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ALCOHOL AND MARIJUANA USE ACROSS THE TRANSITION TO MARRIAGE:

GROUP DIFFERENCES AND PSYCHOSOCIAL FACTORS

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ABSTRACT

It has been well-established that alcohol and marijuana use levels tend to decline during the transition to marriage, or the transition from single to married status, during young adulthood (~ ages 18 to 30; e.g., Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997; Curran, Muthén, & Harford, 1998; Miller-Tutzauer, Leonard, & Windle, 1991). However, several questions remain regarding marriage-related declines in substance use. First, to what extent does the transition to marriage account for age-related declines in alcohol and marijuana use following the early twenties? Second, to what extent do marriage-related declines in alcohol and marijuana use differ by individual characteristics (i.e., age at marriage, gender, and race)? And third, do social influences (i.e., the average amount of time spent with friends, the number of friends who use alcohol and marijuana, and friends' approval of these substances) and attitudes regarding substance use (i.e., approval of alcohol and marijuana use) help explain marriage-related declines in alcohol and marijuana use? To answer to these questions, the present study used multilevel modeling to examine marriage-related change in the frequency of alcohol use, drunkenness, and marijuana use between ages 17 and 27 among 1,644 participants from the longitudinal National Youth Survey (Elliott, Huizinga, & Menard, 1989). Results indicated that the transition to marriage explained 46% of age-related declines in alcohol use, 82% of age-related declines in drunkenness, and 5% of age-related declines in marijuana use between the early and late twenties. Women and whites experienced significantly greater declines in alcohol use frequency during the transition to marriage than men and nonwhites. However, marriage-related declines in each type of substance use frequency did not significantly differ by age at marriage, and marriage-related declines in drunkenness frequency and marijuana use frequency did not significantly differ by gender or race. Marriage-related declines in time spent with friends helped explain marriage-related declines in each type of substance use frequency. In addition, marriage-related declines in participants' approval of alcohol use helped explain declines in alcohol use frequency. However, marriage-related declines in each type of substance use were not explained by friends' substance use, friends' approval of substance use, and participants' approval of drunkenness and marijuana use. Future research on the potential role of marriage-related responsibilities, marital quality, and leisure time in marriage-related declines in substance use is suggested.

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CHAPTER 1. INTRODUCTION

High levels of alcohol and marijuana use can be harmful to health and well-being (Bondy, 1996; Okoro, Brewer, Naimi, Moriarty, Giles, & Mokdad, 2004; Patton, Coffey, Carlin, Degenhardt, Lynskey, & Hall, 2002; Rehm, Gmel, Sempos, & Trevisan, 2003). As a result, much research has examined the prevalence of declines in levels of use and factors that may influence or co-occur with declines. One event that is strongly associated with declines in both level and likelihood of alcohol and marijuana use is the transition into marriage, which typically occurs during young adulthood, roughly ages 18 to 30 (e.g., Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997; Miller-Tutzauer, Leonard, & Windle, 1991). The study of declines in level and likelihood of substance use across the transition to marriage provides information regarding the development of this potentially addictive, risky, and harmful behavior, and the role of social roles and life events in that development.

Reductions in likelihood and level of alcohol and marijuana use during the transition into marriage have been well documented, as will be explained below (e.g., Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997; Miller-Tutzauer et al., 1991). However, several questions remain. Although alcohol and marijuana use rates tend to decline between the early and late twenties, and marriage rates increase during this age period, the extent to which the transition to marriage accounts for age-related declines in alcohol and marijuana use is as yet unclear.

In addition, group differences in marriage-related declines in substance use, or *for whom* these declines occur, have not been well-established. The degree of declines in use following marriage may differ by age at marriage, gender, and race because of these group differences in overall rates of use (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Chen & Kandel, 1995; Cohen, Kasen, Chen, Hartmark, & Gordon, 2003; Nielsen, 1999). Therefore, the current study sought to determine if age at marriage, gender, and race moderate the association between the transition to marriage and frequency of alcohol and marijuana use.

Furthermore, little is known about *why* or *how* declines in level of alcohol and marijuana use

occur during the transition to marriage. Because substance use is often a social behavior, it is possible that normative decreases in time spent with friends and peer substance use help explain why alcohol and marijuana use decline during this transition. In addition, because of the social expectations of low levels of substance use among those who are married, individuals' approval of alcohol and marijuana use and their friends' approval of their own use may help explain marriage-related declines in substance use (e.g., Bachman, O'Malley, Schulenberg, Johnston, Bryant, & Merline, 2002; Leonard & Mudar, 2003; Labouvie, 1996; Osgood, Wilson, O'Malley, Bachman, & Johnston, 1996). The current study used multilevel modeling to determine if these factors mediate the association between the transition to marriage and frequency of alcohol and marijuana use during young adulthood (ages 18 to 27) using data from the National Youth Survey (NYS; Elliott, Huizinga, & Menard, 1989; Elliott, Huizinga, & Morse, 1986; Esbensen & Elliott, 1994).

Age Trends in Alcohol and Marijuana Use During Young Adulthood

On average, compared with other age periods, individuals are most likely to use alcohol and marijuana during their early twenties, and likelihood of use tends to decline thereafter (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Chen & Kandel, 1995, 1998; Gotham, Sher, & Wood, 1997). They also tend to report their highest levels of alcohol and marijuana use during this age period, such as use in the past month or year (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997), high frequency use (Chen & Kandel, 1995), relative highest use (Chen & Kandel, 1995), frequency of heavy drinking (typically defined as five or more drinks in a row in a single drinking episode) in the past two weeks (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Muthén & Muthén, 2000; Schulenberg, O'Malley, Bachman, & Johnston, 2005), and daily use (Chen & Kandel, 1995).

Furthermore, likelihood of alcohol use (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Chen & Kandel, 1995), frequency of intoxication (Gotham et al., 1997), likelihood of heavy drinking (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997), frequency of heavy drinking (Muthén & Muthén, 2000), and likelihood of marijuana use (Bachman,

Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Chen & Kandel, 1995, 1998) tend to decline between the early twenties and thirties. For instance, using data from the national longitudinal Monitoring the Future study, Bachman, Wadsworth, O'Malley, Johnston, and Schulenberg (1997) found that the percentage of people reporting having engaged in heavy drinking at least once in the past two weeks declined from roughly 55% of men and 32% of women at ages 19-22 to 36% of men and 15% of women at ages 31-32. The prevalence of marijuana use also declined over this age period, from 52% of men and 43% of women reporting use in the past year at ages 19-22 to 24% of men and 14% of women at ages 31-32. General alcohol use (i.e., at least once in the past month or year) is more common than heavy drinking and marijuana use, and likelihood of use does not decline to a large degree beyond the early twenties. For instance, Bachman, Wadsworth, O'Malley, Johnston, and Schulenberg (1997) found that 83% of men and 75% of women reported drinking alcohol at least once in the past month at ages 19-22, dropping only slightly to 76% of men and 64% of women at ages 31-32.

Social Role Transitions in Young Adulthood and Alcohol/Marijuana Use

Young adulthood is not only a time of great change in substance use levels, but of social roles as well. Between the late teens and early thirties, individuals typically experience several important social role transitions, such as transitions out of the parental home, out of the student role, into the full-time worker role, and into the family roles of marriage and parenthood. Role occupancy rates in the year 2000 in the United States by age, gender, and race are presented in Table 1. For instance, according to this table, by age 20 the majority are not enrolled in post-secondary school, and by age 25 the majority of individuals are no longer living with their parents, and are working. By age 30 the majority of white men and women are married, and the majority of white and black women have children.

These role transitions are likely to bring about or accompany other changes in individuals' lives, including an increased sense of responsibility for oneself and one's family (Arnett, 1997; Arnett & Taber, 1994; Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Scheer,

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Unger, & Brown, 1996) and economic self-sufficiency (Furstenberg, Kennedy, McLoyd, Rumbaut, & Settersten, 2004; Scheer et al., 1996). These increased responsibilities are likely to decrease the amount of time spent engaging in leisure activities (Osgood & Siennick, 2005) and in risky behaviors, including substance use. For instance, the transition to parenthood for both women and men has been found to predict decreases in alcohol use, heavy drinking, and marijuana use (Arnett, 1998; Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Chen & Kandel, 1998; Schulenberg et al., 2005). Individuals who are employed full-time also tend to have lower levels of alcohol use, heavy drinking, marijuana use, and delinquency than those who are not full-time employees (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Gotham et al., 1997; Roisman, Aguilar, & Egeland, 2004; Sampson & Laub, 1990; Stouthamer-Loeber, Wei, Loeber, & Masten, 2004). While alcohol use and heavy drinking rates tend to be higher during the college years (i.e., roughly ages 18 to 22) among those who attend college full-time than among those who do not, individuals who attend college full-time tend to show greater decreases in use between the early and late twenties and lower levels of alcohol use during the mid and late twenties than those who do not (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Gotham, Sher, & Wood, 2003; Lanza & Collins, 2006; Muthén & Muthén, 2000; Schulenberg et al., 2005). Furthermore, young adults who live with their parents or their spouses report lower levels of alcohol use, heavy drinking, and marijuana use than those who are single and live independently of their parents (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Schulenberg et al., 2005). Overall, these studies suggest that alcohol and marijuana use tend to decrease as individuals move into adult roles and living situations that tend to demand greater responsibility from individuals, both for themselves and others (e.g., parenthood, full-time employment, and independent living away from parents and the school environment).

Marriage and Substance Use: General Trends

Compared to other role transitions, the transition into the marital role is accompanied by greater declines in likelihood and levels of alcohol and marijuana use. However, such trends have

not been found in cigarette use. A few studies have examined these trends in cigarette use, including the Monitoring the Future study, described by Bachman, Wadsworth, O'Malley, Johnston, and Schulenberg (1997). When transitions into various living arrangements and romantic relationships were examined between age 18 and any time between ages 19-20 and 31-32, the percentage of individuals smoking half a pack of cigarettes or more daily increased across the transition to marriage, and these increases were slightly greater for men than women. When transitions into and out of romantic relationships were examined over any two-year interval between ages 18 and 32, the percentage of heavy smokers changed little across transitions into engagement and marriage for both men and women. It is unclear why the percentage of heavy smokers did not decline with the transition to marriage as would be expected. Smoking may perhaps be more addictive or more socially acceptable than alcohol and marijuana use, making it more difficult and less desirable to reduce or stop one's smoking habits with the transition into marriage. Regardless, because the transition into marriage does not seem to be associated with declines in cigarette use, and because the great majority of literature on declines in substance use with marriage focus on alcohol and marijuana use, the current study did not examine changes in cigarette smoking across the transition into marriage, but rather focuses on alcohol and marijuana use.

Around the time that individuals get married, they tend to experience declines in their likelihood to use substances and their levels of substance use, such as their likelihood of alcohol use (i.e., any use vs. no use) in the past month (Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997), frequency and quantity of alcohol use (Curran, Muthén, & Harford, 1998; Hanna, Faden, & Harford, 1993; Labouvie, 1996; Miller-Tutzauer et al., 1991; Prescott & Kendler, 2001), likelihood of heavy drinking (Bachman, O'Malley, & Johnston, 1984; Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997; Miller-Tutzauer et al., 1991; Power, Rodgers, & Hope, 1999), frequency of heavy drinking (Miller-Tutzauer et al., 1991; Mudar, Kearns, & Leonard, 2002; Schulenberg, O'Malley, Bachman, Wadsworth, & Johnston, 1996), and likelihood of marijuana use

(Bachman et al., 1984; Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997).

In addition, cross-sectional evidence has indicated that married individuals tend to have significantly lower levels of alcohol and marijuana use than those who are unmarried. For instance, compared with individuals who are single, cohabiting, engaged, separated, divorced, and widowed, married individuals consistently report lower likelihood of alcohol use (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997), levels of frequency and quantity of alcohol use (Hanna et al., 1993; Labouvie, 1996; Leonard & Rothbard, 1999), frequency of drunkenness (Gotham et al., 1997; Labouvie, 1996; Nielsen, 1999); likelihood of heavy drinking (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Merline, O'Malley, Schulenberg, Bachman, & Johnston, 2004; Miller-Tutzauer et al., 1991; Power et al., 1999), frequency of heavy drinking (Arnett, 1998; Schulenberg et al., 1996), number of alcohol disorder symptoms (Chilcoat & Breslau, 1996; Gotham et al., 2003), number and severity of alcohol problems (Leonard & Rothbard, 1999), likelihood of marijuana use (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Chen & Kandel, 1998; Merline et al., 2004), and frequency of marijuana use (Arnett, 1998; Newcomb & Bentler, 1987).

The timing and duration of changes in substance use during the transition to marriage are important to consider, though not well-known. The transition to marriage may be defined as the changes in identity, attitudes, behaviors, and lifestyle that are likely to occur over a period of time that starts before and continues after the wedding takes place. Thus, it is unlikely that the wedding itself causes substance use levels to decline, but rather that substance use declines in response to or even ahead of these changes in attitudes, behaviors, and lifestyle that accompany the transition to marriage. Although substance use levels have been found to decline between one measurement occasion in which individuals are single and the next in which they are married, it is unclear when substance use levels begin to decline prior to the wedding, and how long levels continue to decline following the wedding. Some researchers found that declines in alcohol use levels occurred around a year or more prior to marriage and around the time of engagement (Bachman, Wadsworth,

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O'Malley, Schulenberg, & Johnston, 1997; Miller-Tutzauer et al., 1991). These declines in level of alcohol use well before the wedding are seen as representing an anticipation effect, where individuals reduce their levels of use in anticipation of becoming married. Moreover, declines in use have been found to continue to occur several years into the marriage (Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997; Miller-Tutzauer et al., 1991). However, more research is needed to determine the timing and duration of marriage-related changes in substance use.

Likelihood and level of substance use tend to decline more during the transition from single to married status than the transition from married to unmarried status or the maintenance of single or married status over a period of time. Individuals who separate or divorce tend to experience increases in likelihood of heavy drinking and marijuana use (Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997)**.** Individuals who are consistently single or consistently married over several years tend to experience slight decreases, no change, or even slight increases in average daily quantity of alcohol use (Hanna et al., 1993; Miller-Tutzauer et al., 1991), likelihood of heavy drinking (Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997; Miller-Tutzauer et al., 1991), and likelihood of marijuana use (Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997) with age.

The findings described above indicate that the likelihood and level of alcohol and marijuana use tend to decline both with age, between the early twenties and early thirties, and with the transition into marriage. The transition into marriage is likely to explain age-related declines in substance use to an extent, because individuals are increasingly likely to be married with age. For instance, in the year 2000 in the United States, less than 10% of individuals were married by age 20, less than half were married by age 25, and over 60% were married by age 30, as shown in Table 1 (Fussell & Furstenberg, 2005a; see also Arnett, 2000; Cohen et al., 2003; Cooksey & Rindfuss, 2001; Sandefur, Eggerling-Boeck, & Park, 2005; Schulenberg et al., 2005). However, the transition into marriage does not explain age-related declines in likelihood and level of alcohol and marijuana use completely because individuals who remain consistently unmarried during young

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adulthood also tend to report declines in use during this age period (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Curran et al., 1998; Miller-Tutzauer et al., 1991).

Therefore, it is important to determine the extent to which the transition to marriage explains declines in alcohol and marijuana use with age. However, few studies of substance use across this marital transition consider or take into account age-related trends in use. For instance, a number of the studies cited above ignored age effects (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997; Chilcoat & Breslau, 1996; Hanna et al., 1993; Miller-Tutzauer et al., 1991). Several studies examined links between changes in alcohol or marijuana use and changes in marital status between two ages, which does not allow for the investigation of age effects (Bachman et al., 1996; Labouvie, 1996; Power et al., 1999). As a result, it is difficult to determine from these studies whether declines in alcohol and marijuana use levels occurred with the transition into marriage independently of age.

However, only a few studies have statistically examined the relationship between change in marital status and age-related or time-related declines in alcohol or marijuana use. Chen and Kandel (1998) found that the positive correlation between age and marijuana cessation between ages 12 and 34 decreased when the independent effects of marital status, as well as frequency of marijuana use, age of onset of use, and educational attainment were included in the logit model. In other words, as individuals aged, they were increasingly likely to stop using marijuana. In addition, individuals who married by age 34 were more likely to stop using by this age than those who never married by this age.

Prescott and Kendler (2001) used spline multilevel modeling to examine changes in frequency and quantity of alcohol use within a typical month between ages 20-30 and ages 30-55. Their sample consisted of women who were aged 17 to over 40 at the first measurement occasion and who were assessed twice more over an eight-year period. Both frequency and quantity of use were found to decline with age and marriage. Getting married accounted almost entirely for age-related declines in frequency of use between ages 20 and 30, and partially accounted for

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decreases in quantity of use. Quantity of alcohol use declined around the time of marriage and not beyond, while frequency of alcohol use declined during and following the transition to marriage.

Curran, Muthén, and Harford (1998) used latent growth curve modeling to examine the extent to which the transition to marriage accounted for declines in alcohol use across the early twenties. These authors examined changes in average daily quantity of alcohol use over the past week among participants in the NLSY who were aged 21-24 at the first of four annual measurement occasions and aged 24-27 at the fourth occasion. They found that average quantity of use declined over time for all participants, and that those who married experienced an additional, significant decline in use. In other words, individuals who married experienced greater declines in quantity of use over time than those who were consistently single, differing slightly from the Prescott and Kendler findings.

To summarize, Chen and Kandel (1998) found that the transition to marriage helped explain age-related declines in likelihood to stop using marijuana, Prescott and Kendler (2001) found that this transition helped explain age-related declines in typical frequency and to a lesser extent quantity of use, and Curran and colleagues (1998) found that this transition helped explain declines in average daily quantity of use. The findings in the Prescott and Kendler study and the Curran and colleagues' study may have differed for several reasons. Prescott and Kendler found greater marriage-related declines in frequency of alcohol use in a typical month than typical quantity of use, while Curran and colleagues found declines in average daily quantity of alcohol use, a measure that was computed from information regarding both frequency and quantity of use over the past week. Because this measure was computed from two different types of information, it is difficult to compare findings regarding this measure to measures of just frequency or quantity of use. Marriage-related declines may be stronger for frequency of alcohol use than quantity of use, which could explain both studies' findings.

In addition, these studies' findings may have differed because Curran and colleagues studied the alcohol use of men and women, while Prescott and Kendler studied only women.

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Gender differences in alcohol use may have contributed to Curran and colleagues' findings, whereas they were not examined in the women-only Prescott and Kendler study. The exclusion of men from this study makes it difficult to generalize findings from this study to a population of both men and women because men typically report higher frequency and quantity of alcohol use than women (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Chen & Kandel, 1995; Curran et al., 1998; Muthén & Muthén, 2000), and are more likely to experience declines in quantity of alcohol use (Labouvie, 1996) and likelihood of alcohol use (Esbensen & Elliot, 1994) than women during young adulthood. Moreover, while Curran and colleagues examined change in alcohol use over one-year intervals, which provides more accurate information regarding change over time, Prescott and Kendler examined change in use over four year intervals, which may not as accurately capture the extent to which substance use changes over the transition to marriage.

The current study examined these issues by combining the strengths of these studies and attempting to overcome their weaknesses. First, as utilized by Prescott and Kendler (2001), this study used multilevel modeling to examine the extent to which the transition from single to married status accounts for change in substance use independently of declines in use with age. Using multilevel modeling, the current study examined age-related changes in frequency of alcohol use, drunkenness, and marijuana use among participants in the cohort-sequential National Youth Survey. Many studies have examined change in substance use levels with movement from single to married status. However, few have examined the extent to which marriage-related changes in use are independent of age-related change, which are important to study because age-related change is confounded with marriage-related change. The estimation of marriage-related change independent of age-related change clarifies the relationship between the transition to marriage and change in substance use by enabling an investigation of marriage-related change independent of other age-related change, such as transitions into other adult roles.

Second, the current study examined change in frequency of alcohol use, drunkenness, and marijuana use substance use among both men and women in order to generalize findings to both

genders. And third, this study examined change in the frequency of these three types of substance use in order to determine if marriage-related change occurs in different types of substance use. Chen and Kandel (1998) focused solely on likelihood of marijuana use, and Curran and colleagues (1998) only examined a combined frequency and quantity of alcohol use measure (average daily quantity of use over the past week). Change in quantity of use was not examined in the current study because the National Youth Survey did not include measures of quantity of substance use. While heavy drinking and marijuana use decline to a greater degree with age than alcohol use, change in frequency of alcohol use was investigated in this study: (a) to compare findings regarding this behavior to those of other studies examining change in frequency of use following the transition to marriage, (b) to compare findings regarding use to drunkenness and marijuana use, and (c) to provide further evidence regarding the role of age at marriage, gender, race, time spent with friends, friends' substance use, and friends' and own approval of substance use in change in substance use across the transition to marriage. In these ways, the current study provides valuable information regarding the extent to which the transition into marriage accounts for age-related declines in alcohol and marijuana use across young adulthood.

Group Differences in Marriage-Related Declines in Substance Use

Declines in likelihood and level of alcohol and marijuana use during the transition to marriage are not the same for all types of adults. Rather, group differences in age at marriage, gender, and race may influence the likelihood or degree to which individuals experience declines in levels of use across this transition.

Age at marriage. Age influences overall alcohol and marijuana use and the likelihood of marriage, as described above, where individuals in their late twenties and early thirties are less likely to drink alcohol, drink heavily, and smoke marijuana, and are more likely to get married than those in their late teens and early twenties (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Fussell & Furstenberg, 2005a). Declines in use by the late twenties and early thirties may result from increases in both marital and non-marital responsibilities (e.g., work and

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financial responsibilities) which are likely to occur with increasing age. Therefore, it is possible that individuals who are in their late twenties and early thirties when they marry may experience less of a decline in their substance use following marriage than those who marry earlier.

The findings of Bachman, Johnson, O'Malley, and Schulenberg (1996) support this hypothesis. Bachman and colleagues examined changes in the proportion of individuals reporting any marijuana use in the past year over the transition to marriage between ages 18 and 26 (assessed every two years) by age at marriage. Their findings indicated that among individuals who married at ages 19-20, 21-22, and 23-24 the proportion of marijuana users remained stable or increased between age 18 and two years prior to when they married, and then decreased sharply between two years prior to marriage and the age at which they married. However, among individuals who married at ages 25-26, the proportion of marijuana users steadily decreased between ages 19-20 and 25-26. This finding suggests that individuals who marry in their mid and perhaps late twenties may already be experiencing declines in likelihood to use substances or in level of substance use well before they marry, and may experience less of a decline in use following the transition from single to married status than those who marry at earlier ages, who may experience little change in substance use until they transition into marriage. Differences in change in the percentage of marijuana users by age at marriage were not statistically tested in this study. Rather, the percentages of users at each two-year age interval by age at marriage were presented in a graph. However, due to the very large sample size in this study (N ≈ 14,000), these differences by age at marriage were most likely significant.

However, it is also possible that individuals who are younger when they marry experience less of a decline in likelihood or level of alcohol and marijuana use following marriage than those who are older when they marry. Individuals who are in their late teens and early twenties are more likely to use substances than those who are older, and therefore may be more committed to alcohol and marijuana use and less willing to change their use following the transition to marriage than older individuals. In support of this hypothesis, Labouvie (1996) examined the frequency and

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quantity of alcohol use and the frequency of drug use in the past year among individuals aged 21 or 24 at the first measurement occasion and aged 28 or 31 at the second. Labouvie found that the correlation between marital status and level of alcohol and drug use was significant at ages 28/31, but was not significant at ages 21/24. In other words, individuals who were married at ages 28/31 reported lower levels of alcohol and drugs than those who were unmarried, but individuals who were married and unmarried at ages 21/24 reported similar levels of use.

A major limitation of this study is that by examining the correlation between marital status and substance use at only two occasions, Labouvie (1996) was not able to examine the role of age at marriage in changes in level of substance use across the transition to marriage, as Bachman and colleagues (1996) were able to do regarding likelihood of use. This may help explain the difference in the findings between these two studies. This disadvantage of the Labouvie study, as well as the lack of statistical testing in Bachman and colleagues' study, limit the extent to which these findings can be used to explain the role of age at marriage in the association between the transition to adulthood and changes in likelihood and level of alcohol and marijuana use. The current study used more rigorous testing to examine the role of age at marriage. Specifically, this study used multilevel modeling to first examine the extent to which changes in frequency of alcohol use, drunkenness, and marijuana use in the past year were explained by the transition from single to married status independently of age-related change in use, and to examine whether marriage-related change differed by age at marriage. This analytic procedure more accurately measures the influence of age at marriage than the strategies used by Labouvie (1996) and Bachman and colleagues (1996).

