Men's and Women's Pathways to Adulthood and Associated Substance Misuse*

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ABSTRACT. Objective: Social role transitions have been linked to changes in substance use and misuse during young adulthood. This study examined how commonly observed pathways to adulthood, defined by education, employment, marriage, and parenthood, were associated with alcohol, tobacco, and marijuana misuse from ages 18 to 33. **Method:** Data came from a longitudinal panel of 412 men and 396 women recruited when they were in fifth grade in Seattle public schools in 1985. Participants were followed through age 33 in 2008, with 92% retention. **Results:** Young adults who had little postsecondary education and remained unmarried through age 30 generally had the highest rates of substance misuse. Those who were involved in postsecondary education and postponed family formation had the lowest rates, particularly with respect to daily smoking and nicotine dependence. Parenting during the young adult years was associated with lower rates of substance misuse for both men and women. However, taking on parenting responsibilities early, during the late teen years and early 20s (observed mostly for women), was associated with higher rates of tobacco misuse. Differences in substance misuse by pathways to adulthood were fairly constant across the young adulthood years and were already observed at age 18, suggesting that substance misuse patterns are established early. **Conclusions:** Young adults may change their substance use only partially in response to new freedoms and responsibilities in young adulthood. Preventive efforts should include a focus on early initiation of substance use and educational experiences that move people into life trajectories and associated substance misuse patterns. (*J. Stud. Alcohol Drugs, 72,* 763–773, 2011)

THE PERIOD FROM AGES 18 to 30 is associated with the adoption of new roles and statuses, including completing school, establishing a place to live, beginning a full-time job, and starting a family (Booth et al., 1999; Cohen et al., 2003; Macmillan and Eliason, 2003; Shanahan, 2000). These role transitions are associated with increases and declines in substance use and misuse during the young adult years (Bachman et al., 1997a). For example, living away from the parental home has been found to be associated with an increase in alcohol use, heavy episodic drinking, and marijuana use during the early 20s (Bachman et al., 1997a; White et al., 2005, 2006). Marriage, pregnancy, and parenthood have been associated with reduced alcohol and marijuana use and, to a lesser degree, cigarette smoking during young adulthood (Bachman et al., 1997a; Bailey et al., 2008; Curran et al., 1998; Merline et al., 2008; Yamaguchi and Kandel, 1985). However, transitions into different adult roles are not independent of each other but are clearly interrelated social pathways that include linked developmental trajectories, where each transition cascades into another (Elder, 1998; Masten et al., 2005). Thus, entering college often means a delay in starting a family (Mortimer et al., 2004; Rindfuss et al., 1987), whereas becoming a parent at a young age can mean ending one's education at high school (Haggstrom et al., 1986; Upchurch, 1993). It is not known how substance use and misuse are associated with multi-dimensional pathways to adulthood that take into account the interrelationship of role transitions. The present study examined differences in alcohol, tobacco, and marijuana misuse from ages 18 to 33 as a function of commonly observed pathways to adulthood, defined by the longitudinal intersection of school attendance, employment, marriage, and parenthood.

Pathways to adulthood

Recent studies have identified a small number of pathways to adulthood defined by the interrelationship between role transitions in education, work, marriage, and parenthood. Studies of earlier cohorts found that these pathways were differentiated primarily by the timing of family formation and participation in postsecondary education (Macmillan and Copher, 2005; Osgood et al., 2005; Sandefur et al., 2005). Similar results were found in the present sample of contemporary young adults but with important gender differences. Using latent class analysis, Oesterle et al. (2010) identified three latent pathways from ages 18 to 30 that were about equally prevalent among both genders but differed in important ways. As Figure 1 (for women) and Figure 2 (for

men) show, the most common transition pattern for women (43%) and men (42%) was postsecondary educated without children. This transition was characterized by investment in postsecondary education and postponement of family formation in terms of both marriage and living with children. A second pathway was defined by a high likelihood of marriage and living with children by the mid-20s and limited involvement in postsecondary education for 29% of women (married mothers) and 32% of men (married fathers). The third pathway was distinguished by a high probability of remaining unmarried through age 30 and having limited involvement in postsecondary education after high school for 26% of men (unmarried men with limited postsecondary education) and 27% of women. Compared with men, women on this pathway were already likely to live with children at age 18 (unmarried early mothers). Men and women differed not only in when they began living with children but also in the timing of marriage and the likelihood of combining both roles. Women moved into both marriage and living with children earlier than men and were more likely than men to be married and to live with children by age 30 on all pathways. Women also were more likely to live with children without being married, whereas marriage often preceded or was more closely timed to living with children for men.

Prior analyses examined socioeconomic and adolescent predictors of membership in these pathways (Oesterle et al., 2010). Multivariate analyses showed that educational factors, race/ethnicity, and experiences of early adversity (including parental divorce, death of a parent, and having been born to a teenage mother) uniquely distinguished between pathways to adulthood. The present study examined how these pathways to adulthood were associated with substance use and misuse from ages 18 to 33.

