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Early and adverse experiences with sex and alcohol are associated with adolescent drinking before and during pregnancy

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Abstract

The goal of this study was to examine the effects of early and adverse experiences with sex and alcohol on adolescent drinking the year before and during pregnancy. Pregnant adolescents, recruited at an outpatient prenatal clinic, were interviewed about their substance use. A subsample was asked about their first sexual experiences. Associations among early experiences with alcohol and sex and drinking before and during pregnancy were examined. Early age at first alcoholic drink predicted problem alcohol use before pregnancy and drinking during pregnancy. Coercive first coitus was not associated with alcohol use, but drinking during first coitus predicted problem alcohol use before pregnancy as well as drinking during the first trimester of pregnancy. In sum, early use of alcohol and use of alcohol during first coitus may be risk factors for problematic alcohol use before pregnancy and during pregnancy among childbearing teenagers. Implications for the health of adolescent mothers and their offspring are discussed.

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1. Introduction

Drinking among sexually active and childbearing teenagers is an important public health problem with implications for two generations and across multiple births, because teenage mothers often become pregnant again at an early age (Meade & Ickovics, 2005) and drinking tends to increase as girls' transition from adolescence to young adulthood (Gilchrist, Hussey, Gillmore, Lohr, & Morrison, 1996). Moreover, teenagers tend to recognize their pregnancies later than adult women and are more likely to engage in binge-drinking early in pregnancy, which has serious implications for fetal development (Cornelius et al., 1994; Sokol,

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Delany-Black, & Nordsstrom, 2003). Adolescent pregnancy is associated with an increased risk of adverse obstetrical and perinatal outcomes, independent of sociodemographic factors (Fraser, Brockert, & Ward, 1995). Therefore, according to a vulnerability model (Horowitz, 1987), the offspring of teenage mothers may be even more vulnerable than the offspring of adult mothers, despite similar alcohol exposure. Consequently, it is important to identify those adolescent girls who are at most risk for continued drinking during pregnancy, because they are also at greater risk of drinking as a young mother and during future pregnancies.

According to the problem behavior theory, girls who drink alcohol at an early age are also more likely to engage in early sexual intercourse and other problem behaviors (Biglan et al., 1990; Donovan & Jessor, 1985; Huizinga, Loeber, & Thornberry, 1993; Jessor, 1991; Jessor & Jessor, 1978; Krohn, Lizotte, & Perez, 1997; Santelli, Brener, Lowry, Bhatt, & Zabin, 1998). Cornelius et al. (1993) examined alcohol use in pregnant teenagers and discovered that binge-drinkers were more likely to have transitioned to adult behaviors (e.g., tobacco and illicit drug use) than nonbinge-drinkers. Rome, Rybicki, and Durant (1998) found no difference in age of onset of alcohol use or alcohol use in the last 3 months between sexually active Ohio girls who became pregnant and those who did not. In fact, the sexually active girls who never got pregnant were more likely to have had a drink in the last 30 days than the girls who reported at least one pregnancy. Other investigators (e.g., Halpern et al., 2004) found that substance use does not necessarily covary with sexual risk-taking in young African-American females.

Early transitions such as younger age at menarche, earlier sexual activity, and younger age at first drink are not only associated with risk for substance abuse disorder and other psychopathology (Cornelius, Clark, Reynolds, Kirisci, & Tarter, 2007; Grant & Dawson, 1997; McGue & Iacono, 2005), but have also been linked with sexual victimization (Rickert & Wiemann, 1998). Adolescent girls and young women are 4 times more likely to experience sexual coercion than older women (Catalano, 2006; Koss, Gidycz, & Wisniewski, 1987; Rennison, 2001), and early use of alcohol may play a role in this heightened vulnerability. Alcohol is more likely to have a disinhibiting effect on adolescents than adults (Halpern-Felsher, Millstein, & Ellen, 1996), and this disinhibitory effect may be stronger for girls, who experience greater social sanctions against sexual activity than boys (Dye & Upchurch, 2006; O'Donnell, Myint, O'Donnell, & Stueve, 2003). Thus, girls may be more susceptible to sexual coercion after using alcohol than boys or adults.