Gender. Declines in alcohol and marijuana use across the transition to marriage may differ by gender as well. Women consistently report lower levels of alcohol and marijuana use than men (e.g., frequency and quantity of alcohol use, frequency of heavy drinking, and frequency of marijuana use), regardless of age, race, social class, and other individual differences (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Chen & Kandel, 1995; Curran et

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al., 1998; Gotham et al., 1997; Jackson, Sher, Gotham, & Wood, 2001; Labouvie, 1996; Muthén & Muthén, 2000). Therefore, gender may influence rates of declines in use with marriage.

For instance, it is possible that men experience greater declines in level of alcohol or marijuana use across the transition to marriage. Evidence suggests that men are more likely to experience declines in use with age than women. For instance, Esbensen and Elliott (1994) found that men were more likely to stop using alcohol and marijuana use (i.e., to become abstainers) in young adulthood than women. In addition, Labouvie (1996) found that men reported greater declines in typical quantity of alcohol use between the early and late twenties than women.

On the other hand, women have been found in some cases to experience greater declines in alcohol and marijuana use level following marriage than men. Yamaguchi and Kandel (1985) found that women were more likely to stop using marijuana after getting married than men. Women may also reduce their levels of substance use following marriage to a greater extent than men in preparation for a future pregnancy (Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997).

Findings from the Buffalo Newlywed Study (BNS; Leonard & Roberts, 1996; Roberts & Leonard, 1997) may also illustrate women's greater reductions in alcohol use with marriage. The BNS assessed 519 couples' alcohol use, relationship characteristics, and personality characteristics at three points in time: as they applied for a marriage license, at their first anniversary, and at their second anniversary. The average age at the time of marriage was 24.2 for men and 23.3 for women. The majority of the sample participants were White (64%), had attended college (65%), and had lived together prior to marriage (69%). Roberts and Leonard (1997) compared men and women's reports of several alcohol use behaviors during the year prior to marriage and during the first year of marriage. They found that women were more likely to experience decreases in alcohol use than men across the transition to marriage. Specifically, women but not men experienced significant declines in typical quantity of use per drinking occasion, frequency of drunkenness in the past month, frequency of heavy drinking in the past

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month, and typical quantity of use when one's partner/spouse was absent. Both men and women experienced significant declines in average daily quantity of alcohol use, number of alcohol problems, number of alcohol dependence symptoms, and typical quantity of use when one's partner/spouse is present. These findings indicate that while both men and women experience declines in level of alcohol use in the first year of marriage, women seem to experience greater declines in overall alcohol use than men. However, only mean levels of each type of alcohol use for each gender was reported at both time points, and only changes over time for both genders were statistically tested. Gender differences in the degree to which these behaviors declined over time were not tested. Therefore, it can not be determined conclusively from these findings if women experience greater declines in the levels of these behaviors across this marital transition than men.

Furthermore, it is also possible that men and women experience similar rates of decline in level of alcohol and marijuana use following marriage. Using latent growth curve modeling, Curran, Muthén, and Harford (1998) found that average quantity of alcohol use in the past week (a composite frequency-quantity measure) declined at a similar rate for men and women in their twenties after they married.

One possible reason why Curran and colleagues found gender similarity in declines in level of alcohol use following marriage while Roberts and Leonard (1997) and Yamaguchi and Kandel (1985) found that women reported greater declines in use is that Curran and colleagues (1998) estimated rates of decline in level of alcohol use following marriage by gender *independently* of individuals' average level of change in use over time, while Roberts and Leonard (1997) and Yamaguchi and Kandel (1985) did not control for this. Therefore, the extent to which marriage-related changes in substance use found by these latter two studies were influenced by gender differences and/or to average changes in use with time/age is unknown. In addition, while Roberts and Leonard (1997) and Yamaguchi and Kandel (1985) found that women were more likely to experience declines in frequency and quantity of alcohol use and in any marijuana use, Curran and

colleagues (1998) found that men and women experienced similar rates of declines in frequency/quantity of alcohol use. The difference between "change in likelihood of use" and "degree of change in use" is a fine point, and may not be that important. However, differences in findings regarding change in likelihood of use and degree of change in use suggest that they may be substantially different ways of operationalizing change in substance use, perhaps yielding different results.

Supporting Curran and colleagues' (1998) findings, two studies that examined patterns of change in alcohol and marijuana use by patterns of change and stability in marital status also found gender similarities in changes in use across the transition to marriage. Miller-Tutzauer, Leonard, and Windle (1991) and Bachman, Wadsworth, O'Malley, Schulenberg, and Johnston (1997) identified trajectory groups characterizing unique transitions between single [S], engaged [E] (in Bachman et al. only), and married [M] statuses over three occasions, and examined patterns of change in alcohol use across these three occasions by trajectory group. Miller-Tutzauer and colleagues identified four trajectory groups among NLSY participants aged 18-25 at the first occasion and aged 20-27 at the third. Bachman and colleagues identified five trajectory groups among Monitoring the Future participants over three consecutive biennial occasions between ages 18 and 32. Miller-Tutzauer and colleagues examined change in a composite frequency/quantity measure and frequency of heavy drinking in the past month. Bachman and colleagues examined change in the proportion of individuals reporting any heavy drinking in the last two weeks and any marijuana use in the last year.

Using repeated measures MANOVA, Miller-Tutzauer and colleagues found that patterns of change in average daily quantity of alcohol use and frequency of heavy drinking differed significantly across marital change groups, where average levels of alcohol use in the single-single-married and single-married-married groups declined over time, particularly in the single to married status groups, while the single-single-single and married-married-married groups reported fairly consistent levels of use over time. Bachman and colleagues (1997) also found similar

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patterns of change in proportion of heavy drinkers and marijuana users by marital status change group. However, these authors only estimated and plotted change in the proportion of heavy drinkers and marijuana users over time by marital change group and by gender, and did not statistically test changes in proportion of users by marital group or by gender.

In addition, both studies found that within each marital group men and women reported similar patterns of change in level of use over time (though this finding was only statistically tested by Miller-Tutzauer et al.), suggesting that both men and women tended to show declines in average daily quantity of alcohol use, likelihood and frequency of heavy drinking, and likelihood of marijuana use over the transition from single to married status, and consistent levels of use when consistently single and married. However, because Miller-Tutzauer and colleagues and Bachman and colleagues did not directly compare rates of decline in level of alcohol use between the transition from single to married status by gender, it is unclear whether men and women truly experience the same degree of declines in level of alcohol use during this particular transition. In addition, neither study estimated change in level or likelihood of alcohol and marijuana use over time by marital change group independently of average change in use over time, as in Curran and colleagues (1998). Therefore, while these studies' findings *appear* to support Curran and colleagues' finding that men and women experience similar rates of decline in level of alcohol use across the transition to marriage, this can not be stated with full confidence.

Unlike these two studies, Curran and colleagues (1998) statistically tested whether men and women experienced different rates of decline in level of use across this transition. In addition, Curran and colleagues estimated this gender difference while controlling for change in use with time. Because time and more specifically age play a significant role in change in level and likelihood of substance use, controlling for age-related change in use when estimating gender differences in change in use over the transition to marriage allows for a more accurate assessment of gender differences or similarities. The current study's use of multilevel modeling allowed for the estimation of age-related change in use. In addition, while Curran and colleagues only assessed

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one combined frequency/quantity measure of alcohol use, the current study examined change in three measures of substance use, namely frequency of alcohol use in the past year, frequency of drunkenness in the past year, and frequency of marijuana use in the past year, to better assess gender differences in change in level of substance use across the transition to marriage. Using these methods, the current study extended beyond past research to determine if men, women, or neither gender experienced greater declines in frequency of alcohol use, drunkenness, and marijuana use across the transition from single to married status.

Race. Changes in alcohol and marijuana use levels during the transition into marriage may also differ by race because of the racial differences in rates and levels of substance use as well as in age-related changes in use. Compared to blacks and Hispanics, whites are typically more likely to drink alcohol (Caetano, 1984; Johnston, O'Malley, Bachman, & Schulenberg, 2004), drink heavily (Johnston et al., 2004; Nielsen, 1999), get drunk (Johnston et al., 2004; Nielsen, 1999), smoke marijuana (Chen & Killeya-Jones, 2006; Johnston et al., 2004), and report higher frequency levels of alcohol use (Nielsen, 1999), heavy drinking (Johnston et al., 2004; Mudar et al., 2002), and drunkenness (Nielsen, 1999) as well as higher quantity levels of alcohol use (Curran et al.,1998; Mudar et al., 2002) during adolescence and young adulthood. The prevalence, frequency, and quantity of Hispanics' alcohol use and heavy drinking tend to fall in between that of whites and blacks (Johnston et al., 2004; Nielsen, 1999).

Whites also tend to experience greater declines in frequency of alcohol use (Nielsen, 1999), heavy alcohol use (Neff & Dassori, 1998; Nielsen, 1999), and drunkenness (Nielsen, 1999) between adolescence and adulthood than blacks and Hispanics. Nielsen (1999) found little change in blacks' and Hispanics' frequency of drunkenness between ages 18-29 and 30-39. Similarly, whites have been found to experience greater decreases in average daily quantity of alcohol use (Curran et al., 1998) and in frequency of heavy drinking (Mudar et al., 2002) than blacks across the transition to marriage. In addition, while Curran and colleagues (1998) found that blacks also experienced decreases in average daily quantity of alcohol use across the transition from single to

married statue, Mudar and colleagues (2002) found that blacks experienced little change in their frequency of heavy alcohol use during their first two years of marriage. Moreover, Nielsen (1999) found that for whites, being married was associated with lower frequency of drunkenness, but married and unmarried blacks reported similar frequency of drunkenness levels. This discrepancy may perhaps be due to the time frame of the Curran and Mudar studies, where Curran and colleagues examined change in alcohol use across the move from single to married status, while Mudar and colleagues examined change once individuals had already married. In addition, these three studies examined different types of alcohol use, where Curran and colleagues found declines in a more normative measure of use, average daily quantity, while Mudar and colleagues and Nielsen did not find change or differences between married and unmarried blacks in heavier levels of use, frequency of heavy drinking, and drunkenness.

The current study, which examined racial differences in change in normative and more extreme types of substance use, namely frequency of alcohol use, drunkenness, and marijuana use, across the transition from single to married status as well as several years into the marriage, will help clarify the nature of racial differences in change in substance use across the transition to marriage. It was expected that whites would experience greater decreases in frequency of substance use across the transition from single to married status than nonwhites, based on these findings. It was also expected, based on prior research, that nonwhites would experience decreases in frequency of alcohol use across the transition to marriage, but might not experience decreases in drunkenness or marijuana use.

In summary, the current study investigated whether age at marriage, gender, and race moderate the association between the transition into marriage and changes in frequency of alcohol and marijuana use during young adulthood. Specifically, this study sought to determine if individuals who are younger when they marry (i.e., roughly the late teens and early twenties) experienced greater or lesser declines in frequency of alcohol use, drunkenness, and marijuana use over the transition from single to married status than those who are older at marriage (i.e.,

roughly the mid and late twenties). This study also sought to determine if women experienced greater declines in frequency of use over the transition into marriage than men. In addition, this study examined if whites experienced greater declines in frequency of use across this transition than nonwhites, and whether nonwhites experienced declines or no change in frequency of use across this transition.

Psychosocial Mechanisms of Marriage-Related Declines in Substance Use

Although it is well documented that alcohol and marijuana use levels typically decline across the transition into marriage, it is not well known why levels of use tend to decline across this transition, which is key to understanding marital and other social role transitions and the development of substance use. As explained above, it is unlikely that the transition from single to married status *causes* declines in likelihood and levels of alcohol and marijuana use. Instead, declines in substance use may result from social or psychological processes associated with the transition into marriage. Substance use is often a social behavior, in that alcohol and marijuana are typically consumed with friends and in social gatherings (e.g., Bell et al., 1997; Carruthers, 1993a). This may be because of social modeling and peer encouragement of use (Bachman et al., 2002), and also because of the expectation that substance use will ease one's comfort level in social settings (e.g., Carruthers, 1993a). Therefore, it is likely that the amount of time individuals spend with their friends as well as their friends' substance use habits, which are correlated with individuals' substance use levels and which are likely to decline with the transition into marriage, help explain declines in use during this transition.

In addition, these declines in use could result from the transition in one's social role, from single to married social status. The marital social role carries social expectations for less impulsive and risky behavior than that allowed for single individuals, as will also be explained below. Therefore, it is likely that peer approval of substance use and own approval of substance use decline across the transition into marriage, and therefore may help explain declines in alcohol and marijuana use levels during this transition. The current study examined whether the amount of time

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spent with friends, friends' substance use, friends' approval of substance use, and individuals' own

approval of substance use mediate the association between the transition into marriage and

declines in frequency of alcohol use, drunkenness, and marijuana use. The following sections

review the literature on these four factors and identify the gaps in this research that were

addressed by the current study.

Time spent with friends. For most individuals, alcohol and marijuana use occur in social

settings (Carruthers, 1993a, 1993b). As a result, the amount of time individuals spend with their

friends, particularly in unstructured social activities (e.g., going to parties or bars, riding in cars) is

highly correlated with their likelihood and level of alcohol and marijuana use (Bachman et al., 2002;

Osgood et al., 1996). For instance, teenagers and young adults are more likely to start using

alcohol and marijuana if they spend a greater amount of time with friends (Esbensen & Elliott,

1994). Marijuana users in college tend to spend more time at parties and with friends than

nonusers (Bell, Wechsler, & Johnston, 1997; Mustane & Tewksbury, 2004). In addition, adults who

spend more time in social and outdoor leisure activities tend to drink alcohol more frequently

(Carruthers, 1993a, 1993b).

The amount of time individuals spend with their friends and in unstructured social activities

also typically decreases when individuals get married, thus reducing their opportunities to drink

alcohol and use marijuana (Bachman et al., 2002; Kunz & Graham, 1996; Leonard & Mudar, 2003;

Warr, 1998). For instance, Bachman and colleagues (2002) found that individuals who married

between ages 18 and 32 reported greater decreases in the number of evenings spent with friends

and at bars, parties, or other locations with or without friends per week than their unmarried age-

mates. Leonard and Mudar (2003) found that husbands and wives reported a decrease in their

number of friends and in the amount of time spent socializing with friends between the year before

they married and the year after they married. Kunz and Graham (1996) reported that married

individuals spent less time at someone else's home and in a bar or tavern than unmarried

individuals. Finally, Warr (1998) found that married individuals spent fewer evenings with friends

per week on average and fewer hours with friends per week than unmarried individuals. In addition, the number of afternoons or evenings spent with friends per week decreased when individuals in their late teens and early twenties married, in contrast to a slight increase among those who were consistently unmarried over this time. To expand on this research, the current study used multilevel modeling to determine if the average amount of time individuals spent with their friends per week helps explain marriage-related declines in alcohol and marijuana use frequency.

Peer alcohol and marijuana use. Peer alcohol and marijuana use also tend to be strongly associated with individuals' levels of use. Specifically, individuals' alcohol and marijuana use levels tend to be highly correlated with their friends' level of use (Bachman et al., 2002; Labouvie, 1996; Leonard & Mudar, 2003) and the number of their friends who use alcohol and get drunk regularly (Preston & Goodfellow, 2006). In addition, Esbensen and Elliott (1994) found that teenagers and young adults are more likely to initiate use of alcohol and marijuana if they had friends who use drugs. According to Chen and Kandel (1998), individuals were less likely to stop using marijuana by their mid-thirties if most of their friends used marijuana. Furthermore, Leonard, Kearns, and Mudar (2000) found that married individuals who were heavy drinkers tended to have more single and heavy drinking friends than married individuals with lower levels of alcohol use. This influence typically occurs through the complementary processes of selection (i.e., individuals choose friends who share similar substance use habits) and socialization (i.e., individuals change their substance use habits so that they become more similar to their friends' habits) (Bullers, Cooper, & Russell, 2001; Fromme & Ruela, 1994; Leonard & Mudar, 2003).

The transition to marriage is typically accompanied by changes in individuals' social lives and experiences, including changes in their friends, in terms of who they are and what they do. For instance, married individuals tend to have fewer friends who drink heavily and get drunk than those who are unmarried (Bachman et al., 2002; Leonard & Mudar, 2003; Prescott & Kendler, 2001). Furthermore, the number of individuals' friends who get drunk also tends to decrease following

marriage (Bachman et al., 2002). Therefore, following the transition to marriage individuals may have fewer friends who drink alcohol and use marijuana, and these declines in friends' substance use may cause, accompany, or result from individuals' declines in substance use with marriage. To investigate the role of friends' use, the current study examined whether the number of individuals' friends who drink alcohol, get drunk, and smoke marijuana over time helped explain marriage-related declines in alcohol and marijuana use frequency.

Friends' and own approval of alcohol and marijuana use. Individuals' alcohol and marijuana use is highly correlated with their approval or disapproval of use (Bachman et al., 2002; Chen & Kandel, 1998; Petraitis, Flay, & Miller, 1995; Preston & Goodfellow, 2006), and with their friends' approval of use (Chen & Kandel, 1998; Esbensen & Elliott, 1994; Fitzgerald & Arndt, 2002; Strano, Cuomo, & Venable, 2004). Specifically, individuals who approve of alcohol or marijuana use or have friends who approve of use are more likely to use these substances, whereas those who disapprove of use or have friends who disapprove are less likely to do so. For instance, according to Preston and Goodfellow (2006), adolescents who approved of daily alcohol use tended to report higher frequencies of alcohol use and to report alcohol abuse than those who did not approve of daily use. Similarly, Strano and colleagues (2004) found that college students were more likely to engage in heavy drinking and to drink heavily more often if they believed their friends did not disapprove of heavy drinking. In addition, Chen and Kandel (1998) found that individuals were more likely to stop using marijuana by their mid-thirties if their friends disapproved of marijuana use and if they themselves considered marijuana use harmful.

Individuals' and their friends' approval of substance use may decline across the transition to marriage because of the social expectations for married individuals' substance use. Compared to those who are unmarried, married individuals are typically expected to have less individualistic and selfish values and behaviors, to be more responsible, interdependent, and concerned with the well-being of their spouses, children, and neighborhoods, and to therefore engage in lower levels of risky behavior, including substance use (Arnett, 1998; Leonard & Mudar, 2003). As a result,

married individuals are more likely to disapprove of alcohol and marijuana use than those who are unmarried (Bachman et al., 2002). In a similar vein, as individuals marry, their friends may become less approving of their substance use because of these substance use expectations for married individuals. Thus, individuals' and their friends' approval of alcohol and marijuana use may help explain marriage-related declines in alcohol and marijuana use frequency. This hypothesis was investigated in the current study.

Esbensen and Elliott (1994) examined similar issues with discrete event history analysis using data from the National Youth Survey between ages 11-17 (at wave 1) and 24-30 (wave 8). These authors found that peer drug use, time spent with friends, and peer disapproval of drug use increased the likelihood of initiating alcohol, marijuana, and drug use. Furthermore, individuals who had friends who used drugs were less likely to stop using marijuana after using it for several years. Gender did not influence the likelihood of initiating alcohol, marijuana, or drug use. However, males were twice as likely to stop using alcohol and 30% more likely to stop using marijuana (i.e., to become abstainers) than females after using for several years. Getting married did not influence the likelihood of initiating or stopping (i.e., abstaining from) using alcohol, marijuana, or drugs. While the current study examined similar topics also with data from the NYS, this study is different from that of Esbensen and Elliott because it examined changes in frequency of alcohol use, drunkenness, and marijuana use rather than initiation and discontinuation of alcohol, marijuana, and drug use. Furthermore, while these authors examined the main effects of marriage, gender, peer use, time spent with friends, and peer disapproval of drug use on alcohol and drug use, the current study examined these influences as potential moderators or mediators of the association between the transition to marriage and declines in frequency of use.

The Current Study

The current study used data from the nationally representative National Youth Survey (NYS) study to answer the three research questions below. The NYS is a longitudinal, cohort-sequential study with seven waves of data collection, where participants were assessed every year

for the first five data collection waves, and every three years for at least the next three waves. The current study used data for participants aged 17 to 27 from the first seven data waves. Participants were aged 11-17 at the first wave (1976) and aged 21-27 at the seventh wave (1986).

Research Question 1. To what extent did the transition into marriage account for age-related declines in alcohol and marijuana use during young adulthood?

> *Hypothesis 1*. Marriage accounts for a significant, yet not total, proportion of age-related declines in alcohol and marijuana use between ages 17 and 27.

Research Question 2. Did age at marriage, gender, and race moderate marriage-related declines in alcohol and marijuana use during young adulthood?

> *Hypothesis 2*. Marriage-related declines in alcohol and marijuana use during young adulthood are greater for individuals who married at older ages, for women, and for whites than for individuals who married at younger ages, for men, and for nonwhites.

Research Question 3. Did time spent with friends, peer alcohol and marijuana use, friends' approval of alcohol and marijuana use, and own approval of alcohol and marijuana use mediate marriage-related changes in alcohol and marijuana use during young adulthood?

> *Hypothesis 3*. These four psychosocial factors significantly mediate the association between the transition to marriage and declines in alcohol and marijuana use. Across the transition to marriage, individuals experience declines in time spent with friends, peer alcohol/marijuana use, friends' approval of use, and own approval of use, which partially explain declines in alcohol and marijuana use following marriage.

The three research questions were tested using multilevel modeling (e.g., Osgood, 2005; Osgood et al., 1996; Raudenbush & Bryk, 2002; Singer & Willett, 2003), which as described above is an appropriate method that has rarely been used to test the association between marital status and substance use and the role of other variables in this association (Prescott & Kendler, 2001).

TABLE

Table 1

Trends in Adult Role Transitions in 2000, by Age, Gender, and Race (in Percentages)

	Married	Have Children	Employed	Live With Parents	In School[1]	Completed College by Age 25[2]
Age 20						
White men	3	3	49	66	36	
Black men	3	2	43	61	30	
White women	12	12	36	51	40	
Black women	7	23	50	41	28	
Age 25						
White men	33	21	89	24		31
Black men	33	28	90	21		14
White women	46	36	75	9		25
Black women	31	50	69	9		17
Age 30						
White men	64	43	91	6		
Black men	44	39	82	11		
White women	70	60	73	2		
Black women	46	66	72	5		

Data: Current Population Survey (U.S. Census Bureau)

Source: Fussell & Furstenberg (2005b)

[1] The Current Population Survey does not include information on school enrollment past age 20.

[2] Data: U.S. Department of Education

CHAPTER 2. METHODS

Participants

Participants in the current study were drawn from the National Youth Survey (NYS), a longitudinal study investigating delinquency, substance use, and other problem behaviors in adolescence and adulthood in the United States (Elliott et al., 1986, 1989). Using a multistage sampling strategy, NYS researchers identified and invited a group of 2,360 individuals who were aged 11-17 in 1976 and were nationally representative (by gender and race) from randomly selected households across the continental United States to take part in this study. Of this sample, 1,725 youth (73%) agreed to participate, signed informed consent forms, and were first interviewed in 1976. Comparisons between participating youth and nonparticipating eligible youth identified through recruitment procedures indicated that the age, sex, and race characteristics of participating youth were not significantly different from those of non-participating youth and of the national population aged 11 to 17 in 1976 according to the U.S. Census Bureau (Elliott, Ageton, Huizinga, Knowles, & Canter, 1983; Gibson & Jung, 2002).

Data used in the present study were collected via interviews annually between 1977 and 1981, and again in 1984 and 1987. Additional interviews were conducted after 1987, but data from these additional waves were not available for use. At each of the seven waves included in the present study, participants were interviewed about their delinquent behavior, substance use, and life events that occurred in the past year or in some cases since the last interview, as well as other topics. Each interview was confidential and conducted by a member of the research team in a private home or another private setting (Elliott et al., 1986). Table 2 presents the waves of data collection, the years at which each wave occurred, the ages of participants at each wave, and the number of participants interviewed. Seven cohorts of individuals, aged 11, 12, 13, 14, 15, 16, and 17 at Wave 1, were followed throughout the study. The current study utilized data from individuals aged 17 or older at each wave from the first seven waves of the NYS. Individuals at age 17 were

included in the analyses in order to observe the transition into marriage for those who married at age 18. Because this is a study of early adulthood and beyond, and early or emerging adulthood is considered to begin at age 18 (e.g., Arnett, 2000), individuals aged 16 and younger were not included in this study. Table 3 presents the age and sample size of each cohort of individuals contributing data at each wave of data collection. Table 3a lists the number of participants who provided information at each age between ages 17 and 27.