Substance use in young adulthood

Substance use and misuse during young adulthood generally peak during the early 20s and decrease thereafter (Substance Abuse and Mental Health Services Administration, 2009). The increase in alcohol use, heavy episodic drinking, and marijuana use during early young adulthood has been shown to be associated with role transitions that are accompanied by fewer social controls, particularly because of greater independence from the parental home (Bachman et al., 1997a; White et al., 2005, 2006). College attendance is associated with excessive and heavy episodic drinking, but the risk for alcohol abuse and dependence is significantly higher among high school dropouts and young adults who do not go to college (Harford et al., 2006). No consistent association of employment status with substance use independent of other role transitions has been found in young adulthood (Bachman et al., 1997a). College attendance and full-time employment are strongly and inversely related during the young adult years. Full-time employment
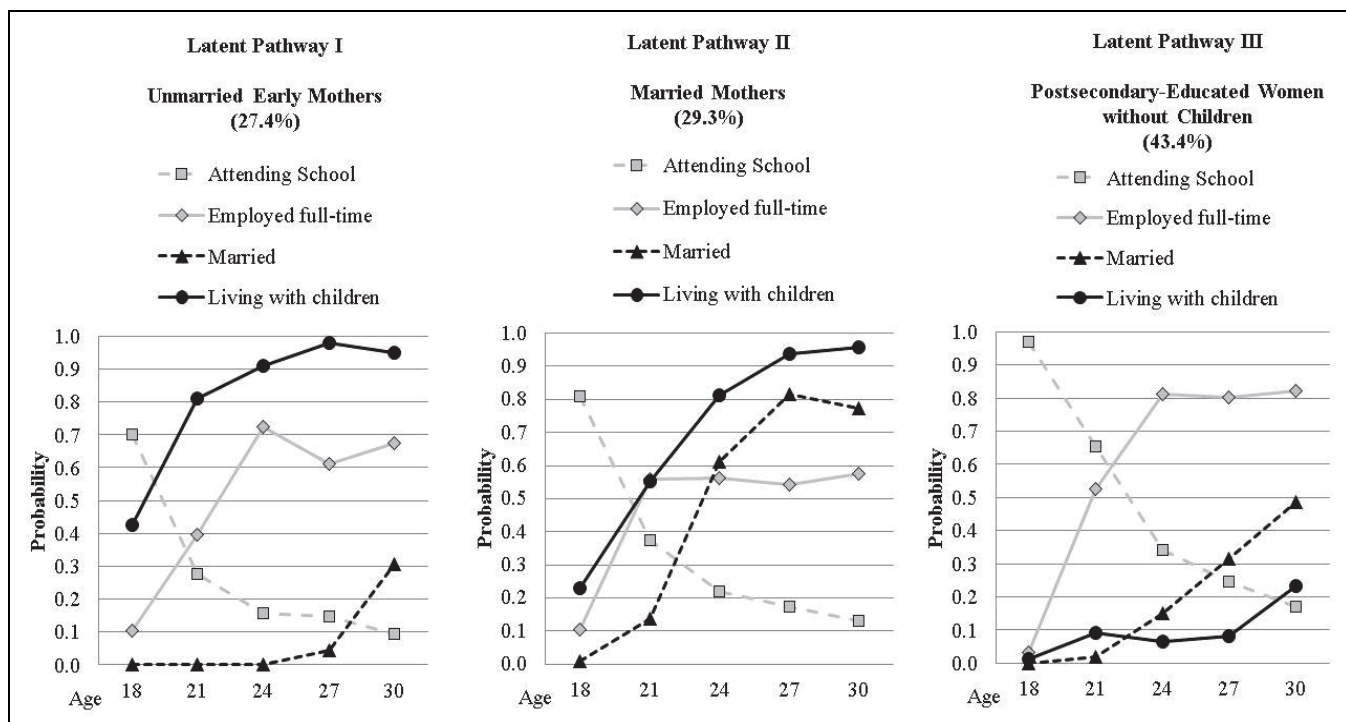

FIGURE 1.   Latent pathways for women ($N' = 366$). Reproduced with permission from John Wiley & Sons, Inc., from Oesterle et al. (2010)
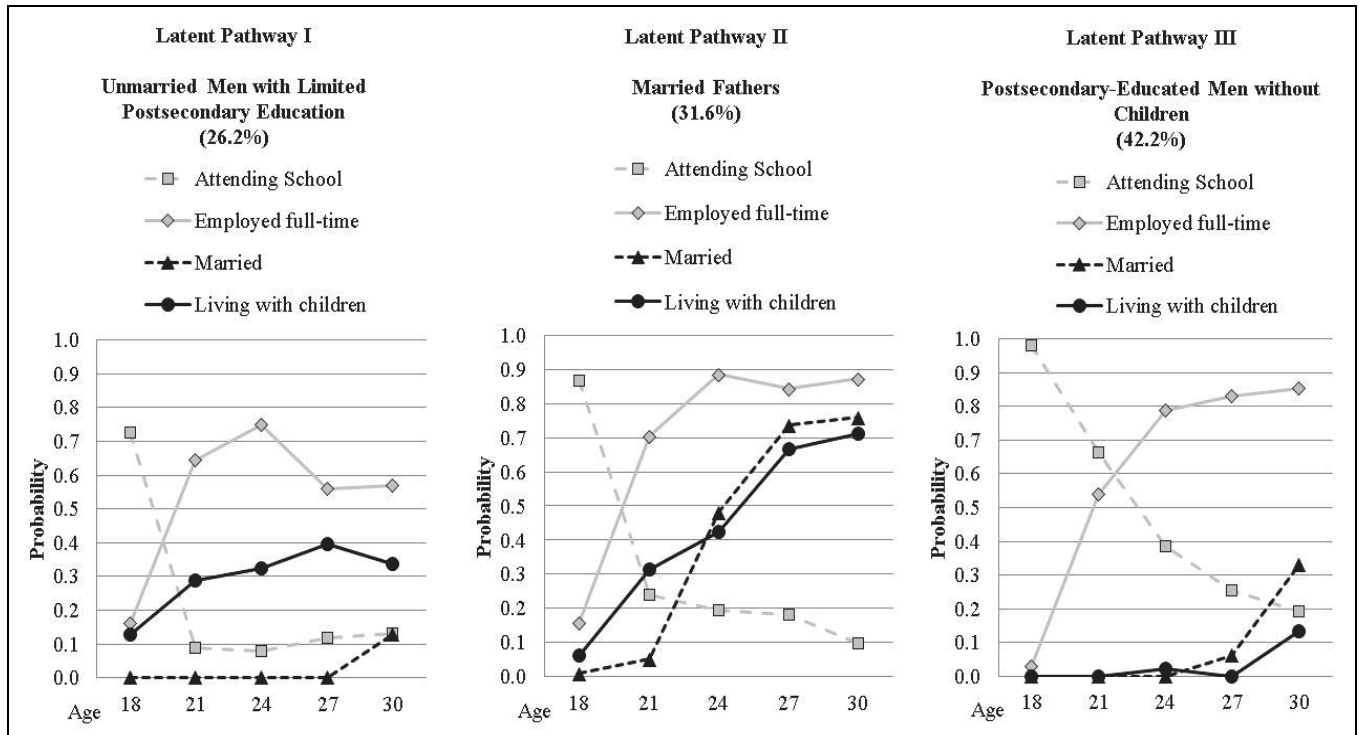
is the normative status for men and women who do not go to college, and most part-time workers are also students during this time. Full-time homemakers tend to be married or are raising children, and any observed differences in their substance use and misuse compared with employed young adults are more likely attributable to occupying family roles than to employment status (Bachman et al., 1997a). Because of the considerable interdependence in role transitions during young adulthood, it is important to take their linkages into account when examining how movement into adult roles is accompanied by changes in substance use patterns.

