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Detection of alcohol use in the second trimester among low-income pregnant women in the prenatal care settings in Jefferson County, Alabama

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Abstract

Background—Prenatal alcohol use, a leading preventable cause of birth defects and developmental disabilities, remains a prevalent public health concern in the United States. This study aims to detect the proportion and correlates of prenatal alcohol use in the prenatal care settings in Alabama. Prenatal care settings were chosen because of their potential as stable locations to screen for and to reduce prenatal alcohol use within a community.

Methods—We conducted a cross-sectional study of 3,046 women in the 22 and 23 weeks of gestation who sought prenatal care in eight community-based public clinics and participated in the Perinatal Emphasis Research Center project in Jefferson County, Alabama, in 1997–2001. Frequency and quantity of alcohol use in the past 3 months were assessed by research nurses during face-to-face interviews. We conducted logistic regression analyses to calculate adjusted odds ratios (OR) and 95% confidence intervals (CI) of correlates of prenatal alcohol use.

Results—Participants were predominantly young, African American, and unmarried, 86.5% on Medicaid. The proportion of alcohol use in the second trimester of pregnancy was 5.1%; 0.3% of women reported 4 or more drinks on a drinking day to research nurses. Older maternal age (OR=1.11; 95% CI=1.08–1.15), use of welfare (OR=1.43; 95% CI=1.02–2.02), and male partner–perpetrated violence (OR=2.96; 95% CI=1.92–4.56) were positively associated with elevated risk of prenatal alcohol use. Protective factors included higher levels of self-esteem (OR=0.94; 95% CI=0.89–0.98) and more years of education (OR=0.88; 95% CI=0.78–0.98).

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Conclusions—Prenatal alcohol use remains a public health issue among low-income pregnant women in Jefferson County, Alabama. Research nurses detected it in the second trimester. Future studies need to encourage screening for prenatal alcohol use in the prenatal care settings by obstetrician-gynecologists, family physicians, nurses, and midwifes. Combined interventions to educate and empower women and strengthen families are needed.

Keywords

Alcohol Use; Pregnancy; Screening; Prenatal care settings; Epidemiology

Introduction

Prenatal alcohol use, the leading preventable cause of birth defects and developmental disabilities(Abel, 1996; Hankin, 2002; Institute of Medicine, 1996; Warren and Hewitt, 2009),remains a prevalent public health issue in the United States despite numerous national efforts aimed at prevention in the past two decades. Findings from the Behavioral Risk Factor Surveillance System surveys at the Centers for Disease Control and Prevention (CDC) indicated that the prevalence of any alcohol use among pregnant women has remained stable, ranging from 10.2%–16.2% (Denny et al., 2009). Among 12,611 mothers from Maryland who completed the Pregnancy Risk Assessment Monitoring System (PRAMS) survey 2 – 9 months after delivery between 2001 and 2008, 7.1% – 8.4 % reported alcohol consumption during the last 3 months of pregnancy (Cheng et al., 2011). Warning labels about prenatal alcohol use and risk of birth defects have appeared on containers for alcoholic beverages since 1989. This universal and primary prevention strategy was conducted by government agencies to address responsible drinking (Kaskutas, 1993). In surveys undertaken between 1990 and 2000, warning labels received the highest public support among 11 alcohol control policies (Greenfield et al., 2007).

Health care providers in health settings are opinion leaders in communities and key actors to ensure effective health system responses, but have an under-recognized role in prevention of prenatal alcohol use. In the 1988 National Maternal and Infant Health Survey, 32% of 9,932 women reported not receiving the advice or counseling about alcohol use during prenatal care visits (Kogan et al., 1994).Several professional organizations in the nation, including the U.S. Preventive Services Task Force, the American College of Obstetricians and Gynecologists (ACOG), the National Institute on Alcohol Abuse and Alcoholism (NIAAA), and the CDC, have provided a long-standing recommendation that physicians screen and advise pregnant women to abstain from alcohol use(ACOG Committee Opinion No. 422, 2008; Bertrand et al., 2004; National Institute on Alcohol Abuse and Alcoholism, 2005; U.S. Preventive Services Task Force, 2004). Despite this, however, during the years 2001–2008, 19% of 12,611 mothers from Maryland who delivered live infants reported that their prenatal care provider did not ask about consumption of alcoholic beverages (Cheng et al., 2011). Among members of the ACOG, only 30% in 1999 and 15% in 2007 reported being very prepared to screen for alcohol use(Anderson et al., 2010; Diekman et al., 2000).Some of the challenges typically encountered by medical staff included time constraints, lack of referral resources, and lack of reimbursement for screening for alcohol use (Anderson et al., 2010; Diekman et al., 2000; Miner et al., 1996).