A slightly greater number of males than females participated in each wave of data collection: 918 (53.2%) males and 807 (46.8%) females participated at Wave 1, and 701 (50.7%) males and 683 (49.3%) females remained in the study by Wave 7. At Wave 1, 1,361 (79%) participants were White, 260 (15%) were Black, 76 (4%) were Hispanic, 17 (1%) were Asian, 8 (0.5%) were American Indian, and 3 (0.2%) were of another race/ethnicity. This distribution was very similar at Wave 7, when 1,125 (81%) participants were White, 190 (14%) were Black, 48 (4%) were Hispanic, 13 (1%) were Asian, 6 (0.4%) were American Indian, and 2 (0.1%) were of another race/ethnicity. Elliott and colleagues (1986) found that attrition across the first five waves of data collection did not significantly affect the distribution of the age, sex, ethnicity, class, place of residence, and reported delinquency variables. Based on this information they concluded that attrition did not affect the representativeness of the sample in terms of these variables.

Participants came from a wide distribution of family incomes and parental education levels. At Wave 1, one of each participants' parents provided information about their and their spouse's education, their family income, and other information. Regarding income, 27% of participants' parents reported their family's annual income at $10,000 or less, 30% of parents reported an annual income between $10,000 and $18,000, 25% reported an annual income between $18,000 and $26,000, and 15% reported an annual income above $26,000. In addition, 18% of parents at Wave 1 reported that their families received public assistance (e.g., welfare). These income levels at Wave 1 (1977) closely matched those of the national population that year, according to the U.S. Census Bureau (U.S. Census Bureau, 2007). Regarding both parents' education, roughly 32% of

participants' parents had less than a high school education, roughly 31% had graduated from high school or obtained a GED, and roughly 37% had received at least some post-secondary education. The NYS sample's parental education levels slightly differed from those of the population of all married adults in 1977, according to the U.S. Census Bureau. Of married adults in the U.S. in 1977, roughly 20% had less than a high school degree, roughly 50% had a high school degree, and roughly 30% had more than a high school degree (U.S. Census Bureau, 1977). NYS participants' parents were roughly equally likely to have a high school education or less as the national population, and slightly more likely to have attended post-secondary school than the population. This may be due to cohort differences, as parents of adolescents may be younger than all married adults.

Measures

In the current study, *age at marriage*, *gender*, and *race* were static, or stable, variables. All other variables were time-varying variables. *Gender* was assessed at Wave 1, where responses were coded as 0 (female) or 1 (male). *Race* was also assessed at Wave 1, where responses were coded as 0 (white) or 1 (nonwhite). After the time-varying variables described below were computed and/or recoded, the data set was reorganized so that these variables reflected age rather than wave of data collection. The time-varying variable *age* was centered at age 17, the earliest age in the study, so that models of age-related change in substance use frequency examined change in use with increasing age beyond age 17.

Substance use. Three measures of substance use assessed at each wave of data collection were used in the current study as outcome measures: frequency of alcohol use, frequency of drunkenness, and frequency of marijuana use. *Frequency of alcohol use* was assessed by participants' reports of their consumption of alcoholic beverages in the past year at each wave of data collection. Responses to these items originally fell into one of nine response categories: 1 (never), 2 (once or twice), 3 (once every 2-3 months), 4 (once a month), 5 (once every 2-3 weeks), 6 (once a week), 7 (2-3 times a week), 8 (once a day), and 9 (2-3 times a day).

However, at Wave 2 only some participants aged 17 and above (*n* = 200) were asked to report their frequency of use of alcoholic beverages in the past year, while the remaining participants of these ages (*n* = 216) were asked to report their frequency of beer, wine, and hard liquor consumption in the past year (three separate items with the same nine response categories as the alcohol beverages item). For those who were asked to report their frequency of beer, wine, and hard liquor use, each individual's highest frequency of beer, wine, or hard liquor was designated as his/her frequency of alcohol use. The mean of these individuals' frequency of alcohol use (*M* = 4.10, *SD* = 2.16) was not significantly different than the mean for those who were only asked to report their frequency of alcoholic beverage use (*M* = 3.95, *SD* = 2.15), where *t* (1, 414) = .718, *p* = .473. Therefore, frequency of alcohol use at Wave 2 was measured as the highest reported frequency of beer/wine/liquor for participants who were asked these three questions, and frequency of alcoholic beverage use for participants who were asked this question.

In addition, at Wave 3 participants answered either the alcoholic beverages question (*n* = 232, *M* = 3.86, *SD* = 2.18), the beer/wine/liquor questions (*n* = 106, *M* = 3.46, *SD* = 2.28), or both (n = 172, beer/wine/liquor: *M* = 3.31, *SD* = 2.14; alcoholic beverages: *M* = 4.78, *SD* = 2.04). Analyses were performed to determine whether responses to the alcoholic beverages question or the highest frequency of beer/wine/liquor should be used as values for Wave 3 alcohol use frequency for the 172 individuals who responded to both sets of questions. Two one-way ANOVAs were computed for this purpose. The first ANOVA test compared reported alcohol use frequency among the three groups, including the 172 participants' highest reported frequency of beer, wine, or liquor. This test was significant (*F* (2, 507) = 3.28, *p* = .038), and Tukey post-hoc tests revealed that responses of the 232 participants who answered the alcoholic beverages question and the highest reported frequency of beer/wine/liquor of the 172 participants who answered both sets of questions were significantly different. The second test compared reported alcohol use frequency among the three groups, this time including the 172 individuals' responses to the alcoholic beverages question. This test was also significant (*F* (2, 507) = 14.80, *p* < .000), and Tukey post-

hoc tests revealed that the frequency of alcoholic beverages reports of the 172 participants who answered both sets of questions were significantly different from the other two groups included in the analysis. Because the three groups of individuals' responses were more similar when the 172 participants' highest reported beer/wine/liquor frequencies were used, frequency of alcohol use at Wave 3 was measured as the highest frequency of beer/wine/liquor for the 278 participants who answered these three questions, and frequency of alcoholic beverages use for the 232 participants who only answered this question.

After the variables reflecting frequency of alcohol use at each wave of data collection were reorganized to reflect use at each age, the distributions of these variables reflecting alcohol use at ages 17 through 27 were examined. Each age-specific variable had a normal and symmetric distribution with minimal skew. Therefore, alcohol use frequency was treated in the analyses as a continuous variable.

Frequency of drunkenness and *frequency of marijuana use* were assessed by participants' reports at each wave of how often they got drunk over the past year and how often they used marijuana in the past year. Responses originally fell into one of the same nine response categories as the alcohol use questions listed above. At each age between 17 and 27, many individuals reported no drunkenness (53% to 64%) or marijuana use (50% to 71%) in the past year. As a result, these variables did not have normal or symmetric distributions, and instead were highly positively skewed (skew for drunkenness = 1.40 to 2.11; and for marijuana = 1.03 to 2.18). Log transformations did not improve the normality of these variables' distributions sufficiently. Therefore, the frequency of drunkenness and frequency of marijuana use variables were treated as categorical variables in the analyses.

In order to determine the best coding scheme for these two categorical variables in our multilevel models, these variables were recoded in two ways. First, responses to these variables were dichotomized into the responses of 0 (no use) and 1 (use) in the past year. And second, frequency of drunkenness was recoded into the following three categories: 0 (never), 1 (once or

twice), and 2 (three or more times). Frequency of marijuana use was recoded into the following four categories: 0 (never), 1 (once every 2-3 months or less), 2 (1-3 times a month), and 3 (once a week or more). The three drunkenness categories and four marijuana use categories were selected to create categories containing as equal a number of responses as possible.

Marriage variables. Marital status at each wave of data collection was determined from information regarding current marital status and marital history (including the dates of marriage, remarriage, separation, and divorce) reported at each wave. Specifically, at Waves 1 and 2 participants were asked if they had married, separated, or divorced in the past year. At Waves 3 through 5 participants were asked if they had ever married, separated, or divorced, and the month and year (Waves 3 and 4 only) in which each reported marital event took place. At Wave 6 participants were asked (1) if they were currently single, married, or divorced, (2) whether they were married more than once, (3) the dates of their marriage(s), and (4) whether they were married or divorced in 1981, 1982, and 1983. At Wave 7 participants were asked (1) whether they were currently single, married, separated, divorced, or widowed, (2) whether they were ever married if they were currently single, and (3) whether they were married in 1984, 1985, and 1986. This information was used to identify whether participants were single, married, separated, divorced, or remarried at each data collection wave.

Though information regarding separation, divorce, and remarriage was present, the primary marital status transition of interest in this study was the transition from single to married status. Therefore, *marital status* at each wave was coded as 0 (single) or 1 (married). Individuals who separated or divorced (*N* = 106, or 6%) were removed from the data set once their marriages ended. This was accomplished by designating their marital status information as missing at the point when they separated or divorced, and for all subsequent waves. Removing these participants' marital status information once they separated or divorced ensured that the substance use of only single and married individuals would be modeled.

Anticipation of marriage was a dichotomous variable indicating at each wave whether

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participants were currently one year away from being married, and was calculated based on marital status at each wave and the prior wave. Values included 0 (not currently one measurement occasion prior to marriage) and 1 (currently one measurement occasion prior to marriage). At the first measurement occasion in which a participant reported being married, his or her anticipation of marriage value was coded as missing. For individuals who were already married when they joined the study or who did not report their marital status in the wave prior to getting married (e.g., single at wave T, missing at wave T+1, married at wave T+2), their anticipation of marriage values at each wave in which they provided marital status information were coded as 0. This variable was used to assess whether declines in alcohol and marijuana use occurred over a year prior to marriage.

Length of marriage indicated the number of years participants had been married at each wave, and was determined from information on marital status and marital history described above. Values ranged from 0 (unmarried or within the first year of marriage) to 10. This variable was used to determine the rate of change in alcohol and marijuana use throughout marriage.

Age at marriage was determined from the information on marital status and marital history described above. Age at marriage was a static, or stable, continuous variable (M = 21.33, SD = 2.76).

Psychosocial variables. Time spent with friends was initially assessed by three questions at each data collection wave. The first two questions asked participants to report (1) the average number of afternoons per week spent with their friends, and (2) the average number of evenings per week spent with friends. Responses to these two questions fell into one of six response categories, ranging from 0 (no afternoons or evenings) to 5 (5 afternoons or evenings). The third question asked participants to report the average amount of time spent with friends each weekend in the past year. Responses to this item fell into one of five categories: 1 (very little), 2 (not too much), 3 (some), 4 (quite a bit), and 5 (a great deal).

A composite measure of average time spent with friends per week was computed as the

average score across these three variables at each wave. Before this average score could be computed, the two original lowest categories of the afternoons and evenings variables, 0 and 1, were collapsed into one category so that all three variables (afternoons, evenings, and weekend) would have five response categories, where higher values for each variable would indicate more time spent with friends. These two lowest categories of the afternoons and evenings variables were collapsed because both are analogous to the lowest category of the weekends variable, "very little".

Peer alcohol use, peer drunkenness, and *peer marijuana use* were assessed by participants' reports at each wave of the number of their close friends who used alcohol, got drunk, and used marijuana in the past year. Responses to each question fell into one of five categories: 0 (none), 1 (few), 2 (some), 3 (most), and 4 (all).

Peer approval of alcohol use and *marijuana use* at each wave were assessed by participants' perceptions of their close friends' approval of participants' alcohol and marijuana use in the past year. Responses to these three questions fell into one of the following five categories: 0 (strongly disapprove), 1 (disapprove), 2 (neither approve nor disapprove), 3 (approve), and 4 (strongly approve), where higher values indicated stronger approval of each type of substance use. Peer approval of drunkenness was not assessed at any wave in the NYS.

Participants' approval of alcohol use, drunkenness, and *marijuana use* at each wave were assessed by their responses to three questions asking them to report how wrong they believed it to be for individuals their age to use alcohol, get drunk, and use marijuana. Responses to these three questions fell into one of the following four categories: 0 (very wrong), 1 (wrong), 2 (a little bit wrong), and 3 (not wrong at all), where higher values indicated less disapproval of each type of substance use.

Control variables. Two control variables measuring aspects of the study's design were included in the analyses to determine if they were associated with frequency of substance use. As described above, participants were in one of seven *cohorts* throughout the study, each separated

by a year. In order to determine if there were *cohort* effects in frequency of alcohol use, drunkenness, and marijuana use, cohort membership was dummy coded, resulting in six dichotomous cohort variables: cohort 1 (age 11 at Wave 1) through cohort 6 (age 16 at Wave 1), each coded as 0 (not a member) or 1 (cohort member). Cohort 7 (age 17 at Wave 1) was the reference group.

In addition, because the first five waves of data collection were collected annually, whereas Waves 6 and 7 were each collected after an interval of three years, the number of years since each participant's *last interview* at each wave of data collection varied, as indicated by Table 3. It was possible that participants' reports of their frequency of substance in the past year differed by the number of years that passed since their last interview. Participants who answered questions about their substance use every year may have become used to answering the questions regularly and, as a result, more aware of their levels of use and perhaps able to give more accurate descriptions of their use during their interviews compared with those who answered these questions after three year intervals. Therefore, a dichotomous time-varying control variable, *time since last interview*, was coded as 0 (1 year) or 1 (3 years) at each wave for each participant.

Analytic Procedure

The three research questions were addressed using multilevel modeling (e.g., Horney, Osgood, & Marshall, 1995; Osgood, 2005; Osgood et al., 1996; Raudenbush & Bryk, 2002; Singer & Willett, 2003). Linear multilevel modeling was used for models in which frequency of alcohol use is the dependent variable, and ordinal logistic multilevel modeling was used for models examining frequency of drunkenness and frequency of marijuana use. Multilevel modeling is well-suited for answering these research questions because of its ability to (1) examine change in behavior and characteristics over numerous time points (up to seven per participant in the present study); (2) handle a varying number of available data points across individuals, which can result from missing data, attrition, and the restructuring of cohort-sequential data by age; (3) include both stable, or between-person, explanatory variables (e.g., gender) and time-varying, or within-person,

explanatory variables (e.g., marital status) in the same model; and (4) include random error terms

that allow for dependence among observations over time due to individual differences in the

average level of the outcome variable and due to serial correlation. The multilevel models

described below were estimated using the HLM v6.04 software program.

Model estimation: All models. Following procedures described by Osgood (2005), the

following multilevel models were used to test the three research questions. Models 1 through 3

examined changes in frequency of alcohol use, drunkenness, and marijuana use with age, marital

status (transitions from single to married status), cohort, time since last interview, anticipation of

marriage, and length of marriage. These models were also used to determine the extent to which

changes in frequency of the three types of substance use with age were accounted for by changes

in marital status. Models 4 through 6 examined group differences in age at marriage, gender, and

race in changes in frequency of each type of substance use during the transition to marriage. And

Models 7 through 14 examined whether time spent with friends, peer substance use, peer approval

of substance use, and own approval of substance use mediated the association between the

transition to marriage and changes in frequency of each type of substance use. For each of these

models, three separate versions were estimated, one for each substance use outcome.

Each model described below is separated into a level 1, within-person sub-model (the top

equation), and a level 2, between-person sub-model (the remaining equations). Each level 1 sub-

model relates the outcome variable to any time-varying explanatory variables and provides the

frame of reference for the level 2 sub-model. Each of the level 2 equations further characterizes a

level 1 parameter by specifying its relationships to any stable, individual level explanatory variables

and potentially allowing for that parameter to vary across individuals through a residual term (ζ).

The individual means over time for all time-varying explanatory variables were included in the level

2 equation for the level 1 intercept (β_{0i}). Inclusion of these terms controls for the association

between these variables' mean levels over time and mean frequency of substance use over time,

which limits estimates for the corresponding time-varying variables to within-person change

(Osgood, 2005). Thus, this step provides a separation of between-person and within-person effects. For instance, in Model 1, the relationship of substance use to individuals' mean ages, γ_{01}, is included in the equation for the intercept, β_{0i}, in order to control for mean age so that the estimate of changes in frequency of substance use with age, γ_{10}, is limited to within-person change in frequency of use with age. These individual means over time on the time-varying variables included in the equation for the intercept term were grand mean centered (by subtracting the grand mean for the sample from that variable), which simplifies the interpretation of other elements of the model (Osgood, 2005).

In addition, several level 2 equations in Models 4 through 6 include the average level of stable explanatory variables (such as age at marriage and gender) in the within-person estimates of marital status, allowing for the estimation of the interaction between time-varying marital status and these stable variables.

The error terms, ζ, indicate that β's were estimated as random effects. For instance, the term ζ_{0i} allows for residual individual differences in average frequency of alcohol use, drunkenness, and marijuana use. The term ζ_{1i} allows for residual individual differences in rates of change in frequency of alcohol use, drunkenness, and marijuana use with age. These residual or error terms are not included in between-person equations when the effects of the modeled time-varying explanatory variables are expected to be the same across individuals. Because there was no specific reason to believe that the effects of marriage, age at marriage, gender, race, peer substance use, peer and own approval of use, and time spent with friends would differ across individuals, error terms were not included in the between-person equations modeling these effects. This assumption was tested and confirmed in the course of the analyses.

Age was used as the metric of time, ranging from 17 to 27, and was centered at age 17. This centering point was chosen because it is the earliest age in the data set and allowed for the examination of change in substance use with age. The models described below only include linear age effects for simplicity. Later analyses determined whether age should be modeled as a linear or

higher order polynomial effect.

Research Question 1, Models 1 - 3. The following models addressed the first research question: "To what extent does the transition into marriage account for age-related declines in alcohol and marijuana use during young adulthood?" Model 1 assessed the extent to which the frequency of alcohol use, drunkenness, and marijuana use change with age. Model 1 also tested whether cohort and time since last interview were associated with frequency of use, and if so were included as control variables in subsequent models. Model 2 assessed the extent to which both age and change in marital status (the transition from single to married status) explained change in frequency of substance use. Comparisons between Models 1 and 2, specifically reductions in the *Age* coefficient, γ_{10}, between these models, were used to determine the extent to which age-related changes in frequency of alcohol use, drunkenness, and marijuana use were explained by the transition from single to married status. Model 3 assessed the influence of several marital variables, including change in marital status over time, anticipation of marriage, and length of marriage, on frequency of substance use. This model determined if individuals began to experience significant changes in frequency of substance use over a year before they married, indicating an anticipation of marriage effect. This model also estimated the extent to which frequency of substance use changed over the course of marriage, as assessed by the "length of marriage" effect. In these equations, "*Age"* refers to individuals' age and "*Mar"* refers to individuals' marital status.

MODEL 1 (Linear Model)

$$Y_{ij} = \beta_{0i} + \beta_{1i}Age_{ij} + e_{ij}$$
$$\beta_{0i} = \gamma_{00} + \gamma_{01}Age_{i\cdot} + \zeta_{0i}$$
$$\beta_{1i} = \gamma_{10} + \zeta_{1i}$$

In Models 1 through 10, the term Y_{ij} refers to the frequency of alcohol use, drunkenness, or marijuana use for individual i at time j. The Model 1 within-person sub-model specifies that each individual's frequency of substance use (Y_{ij}) was modeled as the intercept, or the mean frequency

of substance use at age 17 (β_{0i}), plus each individual's change in frequency of use with age (β_{1i}), plus the unexplained variance in frequency of use for each individual at each age (e_{ij}). The Model 1 between-person equation for the intercept, β_{0i}, included an estimate of the difference in overall frequency of use associated with differences in mean age (γ_{01}) to control for this mean when estimating within-person change, as described above. In Models 1 through 8, the degree to which each individual's frequency of substance use changed with age, β_{1i}, was simply equal to the overall relationship of age and substance use for the sample (γ_{10}) plus an individual deviation from that overall relationship, ζ_{1i}. In addition, though not included in the equations above for clarity, the two control variables were included in Model 1 to determine if they needed to be controlled for in subsequent models: (a) a within-person time since last interview term reflecting change in frequency of substance use with increases in the number of years since the last interview, from one to three years; and (b) a between-person cohort effect, measured by the six dichotomous cohort variables, included in the intercept term.

MODEL 1 (Ordinal Logistic Model): Level 1 Sub-model

$$\text{Prob}[Y = 0|\beta] = P'(0) = P(0)$$
$$\text{Prob}[Y <= 1|\beta] = P'(1) = P(0) + P(1)$$
$$\text{Prob}[Y <= 2|\beta] = P'(2) = P(0) + P(1) + P(2)$$
$$\text{Prob}[Y <= 3|\beta] = 1.0$$

where

$$P(0) = \text{Prob}[Y(0) = 1|\beta]$$
$$P(1) = \text{Prob}[Y(1) = 1|\beta]$$
$$P(2) = \text{Prob}[Y(2) = 1|\beta]$$
$$\log[P'(0)/(1 - P'(0))] = \beta_{0i} + \beta_{1i}Age_{ij} + e_{ij}$$
$$\log[P'(1)/(1 - P'(1))] = \beta_{0i} + \beta_{1i}Age_{ij} + e_{ij} + d(1)$$
$$\log[P'(2)/(1 - P'(2))] = \beta_{0i} + \beta_{1i}Age_{ij} + e_{ij} + d(2)$$

Level 2 Sub-model

$$\beta_{0i} = \gamma_{00} + \gamma_{01}Age_{i\cdot} + \zeta_{0i}$$
$$\beta_{1i} = \gamma_{10} + \zeta_{1i}$$

The level 1 and level 2 equations for the linear version of Model 1 explained above, as well as for Models 2 through 10, describe the linear multilevel models that were used to estimate the linear alcohol use frequency dependent variable. Following the linear version of Model 1, the above equations describe the ordinal logistic multilevel model for Model 1 which estimated the ordinal, four-category marijuana use dependent variable. A similar model was used for the ordinal, three-category drunkenness dependent variable. In these equations, 'Y' refers to the response category of the dependent variable, and 'P' refers to the probability of that response. 'D' refers to a threshold, corresponding to the change from one response category of the dependent variable to the next higher response category, calibrated in the log odds metric. Note that while the level 1 sub-model from the ordinal logistic multilevel model is different from that for the linear model, the level 2 sub-model is the same for both the logistic and linear models. These ordinal logistic model equations are only presented for Model 1 to illustrate the form of the ordinal logistic versions of Models 1 through 10 which were used to estimate the drunkenness and marijuana use frequency dependent variables. Only the linear versions of Models 2 through 10 are presented below.

MODEL 2

$$Y_{ij} = \beta_{0i} + \beta_{1i}Age_{ij} + \beta_{2i}Mar_{ij} + e_{ij}$$
$$\beta_{0i} = \gamma_{00} + \gamma_{01}Age_{i\bullet} + \gamma_{02}Mar_{i\bullet} + \zeta_{0i}$$
$$\beta_{1i} = \gamma_{10} + \zeta_{1i}$$
$$\beta_{2i} = \gamma_{20}$$

The Model 2 within-person sub-model indicates that each individual's frequency of substance use (Y_{ij}) was modeled as the intercept, or the mean frequency of substance use for individuals who were aged 17 and unmarried (β_{0i}), plus each individual's change in frequency of use with age (β_{1i}), plus each individual's change in frequency of use with change in marital status with age (β_{2i}), plus the residual variance (e_{ij}). In Model 2, the between-person equation for the intercept, β_{0i}, included estimates of the difference in frequency of use associated with differences in mean age (γ_{01}) and mean marital status (γ_{02}). The coefficient γ_{10} reflects the degree to which each

individual's frequency of substance use changed with age, controlling for marriage-related change in use. As stated above, a reduction in γ_{10} from Model 1 to Model 2 indicates the extent to which the transition into marriage accounts for age-related change in frequency of substance use. In models 2 and 3, γ_{20} indicates the mean change in frequency of substance use as individuals move from single to married status.

Model 3 was similar to Model 2, except for the addition of (a) a within-person anticipation of marriage term, representing change in frequency of substance use as individuals move from 2 years prior to marriage to 1 year prior, and (b) a within-person length of marriage term, representing change in frequency of substance use with increases in the number of years participants have been married. The grand-centered mean levels of these two terms were added to the intercept, β_{0i}.