Most of the studies linking sexual coercion to alcohol use were conducted on Caucasian adults (e.g., Abbey, 1991; Harrington & Leitenberg, 1994; Kilpatrick, Acierno, Resnick, Saunders, & Best, 1997; Koss, 1993; White & Humphrey, 1997). Studies with ethnically diverse samples have yielded equivocal results. A study of college students that examined ethnic differences revealed that African-American students were less likely to report concurrent alcohol use at the time of sexual assault (Abbey, Ross, McDuffie, & McAuslan, 1996). In a sample of ethnically diverse, urban adolescents and young women, no relationship was found between concurrent alcohol use and victimization during dates, and young women who reported sexual coercion were actually less likely to have used alcohol on this date. However, the young urban women in this study who reported a rape, attempted rape or verbal sexual coercion were also more likely to report a lifetime history of using hard liquor, marijuana or other illicit drugs than the women who had reported no unwanted sexual experiences (Rickert, Wiemann, Vaughan, & White, 2004). Therefore, it is still not clear whether substance use and sexual coercion are implicated in the use of alcohol before and during pregnancy among pregnant adolescents.

The goal of this study is to examine the effects of early and adverse experiences with sex and alcohol on adolescent drinking the year before and during the target pregnancy in an ethnically diverse sample of teenage mothers. Consistent with the problem behavior theory and previous research, we expect earlier initiation of alcohol use, earlier first coitus, drinking at the time of first coitus, and coercion during first

coitus to predict problem alcohol use before pregnancy and drinking during pregnancy. The results of this study will shed light on this particularly high-risk group of childbearing adolescents by exploring the contributions of developmental timing and the context of first coitus on continuity of alcohol use among teenagers who become pregnant.

2. Method

2.1. Study sample

In a cohort study, 413 pregnant adolescents (12–18 years old: $M=16.32$, $SD=1.26$) were recruited from an outpatient prenatal clinic between 1990 and 1995. The goal of that study was to prospectively examine the effects of alcohol and other substance use during pregnancy on offspring development. At the six-year postpartum phase, 357 of these women were available for follow-up (10 mothers refused to participate, 25 were lost to follow-up, 9 had moved out of the state, 5 had children in foster placement, 6 children died, and 1 child was adopted). Maternal alcohol use and demographic characteristics were not significantly different in the 56 mothers who were assessed during pregnancy, but not tested six years later. The current study resulted from additional funding that was received to comprehensively examine the sexual history of this sample at the 6-year follow-up phase. This funding was not received until 78 women had already been assessed. Therefore, the present study is based on the remaining 279 women in the sample who received the sexual history questionnaire. Most of the adolescents were African-American (75%) and primigravidas (72%). African-Americans were younger at recruitment than Caucasians ($t=-2.23$, $p<.05$) and were more likely to have previously gotten pregnant ($t=3.53$, $p<.001$). One-third of the pregnant teenagers had dropped out of school, with Caucasian adolescents significantly less likely to be enrolled in school full-time ($t=4.28$, $p<.001$).

2.2. Data collection

Data were collected during interviews in a private room at the prenatal clinic of the Magee-Women's Hospital at the University of Pittsburgh between 1990 and 1995. The Institutional Review Board of the University of Pittsburgh approved each phase of the study protocol. Participants were informed that their privacy was protected by a Certificate of Confidentiality issued by the National Institutes on Health. This was a naturalistic study of substance use during pregnancy, with no intervention component. All pregnant adolescents who attended the prenatal clinic were eligible. Core data, including demographic information and data on alcohol use, physical and mental health were obtained during the fourth prenatal month (Phase 1). A six-year follow-up of the teen mothers and their offspring took place at the Maternal Health Practices and Child Development offices between 1996 and 2001 (Phase 2). An extensive sexual history and Phase 1 core data were collected during the Phase 2 interview. For a more extensive description of the original methodology and measures, see [Cornelius, Goldschmidt, Day, and Larkby \(2002\)](#).