Due to the unsatisfactory performance among health care providers to detect at-risk fetuses prenatally, community-based screening for alcohol use in the prenatal care settings is an important component of effective health system responses, and is worthy of study in the United States. However, most studies of screening for prenatal alcohol use at the prenatal care settings have been concentrated in the Midwest(Flynn et al., 2003; Kokotailo et al., 1992; Leonardson and Loudenburg, 2003; Meschke et al., 2008) and the Mid-Atlantic

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(Baltimore, District of Columbia)(Kiely et al., 2011; Lucas et al., 2003; Orr et al., 2008); only one study has been conducted in the South (North Carolina)(Martin et al., 1996). Furthermore, other studies with small samples involved 393 pregnant African-American women in Pittsburg(Lucas et al., 2003), 506 pregnant African-American women in District of Columbia (Kiely et al., 2011), or 229 school-age pregnant adolescents in Pittsburgh (Kokotailo et al., 1992).

The correlates of alcohol use during pregnancy require collective consideration of contexts, social networks and norms, demographic and cultural factors surrounding women. Many risk factors were identified in the prenatal care settings. Despite inconsistent findings for maternal age(Leonardson and Loudenburg, 2003; Martin et al., 1996; Meschke et al., 2008), common risk factors of prenatal alcohol use included low education(Leonardson and Loudenburg, 2003; Martin et al., 1996), tobacco use(Flynn et al., 2003; Leonardson and Loudenburg, 2003; Meschke et al., 2008), experience of violence(Leonardson and Loudenburg, 2003; Meschke et al., 2008), being unmarried(Meschke et al., 2008), unwanted pregnancy(Orr et al., 2008), and other psychosocial factors, including feeling sad or depressed(Leonardson and Loudenburg, 2003; Meschke et al., 2008) and psychological distress(Flynn et al., 2003).

Whereas most prevention strategies focused on identified risk factors of alcohol use among pregnant women, the Institute of Medicine's Committee to Study Fetal Alcohol Syndrome recommended also consideration of protective factors (Institute of Medicine, 1996). A social stress model considers prenatal alcohol use as the result of individual stress mitigated by social networks, social competencies, and psychosocial resources (Institute of Medicine, 1996; Kotrla, 2008). Psychosocial resources including self-esteem and mastery have been reported to protect women against stress from life events and chronic strains(Pearlin et al., 1981).Previous studies, primarily outside of prenatal care settings, reported nonsignificant protective effects of self-esteem among a sample of low-income childbearing immigrant Hispanic women, one-quarter of whom were pregnant(Lindenberg et al., 1999), as well as significant protective effects of social support among predominantly Caucasian American women(Astley et al., 2000) and religiosity among African American women (Kotrla, 2008).Protestant Church covenants limit drinking, but the Catholic Church prescribes it in ritual occasions and social affairs(Herd, 1996). African American women are more likely to belong to the proscriptive religions and be abstinent compared to Caucasian American women(Herd, 1996).

The objective of the present study was to investigate the proportion and correlates of prenatal alcohol use in a sample of low-income pregnant women in the prenatal care settings in Alabama. States in the Deep South, including Alabama, Georgia, Louisiana, and Mississippi, are reported higher abstinence rates and fewer occasions of heavy drinking among drinkers, compared with regions of the East, Midwest, Rocky Mountains, and West (Lindquist et al., 1999). Despite the inclusion of prenatal alcohol use in studies in Alabama(Cliver et al., 1992; Neggers et al., 1998), none has primarily focused on it. Furthermore, self-esteem and mastery were determined if they were less likely associated with prenatal alcohol use. These psychosocial resources could be even more relevant when low-income women adapt to manage their lives and cope with the stress and vulnerability associated with socio-economic constraints and racial discrimination in the Deep South, and attempt to compensate for the dearth of neighborhood resources (Bandura A, 1997).