Research Question 2, Models 4 - 6. Models 4, 5, and 6 addressed the second research question: "To what extent do age at marriage, gender, and race moderate marriage-related declines in alcohol and marijuana use during young adulthood?". Model 4 assessed the extent to which changes in frequency of alcohol use, drunkenness, and marijuana use that accompanied the transition from single to married status differed by the age at which individuals marry. Age at marriage was centered at its mean, age 21, in Model 4 to allow comparisons in change in substance use with marriage between those who marry before and after mean age 21. Model 5 assessed the extent to which changes in frequency of substance use with the transition into marriage differed by gender. And Model 6 assessed the extent to which changes occurring during this transition differed by race. The below equations describe how these moderator models were estimated, where the three potential moderators are referred to by the term "Mod".

MODERATOR MODELS 4 - 6

$$Y_{ij} = \beta_{0i} + \beta_{1i}Age_{ij} + \beta_{2i}Mar_{ij} + e_{ij}$$
$$\beta_{0i} = \gamma_{00} + \gamma_{01}Age_{i\cdot} + \gamma_{02}Mar_{i\cdot} + \gamma_{03}Mod_i + \gamma_{04}Mar_{i\cdot}xMod_i + \zeta_{0i}$$
$$\beta_{1i} = \gamma_{10} + \zeta_{1i}$$

$\beta_{2i} = \gamma_{20} + \gamma_{21}Mod_i$

The moderator model's within-person sub-model was the same as that for Model 2. However, the between-person equation for the intercept, β_{0i}, was quite different. This equation included estimates of the difference in frequency of use associated with differences in mean age (γ_{01}), mean marital status (γ_{02}), and each individual's age at marriage, gender, or race (γ_{03}), as well as the interaction between the mean frequency of substance use at the mean marital status and at individuals' age at marriage, gender, or race (γ_{04}, which was necessary for keeping within- and between-person effects separate when there is a cross-level interaction in the model, such as the interaction between age at marriage and marital status in β_{2i}), plus ζ_{0i}. As in Model 2, β_{1i} was estimated as the degree to which each individual's frequency of substance use changes with age, controlling for marriage-related change in use. One of the key aspects of this model is β_{2i}. This term indicates the mean change in frequency of substance use as individuals move from single to married status (γ_{20}), plus the extent to which frequency of use differed by age at marriage, gender, or race (γ_{21}). γ_{2i} assessed the extent to which age at marriage, gender, or race moderated the association between changes in frequency of substance use and the transition to marriage.

Research Question 3, Models 7-14. Two sets of models addressed the third research question: "To what extent do time spent with friends, peer alcohol and marijuana use, and friends' and own approval of alcohol and marijuana use mediate marriage-related changes in alcohol and marijuana use during young adulthood?". According to Baron and Kenny (1986), there are four conditions that must be met for mediation to occur. The first condition states that the transition to marriage must be a significant predictor of the mediator (i.e., time spent with friends, peer substance use, peer approval of substance use, and own approval of substance use). This condition was tested by a set of four models which examined change in each of the four psychosocial variables with age and the transition into marriage. These models were almost identical to Model 2, where frequency of substance use as the dependent variable was replaced by each of these four psychosocial variables.

The second condition states that the transition to marriage must be a significant predictor of frequency of substance use. This condition was tested by Model 2. The third condition states that the mediator must be a significant predictor of frequency of substance use. This condition was tested by Models 7 through 10, which examined change in frequency of alcohol use, drunkenness, and marijuana use with change in age, marital status, and each of the four psychosocial variables. Specifically, Model 7 assessed change in frequency of substance use with change in the average amount of time individuals spent with their friends per week in the past year. Model 8 assessed change in frequency of substance use with change in the number of participants' friends who used alcohol, got drunk, and used marijuana in the past year.

Participants' own approval of others' substance use and their perceptions of their friends' approval of their own substance use were moderately correlated, where r ranged from .52 to .65 between ages 17 and 27 for alcohol use, and ranged from .59 to .68 between ages 17 and 27 for marijuana use, all significant at $p < .001$. Therefore, separate models (Models 9 and 10) were used to examine the mediation role of these two approval variables in order to remove the detrimental effect of multicollinearity in a combined model. Model 9 assessed change in frequency of substance use with change in participants' close friends' approval of alcohol and marijuana use (there was no measure of friends' approval of drunkenness). Model 10 assessed change in frequency of substance use with change in individuals' approval of alcohol use, drunkenness, and marijuana use. In Models 8 through 10, the type of substance use modeled as the dependent variable matched the type of peer substance use, peer approval of use, and own approval of use included in each version of the model. For instance, the marijuana use version of Model 8 included frequency of marijuana use as the dependent variable and peer marijuana use as an explanatory variable. Because there is no estimate of peer approval of drunkenness in the data, there was no drunkenness version of Model 9.

The below equations describe how the mediator models 7 through 10 were estimated, where the four mediators are referred to by the term "Med".

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$$Y_{ij} = \beta_{0i} + \beta_{1i}Age_{ij} + \beta_{2i}Mar_{ij} + \beta_{3i}Med_{ij} + e_{ij}$$

$$\beta_{0i} = \gamma_{00} + \gamma_{01}Age_{i\cdot} + \gamma_{02}Mar_{i\cdot} + \gamma_{03}Med_{i\cdot} + \zeta_{0i}$$

$$\beta_{1i} = \gamma_{10} + \zeta_{1i}$$

$$\beta_{2i} = \gamma_{20}$$

$$\beta_{3i} = \gamma_{30}$$

The within-person equation for Models 7 through 10 specified that individuals' frequency of

alcohol use, drunkenness, or marijuana use (Y_{ij}) was estimated as the mean frequency of

substance use for individuals who were aged 17, unmarried, and who had no friends who used the

type of substance modeled as the dependent variable (β_{0i}), plus each individual's change in

frequency of use with age (β_{1i}), with change in marital status with age (β_{2i}), and with change in time

spent with friends in the past week, the number of friends who used the modeled substance,

friends' approval of the modeled substance, or own approval of that substance with age (β_{3i}), plus

the residual variance (e_{ij}). The between-person equation in this model for the intercept, β_{0i},

included estimates of the difference in frequency of use associated with differences in mean age

(γ_{01}), mean marital status (γ_{02}), and the mean level of time spent with friends, number of friends

who used the modeled substance, friends' approval of use of that substance, or own approval of

use of that substance (γ_{03}). β_{1i} reflects the degree to which each individual's frequency of

substance use changed with age, controlling for marriage-related change in use and change in the

mediator (γ_{10}), plus person-specific error (ζ_{1i}). β_{2i} indicates the mean change in frequency of

substance use as individuals moved from single to married status, independent of change in use

with age and with change in the mediator (γ_{20}). This gamma partially indicated whether a mediation

effect is present. More specifically, as stated above, a significant reduction in γ_{20} from Model 2 to

Models 7 through 10 provided partial evidence that time with friends, peer use, peer approval of

use, or own approval of use mediated the association between frequency of substance use and the

transition to marriage. B_{3i} was measured as the mean change in frequency of substance use with

change in the mediator over time, controlling for age-related and marriage-related changes in use

(γ_{30}).

The fourth and final condition states that the association between the transition to marriage and substance use frequency must decrease between the marriage model (Model 2) and the mediator model (Models 7 through 10). For this condition for mediation to be met, reductions in the Mar coefficient (γ_{20}) between Model 2 and Models 7 through 10 must occur. If the Mar coefficient decreased significantly between Models 2 and 8, for instance, this would indicate that the peer substance use variable in Model 8 explained a significant amount of the variance in participants' substance use that was formerly explained by changes in marital status. This would provide partial evidence that peer substance use helped explain, or mediated, the association between the transition to marriage and change in frequency of substance use with age.

TABLES

Table 2

NYS Data Collection Information: Year of Data Collection Wave, Ages of Participants, and Sample Size Per Wave

Wave	Year of Interview	Year Addressed by Interview	Age of Participants	Sample Size
1	1977	1976	11-17	1,725
2	1978	1977	12-18	1,655
3	1979	1978	13-19	1,626
4	1980	1979	14-20	1,543
5	1981	1980	15-21	1,494
6	1984	1983	18-24	1,496
7	1987	1986	21-27	1,384

Table 3

Age (Sample Size) by Cohort and Wave

Cohort	Wave 1 1977	Wave 2 1978	Wave 3 1979	Wave 4 1980	Wave 5 1981	Wave 6 1984	Wave 7 1987
1						18 (229)	21 (210)
2						19 (230)	22 (218)
3					17 (245)	20 (239)	23 (216)
4				17 (222)	18 (212)	21 (218)	24 (195)
5			17 (235)	18 (219)	19 (207)	22 (210)	25 (195)
6		17 (231)	18 (225)	19 (210)	20 (204)	23 (208)	26 (190)
7	17 (197)	18 (187)	19 (186)	20 (176)	21 (165)	24 (162)	27 (160)
Total	197	418	646	827	1033	1496	1384

Table 3a

Sample Size in Current Study by Age

Age	N
17	1130
18	1072
19	833
20	619
21	593
22	428
23	424
24	357
25	195
26	190
27	160

CHAPTER 3. RESULTS

Although 1,725 individuals took part in the National Youth Survey, not all of these individuals provided data between ages 17 and 27. The analyses included data from the 1,644 participants who were interviewed at least once between these ages. As shown in Table 4, 940 (57.2%) of these remained single throughout the course of the study, 595 (36.2%) married at some point during the course of the study, and 109 (6.6%) married prior to entering the study. These 1,644 participants (the level 2 units) contributed 5,997 person waves of data (the level 1 units) to the analysis.

Of these 1,644 participants, 52.9% were male and 47.1% were female, and 79.0% were white and 21.1% were nonwhite. According to Table 4, males (65.8%) and nonwhites (69.4%) were more likely than were women (47.6%) and whites (53.9%) to have remained consistently single throughout the study. Women (52.5%) and whites (46.1%) were more likely than men (34.3%) and nonwhites (30.6%) to have married prior to or during the course of the study. Regarding the age at which participants married, individuals most commonly married at age 22 (6.9%) or age 21 (6.6%). The median age of marriage for women was 21 (M = 20.83, SD = 2.79) and for men was 22 (M = 22.03, SD = 2.56). These ages are a little younger than the median age at marriage of 22 for women and 24.7 for men in 1980 (U.S. Census Bureau, 2006), most likely because of the right censoring of the data at age 27.

Table 5 lists the descriptive statistics (i.e., range, mean, and standard deviation) for frequency of each type of substance use, length of marriage, time spent with friends, the number of friends who used each type of substance, friends' approval of alcohol and marijuana use, and participants' approval of each type of substance use.

Model Construction

Preliminary multilevel analyses of age-related change in frequency of alcohol use, drunkenness, and marijuana use were conducted using HLM version 6.04 to determine: (1) the

appropriate number of categories for the ordinal frequency of drunkenness and marijuana use dependent variables, (2) the appropriate degree of the polynomial for age with which to model change in substance use, and (3) whether the two potential control variables, cohort membership and number of years since last interview, should be included in subsequent models.

To determine the appropriate number of categories for the drunkenness and marijuana variables, ordinal logistic multilevel modeling was used to compare models of age-related change in drunkenness and marijuana frequency. Three drunkenness models based on two-, three-, and the original nine-category frequency of drunkenness variables, and three marijuana models which were based on two-, four-, and the original nine-category frequency of marijuana use variables were compared. The models that included the nine-category variables did not converge, most likely because there were insufficient degrees of freedom to differentiate among all nine categories of each behavior, given the low frequencies for some categories. Models with the two- and three-/four-category frequency of use variables converged, and the chi-square values for the intercepts from each model were significant, indicating the presence of between-person variance in the outcome variables available for prediction by explanatory variables. The three-category drunkenness and the four-category marijuana use variables were used subsequent models because they were more informative regarding change in frequency of substance use with age and the transition to marriage.

The HLM software program expresses multinomial and ordinal models in terms of the log odds of being in the lower categories versus the higher categories (i.e., 0 vs. 1-3, 0-1 vs. 2-3, and 0-2 vs. 3). The drunkenness and marijuana use variables were reverse-coded so that analyses would produce positive estimates in the presence of a positive relationship between frequency of use and the independent variables (where increasing use coincides with increases in the independent variables), comparable to the estimates from the linear frequency of alcohol use models. As a result, the logistic ordinal drunkenness and marijuana models estimated the log odds of reporting the higher drunkenness and marijuana use frequency levels versus the lower

frequency levels (i.e., 3 vs. 0-2, 2-3 vs. 0-1, and 1-3 vs. 0), and change in the log odds of reporting higher levels of use with increases in the independent variables in each model. For each log odds coefficient, HLM also provided an odds ratio and its confidence interval.

The next step was to determine the most appropriate degree of the polynomial with which to model age-related change in frequency of alcohol, drunkenness, and marijuana use. Analysis of various degrees of the polynomial for age revealed that change in frequency of each type of substance use was best described by a cubic function. The linear, quadratic, and cubed age terms were then estimated as both random and fixed. Only the random variance component for the linear term was significant in the three substance use models. Therefore, the linear age term was set as random and the quadratic and cubed age terms were set as fixed in all subsequent models of frequency of substance use. Later analyses revealed that the random effects of marriage and the four psychosocial variables were nonsignificant, so these variables were estimated as fixed effects in subsequent models.

The cohort and time since last interview variables were then tested to determine if they predicted frequency of substance use. If so, they would be included in all of the age models as control variables. To determine if frequency of substance use differed by cohort, the dummy coded cohort membership variable was included in the level 2 equation for the intercept term of the age model. Chi-square tests of all cohort differences in frequency of alcohol use, drunkenness, and marijuana use were not significant (alcohol: χ^2 = 5.04, df = 6, p > .500; drunkenness: χ^2 = 9.43, df = 6, p = .150; marijuana: χ^2 = 2.19, df = 6, p > .500). Thus, frequency of alcohol use, drunkenness, and marijuana use did not significantly vary by cohort. As a result, the dummy coded cohort variables were not included as control variables in subsequent models.

As explained in the Methods (Chapter 2), data had been collected from participants once a year during the first five years, or waves, of the study and once every three years thereafter. To account for the varying intervals between measurement occasions, analyses were conducted to determine if substance use frequency in the past year differed by the number of years that had

passed since they were last interviewed, where one year was coded as '0' and three years was coded as '1'. According to Model 1 in Table 6, in which frequency of each type of substance use was predicted by a cubic function of age and time since the prior interview, participants whose prior interview was three years previous reported a significantly lower frequency of alcohol use (β = -0.22, SE = .09, p = .015), drunkenness (β = -0.73, SE = .13, p < .001), and marijuana use (β = -0.49, SE = .13, p < .001) than those whose prior interview was one year previous. The odds ratio for the drunkenness model (0.48, CI = 0.38, 0.62) and the marijuana use model (0.62, CI = 0.48, 0.79) indicated that individuals whose prior interview was three years previous were 52% less likely to report getting drunk and 38% less likely to report using marijuana at higher frequencies than those whose prior interview was one year previous. To control for this, time since last interview was included as a control variable in Models 1 through 10.

Following these preliminary analyses, 10 models were analyzed. Model 1 estimated the age trends in frequency of alcohol use, drunkenness, and marijuana use. Time since last interview was included as a control variable. Models 2 and 3 examined age-related change in frequency of substance use with marital status, anticipation of marriage, length of marriage, and time since last interview. Models 4 through 6 investigated age-related change in frequency of use with marital status, the three potential moderating variables (age at marriage, gender, and race), length of marriage[1], and time since last interview. Models 7 through 10 examined age-related change in frequency of use with marital status, the four potential mediating variables (time since last interview, friends' substance use, friends' approval of use, and own approval of use), length of marriage, and time since last interview. The unstandardized coefficients[2], their standard errors, and their significance values in the alcohol use, drunkenness, and marijuana use models are presented in Table 6 (Models 1 to 3), Table 8 (Models 4 to 6), and Table 10 (Models 7 to 10). The odds ratios

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[1]As explained below, length of marriage was a significant predictor of frequency of alcohol use and drunkenness, but not marijuana use. As a result, it was included as a control variable in the alcohol and drunkenness versions of Models 4 through 10.

[2] The HLM software program only estimates unstandardized coefficients.

and their confidence intervals for several of the coefficients from the logistic models of drunkenness and marijuana use frequency are also included in these tables.

Research Question 1: Age and the Transition to Marriage

      Age. Substance use levels have been found in past research to increase from the late teens to early twenties and to decrease with age thereafter (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997). These and other researchers have attempted to examine why levels of use tend to decline following the early twenties, and have identified the transition to marriage as associated with these declines in use (e.g., Curran et al., 1998; Labouvie, 1996). Change in frequency of alcohol use, drunkenness, and marijuana use with age was investigated before examining the extent to which the transition to marriage explained age-related change in use. The findings from this investigation are listed for Model 1 in Table 6. Based on the findings from Model 1, Figure 1 illustrates the age trends in frequency of alcohol use, drunkenness, and marijuana use between ages 17 and 27. These graphs depict increases in frequency of each type of use between age 17 and the early twenties (age 22 for alcohol use and drunkenness, and age 20 for marijuana use), followed by declines in use between the early and late twenties. According to Figure 1, these declines in use were greater for marijuana use than the other two substances. Although frequency of drunkenness may appear to have increased slightly between ages 26 and 27, these increases are not likely to be statistically reliable due to the relatively small number of participants ages 25 though 27 as well as the right censoring of the data at age 27. Overall, these findings matched expectations based on prior research that frequency of each type of substance use would increase between the late teens and early twenties, and would decrease between the early and late twenties. The next goal was to examine the role of the transition to marriage in age-related declines in frequency of use. This role of marriage was examined across the entire age range of 17 to 27 although declines in use were most prevalent after the early twenties.

      Marriage: Preliminary analyses. The central hypothesis of this study was that participants would experience decreases in frequency of substance use across the transition into marriage.

The findings from Model 2 in Table 6 supported this hypothesis, and are illustrated in Figure 2.

The transition to marriage was initially defined as the time period between the last measurement occasion in which participants reported their marital status as single (coded as '0') and the first occasion in which they reported their marital status as married (coded as '1'). In other words, this transition period is the period during which participants moved from single to married status. In Model 2 change in substance use frequency was examined when participants' marital status values changed from '0' to '1'. Models 3 through 10 included a coefficient for change in frequency of use with length of marriage (described below). As a result, change in frequency of use was examined in these later models with the transition from single to married status and with increasing length of marriage.

Before describing the findings from Model 2, Figures 2 through 5 will be explained. These figures compare the substance use trajectories with age for two groups of individuals: those who were consistently unmarried throughout the course of the study (the dashed and usually top line in each set of lines), and those who married at some point before or during the course of the study (the solid and usually bottom line in each set of lines). To clearly show the change in substance use with marriage, substance use trajectory for individuals who married were graphed in such a way that the marriage coefficient was added to the substance use by age estimates at age 21. This age was chosen arbitrarily in order to illustrate clearly the estimated substance use trajectory for individuals who married. This trajectory is identical for individuals who married at any other age, except for the change in position along the horizontal axis denoting the age at which the change in frequency of use accompanying the transition to marriage occurred because age at marriage was not included in these models.

Figure 2, based on Models 2 and 3, is slightly different from Figures 3 through 5 because a third line was graphed in addition to the lines illustrating substance use trajectories for the consistently single and the married participants. Similar to the other figures, the top, dashed line illustrates the substance use trajectories of individuals who were consistently single, as estimated

by Model 2 which modeled change in substance use frequency with change in age and marital status. The middle, solid line denoted with squares illustrates the substance use trajectories of individuals who married at age 21, also based on estimates from Model 2. These trajectories illustrate the level of decline in substance use frequency with the transition to marriage which is estimated as a constant regardless of the length of time individuals are married. The bottom, solid line denoted with circles also illustrates the substance use trajectories of individuals who married at 21, but the level of decline in frequency of use change with increasing length of marriage starting from age 21, as estimated by Model 3. Marriage-related declines in substance use frequency will be described below, followed by a description of change in substance use frequency with increasing length of marriage.

As illustrated by Figure 2, the findings from Model 2 supported the hypothesis that participants' frequency of alcohol use, drunkenness, and marijuana use would decrease significantly as they moved from single to married status. Participants experienced an average decline of 0.42 alcohol use frequency units during the transition into marriage (β = -0.42, SE = .08, p < .001). The effect size of this decline in frequency of alcohol use with the transition to marriage was 0.24 standard deviations, which is considered a small to medium effect size by Cohen (1992). Although this is a modest decrease, it was believed to be substantial enough to merit further analyses on group differences and psychosocial influences on changes in frequency of alcohol use across the transition to marriage. Furthermore, this rate of decrease is similar to that found in past research. For example, Curran and colleagues (1998) found that average daily quantity of alcohol consumption decreased by between 0.20 and 0.29 standard deviations across the transition to marriage.

Individuals who married also experienced significant declines in their drunkenness frequency across the transition to marriage (β = -0.92, SE = .12, p < .001), representing a decrease of 1.35 standard deviations, which is a large effect size (Cohen, 1992). The odds ratio for these declines (0.40, CI = 0.32, 0.50) indicated that getting married significantly reduced the likelihood of

higher frequency drunkenness by 60%. Individuals who married also experienced significant declines in their frequency of marijuana use (β = -0.38, SE = .13, p < .001), representing a decrease of 0.39 standard deviations, which is roughly a medium effect size (Cohen, 1992). Getting married decreased the likelihood of higher frequency marijuana use by 32% (OR = 0.68, CI = 0.53, 0.87). As with frequency of alcohol use, this moderate decline in marijuana use frequency was considered strong enough to warrant further investigations into group differences and psychosocial processes in declines in frequency of marijuana use across the marital transition. Comparing the change in each type of substance use frequency across the transition to marriage, frequency of drunkenness decreased to a greater extent than frequency of alcohol and marijuana use, and was therefore the most responsive to the transition to marriage.

   Test of research question. After determining that frequency of alcohol use, drunkenness, and marijuana use declined significantly with age (following the early twenties) and with the transition to marriage, as expected, the first research question could be tested, which asked to what extent were age-related declines in substance use frequency explained by the transition to marriage?

   The portion of age-related change in use explained by this marital transition, as described by Osgood and colleagues (1996), can be determined by comparing the unadjusted age coefficients with the age coefficients adjusted for marital status if the age trend is linear. The difference between these two age coefficients yields the indirect effect of change in marital status on frequency of use via age. This method can not be used in the present case where the age trends are polynomial, however. Because a polynomial age term was used in the present study, as suggested by Osgood and colleagues two sets of fitted values for frequency of use with age were calculated. The first set of fitted values based on the polynomial age coefficients from Model 1 across the age range of 17 to 27 represents change in frequency of substance use with age as well as marital status. The second set of fitted values from the polynomial age coefficients from Model 2 across this age range represents change in frequency of use with age alone (and not

marital status) because the variance in frequency of use with change in marital status has been controlled for, or removed from the estimation of age-related change. These fitted values for age and adjusted age were also plotted in Figure 1. Pseudo-beta (β*) coefficients were then calculated as the standard deviation of these fitted values for age and age adjusted for marital status over the age range of 17 to 27 divided by the standard deviation of ages 17 to 27. These β* coefficients are analogous to unstandardized regression coefficients. These resulting age and adjusted age coefficients were then compared to determine the extent to which marital status explained age-related changes in frequency of alcohol use, drunkenness, and marijuana use. A percent decrease from the age β* coefficient to the adjusted age β* coefficient indicates the proportion of age-related change in frequency of use explained by marital status.

Before the comparisons of the age and adjusted age β* coefficients are discussed, Figure 1 will be described in more detail. This figure shows how age trends for frequency of alcohol use, drunkenness, and marijuana use changed when marital status was controlled. Before controlling for marital status (Model 1), increases in frequency of substance use between age 17 and the early twenties were smaller and declines in frequency of use between the early twenties and age 27 were greater than these age trends after adjusting for marital status (Model 2). In other words, increasing rates of marriage dampened age-related increases in frequency of substance use between the late teens and early twenties, and increased age-related declines in frequency of use between the early and late twenties. In fact, once marital status was controlled for, there was little change in frequency of alcohol use and drunkenness between the early and late twenties, suggesting that the transition to marriage likely explained a substantial portion of this aspect of age-related change in use. Overall, the impact of marital status on these age trends appeared greatest for frequency of drunkenness, then alcohol use, and least for marijuana use, consistent with the marital status coefficients from Model 2.