2.3. Measures

Demographic information such as age and educational attainment of the adolescent and her mother was collected during interviews at the prenatal clinic and hospital. The educational level of the adolescents' mother ($M=12.05$ years, $SD=1.46$: range=7–16) was used as a proxy for SES. Twenty-seven of the

adolescents reported that they did not know their mother's level of educational attainment: mean replacement was used in these cases. Several measures of developmental transitions were included: age at menarche ($M=11.91$ years old, $SD=1.38$: range=9–15), age at first coitus ($M=14.29$ years old, $SD=1.38$: range=9–17), and age at first full alcoholic drink ($M=13.87$ years old, $SD=1.83$: range=5–17). Adolescent mothers originally coded as missing on age at initiation to alcohol because they had not started drinking by Phase 2 were recoded as 21 ($n=54$). Earlier transitions were expected to predict more problem alcohol use before pregnancy as well as use of alcohol during the pregnancy.

Psychological covariates included measures of both risk (externalizing and internalizing behavioral problems) and resilience (satisfaction with social support). Externalizing (e.g., disobeying parents and teachers, lying, cheating, destroying property) and internalizing behaviors (e.g., depressive symptoms, physical symptoms without medical cause, fear, anxiety) were measured using the Youth Self-Report (YSR; Achenbach, 1991). Mean raw scores for externalizing ($M=12.36$, $SD=7.76$: range=0–44) and internalizing problems ($M=11.52$, $SD=6.99$: range=0–32) were well within the normal range, but the distributions were positively skewed. Therefore, log transformation was performed on these variables. Satisfaction with social support ranged from 1–4, with higher scores indicating greater satisfaction ($M=3.54$, $SD=0.57$). It was expected that adolescents who had fewer internalizing and externalizing problems and who reported more satisfaction with their social support network would be less likely to abuse alcohol before pregnancy or use alcohol during pregnancy.

The independent variables in this study were alcohol use and coercion during first coitus, as reported by the mother at the 6-year follow-up. Ten percent of mothers reported that they were drinking during first coitus. Mothers were also asked if they were raped or pressured to have sexual intercourse, and 24% reported either verbal or physical coercion. We hypothesized that using alcohol or experiencing coercion during first coitus would significantly predict more problem alcohol use before pregnancy and use of alcohol during pregnancy.

Two measures were chosen to represent problem alcohol use before pregnancy: heavy drinking and negative consequences from alcohol. Heavy drinking was defined as an average daily volume of 2 or more drinks, and 10% of the adolescents engaged in this level of drinking before pregnancy. Negative consequences was a dichotomous variable created from positive responses to 2 or more items on a *Negative Consequences of Alcohol* scale (Jessor, Donovan, & Costa, 1989). Negative consequences include drinking to the point of intoxication, vomiting or experiencing a hangover, conflicts over drinking with romantic partners, friends, or parents; and problems at school or with the police due to alcohol. More than a quarter (27%) of the mothers reported 2 or more negative consequences from their alcohol use in the year preceding this pregnancy. Alcohol use during pregnancy was divided into early (1st trimester=35% of teenagers) and later (2nd or 3rd trimester=13% of teenagers) use.

For descriptive purposes, Table 1 illustrates the type and frequency of alcohol ever used the year before pregnancy and during each trimester of pregnancy. Most of the adolescents who drank consumed beer or wine coolers, and consumption declined steeply during pregnancy. Although 1 in 5 girls reported drinking once or twice a week before their pregnancy, only 5% continued to drink on a weekly basis during their first trimester. By the second and third trimesters, only 3% and 2% respectively, of the pregnant teenagers reported using alcohol once a month.

2.4. Statistical analyses

Two sets of bivariate analyses were conducted using the χ^2 test of differences in proportions (SPSS 13.0 for Windows; Norusis, 2005). In the first set of bivariate analyses, the two independent variables