The generally decreasing trend in substance use and misuse starting in the mid-20s has been linked to the adoption of adult roles that involve new social commitments and responsibilities, particularly family roles such as marriage and parenthood (Bachman et al., 1997a, 2002). Marriage has been shown to reduce alcohol and marijuana use and, to a lesser extent, cigarette smoking among young adult men and women (Bachman et al., 1997a; Christie-Mizell and Peralta, 2009; Curran et al., 1998; Merline et al., 2008; Yamaguchi and Kandel, 1985).

Gender differences in the association between family roles and substance misuse during young adulthood have been observed primarily with respect to pregnancy. Pregnancy has been shown to reduce women's alcohol, tobacco, and marijuana use, whereas having a pregnant partner has not

been as clearly associated with reductions in substance use for men (Bachman et al., 1997a, 1997b; Bailey et al., 2008). However, the reduction in substance use around pregnancy may be temporary. Mothers' substance use has been found to return to pre-pregnancy levels within 2 years postpartum (Bailey et al., 2008; Muhuri and Gfroerer, 2009). Other studies, however, have found that, in the long run, parenthood appears to be associated with less substance use and misuse for both men and women, but this may be, in part, because many parents are married. Single parents do not show the same declines in tobacco use as married parents (Bachman et al., 1997a). Declines in substance use may also be because of attitudinal differences of parents and fewer social activities that provide opportunities to use drugs (Bachman et al., 2002). Compared with young adults who are not raising children, parents tend to be more disapproving of substance use and to socialize less often away from home and with friends who use drugs.

The association of parenthood and substance use during the young adult years also seems to depend on the timing of parenthood. Teenage parents have been shown to have higher levels of alcohol, tobacco, and marijuana use not only during adolescence but also in young adulthood, compared with those who become parents later (Gillmore et al., 2006; Little et al., 2009; Martino et al., 2004; Wolfe, 2009). Early pregnancy and the responsibility of raising a child may not

have the same association with substance misuse as more normatively timed parenthood during the young adult years. A similar finding has been reported for the relationship between early involvement in work and alcohol use. Whereas working more than 20 hours a week in late adolescence has been shown to increase alcohol use, full-time employment per se does not seem to be associated with increased rates of substance use in young adulthood (Bachman et al., 1997a; Johnson, 2004; McMorris and Uggen, 2000). Several theories suggest that taking on adult roles too early has negative consequences for later adjustment. The theory of pseudomaturity (Newcomb, 1996) predicts that precocious movement into adult roles is detrimental to later development because it is accompanied by a lack of appropriate skills. Theories about age norms suggest that early transitions that depart from normative age sequences have negative consequences because of social sanctions (Neugarten et al., 1965). Social role and stress theorists would argue that early transitions hinder positive development as a result of a lack of resources and social support (Pearlin et al., 2005).

The use and misuse of alcohol, tobacco, and marijuana all have been shown to increase in response to the newly gained freedoms during the transition to adulthood and then decline to varying degrees with the new responsibilities of marriage, pregnancy, and parenthood. Smoking has been found to be the least related to adult role transitions (Duncan et al., 2006), possibly because of its more addictive nature and consequently stronger continuity both across time and intergenerationally (Bailey et al., 2006). Variation in smoking behavior during young adulthood reflects mostly preexisting differences in smoking rates and educational characteristics already established during adolescence. The prevalence of smoking, including daily smoking, is highest among high school dropouts and young adults who are not attending college (Bachman et al., 1997a; Gfroerer et al., 1997; Gilman et al., 2008; White et al., 2005, 2009). The present study examined the association between alcohol, tobacco, and marijuana misuse across the young adult years and previously identified multidimensional pathways to adulthood, defined by the intersection of school attendance, employment, marriage, and parenthood.