Materials and Methods

A cross-sectional study of pregnant women in the second trimester in the prenatal care settings was conducted in Alabama. The details of this sample were reported previously(Li

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et al., 2010), and are summarized here. Individual and household information was obtained from a sample of pregnant women aged 14 years or older who sought prenatal care at eight clinics of the Jefferson County (Alabama) Department of Health in the 1997–2001. These community-based public health clinics served predominantly low-income pregnant women with Medicaid coverage. In the Perinatal Emphasis Research Center (PERC2) project, 3,887 women provided written informed consent and had face-to-face interviews in the survey conducted by trained research nurses during a single visit at 22–23 weeks of gestation. These research nurses were extensively trained to administer the behavioral structured interview of confidentiality procedures, and were evaluated to identify inconsistent inquiry or coding. We excluded 46 women of races other than African American and Caucasian, 727 women enrolled in clinical trials, and 68 cases with missing information for variables of interest. The final sample consisted of 3,046 women. The original survey protocol was reviewed and approved by the institutional review board of the University of Alabama at Birmingham. This study was also reviewed and approved by the institutional review board of the Wayne State University during the first author's training.

Table 1 provides an overview of analytical variables. The outcome variable was prenatal alcohol use, which was dichotomized as "never" vs. "ever" drinking based on women's face-to-face responses (never, daily, more than once a day, weekly, monthly) to "In the past 3 months, how often have you had a drink?" The amount of alcohol consumed was assessed by two further questions: "On the days that you do drink, how many drinks do you have on average?" and "How many drinks per week do you usually have of wine, beer, or hard liquor?" "One drink (wine) is about (a) 5 oz. glass. One (drink) beer is a 12-ounce glass. Count each shot of hard liquor, which is 1 ½ ounce, as one drink." According to NIAAA's definitions(National Institute on Alcohol Abuse and Alcoholism, 2005),we defined heavy drinking days as consumption of more than 3 drinks on a drinking day; and we defined at-risk drinking as more than 7 drinks per week. Although we used NIAAA's guidelines(National Institute on Alcohol Abuse and Alcoholism, 2005) to define two consumption categories of heavy drinking in this paper, these definitions are for nonpregnant women; and pregnant women are advised to abstain.

The PERC2 collected numerous household- and individual-level variables. Education was measured by years of education. Prenatal tobacco use was dichotomized as "never" vs. "ever" smoking based on women's responses(yes, no, or did not answer) to "In the past 3 months, have you ever used cigarettes?" Being unmarried included being separated, divorced, widowed, or never married. Intimate partner violence, defined as male partner–perpetrated physical violence during this pregnancy and physical violence or forced sexual activity in the past year, was assessed by 3 questions and their follow-up questions using the validated Abuse Assessment Screening tool(McFarlane et al., 1992). As described previously(Li et al., 2010), we determined physical violence from the responses to questions asking whether women had been slapped, kicked, or otherwise physically hurt by someone (e.g., choked, hair pulled, dragged across the floor, locked or tied up). Forced sexual activity was determined by responses to a question asking whether the woman had been forced to have sexual activity (i.e., forced to perform sexual acts against her will). Male partners were identified by women as a boyfriend, ex-boyfriend, baby's father, fiancé, ex-fiancé, husband, or ex-husband, when answering "If yes, by whom?" Household resource was measured by use of welfare. Income was not considered because half of the women did not report it.

To assess psychosocial resources in pregnancy(Goldenberg et al., 1997), both self-esteem and mastery were measured using validated abbreviated scales with a five-point Likert response format (strongly disagree, somewhat disagree, undecided, somewhat agree, strongly agree) for responses to the statements below. All indicators were coded so that higher scores indicate high self-esteem or mastery. A summary score (continuous variable)

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was then calculated for each participant. As a measure of the perception of oneself as a person of worth(Ross and Broh, 2000), self-esteem was assessed by women's responses to the following statements: "All in all, I am inclined to feel that I'm a failure. I take a positive attitude toward myself. I feel that I do not have much to be proud of. I am able to do things as well as most other people. I feel that I have a number of good qualities. I feel that I am a person of worth, at least on an equal plane with other people." Mastery is the perception of oneself as an effective person(Ross and Broh, 2000). It was assessed by women's responses to the following statements: "I have little control over the things that happen to me. There is little I can do to change many of the important things in my life. I often feel helpless in dealing with the problems of life. There is really no way I can solve some of the problems I have." The Cronbach's alpha coefficients were 0.72 for self-esteem and 0.69 for mastery, indicating acceptable reliability. The ranges of the scales were 8–30 for self-esteem and 3–20 for mastery.