The age and adjusted age β* coefficients over the age range of 17 to 27 are presented in Table 7. The adjusted age coefficients for alcohol use and drunkenness (alcohol: $\beta_{\text{adj age}}$ = 0.15;

drunkenness: $\beta_{adj\ age}$ = 0.18) were actually greater than the unadjusted age coefficients (alcohol: β_{age} = 0.13; drunkenness: β_{age} = 0.14), indicating that the transition to marriage did not explain age-related change in frequency of alcohol use and drunkenness between ages 17 and 27. Furthermore, this marital transition only explained 4.8% of the age trend in frequency of marijuana use over this age range (β_{age} = 0.13, $\beta_{adj\ age}$ = 0.12). However, because age-related change in frequency of substance use between ages 17 and 27 actually consisted of two different age trends, namely increases in use between age 17 and the early twenties and decreases in use between the early and late twenties, comparisons of the age and adjusted age coefficients over the entire age range may not adequately describe the role of marital status in these divergent age trends. To determine if the transition to marriage explained age-related increases and/or decreases in frequency of substance use across these ages, the age and adjusted age β^* coefficients between age 17 and the peak age of use for each substance (age 22 for alcohol use and drunkenness, and age 20 for marijuana use), and between this peak age and age 27 were computed.

Table 7 presents the age and adjusted age β^* coefficients from these two age ranges. According to these values, the transition to marriage did not help explain increases in frequency of alcohol use, drunkenness, or marijuana use between ages 17 and the early twenties. Similar to the comparisons of the β^* coefficients calculated over the entire age range, the age coefficient representing change in alcohol use with age and marital status increased by 7.6% when marital status was controlled, the coefficient for drunkenness increased by 17.4%, and the coefficient for marijuana use only slightly increased by 0.6% when marital status was controlled. This finding that marital status did not help explain increases in use was expected based on Figure 1. As illustrated by this figure, increases in frequency of alcohol use, drunkenness, and to a lesser extent marijuana use between age 17 and the early twenties were greater when the age estimates were adjusted for marital status. This pattern reflects decreases in substance use frequency during the transition to marriage. Increases in frequency of use during this age period were not *explained* by the transition to marriage; rather, increases in use would have been even bigger without this transition. In other

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words, increases in frequency of use were greater, and the pseudo-beta coefficients were greater, when variance with marital status was removed from the age estimates.

Also as indicated by Figure 1, the age β^* coefficients for declines in frequency of substance use between the early and late twenties decreased when the age estimates were adjusted for marital status, indicating that marital status helped explain declines in frequency of use between these ages. According to Table 7, the age coefficient for declines in frequency of alcohol use decreased by 45.5% when marital status was controlled, the coefficient for drunkenness decreased by 82.2%, and the coefficient for marijuana use decreased by 4.5%. Thus, the transition to marriage explained these proportions of age-related declines in frequency of use between ages 22 and 27. Again, these findings were similar to those from Model 2, which indicated that declines in frequency of use across the transition to marriage were the greatest for drunkenness, followed by alcohol use, and were the weakest for marijuana use.

In summary, these findings support the hypothesis that the transition to marriage partially explained age-related change in frequency of alcohol use, drunkenness, and to a much lesser extent marijuana use.

Additional marriage variables: Anticipation of marriage and length of marriage. Based on prior research, two hypotheses were tested regarding the timing of declines in frequency of substance use around the time of marriage. First, it was expected that frequency of alcohol use, drunkenness, and marijuana use would begin to decline one full year prior to marriage among participants who anticipated an upcoming marriage. However, the results from Model 3 in Table 6 indicated that the frequency of each type of substance use did not significantly decline in anticipation of marriage. The coefficients for anticipation of marriage in the alcohol model (β = 0.02, *SE* = .09, *p* = .845), the drunkenness model (β = -0.16, *SE* = .12, *p* = .185), and marijuana use model (β = -0.05, *SE* = .14, *p* = .719) were close to zero, indicating that frequency of alcohol, drunkenness, and marijuana use did not change in the year prior to marriage relative to earlier years.

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Second, it was expected that declines in frequency of substance use would continue following the transition into marriage. In other words, it was hypothesized that declines in use would continue or increase with increasing length of marriage. This hypothesis was supported by the findings for Model 3 presented in Table 6. Frequency of alcohol use and drunkenness, but not marijuana use, declined to a small degree with increasing number of years married (alcohol: β = -0.13, SE = .03, p < .001; drunkenness: β = -0.10, SE = .04, p = .014; marijuana: β = -0.02, SE = .05, p = .772). In other words, with every year that participants were married, their frequency of alcohol use decreased by 0.07 standard deviations and their odds of getting drunk at higher frequencies decreased by roughly 10% (OR = 0.91, CI = 0.84, 0.98), representing small decreases in each type of use with length of marriage. Figure 2 illustrates these decreases in frequency of use with increasing number of years married. As a result of this finding, length of marriage was included as a within-person control variable in the alcohol and drunkenness versions of the moderator and mediator models (Models 4 through 10).

Research Question 2: Moderators

The second research question asked whether declines in frequency of substance use across the marital transition differed, or were moderated, by age at marriage, gender, and race.

Age at marriage. It was hypothesized that participants who married at older ages experienced less of a decline in frequency of substance use during the transition to marriage than those who married at younger ages. Although this hypothesis was tested in a number of ways, this hypothesis was not supported by the data. The results suggested that marriage-related declines in frequency of substance use did not differ by the age at which participants married.

The hypothesis was first tested by determining whether change in frequency of alcohol use, drunkenness, and marijuana use during the transition to marriage varied by the original linear age at marriage variable. The results from this model, Model 4 in Table 8, suggested that rates of change in frequency of each type of substance use during the transition to marriage did not differ by age at marriage (alcohol: β = 0.01, SE = .03, p = 0.757; drunkenness: β = -0.03, SE = .05, p =

.563; marijuana: β = 0.05, SE = .05, p = .371). It should also be noted that, according to this model, overall frequency of alcohol use, drunkenness, and marijuana use did not differ by age at marriage (alcohol: β = 0.01, SE = .01, p = 0.148; drunkenness: β = -0.02, SE = .05, p = .662; marijuana: β = 0.01, SE = .01, p = .950).

The change in mean frequency of substance use between the year prior to marriage and the year following marriage for those who married at various ages was then examined. These findings suggested that individuals who married in their late teens appeared to experience less of a decline in their frequency of substance use during the transition to marriage than those who married in their early twenties, which is contrary to the hypothesis. Therefore, the analyses examined whether individuals who married at ages 18 or 19 experienced a significantly different degree of change in frequency of substance use than those who married at older ages in order to confirm the findings regarding change in mean frequency of use. The findings from these multilevel models, however, indicated that participants who married at ages 18 or 19 did not experience significantly greater declines in frequency of substance use with marriage than those who married at older ages, perhaps because of the very small sample size of those married at ages 18 (N = 34) and 19 (N = 43).

Therefore, these findings did not support the hypothesis that participants who married at older ages would experience smaller declines in frequency of substance use across the transition to marriage. Rather, they suggested that marriage-related declines in use did not differ by age at marriage, although they may have been slightly smaller for those who married in their late teens.

Gender. It was hypothesized that women experienced greater declines in frequency of substance use than men across the transition to marriage. As explained in the Methods, Model 5 (Table 8) tested whether participants who married during the study experienced declines in substance use frequency in addition to the age-related change experienced by all participants, as well as the extent to which these declines in frequency of use with marriage differed by gender. It was found that declines in alcohol use frequency but not drunkenness frequency differed

significantly by gender, supporting the hypothesis. The findings for marijuana use were inconclusive.

According to Model 5 (illustrated in Figure 3), the marital status by gender interaction coefficient from the alcohol use model was significant (β = 0.34, *SE* = .14, *p* = .018). Women experienced significantly greater declines in frequency of alcohol use during the transition from single to married status (β = -0.40, a decrease of 0.22 standard deviations) than men (β = -0.07, or -0.04 standard deviations). However, the marital status by gender interaction coefficient from the drunkenness model (β = 0.16, *SE* = .20, *p* = .424) was nonsignificant, suggesting that men (β = -0.73, *OR* = 0.48) and women (β = -0.89, *OR* = 0.41) experienced similar rates of decline in the likelihood of higher frequency drunkenness across this transition, as illustrated by Figure 3.

The marital status by gender interaction coefficient in the marijuana use model was also nonsignificant (β = 0.30, *SE* = .21, *p* = .165). However, this gender difference in declines in marijuana use frequency with marriage was 0.3 standard deviations, a small to medium effect size. The lack of significance was the result of the high standard error, perhaps because the nonlinear test did not have substantial power to detect this effect. This situation can occur if there are low rates of the dependent variable, as there were somewhat for marijuana frequency in this study, making it difficult for the test to detect group differences in this variable. As a result, this finding was deemed inconclusive. However, this modest gender by marital status coefficient suggests that women (β = -0.32, *OR* = .69) may have experienced greater declines in frequency of marijuana use across the transition to marijuana use than men (β = -0.08, *OR* = .93), who may have experienced minimal declines in use.

It is also of note that, according to Model 5, men drank alcohol, got drunk, and used marijuana significantly more often than women (alcohol: β = 0.56, *SE* = .11, *p* < .001, or 0.31 standard deviations; drunkenness: β = 0.87, *SE* = .13, *p* < .001; marijuana: β = 0.93, *SE* = .16, *p* < .001), consistent with prior research. Men were roughly two and a half times more likely to report being drunk (*OR* = 2.39, *CI* = 1.86, 3.08) and using marijuana (*OR* = 2.52, *CI* = 1.86, 3.41) at

higher frequencies than women.

Race. Based on prior research, it was hypothesized that whites experienced greater declines in frequency of use across the transition to marriage than nonwhites. The direction of the findings from Model 6 (Table 8) were consistent with this hypothesis for each type of substance use frequency, although they were only significant for alcohol. Contrary to the hypothesis, nonwhites experienced increases in frequency of alcohol and marijuana use across this transition.

As illustrated by Figure 4, the marital status by race interaction coefficient from the alcohol use model was significant (β = 0.71, *SE* = .24, *p* = .003), indicating a significant racial difference in marriage-related change in alcohol use frequency. Specifically, whites experienced decreases in frequency of alcohol use following marriage (β = -0.37, a decrease of 0.21 standard deviations) while nonwhites experienced increases in frequency of use that were roughly equal in size (β = 0.33, or 0.19 standard deviations). The marital status by race interaction coefficient from the drunkenness model was moderate but not significant (β = 0.32, *SE* = .41, *p* = .434) due to the high standard error most likely because of the low power of the test. This coefficient suggested that whites may have experienced a greater reduction in their likelihood of higher frequency drunkenness (58% reduction, *OR* = .42) across the transition to marriage than nonwhites (42% reduction, *OR* = .58). The marital status by race interaction coefficient from the marijuana model was also moderate but not significant (β = 0.45, *SE* = .34, *p* = .189), again due to the high standard error most likely because of the low power of the test. This large coefficient suggested that whites may have experienced a small reduction in their likelihood of higher frequency marijuana use across the transition to marriage (29% reduction, *OR* = .71), while nonwhites may have experienced a small increase in their likelihood of higher frequency marijuana use across the marital transition (11% increase, *OR* = 1.11). Due to this lack of significance, the findings regarding racial differences in changes in frequency of drunkenness and marijuana use across the transition to marriage were inconclusive. However, these findings suggested that whites experienced greater decreases in frequency of alcohol use, drunkenness, and marijuana use during the transition to

marriage than nonwhites.

It is also of note that, according to Model 6, whites reported higher frequencies of alcohol use, drunkenness, and marijuana use than nonwhites, supporting prior research. Nonwhite participants drank alcohol less often, specifically over one frequency unit less, than whites (β = -1.23, SE = .13, $p < .001$, or -0.69 standard deviations). According to the odds ratio (0.17, CI = 0.12, 0.23) for the drunkenness model, nonwhites were roughly 83% less likely than whites to get drunk at higher frequencies in the past year (β = -1.79, SE = .15, $p < .001$). In addition, nonwhites were 30% less likely than whites (OR = 0.71, CI = 0.49, 1.01) to use marijuana at higher frequencies, though this gender difference was only marginally significant (β = -0.35, SE = .18, p = .055).

Research Question 3: Mediators

Regarding the third research question, it was hypothesized that time spent with friends, friends' substance use, friends' approval of participants' substance use, and participants' approval of substance use mediated or partially explained the association between the transition to marriage and declines in frequency of substance use. In other words, it was hypothesized that declines in frequency of substance use occurring during the transition to marriage were partially explained by declines in these four psychosocial variables also occurring during this transition.

Baron and Kenny's (1986) rules of mediation were followed to determine whether these four variables mediated this association. According to these authors, the first condition for mediation would be met if the transition to marriage significantly predicted the mediator. To test this condition, four linear multilevel models were estimated in which each psychosocial variable was predicted by age and marital status (Table 9). Because there were alcohol, drunkenness, and marijuana use versions of friends' substance use and own approval of use, and alcohol and marijuana use versions of friends' approval of use, different versions of these models were estimated for each type of substance. A model that included linear, quadratic, and cubed polynomial age terms was found to best describe age-related change in the four psychosocial variables. After estimating

these terms as random, only the random variance components for the linear and quadratic terms were found to be significant in each model. As a result, the linear and quadratic age terms were set as random and the cubed age term and the marital status term were set as fixed. Figures 5 through 8 illustrate change in the four psychosocial variables with age. According to these figures, the age trends in these four variables were similar to the age trends in frequency of alcohol use, drunkenness, and marijuana use, suggesting a similarity in these age-related processes and behaviors during young adulthood.

Baron and Kenny's second condition for mediation would be met if the transition to marriage significantly predicted change in frequency of alcohol use, drunkenness, and marijuana use. This condition was met according to the results from Model 2 (Table 6) described above.

The third condition for mediation would be met if the potential mediator significantly predicted frequency of substance use. This condition was tested by Models 7 through 10 (Table 10) in which frequency of alcohol use, drunkenness, and marijuana use were predicted by age, marital status, and each potential mediator.

Finally, the fourth condition for mediation would be met if the association between the transition to marriage and frequency of substance use decreased between the marriage model (Model 3 for alcohol use and drunkenness and Model 2 for marijuana use) and the mediator model (Models 7 through 10) in which frequency of substance use was predicted by age, marital status, the potential mediator, and the appropriate control variables. The test of this condition, specifically the indirect effect of the transition to marriage on frequency of substance use via each potential mediator, was conducted in the following manner. The absolute difference in the marital status coefficient between the marriage model (Models 2 or 3) and the mediator model (Models 7 through 10) for each potential mediator was calculated ($\Delta\beta$). Next, this absolute difference was divided by the standard error of the indirect effect. This standard error, which was derived by Sobel (1982) and described in Baron and Kenny (1986), was estimated as:

$$S_{ab} = \sqrt{b^2 S_a^2 + a^2 S_b^2 + S_a^2 S_b^2} \quad ,$$

where *ab* refers to the indirect effect, *a* refers to the coefficient for the prediction of the potential mediator by marital status, S_a is its standard error, *b* is the coefficient for the prediction of frequency of substance use by the potential mediator, and S_b is its standard error. The division of the absolute difference between the marital status coefficients between the marriage and mediator models by the standard error of this indirect mediator effect yielded a z-value. To determine if this z-value was significant, its two-tailed p-value was examined against the normal distribution. Table 11 lists the absolute and percent difference in the marital status coefficients between the marriage and mediator values, the standard error of the indirect mediator effect, and the z-value and significance for each of the four potential mediators.

Below, the findings from the tests of the first, third, and fourth criteria for mediation for the four psychosocial variables will be described.

Time spent with friends. As illustrated by Figure 5 and Table 9, time spent with friends[3] decreased significantly across the transition into marriage (*β* = -0.73, *SE* = .05, *p* < .001), which represents a large effect size of 0.85 standard deviations. Therefore, Baron and Kenny's first criterion for mediation, that the transition to marriage predict the potential mediator, was satisfied.

Time spent with friends also predicted frequency of substance use, satisfying Baron and Kenny's third condition for mediation. According to the findings for Model 7 from Table 10, participants who spent more time with their friends tended to report significantly higher frequency levels of alcohol use, drunkenness, and marijuana use (alcohol: *β* = 0.15, *SE* = .03, *p* < .001; drunkenness: *β* = 0.19, *SE* = .04, *p* < .001; marijuana: *β* = 0.25, *SE* = .04, *p* < .001). An increase in one unit of time spent with friends increased the odds of higher frequency drunkenness by 21% (*OR* = 1.21, *CI* = 1.13, 1.31), and increased the odds of higher frequency marijuana use by 28% (*OR* = 1.28, *CI* = 1.18, 1.38).

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[3] Descriptives for this variable and the other potential mediators are listed in Table 5.

Finally, meeting Baron and Kenny's fourth requirement for mediation, the marital status coefficients from the marriage models (Models 2 and 3) decreased when time spent with friends was added to these models (Model 7). According to Tables 12 and 13, the marital status coefficient from the model of marriage-related change in alcohol use frequency (Model 3: β = -0.43, SE = .08, p < .001) decreased by 24.0% when time spent with friends was added to this model (Model 7: β = -0.33, SE = .09, p < .001). As indicated by Table 11, the Sobel test for this indirect effect of the transition to marriage on change in frequency of alcohol use via time spent with friends was significant ($\Delta\beta$ = .10, SE = .02, z = 4.60, p < .001). The marital status coefficient from the model of marriage-related change in drunkenness frequency (Model 3: β = -0.89, SE = .12, p < .001) decreased by 15.9% (Model 7: β = -0.75, SE = .13, p < .001), which was a significant decrease ($\Delta\beta$ = .14, SE = .03, z = 4.80, p < .001). And the marital status coefficient from the model of marriage-related change in marijuana use frequency (Model 2: β = -0.38, SE = .13, p = .003) decreased by 52.8% (Model 7: β = -0.18, SE = .14, p = .184), which was a significant decrease ($\Delta\beta$ = .20, SE = .03, z = 6.27, p < .001).

Based on the evidence regarding Baron and Kenny's rules for mediation and the strength of this indirect effect, it was concluded that time spent with friends partially mediated the association between the transition into marriage and declines in frequency of alcohol use, drunkenness, and marijuana use. In other words, declines in frequency of each type of substance use during the transition to marriage were partially explained by declines in time spent with friends that also occurred during this period.

Friends' substance use. As shown in Table 9, the number of participants' friends who drank alcohol, got drunk, and used marijuana did not change across the transition to marriage (alcohol: β = -0.06, SE = .05, p = .181; drunkenness: β = -0.08, SE = .05, p = .108; marijuana: β = -0.07, SE = .04, p = .128). Thus, Baron and Kenny's first criterion for mediation was not met.

However, their third condition was satisfied. According to Model 8 from Table 10, participants who had a higher number of friends who used each substance tended to report a

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significantly higher frequency of alcohol use, drunkenness, and marijuana use (alcohol: β = 0.49, *SE* = .03, *p* < .001; drunkenness: β = 0.63, *SE* = .04, *p* < .001; marijuana: β = 0.95, *SE* = .04, *p* < .001). An increase in one unit of the number of friends who got drunk increased the odds of higher frequency drunkenness by almost two times (*OR* = 1.89, *CI* = 1.73, 2.06), and increased the odds of higher frequency marijuana use by over two and a half times (*OR* = 2.59, *CI* = 2.38, 2.82).

Because Baron and Kenny's first criterion for mediation was not met, the fourth criterion was also not met. That is, friends' substance use did not help explain marriage-related declines in frequency of substance use because friends' substance use did not change significantly with marriage. This lack of a mediation effect was indicated by the test of the fourth mediation criterion. According to the findings for the marriage models (Models 2 and 3) and the mediator model (Model 8) from Table 10 as well as the values in Table 11, the marital status coefficient from the model of marriage-related change in alcohol use frequency (Model 3: β = -0.43, *SE* = .08, *p* < .001) decreased by 8.3% when friends' alcohol use was added to this model (Model 8: β = -0.39, *SE* = .08, *p* < .001), which was not a significant decrease according to Table 11 ($\Delta\beta$ = .04, *SE* = .02, *z* = 1.54, *p* = .123). The marital status coefficient in the model of marriage-related change in drunkenness frequency (Model 3: β = -0.89, *SE* = .12, *p* < .001) decreased by 1.9% when friends' drunkenness was added to this model (Model 8: β = -0.88, *SE* = .13, *p* < .001), which was also not a significant decrease ($\Delta\beta$ = .02, *SE* = .03, *z* = 0.53, *p* = .597). The marital status coefficient in the model of marriage-related change in marijuana use frequency (Model 2: β = -0.38, *SE* = .13, *p* = .003) increased by 15.3% when friends' marijuana use was added to this model (Model 8: β = -0.44, *SE* = .14, *p* = .002). Thus, the indirect effect of the transition to marriage on change in frequency of marijuana use via friends' marijuana use was also not significant ($\Delta\beta$ = .06, *SE* = .05, *z* = 1.26, *p* = .208).

Therefore, primarily because the first condition for mediation was not met, it was concluded that friends' alcohol use, drunkenness, and marijuana use did not mediate the association between the transition to marriage and declines in frequency of alcohol use, drunkenness, and marijuana

use.

Friends' approval of substance use. Baron and Kenny's first criterion for mediation was satisfied for friends' approval of marijuana use but not alcohol use[4]. The findings from Table 9 indicated that friends' approval of alcohol use did not change across the transition to marriage (β = -0.04, *SE* = .04, *p* = .281). Friends' approval of marijuana use decreased significantly across this transition (β = -0.10, *SE* = .04, *p* = .010). This was a small effect, however, where friends' approval of marijuana use decreased by 0.12 standard deviations with marriage.

Participants whose friends more strongly approved of alcohol and marijuana use tended to report significantly higher alcohol use (β = 0.51, *SE* = .04, *p* < .001) and marijuana use frequencies (β = 0.96, *SE* = .06, *p* < .001), according to Model 9 in Table 10. An increase in one unit of friends' approval of marijuana use increased the odds of higher frequency marijuana use by over two and a half times (*OR* = 2.60, *CI* = 2.30, 2.93). Thus, the third mediation requirement was met.

The fourth condition of mediation was not satisfied for friends' approval of alcohol or marijuana use. This was the case because friends' approval of alcohol use did not change significantly with marriage, and friends' approval of marijuana use changed minimally across this transition. According to Tables 12 and 13, the marital status coefficient from the model of marriage-related change in alcohol use frequency (Model 3: β = -0.43, *SE* = .08, *p* < .001) decreased by 3.9% when friends' approval of alcohol use was added to this model (Model 9: β = -0.41, *SE* = .08, *p* < .001), which was not a significant decrease ($\Delta\beta$ = .02, *SE* = .02, *z* = 0.92, *p* = .357). The marital status coefficient from the model of marriage-related change in marijuana use frequency (Model 2: β = -0.38, *SE* = .13, *p* = .003) increased by 8.2% when friends' approval of marijuana use was added to this model (Model 9: β = -0.41, *SE* = .14, *p* = .003). Thus, the indirect effect of the transition to marriage on declines in frequency of marijuana use was also not significant ($\Delta\beta$ = .03, *SE* = .04, *z* = 0.85, *p* = .396).

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[4] There was no measure of friends' approval of drunkenness.

As a result of these findings, primarily because friends' approval of alcohol and marijuana use did not change substantially across the transition to marriage, it was concluded that friends' approval of alcohol and marijuana use did not mediate the association between the transition to marriage and declines in frequency of alcohol and marijuana use.

Own approval of substance use. According to Table 9, Baron and Kenny's first mediation criteria was met for each type of substance use. Own approval of alcohol use, own approval of drunkenness, and own approval of marijuana use decreased by a small yet significant degree across the transition to marriage (alcohol: β = -0.09, *SE* = .04, *p* = .016, or -0.10 standard deviations; drunkenness: β = -0.13, *SE* = .04, *p* = .001, or -0.15 standard deviations; marijuana: β = -0.07, *SE* = .03, *p* = .025, or -0.34 standard deviations).

In addition, the third mediation condition was also satisfied. The findings from Model 10 (Table 10) indicated that participants who highly approved of each type of substance use tended to report higher frequencies of each type of use (alcohol: β = 0.48, *SE* = .04, *p* < .001; drunkenness: β = 0.77, *SE* = .06, *p* < .001; marijuana: β = 0.91, *SE* = .06, *p* < .001). An increase in one unit of own approval of use increased the odds of higher frequency drunkenness by over two times (*OR* = 2.16, *CI* = 1.90, 2.44), and increased the odds of higher frequency marijuana use by two and a half times (*OR* = 2.47, *CI* = 2.21, 2.78).