Method

Data

We describe data from the prospective, longitudinal panel data from the Seattle Social Development Project. Because the present study is a direct follow-up to previously published research, we reuse with permission from the *Journal of Marriage and Family* sections from Oesterle et al. (2010) to describe the data, measures, and analysis.

As described in Oesterle et al. (2010), 18 public elementary schools that served students from high-crime neighborhoods in Seattle were identified in 1985. At that time,

the school district used mandatory busing to achieve racial balance in schools. Thus, all schools in the study served a heterogeneous population of students drawn from at least two different neighborhoods of the city. The study population included all fifth graders in these schools ($N = 1,053$). A total of 808 students (77% of the identified population) and their families agreed to participate in the longitudinal study.

The panel was interviewed in 13 waves (annually during school Grades 5–10, in Grade 12, and every 3 years thereafter) from 1985 through 2008, when most participants were 33 years old ($SD = 0.52$). One parent of the respondents was also interviewed in person in six annual waves when panel members were in Grades 5–10. Student questionnaires were group administered in school in Grades 5 and 6; in later years, in-person interviews were conducted with participants individually. Respondents who moved out of state (about 25% by 2008) were tracked and interviewed. Retention rates for the sample have remained above 91% since 1989, when panel members were 14 years old.

The sample included about equal numbers of men ($n = 412$) and women ($n = 396$) and was ethnically diverse: 47% White, 26% African American, 22% Asian American, and 5% Native American. Of these groups, 5% were Hispanic. A substantial proportion of the participants grew up in low-income families. Forty-six percent of the participants' parents reported a maximum annual family income of less than $20,000 in 1986. About 52% of the panel members participated in the National School Lunch/School Breakfast Program in Grades 5, 6, or 7.

The study included a universal preventive intervention during the elementary school years aimed at reducing health risk behaviors in youth (Hawkins et al., 1999) and was designed as a nonrandomized controlled trial. Prior examinations of the data have shown that the intervention had significant long-term effects on some of the markers of the transition to adulthood, including a lower rate of early parenting, greater engagement in work and school, and decreased crime and drug use by age 21 (Hawkins et al., 2005; Lonczak et al., 2002), and higher educational and economic attainment by age 27 (Hawkins et al., 2008). Although differences in prevalences and means have been observed between the intervention and control groups, prior analyses have shown few differences in the covariances among variables between the groups (Hill et al., 2005; McCarty et al., 2009). The present analyses included indicators for the intervention conditions but did not find any significant differences in the likelihood of membership on the latent pathways (Oesterle et al., 2010). Analyses for this study were based on the full sample after examining possible differences in the relationships between pathways and substance misuse outcomes. A model constraining the coefficients relating pathways to substance misuse outcomes to be equal across intervention and control groups fit the data well and did not significantly worsen the fit, thereby supporting a single-group analysis.

Measures

Pathways to adulthood. To examine pathways to adulthood, the analysis used data collected at five time points when most panel members were 18, 21, 24, 27, and 30 years old. At each of these time points, participants' school attendance (0 = *not attending school*, 1 = *attending school*), employment status (1 = *not employed*, 2 = *employed part time*, 3 = *employed full time*), marital status (1 = *not married*, 2 = *married*, 3 = *divorced*), and whether they were living with children (0 = *no*, 1 = *yes*) were assessed (Oesterle et al., 2010).

Substance misuse. The study assessed the prevalence of heavy episodic drinking, daily smoking, and any use of marijuana in the past month at six time points when most panel members were 18, 21, 24, 27, 30, and 33 years old. Heavy episodic drinking was defined as having had five or more alcoholic drinks in a row at least once in the past month; daily smoking was indicated by smoking one to five cigarettes a day or more in the past month; and marijuana use was defined as having used marijuana at least once in the past month. At the age 24 assessment, heavy episodic drinking was measured as part of a short form of the Diagnostic Interview Schedule (DIS; Robins et al., 1981) to assess diagnostic outcomes based on the American Psychiatric Association's (1994) *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV). The DIS defines heavy episodic drinking as having had "5 or more drinks in a row *in a 2-hour period*," which imposes restrictions on the timeframe in which the drinking may have occurred. As a result, the rate of reported heavy episodic drinking at age 24 (23%) was lower than expected given the rates in adjacent years (32% at age 21 and 27% at age 27). However, the association of heavy episodic drinking and alcohol abuse and dependence diagnosis at age 24 was the same as in other years ($r = .70$).

The study also assessed the abuse of and dependence on alcohol, tobacco, and marijuana as reported by participants for the year before the interview. Diagnostic measures were available for alcohol abuse and dependence starting with the age 21 assessment, for nicotine dependence starting with the age 24 assessment, and for marijuana abuse and dependence starting with the age 27 interview. At age 21, the short form of the DIS was used to assess DSM diagnostic criteria for alcohol abuse and dependence. Beginning with the age 24 interview, an updated DIS (Robins et al., 1995) was used based on DSM-IV criteria. Participants who met criteria for abuse or dependence in the past year were coded as 1; those who did not were coded as 0.