Logistic regression analyses using SAS Version 9.1.3 (SAS Institute, Cary, NC) were conducted to calculate adjusted odds ratios (OR) and 95% confidence intervals (CI) for predictors of prenatal alcohol use. Potential multicollinearity was assessed by examining Pearson correlation coefficients between each pair of independent variables. Because self-esteem and mastery correlated in the normal range (r=0.504) and were conceptually distinct(Ross and Broh, 2000), they were entered into models together. Following the practice of a previous study(Martin et al., 1996), smoking was not included in the models; this decision was also due to racial difference in smoking (46.6% of Caucasian American mothers and 9.4% of African-American mothers) and its impact on findings of race, education, and use of welfare (available upon request). Statistical significance was set at $\alpha < 0.05$. All statistical tests were two-tailed.

Results

In this sample of 3,046 low-income pregnant women in the second trimester of pregnancy in Jefferson County, Alabama, 86.5% used Medicaid, 5.1% (156 women) reported prenatal alcohol use in the past 3 months (Table 1), and 16.2% smoked in the past 3 months. Study participants were predominantly young (aged 21.9±4.6 years), African American (81.6%), and unmarried (85.0%). Mean education was 11.5 (±1.6 years) years. Mean self-esteem score was 26.8 (±3.4). Mean mastery score was 14.5 (±4.0). More than one quarter (27.8%) used welfare.

Table 2 presents the frequency and quantity of alcohol use among 156 drinkers. Among the 3,046 pregnant women, 0.7% (20) drank daily, 1.1% (35) drank weekly, and 3.3% (101) drank monthly. Of the 3,046 women, 0.3% reported more than 3 drinks on a drinking day, and 0.1% drank more than 7 drinks per week.

Table 3 presents the results of the multivariable logistic regression analysis. Older maternal age (OR=1.11; 95% CI=1.08–1.15), use of welfare (OR=1.43; 95% CI=1.02– 2.02), and male partner–perpetrated violence (OR=2.96; 95% CI=1.92–4.56) were positively associated with elevated risk of alcohol use. Protective factors included higher level of self-esteem (OR=0.94; 95% CI=0.89–0.98) and more years of education (OR=0.88; 95% CI=0.78–0.98).

Discussion

Prenatal alcohol use remains a public health issue among low-income pregnant women in Jefferson County, Alabama. About five percent of 3,046 pregnant women in the second trimester of pregnancy reported alcohol use in the past 3 months; 0.7% drank daily; 0.3%

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drank more than 3 drinks on a drinking day; and 0.1% drank more than 7 drinks per week. Previous studies reported higher prevalence rates of prenatal alcohol use, for example 23.8% in the Midwest (the Four-State Fetal Alcohol Syndrome Consortium including Montana, Minnesota, South Dakota, and North Dakota) (Leonardson and Loudenburg, 2003), 27% in Minnesota (Meschke et al., 2008), 15.1% in Southeastern Michigan (Flynn et al., 2003), 7.8% in Baltimore (Orr et al., 2008), and 8% in North Carolina (Martin et al., 1996). This sample of low-income pregnant women in the Deep South reported relatively higher abstinence and fewer heavy drinking days during pregnancy. Pregnant women who drink are at risk for Fetal Alcohol Spectrum Disorders (FASD), and are targets in the prenatal care settings for selective prevention (Institute of Medicine, 1996). Efforts need to detect at risk fetuses in the prenatal care settings in Alabama.