However, the fourth requirement for mediation was met only for own approval of alcohol use, not drunkenness or marijuana use. This was likely the case because own approval of drunkenness and marijuana use changed with marriage to a fairly small degree. According to Tables 12 and 13, the marital status coefficient from the model of marriage-related change in alcohol use frequency (Model 3: β = -0.43, *SE* = .08, *p* < .001) decreased by 8.3% when own approval of alcohol use was added to this model (Model 10: β = -0.39, *SE* = .08, *p* < .001), which was a significant decrease ($\Delta\beta$ = .04, *SE* = .02, *z* = 1.98, *p* = .048). The marital status coefficient from the model of marriage-related change in drunkenness frequency (Model 3: β = -0.89, *SE* = .12, *p* < .001) decreased by 2.7%, when own approval of drunkenness was added to the model

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(Model 9: β = -0.87, SE = .13, p < .001). This decrease was not significant, however ($\Delta\beta$ = .02, SE = .03, z = 0.82, p = .415). And the marital status coefficient from the model of marriage-related change in marijuana use frequency (Model 2: β = -0.38, SE = .13, p = .003) barely changed, increasing slightly by 0.7% when own approval of marijuana use was added to the model (Model 9: β = -0.39, SE = .13, p = .004). Thus, the indirect effect of marital status on change in frequency of marijuana use via own approval of marijuana use was not significant ($\Delta\beta$ = .01, SE = .03, z = 0.09, p = .927).

Therefore, own approval of alcohol use partially mediated the association between the transition into marriage and declines in frequency of alcohol use. Declines in frequency of alcohol use occurring during the transition to marriage were partially explained by declines in own approval of alcohol use which also occurred during this transition. The strength of this mediation was fairly weak because own approval of alcohol use only minimally changed across the transition to marriage. Own approval of drunkenness and marijuana use were not found to mediate the association between the transition to marriage and declines in frequency of drunkenness and marijuana use.

Finally, the extent to which age-related change in alcohol use, drunkenness, and marijuana use frequency could be explained by age-related change in the four psychosocial variable was assessed. This was determined by calculating the percent change in the polynomial age coefficient for each type of substance use frequency controlling for marital status from Models 2 and 3 to Models 7 through 10. Most notably, according to Table 12, 22%, 11%, and 20% of age-related change in alcohol use frequency was explained by change in friends' substance use, friends' approval of use, and participants' approval of use, respectively. Regarding drunkenness, only 6%, 1%, and 5% of age-related change in drunkenness frequency was explained by change in time spent with friends, friends' substance use, and participants' approval of use, respectively. And regarding marijuana use, 17%, 41%, and 25% of age-related change in marijuana use frequency was explained by change in time spent with friends, friends' substance use, and friends' approval

of use, respectively. These findings suggest that the four psychosocial variables appeared to help explain age-related change in alcohol and marijuana use frequency.

In summary, these analyses indicated that the relationships between the transition to marriage and declines in frequency of alcohol use, drunkenness, and marijuana use were partially mediated by time spent with friends and own approval of alcohol use. Regarding alcohol use, almost 24% of marriage-related declines in frequency of alcohol use were explained by marriage-related declines in time spent with friends, and an additional 8% were explained by declines in own approval of alcohol use. This indicates that roughly 70% of marriage-related declines in frequency of alcohol use were still unexplained. Regarding drunkenness, almost 16% of marriage-related declines in frequency of drunkenness were explained by marriage-related declines in time spent with friends, leaving roughly 84% of these declines in drunkenness unexplained. And regarding marijuana, over half of marriage-related declines in frequency of marijuana use, almost 53%, were explained by marriage-related declines in time spent with friends, leaving roughly 47% of these declines in use unexplained. Declines in frequency of substance use during the transition to marriage were not explained by participants' friends' alcohol use, drunkenness, and marijuana use, friends' approval of alcohol and marijuana use, and participants' approval of drunkenness and marijuana use.

Table 4

Descriptive Statistics: Frequencies and Percentages

	N	Percent
Sex		
Men	870	52.9
Women	774	47.1
Race		
White	1298	79.0
Nonwhite	346	21.1
Never Married		
Men	572	65.8
Women	368	47.6
White	700	53.9
Nonwhite	240	69.4
Total	940	57.2
Married During Study		
Men	273	31.4
Women	322	41.6
White	511	39.4
Nonwhite	84	24.3
Total	595	36.2
Married Before Study		
Men	25	2.9
Women	84	10.9
White	87	6.7
Nonwhite	22	6.4
Total	109	6.6
Age at Marriage		
15	5	0.3
16	25	1.5
17	31	1.9
18	61	3.7
19	83	5.1
20	76	4.6
21	108	6.6
22	114	6.9
23	78	4.7
24	57	3.5
25	41	2.5
26	38	2.3
27	26	1.6

Table 5

Descriptive Statistics: Ranges, Means, and Standard Deviations

	Range	Mean	Standard Deviation
Frequency of Alcohol Use	0 – 8	3.47	1.79
Frequency of Drunkenness	0 – 2	0.65	0.68
Frequency of Marijuana Use	0 – 3	0.87	0.99
Length of Marriage[a]	0 – 10	1.59	2.12
Time Spent With Friends	0 – 4	1.96	0.87
Friends' Alcohol Use	0 – 4	2.57	1.09
Friends' Drunkenness	0 – 4	2.38	1.13
Friends' Marijuana Use	0 – 4	1.47	1.11
Friends' Approval of Alcohol Use	0 – 4	2.04	0.73
Friends' Approval of Marijuana Use	0 – 4	1.41	0.85
Own Approval of Alcohol Use	0 – 3	1.98	0.87
Own Approval of Drunkenness	0 – 3	2.01	0.85
Own Approval of Marijuana Use	0 – 3	0.66	0.71

[a] Mean length of marriage was calculated among participants who married before or during the study.

Table 6

Frequency of Substance Use Predicted by Age and Marital Status

	Alcohol β (SE)	Drunkenness β (SE)	Marijuana β (SE)
MODEL 1			
Age	0.69 (.05)**	0.80 (.07)**	0.45 (.07)**
Age^2	-0.10 (.01)**	-0.13 (.02)**	-0.09 (.02)**
Age^3	0.01 (.01)**	0.01 (.01)**	0.01 (.01)**
Last Interview	-0.22 (.09)*	-0.73 (.13)**	-0.49 (.13)**
Odds Ratio (CI)		0.48 (0.38, 0.62)	0.62 (0.48, 0.79)
MODEL 2			
Age	0.70 (.05)***	0.84 (.07)**	0.44 (.07)**
Age^2	-0.10 (.01)**	-0.13 (.02)**	-0.09 (.02)**
Age^3	0.01 (.01)**	0.01 (.01)**	0.01 (.01)**
Marital Status	-0.42 (.08)**	-0.92 (.12)**	-0.38 (.13)**
Odds Ratio (CI)		0.40 (0.32, 0.50)	0.68 (0.53, 0.87)
Last Interview	-0.22 (.09)*	-0.77 (.13)**	-0.44 (.13)**
MODEL 3			
Age	0.70 (.05)**	0.84 (.07)**	0.44 (.07)**
Age^2	-0.10 (.01)**	-0.13 (.02)**	-0.09 (.02)**
Age^3	0.01 (.01)**	0.01 (.01)**	0.01 (.01)**
Marital Status	-0.43 (.08)**	-0.89 (.12)**	-0.38 (.13)**
Anticipation of Marriage	0.02 (.09)	-0.16 (.12)	-0.05 (.14)
Odds Ratio (CI)		0.85 (0.67, 1.08)	0.95 (0.72, 1.25)
Length of Marriage	-0.13 (.03)**	-0.10 (.04)*	-0.02 (.05)
Odds Ratio (CI)		0.91 (0.84, 0.98)	0.99 (0.89, 1.09)
Last Interview	-0.24 (.09)*	-0.78 (.13)**	-0.44 (.13)**

* $p \leq .05$

** $p \leq .005$

Note: Betas are unstandardized.

Table 7

Change in Frequency of Substance Use With Age (Not Controlling for Marital Status) and Adjusted Age (Controlling for Marital Status)

	Alcohol $\beta *^{l}$	Drunkenness $\beta *$	Marijuana $\beta *$
Age 17 to 27			
Age	0.13	0.14	0.13
Adjusted Age	0.15	0.18	0.12
% Change Age to Adj Age	13.5	31.9	-4.8
Age 17 to Peak Age	(Peak age: A = 22, D = 22, M = 20)		
Age	0.30	0.32	0.22
Adjusted Age	0.32	0.37	0.22
% Change Age to Adj Age	7.6	17.4	0.6
Peak Age to 27	(Peak age: A = 22, D = 22, M = 20)		
Age	0.05	0.04	0.19
Adjusted Age	0.03	0.03	0.18
% Change Age to Adj Age	-45.5	-20.6	-4.5
Peak Age to 26			
Age		0.05	
Adjusted Age		0.01	
% Change Age to Adj Age		-82.2	

[1] The pseudo-beta ($\beta *$) coefficients were calculated as the standard deviation of the fitted values for age and adjusted age based on the polynomial age term over each specified age range divided by the standard deviation of the ages within that range.

Table 8

Frequency of Substance Use Predicted by Age, Marital Status, Age at Marriage, Gender, and

Race

	Alcohol β (SE)	Drunkenness β (SE)	Marijuana β (SE)
MODEL 4			
Age	0.71 (.049)**	0.83 (.07)**	0.45 (.07)**
Age^2	-0.10 (.01)**	-0.13 (.02)**	-0.09 (.02)**
Age^3	0.01 (.01)**	0.01 (.01)**	0.01 (.01)**
Marital Status	-0.65 (.70)	-0.88 (.12)**	-0.93 (.62)
Age at Marriage	0.01 (.01)	-0.02 (.05)	0.01 (.01)
Odds Ratio (CI)		0.98 (0.89, 1.08)	1.01 (0.98, 1.02)
Mar Stat x Age at Marr	0.01 (.03)	-0.03 (.05)	0.05 (.05)
Length of Marriage	-0.12 (.03)**	-0.11 (.04)*	
Last Interview	-0.24 (.09)*	-0.78 (.13)**	-0.44 (0.13)**
MODEL 5			
Age	0.70 (.05)**	0.85 (.07)**	0.45 (.07)**
Age^2	-0.10 (.01)**	-0.13 (.02)**	-0.09 (.02)**
Age^3	0.01 (.01)**	0.01 (.01)**	0.01 (.01)**
Marital Status	-0.40 (.08)**	-0.89 (.12)**	-0.37 (.13)**
Gender[a]	0.56 (.11)**	0.87 (.13)**	0.93 (.16)**
Odds Ratio (CI)		2.39 (1.86, 3.08)	2.52 (1.86, 3.41)
Mar Stat x Gender	0.34 (.14)*	0.16 (.20)	0.30 (.21)
Men (*β*)	-0.07	-0.73	-0.08
Women (*β*)	-0.40	-0.89	-0.37
Length of Marriage	-0.12 (.03)**	-0.10 (.04)*	
Last Interview	-0.23 (.09)*	-0.78 (.13)**	-0.44 (.13)**

Table 8 (cont.)

	Alcohol β (SE)	Drunkenness β (SE)	Marijuana β (SE)
MODEL 6			
Age	0.70 (.05)**	0.85 (.08)**	0.44 (.07)**
Age^2	-0.10 (.01)**	-0.13 (.02)**	-0.09 (.02)
Age^3	0.01 (.01)**	0.01 (.01)**	0.01 (.01)**
Marital Status	-0.37 (.09)**	-0.87 (.13)**	-0.34 (.13)*
Race^a	-1.23 (.13)**	-1.79 (.15)**	-0.35 (.18)*
Odds Ratio (CI)		0.17 (0.12, 0.23)	0.71 (0.49, 1.01)
Mar Stat x Race	0.71 (.24)**	0.32 (.41)	0.45 (.34)
Whites (*β*)	-0.37	-0.87	-0.34
Nonwhites (*β*)	0.33	-0.55	0.11
Length of Marriage	-0.13 (.03)**	-0.10 (.04)	
Last Interview	-0.24 (.09)*	-0.78 (.14)**	-0.44 (.13)**

* p ≤ .05

** p ≤ .005

^{a} Gender is coded as women = 0 and men = 1. Race is coded as white = 0 and nonwhite = 1.

Note: Betas are unstandardized.

Table 9

Psychosocial Variables as Dependent Variables

	Alcohol β (SE)	Drunkenness β (SE)	Marijuana β (SE)
Time Spent with Friends			
Age	0.23 (.03)**		
Age^2	-0.06 (.01)**		
Age^3	0.01 (.01)**		
Marital Status	-0.73 (.05)**		
Peer Substance Use[a]			
Age	0.30 (.03)**	0.27 (.03)**	0.17 (.03)**
Age^2	-0.06 (.01)**	-0.06 (.01)**	-0.05 (.01)**
Age^3	0.01 (.01)**	0.01 (.01)**	0.01 (.01)**
Marital Status	-0.06 (.05)	-0.08 (.05)	-0.07 (.04)
Peer Approval of Substance Use[a]			
Age	0.14 (.02)**		0.14 (.02)**
Age^2	-0.02 (.01)**		-0.03 (.01)**
Age^3	0.01 (.01)*		0.01 (.01)**
Marital Status	-0.04 (.04)		-0.10 (.04)**
Own Approval of Substance Use[a]			
Age	0.13 (.02)**	0.25 (.02)**	-0.16 (.02)**
Age^2	-0.05 (.01)**	-0.05 (.01)**	0.03 (.01)**
Age^3	0.01 (.01)**	0.01 (.01)**	-0.01 (.01)**
Marital Status	-0.09 (.04)*	-0.13 (.04)**	-0.07 (.03)*

* $p \leq .05$

** $p \leq .005$

[a] There are alcohol, drunkenness, and marijuana versions of these variables.

Note: Betas are unstandardized.

Table 10

Frequency of Substance Use Predicted by Age, Marital Status, and Potential Mediators

	Alcohol β (SE)	Drunkenness β (SE)	Marijuana β (SE)
MODEL 7			
Age	0.73 (.05)**	0.79 (.08)**	0.37 (.08)**
Age^2	-0.11 (.01)**	-0.11 (.02)**	-0.08 (.02)**
Age^3	0.01 (.01)**	0.01 (.01)**	0.01 (.01)*
Marital Status	-0.33 (.09)**	-0.75 (.13)**	-0.18 (.14)
Time with Friends	0.15 (.03)**	0.19 (.04)**	0.25 (.04)**
Odds Ratio (CI)		1.21 (1.13, 1.31)	1.28 (1.18, 1.38)
Length of Marriage	-0.13 (.03)**	-0.06 (.04)	
Last Interview	-0.19 (.10)*	-0.83 (.14)**	-0.39 (.14)**
MODEL 8			
Age	0.55 (.05)**	0.83 (.09)**	0.26 (.08)**
Age^2	-0.07 (.01)**	-0.12 (.02)**	-0.06 (.02)*
Age^3	0.01 (.01)**	0.01 (.01)**	0.01 (.01)
Marital Status	-0.39 (.08)**	-0.88 (.13)**	-0.44 (.14)**
Peer Substance Use[a]	0.49 (.03)**	0.63 (.04)**	0.95 (.04)**
Odds Ratio (CI)		1.89 (1.73, 2.06)	2.59 (2.38, 2.82)
Length of Marriage	-0.12 (.03)**	-0.08 (.04)	
Last Interview	-0.17 (.09)*	-0.80 (.15)**	-0.27 (.15)
MODEL 9			
Age	0.63 (.05)**		0.33 (.08)**
Age^2	-0.09 (.01)**		-0.07 (.02)**
Age^3	0.01 (.01)**		0.01 (.01)
Marital Status	-0.41 (.08)**		-0.41 (.14)**
Peer Approval of Substance Use[a]	0.51 (.04)**		0.96 (.06)**
Odds Ratio (CI)			2.60 (2.30, 2.93)
Length of Marriage	-0.14 (.03)**		
Last Interview	-0.20 (.09)*		-0.49 (.15)**

Table 10 (cont.)

	Alcohol β (SE)	Drunkenness β (SE)	Marijuana β (SE)
MODEL 10			
Age	0.56 (.05)**	0.80 (.09)**	0.67 (.08)**
Age^2	-0.08 (.01)**	-0.12 (.02)**	-0.13 (.02)**
Age^3	0.01 (.01)**	0.07 (.01)**	0.01 (.01)**
Marital Status	-0.39 (.08)**	-0.87 (.13)**	-0.39 (.13)**
Own Approval of Substance Use[a]	0.48 (.04)**	0.77 (.06)**	0.91 (.06)**
Odds Ratio (CI)		2.16 (1.90, 2.44)	2.47 (2.21, 2.78)
Length of Marriage	-0.13 (.03)**	-0.10 (.04)*	
Last Interview	-0.16 (.09)	-0.80 (.15)**	-0.68 (.14)**

* p ≤ .05

** p ≤ .005

[a] There are alcohol, drunkenness, and marijuana versions of these variables.

Note: Betas are unstandardized.

Table 11

Significance Tests of Indirect (Mediation) Effects

	Indirect Effect: Δ Marriage Coefficient (Model 2/3 to Models 7-10)	% Δ Marriage Coefficient (Model 2/3 to Models 7-10)	SE of Indirect Effect (Sobel's Test)	Z-value (Δ Marr Coeff / SE)
Time Spent with Friends				
Alcohol	0.10	-24.0	.02	4.60**
Drunkenness	0.14	-15.9	.03	4.80**
Marijuana	0.20	-52.8	.03	6.27**
Peer Substance Use				
Alcohol	0.04	-8.3	.02	1.54
Drunkenness	0.02	-1.9	.03	0.53
Marijuana	0.06	15.4	.05	1.26
Peer Approval of Substance Use				
Alcohol	0.02	-3.9	.02	0.92
Marijuana	0.03	8.2	.04	0.85
Own Approval of Substance Use				
Alcohol	0.04	-8.3	.02	1.98*
Drunkenness	0.02	-2.7	.03	0.82
Marijuana	0.01	0.7	.03	0.09

* $p \le .05$

** $p \le .005$

Table 12

Percent Change in Polynomial Age Coefficient for Substance Use Frequency with Addition of Psychosocial Variables, Controlling for Marital Status

	Alcohol	Drunkenness	Marijuana
Time Spent with Friends	4.6	-6.1	-17.4
Peer Substance Use	-21.8	-1.3	-40.6
Peer Approval of Substance Use	-10.7		-24.8
Own Approval of Substance Use	-20.2	-4.5	52.3

Figure 1

Frequency of Substance Use by Age and Adjusted Age (Controlling for Marital Status)

Alcohol Use Frequency (Predicted)

Drunkenness Frequency (Predicted)
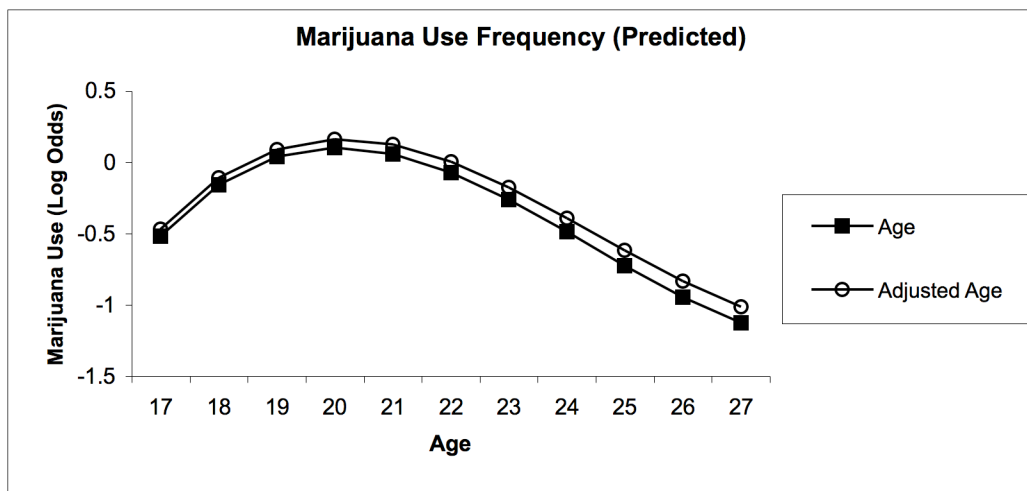

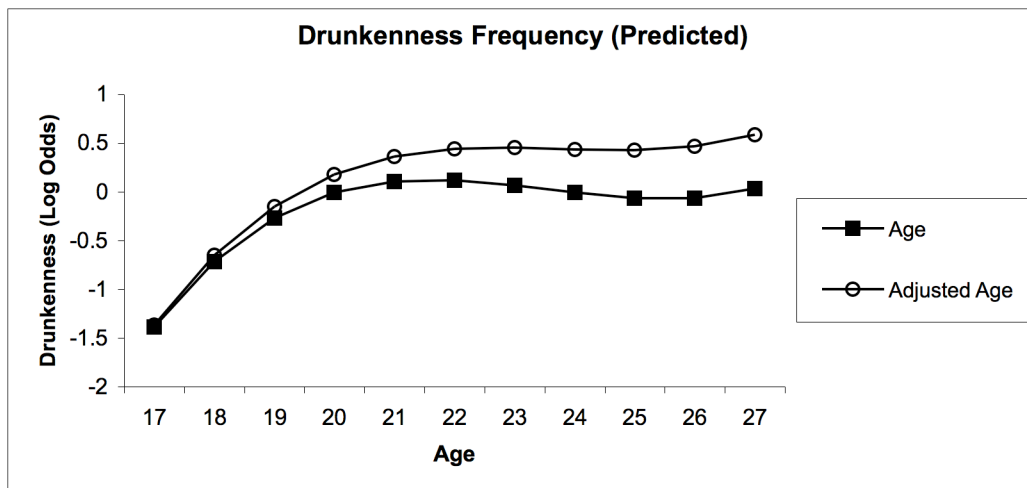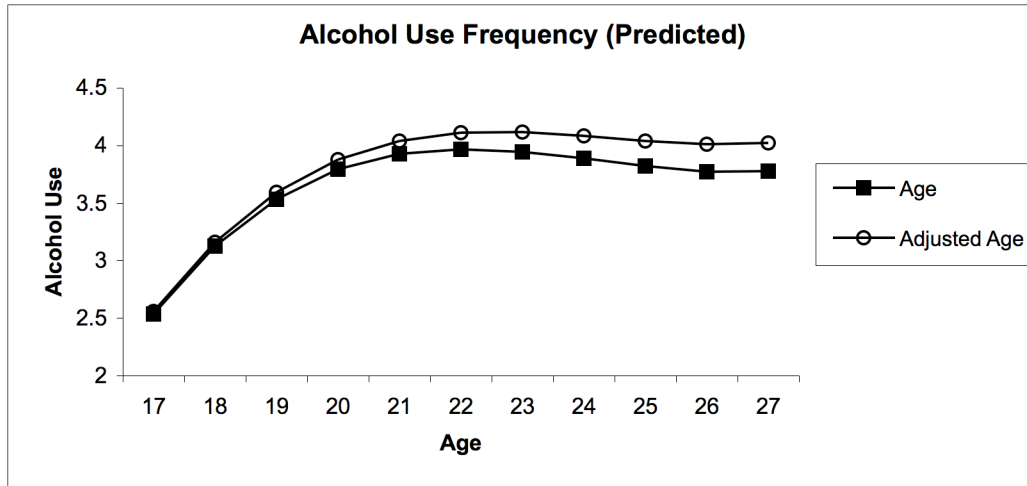**Marijuana Use Frequency (Predicted)**