Analysis

Latent class analysis (Clogg, 1995) was used to examine how school attendance, employment, marriage, and living with children interrelated across five time points (ages 18, 21, 24, 27, and 30) to form distinct pathways. Twenty variables (i.e., four role statuses measured at five time points) were entered as indicators of a single latent categorical variable. Analyses were conducted separately for men and women using Mplus 5.2 (Muthén and Muthén, 1998–2007). The best-fitting model was chosen based on substantive considerations and multiple statistics assessing relative model fit (Oesterle et al., 2010). Models included several covariates as predictors of the latent pathways: sociodemographic factors (race/ethnicity, childhood poverty, and parental education), adolescent experiences (academic performance in high school; family disruption as indicated by parental divorce, separation, or widowhood; being born to a teenage mother; arrest; and frequency of substance use), and intervention status.

To compare prevalence rates of substance misuse across latent pathways, mean comparisons using the Wald test statistic were conducted. Effects of covariates on substance misuse were modeled only indirectly through latent pathways. The pseudoclass draw technique implemented in Mplus (Petras and Masyn, 2010) was used to determine latent pathway membership. This technique uses a method similar to multiple imputation (Rubin, 1987), estimating the relationship between latent pathways and observed substance misuse variables multiple times based on random draws from the posterior probability distribution, calculating the average of each estimate across the multiple random draws, and adjusting its standard error by taking into account the within- and between-random draw variation. This method is preferable to assigning sample members deterministically to one of the three pathways based on the highest posterior probability and treating pathways as an observed variable in further analyses because the latter approach could lead to bias and underestimated standard errors of the relationship between pathways and substance misuse (Clark and Muthén, 2009; Nylund and Masyn, 2008, 2009). A Wald test was performed separately for each substance misuse variable at each age to test for significant mean differences in substance misuse by latent pathways (Muthén and Asparouhov, 2007).

Missing data

The proportion of missing data was low because of the high retention rate in the study (92% at age 33) and generally low nonresponse. Of the 412 men in the sample, 395 had available data for the analysis, 268 (68%) of which had complete data on the pathway indicators across all five time points. Of the 396 women in the sample, 387 had available data, 288 (74%) of which had complete data. Of the total number of data points (20 Variables × Sample Size), 5% were missing for women and 8% for men. Adjusted for missing data ($N' = N \times [1 - \text{proportion missing}]$; Graham and Hofer, 2000), the sample sizes were 362 for men and 366 for

women. Full information maximum likelihood estimation was used to include all available data and obtain unbiased estimates of model parameters and their standard errors (Schafer and Graham, 2002).

Results

The present study examined the association between substance misuse and the previously identified pathways to adulthood in this sample (Oesterle et al., 2010) and how these relationships differed by gender. Table 1 (for women) and Table 2 (for men) show prevalence rates of substance misuse by age with standard errors in parentheses and the significance of the overall Wald tests and the pairwise comparisons.

Prevalence rates of substance misuse and abuse or dependence were higher among men than women for alcohol and marijuana use but were similar for daily smoking and nicotine dependence. Consistent with the generally observed spike in substance use after high school, substance misuse in this sample increased from ages 18 to 21, but this increase was most pronounced for heavy episodic drinking and daily

smoking and less steep for marijuana use. After age 21, rates of substance misuse generally declined and in many instances stabilized.

Alcohol misuse

Women on the pathway identified by postsecondary education and later family formation had significantly lower rates of heavy episodic drinking at age 18 than unmarried early mothers and married mothers. However, they caught up by age 21, when, on average, about 20% of all women engaged in heavy episodic drinking. Women on the three latent pathways did not differ in rates of heavy episodic drinking and alcohol abuse or dependence after age 18, although at age 27, married mothers had a significantly lower rate of heavy episodic drinking than postsecondary-educated women without children.

At age 18, men on the pathway characterized by postsecondary education and postponed family formation had significantly lower rates of heavy episodic drinking than unmarried men with limited postsecondary education but not compared with married fathers. At later ages, married

TABLE 1.　Prevalence of substance misuse by latent pathways, women ($N' = 366$), % (SE) and chi-square