In addition to common risk factors of prenatal alcohol use, including older maternal age, low education, use of welfare, and male partner–perpetrated violence(Flynn et al., 2003; Leonardson and Loudenburg, 2003; Martin et al., 1996; Orr et al., 2008), the present study was the first to find high self-esteem as a significant protective factor. This significant finding among a sample of predominantly African American women differs from a sample of low-income immigrant Hispanic women, of which there was nonsignificant effects of self-esteem and one quarter were pregnant(Lindenberg et al., 1999).Furthermore, future research could explore race-specific stress (e.g, perceived discrimination) and psychosocial resources (e.g., racial identification, ethnic pride)that protect against prenatal alcohol use. Consistent with the findings from Edin(2000), this study found that the average scores for self-esteem and mastery were 26.8 (range 8–30) and 14.5 (range 3–20) respectively, indicating high levels of self-esteem but medium levels of mastery among this sample of low-income pregnant women. Future research on psychological resources might further underscore the protective effect of women's high self-esteem on prenatal alcohol use. Intimate partner violence, a serious indicator of unhappy and unsatisfactory partner relationships, was significantly correlated with prenatal drinking. This finding, together with those of a previous study that reported low tolerance for gender equality in Alabama(Putnam, 2000), suggests that the prevention of intimate partner violence is a salient component in prevention of prenatal alcohol use in the Deep South. Primary prevention programs for prenatal alcohol use could consider combined interventions to strengthen families and educate and empower women to respect and manage their lives.

This research has public health implications for screening for alcohol use among low-income pregnant women in Jefferson County, Alabama. First, health care providers need to routinely ask whether a pregnant woman drinks alcohol during preconception period and pregnancy. The CDC-funded FASD regional training centers have trained health care providers and developed translational research for screening for prenatal alcohol use(Floyd et al., 2006; Sharpe et al., 2004). The screening practices in prenatal care settings varied in the method and timing of ascertaining alcohol use and who administered the inventory for drinking. This study presents valuable information about screening focused in the second trimester. In other studies, screening was conducted once in the first prenatal care visit (Leonardson and Loudenburg, 2003; Martin et al., 1996; Orr et al., 2008), the first trimester (Meschke et al., 2008), or widely ranging from 3 to 41 gestational weeks (mean=24.9, SD=10.4 weeks) (Flynn et al., 2003). Others were conducted two times including the initial and the third trimester (Kokotailo et al., 1992), and three times in the first and third trimesters and at delivery (Lucas et al., 2003). Second, obstetricians have a pivotal role in carrying out preventive interventions to detect and reduce prenatal alcohol use (Anderson et al., 2010; Danis et al., 1981; Elliott and Bower, 2008). In previous studies, other health care providers in the prenatal care settings, for example, nurses and receptionists (Leonardson and Loudenburg, 2003; Meschke et al., 2008), and research assistants (Flynn et al., 2003), were involved in screening for alcohol use. Obstetricians played a primary role in designing

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this original survey, and need to effectively transfer the data into prevention practice. In the present study, trained research nurses administered simple screening questions for prenatal alcohol use during face-to-face interviews with pregnant women. Obstetricians could overcome time constraint challenges (Anderson et al., 2010; Diekman et al., 2000) and when possible incorporate these techniques into routine clinical practice. Furthermore, the availability of a simple, culturally sensitive, and quick screening tool that is acceptable to both health care providers and women, could facilitate monitoring and evaluation of prenatal alcohol use, and help to promote early intervention. Another study demonstrated that the screening with a 10-minute questionnaire handed out by research assistants in busy Michigan obstetrics clinics was feasible and acceptable to pregnant women (Flynn et al., 2003). This secondary data analysis of alcohol use screening by three questions about frequency and quantity demonstrates the value of asking very simple questions on prenatal alcohol use by research nurses. Three questions in the present study are as simple to detect abstinence as those previously validated NIAAA questionnaire (ACOG Committee Opinion No. 422, 2008) and the Alcohol Use Disorders Identification Test (AUDIT-C)(Babor et al., 1992; Dawson et al., 2005; Saunders et al., 1993). A program in Massachusetts effectively engaged prenatal care sites and provided training and ongoing support to staff to universally and routinely screen women, where 95% of pregnant women were successfully screened and 77% of positive cases received a brief intervention (Kennedy et al., 2004). Future research needs to engage managers of health care providers to enhance the prevention norms and institutional policies in each clinic to detect prenatal alcohol use in Alabama.