Figure 2

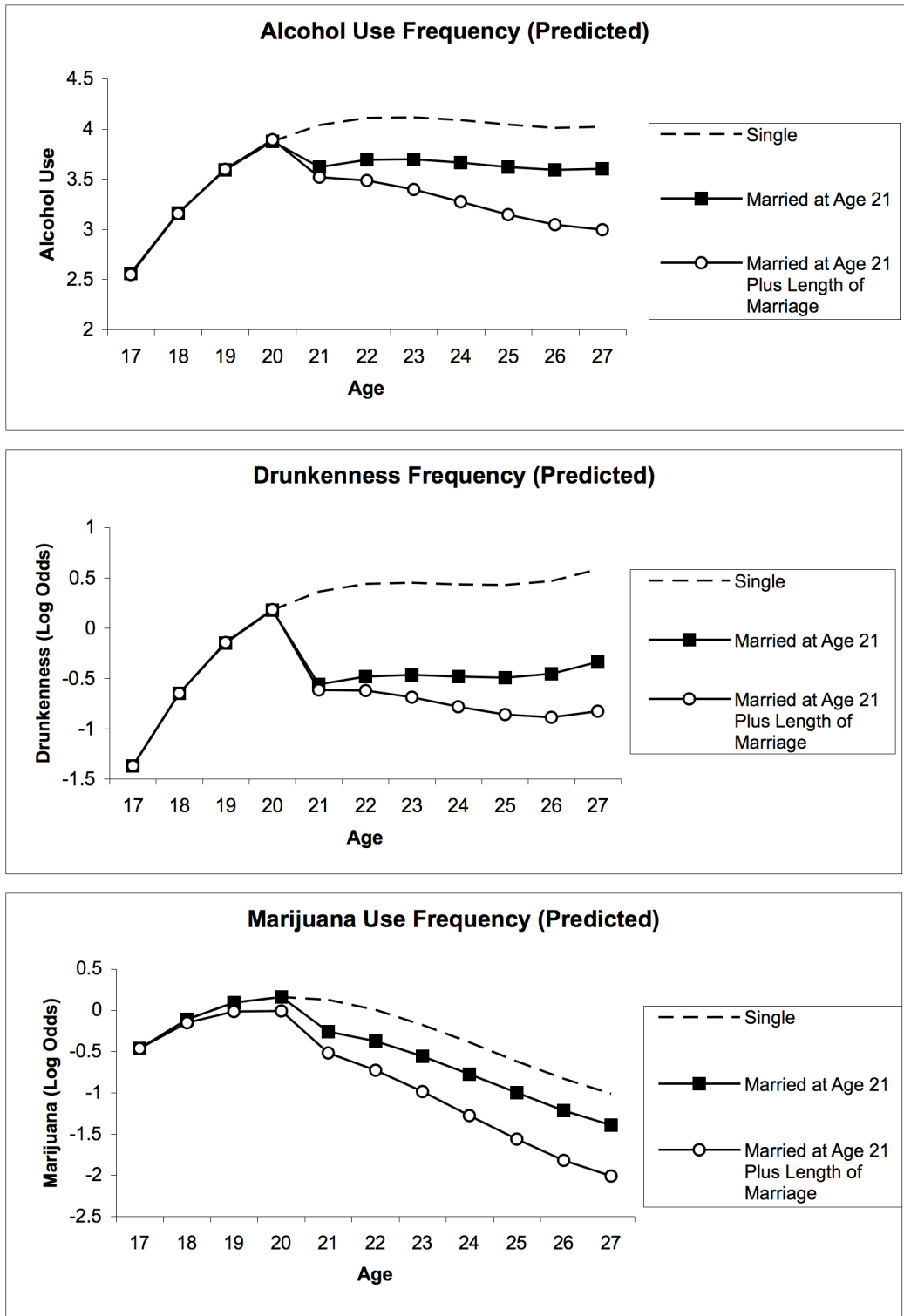*Frequency of Substance Use by Marital Status and Length of Marriage*

Figure 3

Frequency of Substance Use by Marital Status and Gender

Alcohol Use Frequency (Predicted)

Legend: Single Men, Men Married at Age 21, Single Women, Women Married at Age 21

Drunkenness Frequency (Predicted)

Legend: Single Men, Men Married at Age 21, Single Women, Women Married at Age 21

Marijuana Use Frequency (Predicted)

Legend: Single Men, Men Married at Age 21, Single Women, Women Married at Age 21
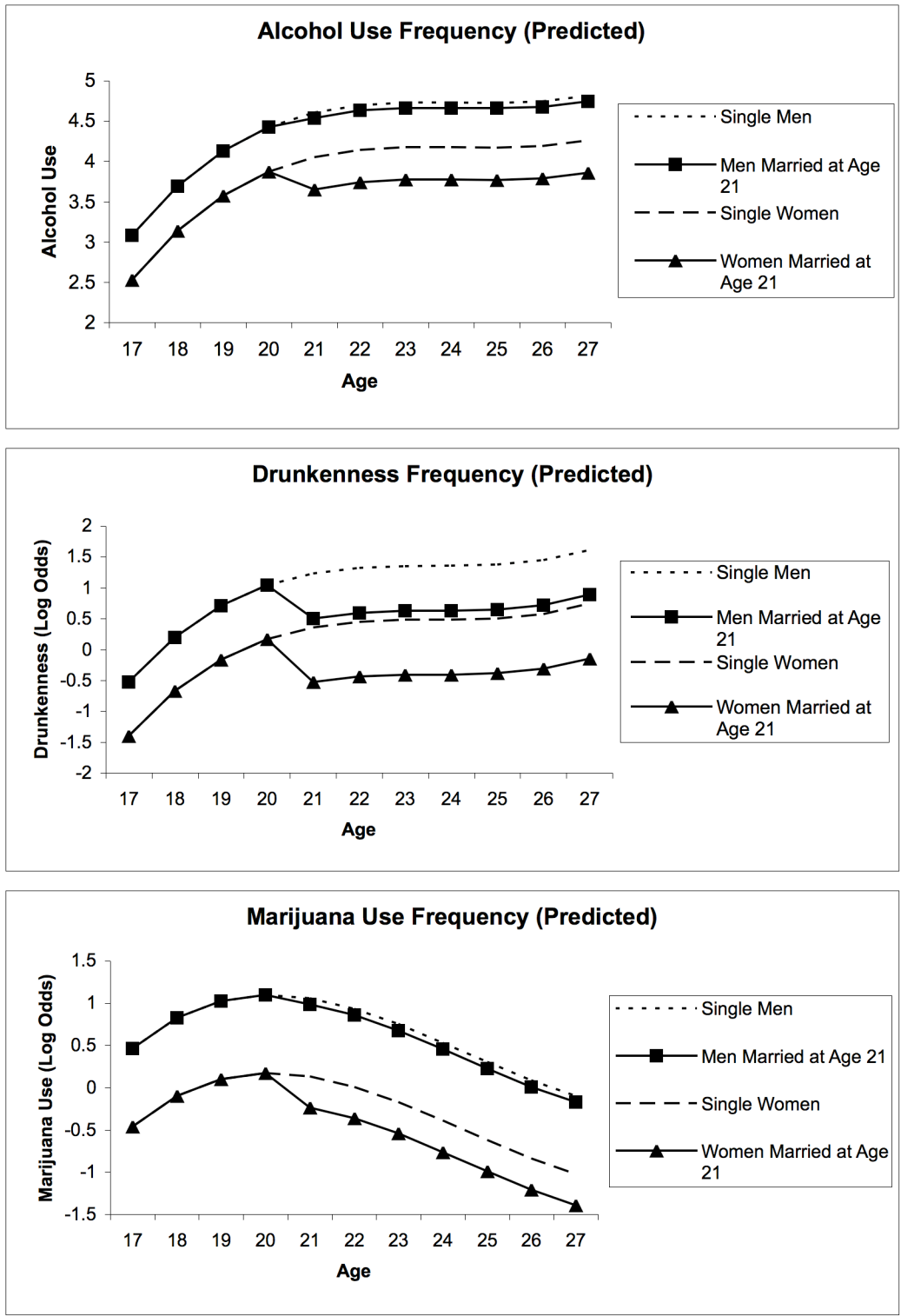
Figure 4

Frequency of Substance Use by Marital Status and Race
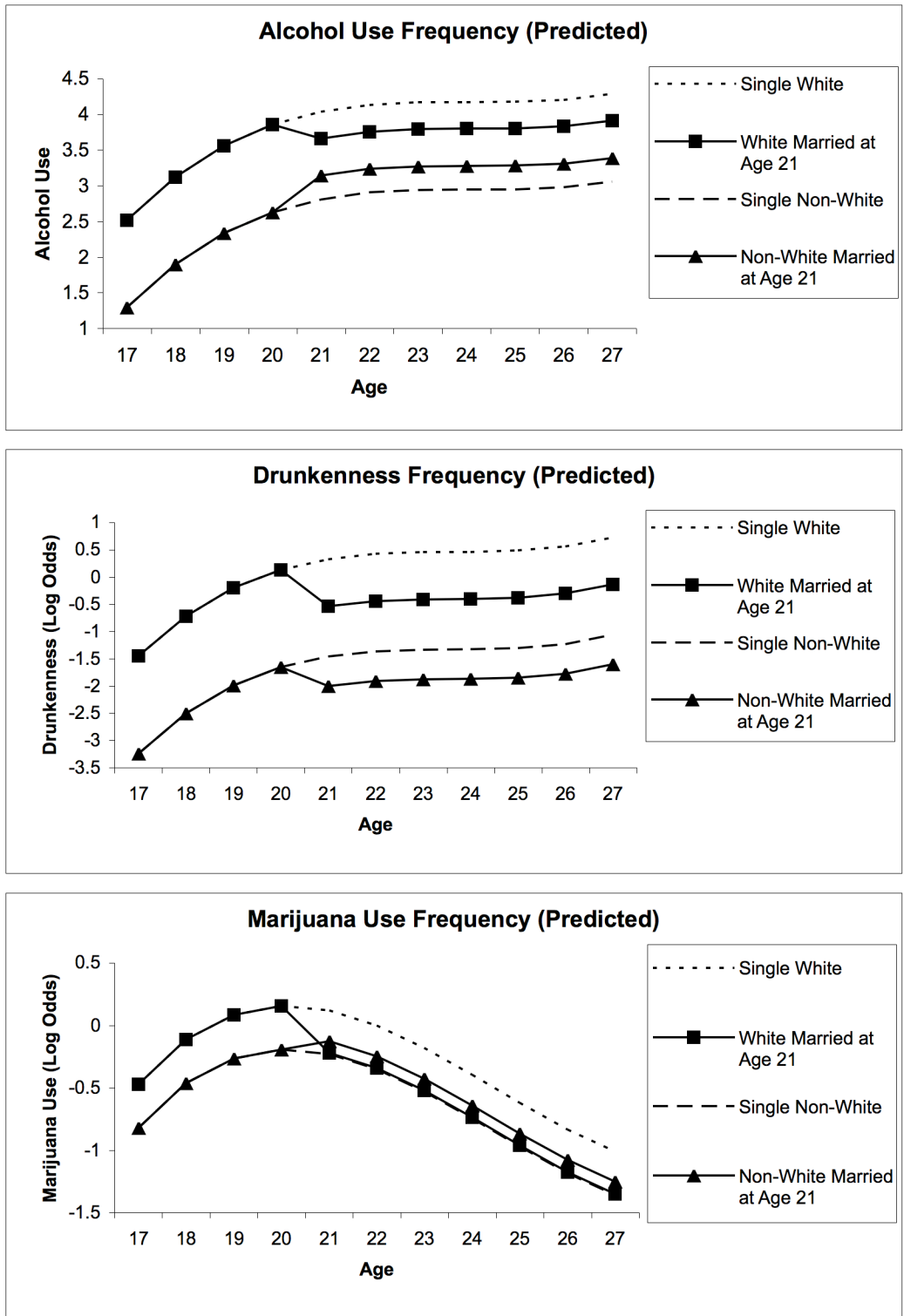
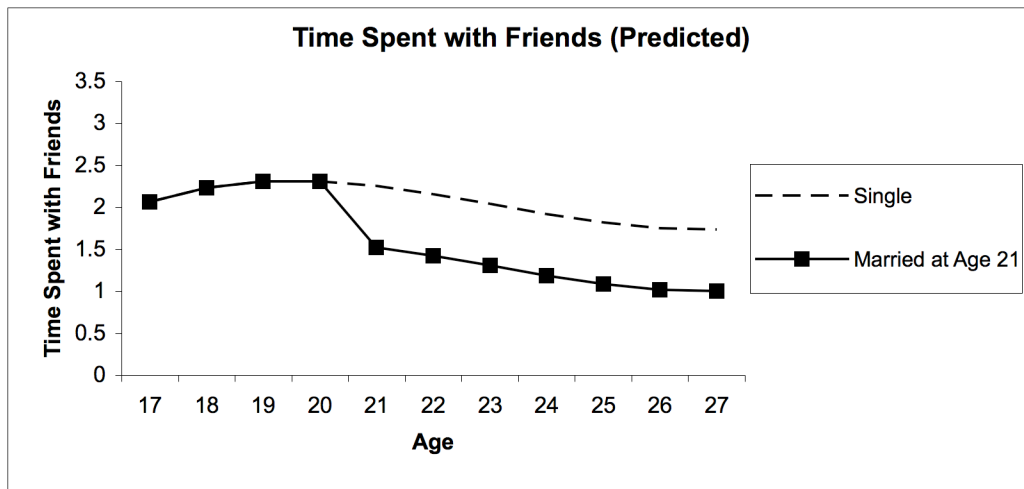Figure 5

Time Spent with Friends by Age and Marital Status
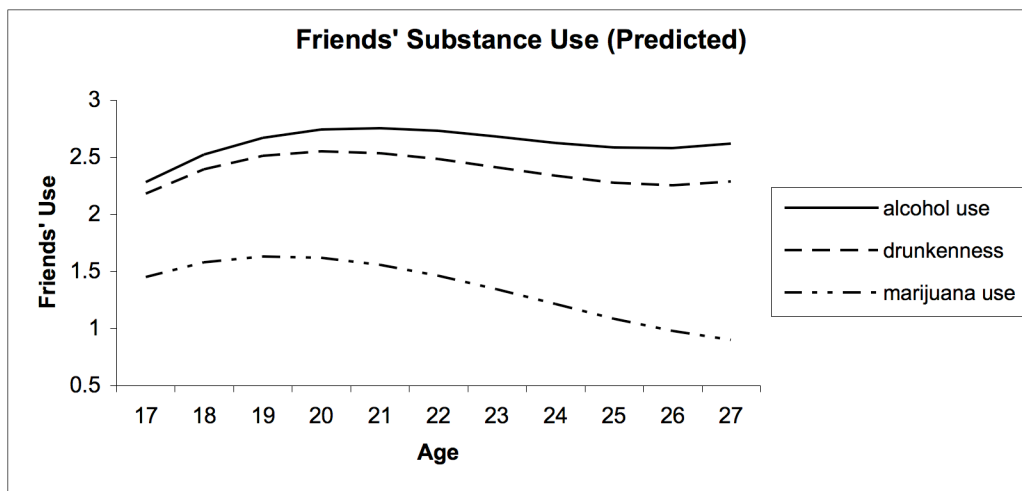
Figure 6

Friends' Substance Use by Age

Friends' Substance Use (Predicted)

Figure 7

Friends' Approval of Substance Use by Age

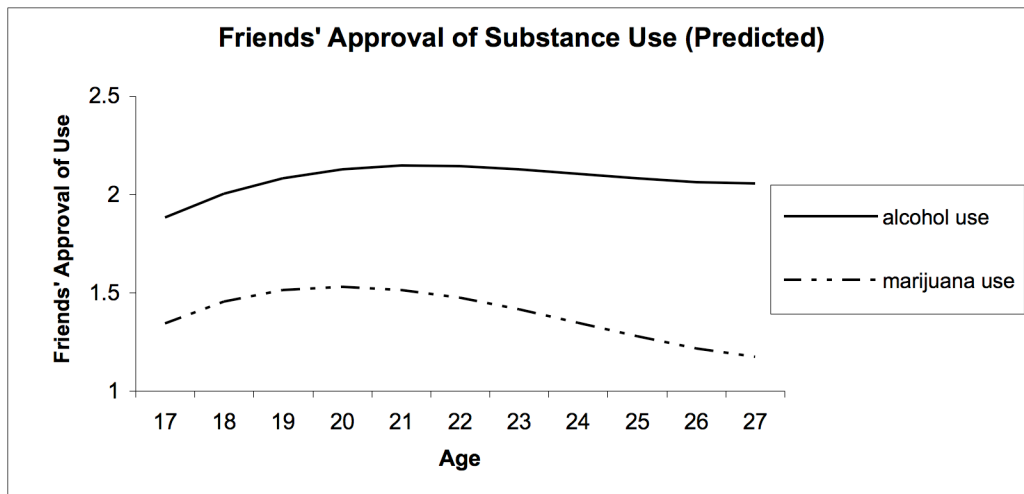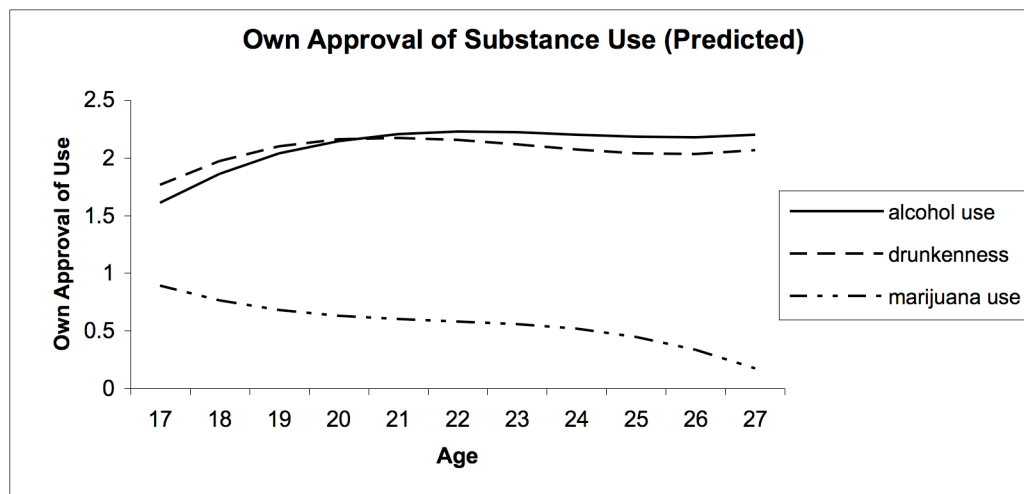Figure 8

Own Approval of Substance Use by Age

Own Approval of Substance Use (Predicted)

CHAPTER 4. DISCUSSION

Change in substance use across the transition to marriage has been the focus of much research. The likelihood and levels of substance use tend to decrease as individuals marry (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Curran, Muthén, & Harford, 1998; Miller-Tutzauer, Leonard, & Windle, 1991). However, likelihood and levels of use also tend to decline with age, particularly between the early and late twenties (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Chen & Kandel, 1995). As a result, it is unclear from the majority of past research whether declines in substance use during young adulthood occur with the transition to marriage or other age-related processes. The current study has attempted to address this question by assessing the extent to which the transition to marriage explained age-related change in frequency of alcohol use, drunkenness, and marijuana use across young adulthood (ages 17 to 27). The examination of age-related change allowed for the estimation of the extent to which the transition to marriage accounted for age-related declines in substance use frequency between the early and late twenties, which is a relatively new type of analysis in this field. The current findings indicated that the transition to marriage helped explain a fairly substantial portion of age-related declines in the frequency of alcohol use and drunkenness, and a small portion of declines in the frequency of marijuana use.

Another aspect of marriage-related change in substance use that has rarely been studied is whether some individuals experience greater declines across the marital transition than others. While a few researchers have studied this question, fewer have used powerful statistical methods to aid their study. Therefore, the present study used multilevel modeling to determine whether marriage-related change in alcohol use, drunkenness, and marijuana use frequency differed by age at first marriage, gender, and race. The findings indicated that women and whites experienced greater declines in substance use frequency than men and nonwhites, and that declines did not vary by age at marriage.

Furthermore, no research to date has sought to identify mediators of the relationship

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between the transition to marriage and change in substance use levels. Because substance use is strongly influenced by social and psychological factors, the current study tested whether time spent with friends, friends' substance use, friends' approval of substance use, and individuals' approval of substance use helped explain marriage-related change in substance use frequency. The findings indicated that only time spent with friends helped explain marriage-related declines in frequency of use.

Methodological Strengths

There are several important methodological strengths of the present study which advance prior research on marriage-related change in substance use. These include (a) the rich and under-utilized data source, the National Youth Survey, (b) the measurement of substance use and psychosocial influences on use, and (c) the use of multilevel modeling and innovative methods to test the research questions described above.

The present study used data from the large, nationally representative National Youth Survey (NYS; Elliott et al., 1986). The NYS collected information on substance use, life events, and peer influences on substance use on seven occasions across eleven years, from 1976 to 1986. Due to the cohort sequential design, data were available across adolescence and early adulthood, roughly from ages 11 to 27. As a result, the development of substance use and the role of the transition to marriage on change in use could be investigated over these two different age periods.

Despite its rich data, the NYS has rarely been used to examine change in substance use levels during the transition to marriage (e.g., Esbensen & Elliot, 1994). The majority of studies on this topic have used data from the National Longitudinal Survey of Youth (e.g., Curran et al., 1998; Hanna et al., 1993; Miller-Tutzauer et al., 1991), Monitoring the Future (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Bachman et al., 2002), and the Buffalo Newlywed Study (e.g., Leonard & Mudar, 2003; Mudar et al., 2002; Roberts & Leonard, 1997). As a result, examination of this topic using data from the NYS helps to confirm and further expand on the findings from these more commonly used data sources.

A second strength of the current study is the National Youth Survey's assessment of substance use and psychosocial influences on use. This study included numerous questions about different types of substance use at each wave of data collection. Therefore, the present study was able to examine change in frequency of three different types of substance use to obtain more information than could be gained from examination of just one type of substance. This study examined change in the most prevalent and frequently used substance, alcohol, measured as both frequency of alcohol use and drunkenness. This study also examined change in the frequency of use for the most common type of illicit drug, marijuana. The majority of past studies that have examined change in substance use levels and rates across the transition to marriage focused on alcohol use frequency or quantity (e.g., Curran et al., 1998; Labouvie, 1996; Miller-Tutzauer et al., 1991; Prescott & Kendler, 2001) or heavy alcohol use (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Miller-Tutzauer et al., 1991), and a few have examined marijuana use as well (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997). The present examination of marriage-related change in frequency of alcohol and marijuana use allows for the confirmation of prior results across these types of use. The examination of marriage-related change in frequency of drunkenness expands on prior research on general alcohol use because drunkenness is a different and infrequently studied type of alcohol use.

In addition, the NYS included numerous questions on social and psychological influences on substance use. Many of these questions, including those on peer influences on use and participants' beliefs about use, were specific to different types of substance use, allowing for substance-specific analyses. In addition, these questions were worded in the same way at each measurement occasion, allowing for the examination of longitudinal change in substance use behaviors and potential influences on these behaviors.

A third strength of the present study is the use of powerful statistical methods, principal of which was multilevel modeling, to test the hypotheses. As explained in the Methods (Chapter 2), this method is a powerful and appropriate tool to study change in substance use level over the

transition to marriage, as well as moderating and mediating influences on these changes in use, but has rarely been used in this capacity (e.g., Prescott & Kendler, 2001). The use of multilevel modeling facilitated the examination of age-related change in frequency of substance use using cohort-sequential data. This type of modeling also allowed for the examination of within-person change in frequency of substance use, including within-person change in age, marital status, length of marriage, and the four psychosocial variables, while ruling out stable individual differences in frequency of use as an alternative explanation. Moreover, this statistical method allowed for the testing of four potential psychosocial mediators in the relationship between change in marital status and change in frequency of substance use.

Transition to Marriage Findings

One of the central findings of this study was that frequency of alcohol use, drunkenness, and marijuana use significantly declined across the transition to first marriage, where declines ranged from .24 to 1.35 standard deviations, confirming past research (e.g., Curran et al., 1998; Hanna et al., 1993; Labouvie, 1996; Miller-Tutzauer et al., 1991; Prescott & Kendler, 2001). For instance, Curran and colleagues (1998) found that average daily quantity of alcohol use declined by between .20 and .29 standard deviations across the transition to marriage. Prescott and Kendler (2001) found that frequency and quantity of alcohol use decreased by 20-25% across the transition to marriage, representing an average decrease of .7 drinks per week. Hanna, Faden, and Harford (1993) found that women's average quantity of alcohol consumption per month decreased by 23%, or almost 4 drinks per month, across the transition to marriage.

These findings indicate that while substance use levels declined significantly across the transition to marriage, this transition was not accompanied by a complete reduction in substance use, and did not explain 100% of age-related reductions in substance use frequency. In other words, individuals are likely to continue using substances after they marry, although on average this is at a reduced rate. Others may increase their substance use. For example, individuals who experience high levels of stress following marriage, perhaps due to the added responsibilities of

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marriage, financial challenges, or high marital conflict, may maintain or increase their substance use levels to cope with this stress (Hanna et al., 1993; Leonard & Rothbard, 1999). Moreover, the present study found that peer substance use, peer approval of substance use, and own approval of substance use changed minimally if at all across the transition to marriage, but were highly associated with substance use levels. Therefore, individuals who married may have continued to use substances following marriage at least in part because they approved of substance use and/or their friends used substances and approved of use.