Table 1
Frequency of alcohol use by type of alcohol

	Beer	Liquor	Wine	Coolers	Any
Before pregnancy					
Ever	60%	27%	11%	40%	73%
Once a month	44%	12%	5%	23%	
1–2 times/week	17%	4%	1%	8%	
Every day	<1%	–	<1%	<1%	
1st Trimester					
Ever	26%	8%	8%	7%	35%
Once a month	12%	1%	1%	4%	
1–2 times/week	5%	<1%	1%	1%	
Every day	–	–	<1%	–	
2nd Trimester					
Ever	7%	1%	1%	5%	9%
Once a month	3%	<1%	<1%	2%	
1–2 times/week	1%	–	–	<1%	
Every day	–	–	–	–	
3rd Trimester					
Ever	4%	1%	2%	3%	7%
Once a month	2%	–	–	1%	
1–2 times/week	<1%	–	–	<1%	
Every day	–	–	–	–	

(drinking and coercion during first coitus) and dependent variables (drinking before and during pregnancy) were examined as a function of race. In the second set of bivariate analyses, the direct effects of the independent variables on the alcohol outcome measures were considered.

Logistic regression was used to consider the effects of drinking and coercion during first coitus on alcohol use (heavy drinking and negative consequences) before and during pregnancy (early and later in pregnancy). Variables were grouped into four domains and were entered into the regression analyses in four separate blocks (Step 1 = Demographic, Step 2 = Psychosocial, Step 3 = Developmental, Step 4 = Experiences during First Sex) in order to determine if drinking and sexual coercion during first coitus predicted alcohol use, after controlling for demographic, psychosocial, and developmental covariates. The demographic covariates were race and SES. Psychological covariates included externalizing and internalizing problems, and satisfaction with social support. Developmental timing included age at menarche, age at first drink, and age at first coitus. The independent variables examining context of first coitus (drinking during first coitus, coercion during first coitus) were entered last, as a conservative test of their effects on alcohol use before and during pregnancy, after controlling for the other covariates.

3. Results

3.1. Bivariate results

Table 2 illustrates the percentages of Caucasian and African-American adolescents who used alcohol during their first coitus, experienced coercion during first coitus, used alcohol in a problematic manner the year before pregnancy, and used alcohol while pregnant. Although Caucasian teenagers were significantly

Table 2
Bivariate analyses as a function of race

	African-Americans <i>n</i> =191	Caucasians <i>n</i> =88	
Experiences during first coitus			
Alcohol use	7%	15%	$\chi^2=4.28^*$
Coercion	23%	25%	$\chi^2=0.13$
Drinking before pregnancy			
Heavy drinking	9%	14%	$\chi^2=1.45$
Negative consequences	20%	41%	$\chi^2=12.87^{***}$
Drinking during pregnancy			
1st trimester	32%	42%	$\chi^2=2.80^{\dagger}$
2nd/3rd trimester	13%	11%	$\chi^2=0.16$

$^{\dagger}p<.10$, $^*p<.05$, $^{**}p<.01$, $^{***}p<.001$.

more likely to drink alcohol during first coitus, they were not more likely to experience sexual coercion during first coitus. Caucasians were also more likely to experience 2 or more negative consequences from alcohol the year before pregnancy, but they were not more likely to be heavy drinkers. There were no significant group differences for alcohol use during pregnancy.

The results of bivariate analyses between the independent variables and the four alcohol outcome measures are shown in Table 3. Drinking during first coitus was a better predictor of using alcohol before and during pregnancy than coercive first coitus. Girls who used alcohol during first coitus were significantly more likely to be heavy drinkers (35%) and experience negative consequences from drinking (65%) before pregnancy. They were also more likely to drink while pregnant, especially during the first trimester. Although sexual coercion during first coitus was not significantly related to any of the alcohol outcomes, there was a trend for an association with drinking later in pregnancy.¹

3.2. Multivariate results

3.2.1. Problem alcohol use before pregnancy

Significant predictors of problem drinking before pregnancy and negative consequences of alcohol use are shown in Table 4. Earlier age at first drink was a significant predictor of heavy drinking in the year before pregnancy. Moreover, drinking during first coitus was positively associated with heavy drinking. Teenagers who used alcohol during their first coitus were almost six times more likely to use alcohol in a problematic way before this pregnancy. Developmental timing was also important, with younger age at first coitus and younger age at first alcoholic drink both predicting negative consequences from drinking before pregnancy. After controlling for significant demographic and developmental covariates, drinking during first coitus remained a significant predictor of negative consequences of alcohol.