Variable	Age, in years											
	18		21		24		27		30		33	
Heavy episodic drinking												
Unmarried early mothers	23.8^a	(4.3)	19.7	(4.0)	10.5	(3.2)	16.3	(3.7)	17.0	(3.8)	10.7	(3.1)
Married mothers	22.4^b	(4.1)	21.5	(4.0)	8.8	(2.8)	9.7^a	(2.9)	9.3	(3.0)	13.1	(3.4)
PS-educated w/o children	$10.7^{a,b}$	(2.5)	23.2	(3.4)	9.3	(2.3)	18.2^a	(3.1)	15.4	(3.0)	10.7	(2.5)
Overall Wald χ^2 (2 df)	8.660*		0.446		0.188		3.685		2.895		0.355	
Alcohol abuse/dependence												
Unmarried early mothers	N.A.		20.6	(4.0)	10.1	(3.1)	12.2	(3.3)	11.6	(3.3)	10.0	(3.0)
Married mothers	N.A.		14.2	(3.4)	9.3	(2.8)	9.0	(2.8)	10.6	(3.2)	8.8	(2.8)
PS-educated w/o children	N.A.		18.4	(3.0)	10.4	(2.4)	16.2	(3.0)	14.2	(2.9)	12.0	(2.7)
Overall Wald χ^2 (2 df)	N.A.		1.560		0.074		2.684		0.647		0.673	
Daily smoking												
Unmarried early mothers	32.4^a	(4.7)	40.7^a	(4.9)	$37.4^{a,b}$	(4.9)	28.5^a	(4.5)	33.9^a	(4.8)	31.2^a	(4.7)
Married mothers	26.0^b	(4.4)	27.4^a	(4.3)	21.5^b	(4.0)	21.9	(4.1)	28.7^b	(4.6)	23.2^b	(4.2)
PS-educated w/o children	$5.3^{a,b}$	(1.8)	15.6^a	(2.9)	16.1^a	(3.0)	12.8^a	(2.7)	$14.4^{a,b}$	(2.9)	$9.2^{a,b}$	(2.4)
Overall Wald χ^2 (2 df)	34.612***		19.762***		13.786**		9.544**		14.527**		19.394***	
Nicotine dependence												
Unmarried early mothers	N.A.		N.A.		8.6^a	(2.8)	21.3^a	(4.1)	$21.5^{a,b}$	(4.2)	$24.0^{a,b}$	(4.4)
Married mothers	N.A.		N.A.		5.8	(2.3)	12.6	(3.3)	6.0^a	(2.5)	12.6^a	(3.4)
PS-educated w/o children	N.A.		N.A.		1.9^a	(1.1)	9.1^a	(2.3)	7.8^b	(2.2)	9.3^b	(2.4)
Overall Wald χ^2 (2 df)	N.A.		N.A.		6.140*		6.647*		11.071**		8.837*	
Marijuana use												
Unmarried early mothers	26.3^a	(4.4)	23.0	(4.3)	11.7	(3.3)	18.8	(3.9)	12.8	(3.4)	11.2	(3.2)
Married mothers	23.3^b	(4.2)	15.0	(3.5)	12.7	(3.3)	10.2	(3.0)	12.6	(3.4)	16.1	(3.7)
PS-educated w/o children	$10.7^{a,b}$	(2.5)	21.2	(3.3)	14.9	(2.9)	14.9	(2.9)	12.1	(2.7)	10.3	(2.5)
Overall Wald χ^2 (2 df)	11.196**		2.388		0.525		3.033		0.026		1.490	
Marijuana abuse/dependence												
Unmarried early mothers	N.A.		N.A.		N.A.		8.7	(2.8)	5.0	(2.2)	5.0	(2.2)
Married mothers	N.A.		N.A.		N.A.		3.3	(1.8)	3.9	(2.1)	6.2	(2.4)
PS-educated w/o children	N.A.		N.A.		N.A.		4.7	(1.7)	4.8	(1.8)	4.5	(1.7)
Overall Wald χ^2 (2 df)	N.A.		N.A.		N.A.		2.605		0.138		0.258	

Notes: The statistics are percentages with standard errors in parentheses, except for rows with chi-square values. Estimated prevalences for latent pathways were 27.4% for unmarried early mothers, 29.3% for married mothers, and 43.4% for postsecondary-educated women without children. Pairwise comparisons (1 df) with the same superscript were significantly different at $p < .05$. PS = postsecondary; N.A. = data not available; w/o = without.
*$p < .05$; **$p < .01$; ***$p < .001$.

TABLE 2. Prevalence of substance misuse by latent pathways, men ($N' = 362$), % (SE) and chi-square

	Age, in years											
Variable	18		21		24		27		30		33	
Heavy episodic drinking												
Unmarried with limited PS education	35.6[a]	(5.2)	42.1	(5.3)	44.1[a]	(5.3)	41.6	(5.4)	37.6	(5.6)	34.4	(5.2)
Married fathers	30.9	(4.4)	38.3	(4.6)	29.4[a]	(4.4)	33.1	(4.6)	28.5	(4.5)	32.9	(4.6)
PS-educated w/o children	22.6[a]	(3.6)	44.2	(4.1)	39.0	(4.2)	43.9	(4.2)	36.7	(4.3)	39.5	(4.3)
Overall Wald χ^2 (2 df)	5.482		0.842		3.604		2.692		1.739		1.252	
Alcohol abuse/dependence												
Unmarried with limited PS education	N.A.		46.5[a]	(5.5)	45.4[a]	(5.3)	35.7[a]	(5.1)	28.5	(5.0)	29.6[a]	(5.1)
Married fathers	N.A.		29.2[a]	(4.4)	21.5[a,b]	(4.0)	21.8[a]	(4.0)	17.0	(3.7)	16.2[a]	(3.7)
PS-educated w/o children	N.A.		33.0	(3.9)	34.2[b]	(4.1)	30.1	(3.9)	26.2	(3.9)	18.1	(3.5)
Overall Wald χ^2 (2 df)	N.A.		4.215		8.683*		3.598		3.616		4.082	
Daily smoking												
Unmarried with limited PS education	35.1[a]	(5.2)	48.2[a]	(5.3)	46.6[a,b]	(5.2)	41.7[a]	(5.2)	42.6[a]	(5.4)	43.1[a]	(5.4)
Married fathers	24.3[b]	(4.1)	35.7[b]	(4.6)	31.8[a]	(4.5)	29.0	(4.4)	26.6[a]	(4.3)	28.2[a]	(4.5)
PS-educated w/o children	10.7[a,b]	(2.7)	22.1[a,b]	(3.6)	20.9[b]	(3.6)	20.9[a]	(3.5)	17.8[a,b]	(3.3)	15.6[a]	(3.3)
Overall Wald χ^2 (2 df)	23.424***		19.239***		17.727***		11.291**		16.023***		21.522***	
Nicotine dependence												
Unmarried with limited PS education	N.A.		N.A.		15.0[a]	(3.7)	24.5[a]	(4.6)	24.6[a,b]	(4.9)	29.6[a]	(5.2)
Married fathers	N.A.		N.A.		10.8[b]	(3.0)	17.7	(3.7)	17.0[a]	(3.7)	19.9	(4.0)
PS-educated w/o children	N.A.		N.A.		3.6[a,b]	(1.6)	11.9[a]	(2.8)	6.7[b]	(2.3)	16.6[a]	(3.4)
Overall Wald χ^2 (2 df)	N.A.		N.A.		11.408**		6.125*		15.421***		4.345	
Marijuana use												
Unmarried with limited PS education	44.9[a,b]	(5.4)	43.0[a,b]	(5.3)	42.7[a,b]	(5.3)	35.5[a]	(5.2)	29.1	(5.1)	26.9[a]	(4.9)
Married fathers	21.8[a]	(4.0)	25.0[a]	(4.1)	20.6[a]	(3.8)	15.1[a]	(3.5)	18.5	(3.8)	13.5[a]	(3.4)
PS-educated w/o children	20.8[b]	(3.4)	26.3[b]	(3.7)	24.5[b]	(3.8)	24.0	(3.7)	21.0	(3.5)	20.6	(3.5)
Overall Wald χ^2 (2 df)	13.593**		6.932*		8.638*		7.653*		2.141		3.666	
Marijuana abuse/dependence												
Unmarried with limited PS education	N.A.		N.A.		N.A.		25.5[a,b]	(4.6)	15.5	(4.1)	17.2[a]	(4.2)
Married fathers	N.A.		N.A.		N.A.		6.6[a]	(2.4)	10.0	(3.0)	3.1[a]	(1.8)
PS-educated w/o children	N.A.		N.A.		N.A.		12.4[b]	(2.8)	6.3	(2.2)	8.8	(2.6)
Overall Wald χ^2 (2 df)	N.A.		N.A.		N.A.		9.832**		4.551		7.468*	