It is important to note that individuals who did not marry were also likely to experience reductions in substance use with age. These reductions in use must be due to age-related processes not associated with marriage. For instance, individuals may reduce their levels of use so that they do not interfere with responsibilities associated with attaining financial and residential independence (Arnett, 1997, 2001; Scheer et al., 1996), work and career development (Arnett, 2001; Labouvie, 1996), or anticipated family roles (Labouvie, 1996). In addition, as adolescents become young adults, they typically begin to accept greater responsibility for the consequences of their actions and deciding upon their values and beliefs independently of their parents and friends (Arnett, 1997, 2001; Scheer et al., 1996). Each of these factors associated with the transition to adult roles and responsibilities may also result in reductions in risky behavior such as substance use.

Furthermore, the present findings suggested that age-related change in time spent with friends, friends' substance use, and friends' and own approval of substance use helped explain age-related change in alcohol and marijuana use frequency when controlling for marital status. Thus, substance use levels are likely to decline with age-related declines in these psychosocial variables independently of marital transitions. Perhaps as individuals age high frequency substance use has an increasingly negative effect on their physical health, or they recover from high levels of use at slower rates. In addition, as they age they may experience an increasing level of work-related responsibility. As unmarried individuals age, they may begin to feel ready to marry

and look for a marriage partner and prepare for the marital role. As a result of these age-related processes, individuals may reduce their substance use and their approval of substance use, and in turn spend less time in unstructured social activities in which substance use is common. Their friends' substance use approval and behavior may decrease with age for the same reasons that individuals' use and approval of use decline. Further research on the effects of age-related declines in these and other social influences and substance use attitudes and beliefs will help describe the process by which substance use levels decline across young adulthood.

Timing and Duration of Marriage-Related Change in Substance Use

It was hypothesized that declines in frequency of substance use would begin roughly two years prior to marriage and continue as the marriage progressed. However, the data did not support the idea that substance use frequency declined in anticipation of marriage, which is consistent with prior findings regarding average daily quantity of alcohol use (Curran et al., 1998) and frequency and quantity of alcohol use (Prescott & Kendler, 2001), but contradicted findings regarding likelihood of marijuana use (Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997), likelihood of heavy drinking (Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston,1997; Miller-Tutzauer et al., 1991), and average daily quantity of alcohol use (Miller-Tutzauer et al., 1991).

These studies vary in terms of analytic method and study design, which may help explain their discrepancies. First, Curran, Muthén, and Harford (1998), Prescott and Kendler (2001), and the present study statistically tested change in substance use over time, while Bachman, Wadsworth, O'Malley, Schulenberg, and Johnston, (1997) and Miller-Tutzauer, Leonard, and Windle (1991) did not. Therefore, the declines in substance use found by these latter two studies beginning over a year prior to marriage may have been at low, non-significant levels. And second, substance use levels were measured at different intervals, including every year (Curran et al., 1998; Miller-Tutzauer et al.,1991), two years (Bachman et al., 1997), one or three years (the present study), and four years (Prescott & Kendler, 2001). The timing of observations is critical to

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the question of when substance use levels begin to decline prior to marriage. Although the studies that used statistical methods to test declines in use did not find evidence that use declines in anticipation of marriage, the fact that two of these studies observed change in use over intervals greater than one year suggests that it is possible that substance use levels do begin to decline over a year prior to marriage, but not as much as 3 or 4 years prior. Therefore, it is difficult to conclude based on the evidence of these present and past studies whether substance use declines in anticipation of marriage or when declines begin to occur.

Despite the lack of consistent evidence, it is plausible that individuals would begin to reduce their substance use levels prior to marriage. This is because prior to marriage individuals are likely to begin to experience the lifestyle changes that accompany marriage and are or may be associated with declines in substance use, such as spending less time with friends, anticipating becoming pregnant, and having more responsibilities. In addition, as mentioned above, when single individuals begin to feel ready to marry and look for a marriage partner, they might reduce their substance use and other impulsive and risky behaviors as they prepare for the role or marriage. They could reduce these behaviors to signify to themselves and potential marriage partners that they are ready for the responsibilities of marriage. This process illustrates the potential role of selection effects in the relationship between the transition to marriage and declines in substance use. More precise research on the timing of declines in substance use prior to marriage is needed to establish when substance use levels begin to decline. Furthermore, research on the reasons for these anticipatory declines in use will help explain when and why these declines occur around the time of marriage, as well as the role of selection effects in marriage-related declines in substance use.

Although it is as yet unclear when substance use levels begin to decline around the time of marriage, the present findings confirmed the hypothesis that after individuals marry, their substance use levels would continue to decline during the first few years of marriage. This finding supported past research regarding continued declines in likelihood of heavy drinking and marijuana

use (Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997) and average quantity of alcohol use (Curran et al., 1998). These continued declines in use suggest that the changes in individuals' lives that accompany the transition to marriage and are associated with substance use, such as declines in time spent with friends and increases in the number of responsibilities, continue to influence individuals' behavior for several years into the marriage.

Age at Marriage

Although it was hypothesized that individuals who were in their mid and late twenties when they married would experience smaller declines in substance use frequency across the transition to marriage than those who married at younger ages, as suggested by Bachman, Johnson, O'Malley, and Schulenberg (1996), the findings indicated that participants aged 17 to 27 experienced similar reductions in substance use frequency across the transition to marriage regardless of their age at marriage. Although frequency of alcohol use, drunkenness, and marijuana use varied by age, the lack of an age at marriage finding suggests that participants tended to experience declines in substance use frequency regardless of how old they were when they married and their levels of use at that age.

It is important to note that the findings of the current study are limited to individuals who married by age 27. A small to moderate proportion of individuals now typically marry after that age. Findings from the U.S. Census Bureau's Current Population Survey regarding the proportion of men and women married at different ages in the years 1970 and 1994 are presented in Table 13 (Saluter, 1996). According to this table, in 1970 6% of women and 9% of men had never married by their early thirties, while these percentages increased to 20% of women and 30% of men never married by this age in 1994. In addition, 5% of women and 6% of men had never married by their early forties in 1970, while 9% of women and 13% of men had never married by their early forties in 1994.

As a result of the lack of data from individuals aged 28 or older in the present study, the median ages of marriage among the study participants were one to three years younger than the

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median age at marriage for the U.S. population in 1980. Although the participants of the present study were a little younger than the population of young adults in their twenties and thirties that the current findings could be generalized to, these findings are still likely applicable to those who first marry in their late twenties. This belief is supported by the finding that NYS participants' declines in alcohol use, drunkenness, and marijuana use frequency did not differ by they age at which they married. However, these findings should be confirmed by analyses of data from individuals aged 28 and older.

Gender

The analyses indicated that women experienced significantly greater declines in alcohol use frequency across the transition to marriage than men, supporting past findings regarding typical quantity of alcohol use (Roberts & Leonard, 1997), frequency of drunkenness (Roberts & Leonard, 1997), frequency of heavy drinking (Roberts & Leonard, 1997), and likelihood of marijuana use (Yamaguchi & Kandel, 1985).

Women may experience greater declines in substance use levels following the transition to marriage than men because of their anticipation of pregnancy and childbirth, which often accompanies the transition to marriage. Because of teratogenic effects of substance use during pregnancy to the developing embryo and fetus, women typically reduce their substance use when they become pregnant (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Sidhu & Floyd, 2002). Women are also advised by medical experts to reduce their substance use if they are anticipating or trying to become pregnant because they may conceive a child before they become aware of it (March of Dimes Foundation, 2008; Stovsky, 2008). In support of this, becoming pregnant and becoming a parent is associated with greater reductions in marijuana use cessation (Chen & Kandel, 1998), likelihood of heavy drinking (Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997), and likelihood of marijuana use (Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997) for women than men, as well as significant reductions in alcohol use frequency and quantity (Prescott & Kendler, 2001) among women. However, these

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parenthood-related declines in substance use did not account completely for marriage-related declines in use, but rather declines in substance use occurred across the transition to marriage after controlling for the transition to parenthood (Bachman, Wadsworth, O'Malley, Schulenberg, & Johnston, 1997; Prescott & Kendler, 2001).

In general, men tend to consume alcohol and illicit drugs at higher quantities and more often than women (e.g., Chen & Kandel, 1995; Curran et al., 1998; Gotham et al., 1997; Labouvie, 1996; Muthén & Muthén, 2000). NYS men only reduced their frequency of drunkenness, not their frequency of alcohol or marijuana use, across the transition to marriage, while women reduced their frequency of each type of use across this transition to a moderate or large degree. This suggests that men may be more committed to substance use and less willing to reduce their frequency of use around the time of marriage than women. Perhaps men were less likely to feel their substance use interfered with their increased marriage-related responsibilities. Further research is necessary to better understand gender differences in lifestyle changes during the transition to marriage and marriage-related declines in substance use.

Race

Whites experienced significantly greater declines in frequency of alcohol use, and greater (though non-significant) declines in drunkenness and marijuana use frequency across the transition to marriage than nonwhites. These findings are consistent with the limited past research on the topic, which indicated that, compared with blacks, whites experienced greater declines in average daily quantity of alcohol use (Curran et al., 1998) and frequency of heavy drinking (Mudar et al., 2002) across the transition to marriage.

Although the present study and past studies agree in finding that whites experience declines in substance use level across this transition, there is less agreement about nonwhites' marriage-related changes in use. The current findings indicated that nonwhites experienced an increase in frequency of alcohol use, a decrease in frequency of drunkenness, and a very slight increase in frequency of marijuana use across the marital transition. Only racial differences in

marriage-related change in alcohol use frequency were significant. Curran and colleagues (1998) and Mudar and colleagues (2002) found that blacks experienced decreases or little change in substance use levels across the marital transition. These discrepancies could possibly be due to the difference in type of substance use investigated by each study, the studies' time frames (i.e., the period of time observed relative to when participants married), their samples, or their statistical methods. For instance, Mudar and colleagues examined change in use across the first two years of marriage, which differed from Curran and colleagues and the present study.

In addition, Mudar and colleagues and Curran and colleagues compared whites' and blacks' marriage-related change in use, while the current study compared whites' and nonwhites' levels of use, where blacks, Hispanics, and other racial groups were included in the nonwhite group. However, Hispanics' prevalence, frequency, and quantity of alcohol use and heavy drinking tend to fall between that of whites and blacks (Johnston et al., 2004; Nielsen, 1999), which does not help explain NYS nonwhites' counter-to-hypothesis marriage-related increases in alcohol and marijuana use. Furthermore, while Parker, Weaver, and Calhoun (1995) found that married Hispanics used marijuana and cocaine less often than unmarried Hispanics, they also found that married and unmarried Hispanics (and whites) reported similar levels of alcohol use frequency, which also does not help explain NYS nonwhites' increases in substance use frequency with the transition to marriage. Further research on Hispanics' change in substance use levels across the transition to marriage would help clarify these discrepancies between blacks' and nonwhites' marriage-related change in substance use. Moreover, even less is known about Asian American young adults' substance use in general, and changes across the transition to marriage in particular.

Moreover, both Curran and colleagues and the current study controlled for whites' and nonwhites' average substance use levels, while Mudar and colleagues did not. Because whites tend to report higher levels of use than nonwhites (e.g., Johnston et al., 2004; Mudar et al., 2002; Nielsen, 1999), it is important to control for these average differences when comparing group

differences in change in use. Regardless of the reasons for this lack of agreement, nonwhites' patterns of change in substance use across the transition to marriage is as yet unclear, and further research in this area is needed.

In prior studies, racial differences in marriage-related change in substance use levels were found to not be influenced by racial differences in age, education level, or parenthood status at the time of marriage (Curran et al., 1998; Mudar et al., 2002). Nielsen (1999) and Mudar and colleagues (2002) suggested that these racial differences in change in levels of use may be due to differences in marital quality or attachment, where whites tend to report higher marital happiness than blacks (Mudar et al., 2002). Sampson and Laub (1990) found that reductions in crime were explained by increases in marital quality rather than the transition into marriage. Mudar and colleagues (2002) also suggested that these racial differences in marriage-related declines in use could be due to racial differences in attitudes regarding expectations about the marital role, citing Cherlin's (1998) findings that black Americans are less likely to marry and more likely to separate or divorce than white Americans. To date there is little research examining the role of marital quality and attitudes in change in substance use with marriage. Future research in this area, particularly regarding racial differences in marital quality, may help explain the findings regarding racial differences of this and past studies.

Curran and colleagues (1998) also suggested that this racial difference may be due to racial differences in peer influence, citing prior research that found that peer influences have a stronger influence on white adolescents' substance use than black adolescents' use. However, as will be explained below, the current study found that peer substance use and peer approval of substance use did not influence change in young adults' substance use frequency across the transition to marriage.

Psychosocial Processes

Much research has documented that substance use rates and levels tend to decline around the time of marriage and suggested possible reasons for these declines, including peer influences

such as friends' substance use, friends' approval of substance use, and time spent with friends, as well as individuals' own approval of substance use. However, no prior research had tested whether these factors mediate the relationship between the transition to marriage and declines in substance use level. The current study has begun to fill this gap in the literature by statistically testing whether these four psychosocial factors mediated marriage-related change in NYS participants' substance use frequency. These analyses suggested that participants' alcohol use, drunkenness, and marijuana use frequency declined during the transition to marriage in part because of marriage-related declines in time spent with friends and in participants' approval of alcohol use. However, the number of participants' friends who used each substance, friends' approval of each substance, and participants' approval of drunkenness and marijuana use did not help explain declines in participants' frequency of substance use across the marital transition.

This pattern of findings is interesting because it suggests that individuals' substance use declines with marriage in part because of reductions in the amount of time they spend with their friends across the transition to marriage, regardless of their friends' substance use and approval of use. Friends' substance use (i.e., the number of friends who used alcohol and marijuana and got drunk) and friends' approval of use hardly changed across the transition to marriage, suggesting that NYS participants may have kept the same friends across this transition. Thus, substance use may not decline across the marital transition due to a change in who individuals are friends with, but rather to changes in the amount of time spent with their friends. Married individuals may spend less time with their friends than prior to marriage because they spend more of their leisure time with their spouses in order to build and strengthen their marital relationships. In addition, as will be explained below in more detail, the transition to marriage is likely to bring increased responsibilities, which may reduce the amount of time individuals have to spend with their friends and in leisure activities (Osgood & Siennick, 2005).

Substance use may also decline across the transition to marriage because of changes in the types of activities individuals take part in with their friends. Individuals are more likely to drink

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alcohol and use marijuana when engaging in unstructured activities with their friends, such as

"hanging out" at a friend's house, bar, restaurant, party, or sporting event, or going on a camping or

boating trip, than when engaging in more structured activities, such as going to movies, shopping,

or taking part in sports or social club activities (e.g., Bachman et al., 2002; Carruthers, 1993b;

Kunz & Graham, 1996; Osgood et al., 1996). Married individuals tend to spend less time at

unstructured social activities than unmarried individuals (Bachman et al., 2002; Kunz & Graham,

1996). Unstructured activities tend to provide opportunities for unmarried individuals to meet and

become better acquainted with potential marital partners. Thus, once individuals marry they may

spend less time in such activities because they now have a spouse. In addition, unstructured

activities provide opportunities for individuals to talk and receive emotional support from their

friends. Because married individuals tend to receive such support from their spouses, they may no

longer require as much support and companionship from their friends. Future research on the level

of substance use that tends to occur in various types of social and leisure activities and the

relationship between change in these types of activities with marriage and change in substance

use is needed to further explore marriage-related change in substance use.

Thus, levels of substance use and other risky behaviors are likely to decline with marriage

because of the reduction in leisure time due to increased time spent in marriage-related activities

and decreased time spent with friends. Individuals tend to engage in higher levels of substance

use when engaging in unstructured, passive, social activities (e.g., "hanging out" at a friend's

house or with friends at a party, bar, restaurant, or sporting event) than when engaging in

structured or active activities (e.g., taking part in sports and social clubs, and going out to see

movies) (Bachman et al., 2002; Carruthers, 1993a, 1993b; Bot, Engels, Knibbe, & Meeus, 2007;

Osgood et al., 1996; Thorlindsson & Bernburg, 2006). Future research could determine the extent

to which reductions in leisure time and particularly time spent in unstructured social activities with

marriage explain marriage-related declines in levels of substance use and other risky behaviors.

It was unexpected that participants' approval of alcohol use only explained a small portion

of marriage-related declines in alcohol use frequency, and that their approval of drunkenness and marijuana use did not explain marriage-related declines in use. Although Bachman and colleagues (2002) found that married individuals were more disapproving of alcohol and marijuana use than unmarried individuals, the current study's results indicated that individuals became only slightly (yet significantly) more disapproving of alcohol use and drunkenness across the transition to marriage, though moderately more disapproving of marijuana use across this transition. Perhaps individuals do not internalize the social expectations of lower levels of impulsivity and risky behavior, including substance use, for married individuals when they marry by substantially reducing their approval of alcohol use and drunkenness (Arnett, 1998; Leonard & Mudar, 2003). Further research on the internalization of social role expectations and the role of change in substance use approval in change in substance use behavior is needed to help explain the association between substance use attitudes and behaviors across the transition to marriage.

Other Explanations for Marriage-Related Change in Substance Use

Because time spent with friends and own approval of alcohol use only partially explained declines in frequency of alcohol use, drunkenness, and marijuana use across the transition to marriage, it appears that other processes also contribute to the declines in substance use that accompany marriage. Two likely explanations of these declines in use is the increase in responsibilities that accompany marriage and the strength of marital quality and bonds.

Marriage-related responsibilities. The age period between the late teens and late twenties is a time of great change in substance use, during which substance use tends to first increase into the early twenties, and then to decline through the twenties and into the thirties. This age period is also a period of great change in other aspects of individuals' lives. Common changes include transitions from living with one's parents to living independently, from being financially dependent upon parents to being financially self-sufficient, from being a student to being a worker, from being single to being married, and from being childless to being a parent (e.g., Arnett, 2000; Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997). As individuals move from late adolescence

to adulthood and experience these transitions, they tend to move from a state of relative freedom from responsibility and parental monitoring to one of spousal monitoring and increasing responsibility in personal, interpersonal, financial, and occupational domains (Arnett, 1998, 2000).

In particular, regarding the transition to marriage, individuals who marry may experience (a) increased financial responsibility to maintain their enlarged household, (b) increased house-related responsibilities if they buy or rent a larger home to accommodate their larger household, particularly if they expect or have children, and (c) increased responsibility for the health and well-being of themselves now that others are depending on them, as well as that of their spouses and any present or future children (e.g., Arnett, 1998, 2000; Leonard & Mudar, 2003).

Substance use, as well as other risky behaviors such as risky driving, risky sexual behavior, and delinquency, may change during adolescence and adulthood in response to these changes in responsibility levels (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Chen & Kandel, 1998; Stouthamer-Loeber et al., 2004). Substance use and other risky behaviors tend to be high in adolescence and early adulthood, particularly the late teens to early twenties, when individuals tend to be relatively free from responsibility (Arnett, 1998, 2000; Stouthamer-Loeber et al., 2004). Early adults may engage in fun and dangerous activities because they may believe these activities will have relatively few negative effects upon their lives, barring serious illness or injury.

Substance use and other risky behaviors tend to decline between the early and late twenties and into the thirties as individuals transition into adult roles and responsibilities, including marriage, parenthood, and an increase in level of responsibility for oneself and one's family (Arnett, 1997, 1998, 2000; Arnett & Taber, 1994; Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Chen & Kandel, 1998; Prescott & Kendler, 2001; Sampson & Laub, 1990; Scheer et al., 1996; Warr, 1998), and full-time employment, which may accompany the transition to marriage (e.g., Gotham et al., 1997; Merline et al., 2004; Sampson & Laub, 1990; Stouthamer-Louber et al., 2004).

With increases in responsibility for themselves and others, individuals may feel they are no longer as free to engage in risky behaviors because these behaviors could potentially cause harm by impairing their roles and responsibilities (Arnett, 2000; Bogart et al., 2005; Labouvie, 1996; Miller-Tutzauer et al., 1991; Roberts & Leonard, 1997). For instance, the transition to marriage often brings added responsibilities for the couple's home and for the maintenance of the marital relationship. The transition to full-time employment often brings responsibilities such as showing up for work on time every day, performing all job-related tasks, working with potentially disagreeable people, and maintaining employment in order to financially support oneself and one's family. Job and financial responsibilities may be shared with one's spouse, or even held only by one's spouse when a married individual is unemployed (e.g., homemakers, students). However, most married individuals take on a number of responsibilities with marriage which require energy, patience, and stable good health, all of which can be compromised by high levels of substance use and other risky behaviors. Future research identifying the specific type and level of responsibilities that accompany declines in substance use levels will help clarify the relationship between increased responsibilities and declines in use.

Marital quality, marital bonds, and friends. Substance use levels and other risky behaviors may also decrease with marriage because of the social changes that occur in individuals' lives during this transition. Substance use, particularly alcohol and marijuana use, is often a social behavior because friends and other people provide access to substances, opportunities for use, and encouragement of use. As individuals marry, they most likely shift their need for social and emotional support from their friends to their spouses, resulting in a strengthening of the social bond with one's spouse and a decrease in the amount of time spent with friends. According to Warr (1998), NYS participants who had higher marital quality (i.e., less marital stress, more warmth, affection, support, encouragement, and loyalty) spent less time with their friends and had fewer delinquent friends and perhaps as a result engaged in lower levels of substance use and delinquency. In addition, Sampson and Laub (1990) found that young adults tended to engage in

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lower levels of crime and delinquency if they had a strong marital attachment, which was characterized by no periods of separation or divorce, high closeness and warmth, and the fulfillment of financial and emotional marital responsibilities. Further research on marital quality and changes in social networks and social support with marriage will help clarify the emotional and social aspects of marriage that influence declines in substance use and other risky behaviors.

Limitations

As mentioned above, there were several limitations of the present study's findings due to features of the National Youth Survey data. These included the design of the NYS, the age range of the participants, and the number of nonwhites in the study.

Perhaps the main limitation of the present study is the NYS study design. Participants provided data once a year only for the first five years of the study, and every three years thereafter. As a result, the transition from single to married status spanned one year for some participants and three years for others. This could affect estimates of the role of the anticipation of marriage (i.e., change in substance us frequency between two measurement occasions prior to marriage and one occasion prior) because the spacing of these occasions in time could be one or three years, and it is yet unknown when declines in substance use levels start to decline prior to marriage. Consistent measurement intervals of less than one year would better detect the timing of changes in substance use prior to marriage than intervals of one year or more, and therefore should be used in future studies of substance use during the transition to marriage.

In addition, as mentioned above, data were only available from NYS participants up to age 27, and that only for some but not all participants due to the cohort-sequential design of the study. As a result, the findings from the present study may only describe individuals who marry by a couple of years above the median age at marriage, but not individuals who marry at older ages. Although this does not decrease the validity of the present findings, additional research on marriage-related change in substance use among individuals in their thirties and forties would help further describe changes in use across the transition to marriage.

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Finally, there were relatively few nonwhites who married during the course of the study ($n = 84$), compared with the number of whites who married during the study ($n = 511$). As a result, there may not have been enough information with which to model nonwhites' change in substance use across the transition to marriage. Thus, the findings regarding race differences in marriage-related change in use need to be interpreted with caution. Because different races (e.g., white, black, Hispanic, Asian) may have different cultural values and attitudes regarding marriage and different timing and rates of marriage, childbirth, and other family formation events, further research should investigate these issues using large samples of individuals from numerous races to clarify race differences in marriage-related change in substance use.

Table 13

Percent Married in 1970 and 1994 in U.S. by Age

	Percent Never Married		Percent Married	
	1970	1994	1970	1994
Women				
20-24	36	66	64	34
25-29	11	35	89	65
30-34	6	20	94	80
35-39	5	13	95	87
40-44	5	9	95	91
Men				
20-24	55	81	45	19
25-29	19	50	81	50
30-34	9	30	91	70
35-39	7	19	93	81
40-44	6	13	94	87

Data: Current Population Survey (U.S. Census Bureau), 1994

Source: Saluter (1996)

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RESEARCH INTERESTS

- The transition from adolescence to adulthood, and social role transitions in young adulthood, particularly the transition to marriage
- The development of substance use, delinquency, and other risky behaviors during adolescence and adulthood
- The impact of social role transitions on substance use and other risky behaviors
- The influence of gender, race, college status, social influences, and substance use attitudes on substance use
- Longitudinal developmental research methodology and statistical analysis
- Measurement of substance use and other complex, multidimensional behaviors

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