3.2.2. Alcohol use during pregnancy

Predictors of alcohol use during pregnancy are summarized in Table 5. Variables from all 4 domains contributed to the final model. SES was a significant predictor of alcohol use both before and during

¹ Age at sexually coercive first coitus was also examined in bivariate analyses, in order to compare girls who reported coercive first sexual intercourse before and after age 13. However, these 2 groups did not differ on any of the alcohol use outcomes.

Table 3
Bivariate analyses on first coitus and alcohol use before and during pregnancy

	Not drinking during first coitus	Drinking during first coitus	
Drinking before pregnancy			
Heavy drinking	8%	35%	$\chi^2 = 17.64^{***}$
Negative consequences	23%	65%	$\chi^2 = 21.03^{***}$
Drinking during pregnancy			
1st trimester	32%	64%	$\chi^2 = 10.04^{**}$
2nd/3rd trimester	11%	23%	$\chi^2 = 3.04^{\dagger}$
	No coercion during first coitus	Coercion during first coitus	
Drinking before pregnancy			
Heavy drinking	10%	11%	$\chi^2 = 0.03$
Negative consequences	25%	30%	$\chi^2 = 0.66$
Drinking during pregnancy			
1st trimester	33%	40%	$\chi^2 = 0.81$
2nd/3rd trimester	10%	19%	$\chi^2 = 3.41^{\dagger}$

$^{\dagger}p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

Table 4
Multivariate analyses on problem alcohol use before pregnancy

Heavy drinking ($R^2 = .20$, $\chi^2 = 27.18^{**}$)	Beta	Wald	Odds ratio	Confidence interval
Caucasian race	0.09	0.04	1.10	0.45–2.64
Higher SES	-0.14	0.90	0.87	0.66–1.56
Internalizing problems	-0.36	2.01	0.70	0.43–1.14
Externalizing problems	0.46	3.39 [†]	1.60	0.97–2.57
Social support	-0.71	3.20 [†]	0.49	0.23–1.07
Age at menarche	-0.01	0.01	0.99	0.69–1.41
Age at first drink	-0.21	4.59*	0.81	0.67–0.98
Age at first sex	0.10	0.30	1.10	0.76–1.61
Drinking during first coitus	1.77	10.13 ^{***}	5.89	1.98–17.55
Coercion during first coitus	-0.35	0.45	0.70	0.25–1.97
Negative consequences ($R^2 = .23$, $\chi^2 = 45.47^{***}$)	Beta	Wald	Odds ratio	Confidence interval
Caucasian race	0.79	6.08 ^{**}	2.20	1.18–4.13
Higher SES	0.09	0.76	1.09	0.89–1.34
Internalizing problems	-0.01	0.00	0.99	0.69–1.42
Externalizing problems	0.32	2.96 [†]	1.38	0.96–2.00
Social support	-0.12	0.16	0.89	0.49–1.59
Age at menarche	-0.07	0.36	0.93	0.73–1.19
Age at first drink	-0.20	9.08 ^{**}	0.82	0.71–0.93
Age at first sex	0.27	3.70*	1.31	1.00–1.72
Drinking during first coitus	1.61	9.83 ^{**}	4.99	1.83–13.61
Coercion during first coitus	-0.23	0.36	0.80	0.38–1.67