This study is subject to several limitations. First, the findings of prenatal alcohol use detected by research nurses in the prenatal care settings in Jefferson County, Alabama may have limited generalizability to other metropolitan areas or settings with potential to screen prenatal alcohol use. For example, the Special Supplemental Nutrition Program for Women, Infants, and Children(Chambers et al., 2005) has different personnel and institutional constraints to screening for alcohol use. Second, due to the cross-sectional nature of this study, causal relationships for the correlates of prenatal alcohol use cannot be established. Third, prenatal alcohol use may have been underreported since it was measured by self-reporting by pregnant women at a single clinic visit; alternative methods, such as the Bogus Pipeline Method could potentially have increased the validity of self-report (Lowe et al., 1986). Other reasons for the possible under-reporting of alcohol use may include socio-cultural factors (e.g., social stigma associated with reporting any alcohol use, and heavier use in particular, during pregnancy) and methodological issues (e.g. difficulty in establishing trust during one-time visit).Fourth, this secondary data analysis could not systematically assess the acceptability or refusal of screening of prenatal alcohol use among this group of pregnant women or research nurses (e.g., racial pairing of participants and interviewers, stigmatization) (Drabble et al., 2011). Fifth, life-course, social-ecological, or cultural factors, such as women's drinking history, drinking behavior of their male partners (Bakhireva et al., 2011), and religious affiliations (Herd, 1996; Kotrla, 2008)could have helped us better understand the contexts and correlates of women's drinking, but measures of such factors were not included in the study.

The study findings indicate that prenatal alcohol use is a public health issue among low-income pregnant women in Jefferson County, Alabama. The screening for alcohol use in the second trimester by three simple questions about frequency and quantity was feasible for research nurses in the prenatal care settings. Future studies need to encourage screening for prenatal alcohol use by obstetrician-gynecologists, family physicians, nurses, and midwifes. Research is needed to enhance cultural understanding of the socio-economic factors that influence alcohol use among low-income pregnant women. Combined interventions to educate and empower women as well as strengthen families are needed to reduce prenatal alcohol use.

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TABLE 1

Descriptive statistics of characteristics and hypothesized effects on prenatal alcohol use in the second trimester among 3,046 low-income pregnant women: Perinatal Emphasis Research Center Project, Jefferson County, Alabama, 1997–2001

Variables	Descriptive Statistics		Expected Effect
	Mean (SD) or %	Range	
Dependent variable: Prenatal alcohol use 0|=|no; 1|=|yes	5.1%	0–1	
Explanatory variables			
Age entering study, year	21.9 (4.6)	14–44	+/−
Years of education	11.5 (1.6)	6–18	−
Self-esteem, score	26.8 (3.4)	8–30	−
Mastery, score	14.5 (4.0)	3–20	−
Unmarried, 0|=|no; 1|=|yes	85.0%	0–1	+
Use of welfare, 0|=|no; 1|=|yes	27.8%	0–1	+
Smoking	16.2%	0–1	+
Intimate partner violence, 0|=|no; 1|=|yes	7.5%	0–1	+
African American, 0|=|no; 1|=|yes	81.6%	0–1	+/−

Note: +/− was for inconsistent findings of hypothesized effects in the literature.

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TABLE 2

Frequency and quantity of alcohol use among 3,046 low-income pregnant women, Perinatal Emphasis Research Center Project, Jefferson County, Alabama, 1997–2001

Drink frequency	N=3,046	%	Drinks /day	N=153	%	Drinks /week	N=151	%
Never	2890	94.9	<1	9	0.3	<1	79	2.6
≥Daily	20	0.7	1	97	3.2	1	43	1.4
Weekly	35	1.1	2	26	0.9	2	11	0.4
Monthly	101	3.3	3	11	0.4	3–7	16	0.5
			>3	10	0.3	>7	2	0.1

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TABLE 3

Multivariate analysis of prenatal alcohol use in the second trimester by characteristics of 3,046 low-income pregnant women, Perinatal Emphasis Research Center Project, Jefferson County, Alabama, 1997–2001.

Prenatal Drinking	Model		
	OR	95% CI	*P*
Age entering study	1.11	1.08–1.15	<.01
Years of education	0.88	0.78–0.98	0.02
Mastery	0.99	0.95–1.05	0.93
Self-esteem	0.94	0.89–0.98	<.01
Unmarried	0.90	0.58–1.41	0.65
Use of welfare	1.43	1.02–2.02	0.04
Intimate partner violence	2.96	1.92–4.56	<.01
African American	0.84	0.55–1.28	0.40

Note: all variables listed were coded as shown in Table 1. Prenatal tobacco use was excluded for reasons explained in the method section.