, cohabitation and child measures were added to the regression. We could not estimate a fixed-effects version of the spline models since very few individuals had more than one observation in the crucial "surrounding" period.

[3] Coefficients and standard errors on all of the control variables are identical in the corresponding regressions in Tables 4 and 5 since the form of the equations used to calculated these two different versions of the splines are identical. In both versions, the spline variables for all three segments are equivalent transformations of the continuous variable for years before or after marriage or cohabitation.