Notes: The statistics are percentages with standard errors in parentheses, except for rows with chi-square values. Estimated prevalences for latent pathways were 26.2% for unmarried men with limited postsecondary education, 31.6% for married fathers, and 42.2% for postsecondary-educated men without children. Pairwise comparisons (1 df) with the same superscript were significantly different at $p < .05$. PS = postsecondary; N.A. = data not available; w/o = without.
*$p < .05$; **$p < .01$; ***$p < .001$.

fathers generally had the lowest rates of heavy episodic drinking and alcohol abuse or dependence, and unmarried men with limited postsecondary education had the highest. Only at age 24, however, were the rates of heavy episodic drinking significantly different between these two pathways. Yet unmarried men with limited postsecondary education had significantly higher rates of alcohol abuse or dependence than married men at all ages except age 30. Rates of alcohol abuse or dependence for postsecondary-educated men without children tended to be in between those on the other two pathways; yet, heavy episodic drinking was generally as high in this group as among unmarried men with limited postsecondary education.

Tobacco misuse

For both men and women, the three pathways differed consistently in daily smoking and nicotine dependence between ages 18 and 33. Unmarried early mothers and unmarried men with limited postsecondary education had significantly higher rates of daily smoking and nicotine dependence than did the other two groups at all time points. In fact, daily smoking rates were about three times as high and nicotine dependence about twice as high for men and women on the unmarried pathways compared with postsecondary-educated men and women, who had the lowest rates overall. Married fathers and married mothers were generally between the other two pathways in rates of daily smoking and nicotine dependence, although married mothers did not differ in nicotine dependence from postsecondary-educated women without children.

Marijuana misuse

There was little difference in marijuana use and abuse or dependence among women on the three pathways.

Postsecondary-educated women without children had significantly lower rates of past-month marijuana use compared with married mothers and unmarried early mothers at age 18 only.

Among men, the pathway described as unmarried with limited postsecondary education was associated with the highest rates of marijuana use and abuse or dependence between ages 18 and 33. Rates on this pathway were about twice as high as for men on the other two pathways, which did not differ from each other. The same pattern was found for marijuana abuse or dependence.

Adjusting for adolescent substance use

Because pathway differences in substance misuse were already observed at age 18 and were fairly constant throughout young adulthood, we examined in auxiliary analyses whether preexisting differences in substance use before age 18 accounted for differences in substance misuse later on. Because covariates cannot currently be included when using the pseudoclass draw procedure in MPlus, we assigned participants to latent pathways based on their most likely pathway membership and regressed substance misuse outcomes on pathway membership and adolescent substance use. Simulation studies (Clark and Muthén, 2009) have shown that this procedure may introduce less bias if entropy is high (>.80), as was the case in the present study.

Controlling for differences in the average frequency of adolescent substance use (i.e., a composite measure that combined alcohol, cigarette, marijuana, and other illicit drug use across Grades 7 and 10) did not explain differences between pathways in tobacco or marijuana misuse. However, adolescent substance use did explain pathway differences in age 18 heavy episodic drinking for both genders and rates of alcohol abuse or dependence for men. Men and women on the postsecondary-educated without children pathway already used drugs less frequently before age 18. More frequent substance use before age 18 was strongly and positively associated with age 18 and later alcohol misuse.