$^{\dagger}p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

Table 5
Multivariate analyses on alcohol use during pregnancy

Alcohol in 1st trimester ($R^2 = .24$, $\chi^2 = 49.63^{**}$)	Beta	Wald	Odds ratio	Confidence interval
Caucasian race	0.16	0.27	1.17	0.64–2.14
Higher SES	−0.23	5.03*	0.80	0.65–0.97
Internalizing problems	−0.04	0.06	0.96	0.68–1.34
Externalizing problems	0.34	3.74*	1.40	1.00–1.98
Social support	−0.42	2.35	0.66	0.38–1.12
Age at menarche	−0.05	0.21	0.95	0.76–1.19
Age at first drink	−0.26	16.82***	0.77	0.68–0.87
Age at first sex	0.22	3.11 ^t	1.25	0.98–1.61
Drinking during first coitus	1.06	4.37*	2.88	1.07–7.79
Coercion during first coitus	−0.23	0.43	0.80	0.40–1.57
Alcohol in 2nd/3rd trimester ($R^2 = .18$, $\chi^2 = 25.79^{**}$)	Beta	Wald	Odds ratio	Confidence interval
Caucasian race	−0.28	0.39	0.76	0.31–1.82
Higher SES	−0.29	4.13*	0.75	0.56–0.99
Internalizing problems	−0.17	0.49	0.84	0.52–1.36
Externalizing problems	0.29	1.43	1.33	0.83–2.13
Social support	−0.82	4.84*	0.44	0.21–0.92
Age at menarche	0.29	2.88 ^t	1.34	0.96–1.88
Age at first drink	−0.20	4.31*	0.82	0.68–0.99
Age at first sex	0.29	2.07	1.33	0.90–1.96
Drinking during First Coitus	0.66	1.25	1.94	0.61–6.18
Coercion during first coitus	0.72	2.48	2.06	0.83–5.08

^t $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

pregnancy: higher maternal educational attainment emerged as a protective factor for teen drinking during pregnancy. Although externalizing problems were a risk factor for alcohol use during the first trimester, they were not a risk factor for alcohol use later in pregnancy. Social support was a buffer against drinking during pregnancy, but only later in pregnancy. Age at first drink was negatively related to alcohol use throughout pregnancy, with earlier drinkers more likely to continue to use alcohol during pregnancy. Finally, drinking during first coitus was a significant predictor of alcohol use during early pregnancy. Girls who used alcohol at the time of first intercourse were almost three times more likely to drink during the first trimester.

4. Discussion

There was partial support for the hypotheses that earlier initiation of alcohol use and sexual intercourse, drinking during first coitus, and coercion during first coitus were associated with problem alcohol use before pregnancy and alcohol use during pregnancy. Earlier initiation of alcohol use significantly predicted all 4 outcomes, consistent with the literature on adolescent alcohol use (Gruber, DiClemente, Anderson, & Lodico, 1996) and abuse and dependence in adulthood (Grant & Dawson, 1997). This finding suggests that teenage pregnancy does not alter the developmental progression of alcohol use in these girls. Moreover, use of alcohol during first coitus emerged as a powerful predictor of problem alcohol use before pregnancy; it also significantly predicted drinking during the first trimester of pregnancy, controlling for the effects of age at first drink and race. Consistent with the problem behavior

theory and previous longitudinal studies on adolescents (Donovan & Jessor, 1985; Jessor, 1991; Jessor & Jessor, 1978; Krohn et al., 1997), early initiation of sexual intercourse was associated with negative consequences of alcohol before pregnancy. However, it was not a significant predictor of heavy drinking before pregnancy or ever drinking during early or late pregnancy.

There was a trend for increased use of alcohol during pregnancy for girls who experienced coercion during first coitus, but it was not statistically significant in any of the multivariate models of alcohol use in adolescent mothers. In multivariate analyses of data from a large, nationally representative sample of American teenagers, Basile et al. (2006) similarly found no significant link between lifetime history of forced sex and alcohol abuse. Thornberry, Ireland, and Smith (2001) examined adolescents with documented cases of sexual abuse and found alcohol-related problems among the 14–16 year old but not the 16–18 year old adolescents who had been victimized. Further, a study of ethnically diverse, urban adolescents found no relationship between concurrent alcohol use and victimization during dates; young women who reported sexual coercion were actually less likely to have used alcohol during this date (Rickert et al., 2004). Therefore, although the data do not support our hypothesized link between sexual coercion and alcohol use in teenage mothers, these results are similar to findings from other studies.

Race, SES and psychosocial factors were included as control variables, but it is interesting to examine their contribution to problem alcohol use before pregnancy and alcohol use during pregnancy in this high-risk sample of teen mothers. African-American girls were significantly less likely to use alcohol during first coitus or experience negative consequences from drinking before pregnancy, which is consistent with previous studies that have found African-American race to be protective for early alcohol use (Johnston, O'Malley, Bachman, & Schulenberg, 2006). Nonetheless, African-American girls were not less likely to use alcohol during pregnancy, so this protective effect of race may not extend into pregnancy or other major life changes. SES did not significantly predict problem alcohol use before pregnancy in this sample, but it did predict alcohol use during pregnancy. Pregnant adolescents from lower SES families were more likely to use alcohol before and after the first trimester, even after controlling for age at onset of use and drinking during first sex. Finally, girls who were more satisfied with their levels of social support were less likely to be heavy drinkers before pregnancy, and less likely to use alcohol after the first trimester. These results highlight the importance of demographic and psychosocial factors in use and abuse of alcohol among teenagers that become pregnant, with implications for interventions that target groups with these risk factors.

Although this is the first study to examine associations between alcohol use and experiences during first coitus in pregnant teenagers, there were several limitations to consider. Most of the data were either cross-sectional (e.g., alcohol use during pregnancy) or retrospective (e.g., age at first drink, alcohol use before pregnancy), whereas a prospective and longitudinal design is more optimal for examining developmental pathways and avoiding memory bias. The study also relied on adolescent self-report, with no biochemical verification of use. However, in order to increase the accuracy of the data that were reported, we constructed detailed questions, carefully selected interviewers, and extensively trained our staff in interviewing techniques. Moreover, many biological measures can only assess alcohol use within a short window of time, whereas questionnaire data can elicit patterns of substance use over time.

In the future, it would also be useful to examine the history of childhood sexual abuse, which has also been associated with coercive sex in adolescents (Lodico, Gruber, & DiClemente, 1996). Furthermore, it would be informative to investigate the effects of parent, peer and sex partner characteristics, in order to better understand the social environment for alcohol use among teenagers who become pregnant (e.g., Ary et al., 1999; Biglan et al., 1990; Cornelius et al., 2007; Metzler, Noell, Biglan, Ary, & Smolkowski, 1994). The use of diaries or pagers to monitor adolescent sexual activities as they occur could also

eliminate some of the memory bias inherent in retrospective research. Nevertheless, this study represents an important first step in examining the importance of early and adverse experiences with sex and alcohol in alcohol use among ethnically diverse pregnant teenagers.

Early sex and alcohol use have been associated with having multiple sexual partners in a short period of time (Santelli et al., 1998) and several studies have found negative associations among drinking and contraceptive use in teenagers (Dye & Upchurch, 2006; Hingson, Strunin, Berlin, & Heeren, 1990). This is especially troubling for minority youth, who initiate sex at a younger age (Furstenberg, Morgan, Moore, & Peterson, 1987; Grunbaum et al., 2004; Warren et al., 1998), are less likely to use contraception (Abma & Sonenstein, 2001), and are at much higher risk for sexually transmitted diseases (Aral & Holmes, 1990). Furthermore, there is evidence that fetal alcohol spectrum disorders may be more common among African-Americans (Russo, Purohit, Foudin, & Salin, 2004). Therefore, although fewer African-American girls may use and abuse alcohol than Caucasians, those who do try alcohol may be especially vulnerable to teenage pregnancy and STDs, including HIV.

Taken together, these findings help to illustrate the importance of developmental timing and alcohol use during first coitus for continued alcohol use in childbearing Caucasian and African-American adolescents. In this sample, drinking during first coitus was a risk factor for continued use of alcohol in adolescence and during pregnancy, which has implications for the health of the adolescent mother and her offspring. Teenage girls discover pregnancy significantly later than adult women, so they are much more likely to inadvertently expose their fetuses to early alcohol exposure at a crucial stage of fetal development, especially considering their less frequent, but high volume pattern of alcohol use (Cornelius et al., 1994). Research on pregnant adolescents' attitudes and knowledge about drinking has shown that having more specific knowledge about fetal alcohol effects is associated with abstinence during pregnancy, and a decrease in consumption among drinkers (Cornelius, Lebow, & Day, 1997). Studies such as these highlight children's need for information and decision-making skills before they reach middle school (Gruber et al., 1996; O'Donnell et al., 2003), including knowledge about the early signs of pregnancy (Cornelius et al., 1994), the association between alcohol use and unprotected sexual intercourse (Dye & Upchurch, 2006), and the effects of alcohol exposure on fetal development.

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