Discussion

The present study examined differences in alcohol, tobacco, and marijuana misuse and abuse or dependence from ages 18 to 33 as a function of commonly observed pathways to adulthood. Modeling the longitudinal interrelationship between role transitions in education, employment, marriage, and parenthood, the analysis showed that substance misuse was consistently associated with different pathways to adulthood. College-bound young adults, who were the least likely to start their own families during their 20s, showed the greatest increase in substance misuse between ages 18 and 21. However, they had some of the lowest rates of substance misuse in adolescence and at later ages, particularly with respect to daily smoking and nicotine dependence. The increase may reflect a catching-up effect when reaching legal drinking age at 21 but may also be because of the college environment, which in other studies has been found to increase alcohol misuse. Women on different pathways to adulthood did not differ in rates of alcohol or marijuana misuse. Men and women who had little postsecondary education and remained unmarried through age 30 generally had the highest rates of substance misuse. Among women, this pathway was associated with moving into a mother role early, during the late teens and early 20s. These findings suggest that normatively timed parenthood during the young adult years was associated with lower rates of substance misuse for both men and women. A pathway that involved taking on parenting responsibilities early, during the late teen years and early 20s, was associated with higher rates, particularly of tobacco misuse. Because very early parenting was observed mostly among women and generally occurred outside of marriage, parenting that was not normatively timed was associated with tobacco misuse predominantly among women. In contrast, men lived with children mostly during their 20s and most often in the context of marriage. This does not suggest that early parenting is not associated with substance misuse for men as it is for women, but because early parenting outside the context of marriage was less commonly observed among men, this association could not be fully examined in the present study. However, unmarried men with limited postsecondary education had the highest probability of living with children and also had the highest rates of substance misuse. This supports the idea that early parenting and not being married is a risk factor for elevated substance misuse for both genders. Young parents' high rates of daily smoking and nicotine dependence in this study are of particular concern because of the risk to their own health and the health of their children.

It is noteworthy that differences in substance misuse by pathways to adulthood were fairly constant across the young adulthood years for both genders and were already observable at age 18. This consistency suggests that young adults may change their substance use only partially in response to new freedoms and responsibilities as they move into adult roles. Much of the variation in substance misuse, abuse, and dependence may be a result of differences in early initiation of substance use and selection into life trajectories that begin in childhood and adolescence. For example, men who took on family roles during the young adult years had the lowest rates of alcohol and marijuana misuse, but this difference already existed at age 18 and during the early 20s, before most of them had gotten married or had begun parenting. Auxiliary analyses confirmed that some of these differences, particularly in alcohol misuse, were explained by preexisting differences in adolescent substance use before age 18. This phenomenon may be a form of "anticipatory socialization" (Yamaguchi and Kandel, 1985), in which those who initiate drug use early are more likely to abuse substances or

become dependent later in life (Guo et al., 2000; Hingson et al., 2006) and are also more likely to make precocious transitions into adult roles (including teenage parenting).

This kind of selection effect seems to be particularly relevant for differences in alcohol misuse during young adulthood, but it does not fully explain pathway differences in tobacco and marijuana misuse. Different mechanisms associated with adult role changes (e.g., assortative mating) may be at work for tobacco and marijuana misuse. Although not tested directly in this study, experiences in early adulthood may be mechanisms through which early selection factors, such as socioeconomic differences in family background, early initiation of substance use, and educational successes (Oesterle et al., 2010), influence tobacco and marijuana misuse across young adulthood. The relatively stronger stability of differences in tobacco misuse also may be in part because of nicotine's addictive characteristics and greater intergenerational transmission than is found for other drugs (Bailey et al., 2006). It may also be partially a reflection of the cross-sectional analysis approach used in this study, which does not take into account within-person change in substance misuse over time. However, early initiation of drug use and academic experiences in childhood and adolescence appear to select and socialize young people into behavioral pathways that are predictive of later alcohol, tobacco, and marijuana misuse. Hence, they may be important targets of preventive efforts aimed at reducing substance misuse during young adulthood and in later life. Future research should focus on examining the mechanisms during young adulthood that are associated with different pathways and that contribute to maintenance and discontinuity of substance misuse during adult life, such as mental health and socialization experiences.

A strength of the present study was that it examined multidimensional pathways to adulthood that take into account the interrelations between transitions into different adult roles across time. The use of the pseudoclass draw technique to analyze the association between latent pathways and observed substance misuse is a methodological strength of this study, as are the longitudinal evaluations of a contemporary panel of young adults. The study involved similar numbers of men and women, allowing for comparisons of pathways into adulthood and substance misuse across ages 18 to 33. Further contributing to the potential impact of the work are the presence of multiple ethnic groups, the incorporation of lower income subjects from single-parent households, and the high retention rate.

It is important to remember that the focus on children from urban households may limit generalizability, although the rates of substance misuse are generally akin to similar-age panels (Macmillan and Eliason, 2003; Sandefur et al., 2005; Substance Abuse and Mental Health Services Administration, 2009). Also, the complex analysis limited the ability to examine changes in substance misuse across the young adult years. The present analysis examined prevalence differences in substance misuse at six different time points throughout young adulthood. The pattern of an increase in substance misuse from ages 18 to 21 and a decline thereafter was generally observed for all pathway groups. Future research will have to explore more systematically, however, whether individual trajectories of substance misuse differ by pathways to adulthood.

An important conclusion of this study is that young adults may change their substance use only partially in response to new freedoms and responsibilities experienced during young adulthood and that substance misuse patterns are established early, before entry into adulthood. Young adults with fewer educational successes in high school, more substance use in adolescence, and little involvement in postsecondary education during young adulthood appear to be at greatest risk for substance misuse and disorders during this life stage. These results support the idea that efforts to prevent alcohol, tobacco, and marijuana problems in adulthood should include a focus on preventing the early initiation of substance use in adolescence and on understanding and changing educational experiences that select people into life trajectories and associated substance misuse patterns relatively early in life.

Acknowledgments

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