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Christina Studts, PhD, Committee Chair

Dr. William Pfeifle, Director of Graduate Studies

**Associations of Maternal Socio-demographic and Psychosocial
Characteristics with Alcohol Use During Pregnancy**

CAPSTONE PROJECT PAPER

A paper submitted in partial fulfillment of the
requirements for the degree of
Master of Public Health
in the
University of Kentucky College of Public Health
By
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Introduction

Alcohol is reported to be one of the most used legal substances among women of reproductive age, and its use during pregnancy is one of the most preventable causes of birth defects and developmental disabilities.¹ Due to its teratogenic nature, alcohol use during pregnancy has been associated with a condition referred to as Fetal Alcohol Spectrum Disorders (FASD).² This comprises of a wide spectrum of disorders such as Fetal Alcohol Syndrome (FAS), alcohol-related birth defects, and alcohol-related neurodevelopmental disorders, which are estimated to affect 1% of all births in the United States and can be prevented through the modification of maternal behaviors.¹ These adverse birth outcomes and defects are not only witnessed during infancy, but often translate into life-long impairments.³ Not only does this constitute a problem to the population living with it, but it also poses an enormous public health and economic burden, with an estimated annual health care cost of \$74.6 million.⁴

To eliminate this issue, medical health care workers and public health officials have developed several policies, recommendations, guidelines, and interventions. Examples include recommendations by the Surgeon General and American Congress of Obstetricians and Gynecologists (ACOG) for pregnant women to abstain from any alcohol during pregnancy.¹ This came about due to the lack of evidence for a safe consumption level of alcohol during pregnancy, as even low levels of in-utero alcohol exposure have been associated with subsequent persistent developmental, behavioral, and emotional problems.³ In line with efforts to address this issue is the Healthy People 2020 goal of attaining both an alcohol abstinence rate of 98.3%, and a binge drinking abstinence rate of 100% during pregnancy.⁵

Despite these recommendations and interventions, the rate of alcohol use during pregnancy remains alarming. Research estimates the rate of alcohol consumption during pregnancy to range from 13% to over 50%, with the Institute of Medicine (IOM) suggesting use of some form of alcohol by approximately 20% of pregnant women.⁶ Other studies have reported a prevalence of 10% in the United States for alcohol consumption during pregnancy.⁷

Several research studies addressing alcohol use during pregnancy have been conducted, and their findings have influenced the development of interventions. One recent study analyzed the Pregnancy Risk Assessment Monitoring Systems (PRAMS) data to explain the relationship between maternal socio-demographic characteristics and alcohol use during pregnancy. Associations were found between alcohol use during pregnancy and the following maternal socio-demographic characteristics: race/ethnicity (non-Hispanic white), age (≥ 35 years), education (more than high school), and income (higher incomes).⁸ However, these maternal socio-demographic characteristics differ from characteristics (lower income, less educated, younger black women) viewed as high risk for other maternal harmful health behaviors such as tobacco use during pregnancy, not breastfeeding, and not using the back to sleep position.⁸

Most research studies concerning alcohol use during pregnancy are focused mainly on intrapersonal factors, that is, factors solely within the individual and their control. However, Bronfenbrenner's ecological theory provides another context through which this issue can be addressed, by postulating that human development and behaviors are shaped by several environmental systems.⁹ The microsystem, which refers to the individual's immediate surroundings, is the system of interest for this study.¹⁰ Translating

this theory to the issue of alcohol use during pregnancy, maternal characteristics within an individual's microsystem that may be associated with this risk behavior include physical abuse, depression and stress. These maternal psychosocial characteristics are the focus of the current study.

Psychosocial characteristics present in women before and during pregnancy could lead to alcohol use during pregnancy. 20.6% of teens and 14.2% of adult women report physical abuse during pregnancy.¹¹ Conservative estimates of the prevalence of physical abuse during pregnancy range from 2.1% to 6.3%.¹² Despite these varying prevalence estimates, adverse outcomes of physical abuse during pregnancy are known to include late or no access to prenatal care, spontaneous abortion, fetal injury, and low birth weight.¹³ Previous studies suggest that women may be at higher risk for depressive symptoms during pregnancy, with a period prevalence for major and minor depressive symptoms during pregnancy of 18.4%.¹⁴ Depression during pregnancy is also associated with adverse birth outcomes, such as preterm birth and low birth weight.¹⁴ These psychosocial factors are not only associated with negative birth and developmental outcomes, but physical violence and abuse, emotional abuse, mood, and chronic distress have also been tied to risk of substance abuse.¹⁵

The main objective of this study was to examine the associations between maternal psychosocial characteristics in the microsystem—specifically physical abuse, depression, and stress—and the health risk behavior of alcohol use during pregnancy, controlling for known socio-demographic correlates. The study hypothesized that the presence of these psychosocial characteristics before and during pregnancy would increase the likelihood of alcohol use during pregnancy, after accounting for previously

demonstrated effects of socio-demographic factors. Having a clear understanding of the various risk factors for alcohol use during pregnancy will aid in the development of risk-specific interventions aimed at mitigating this public health issue.

Materials and Methods

Study Design

The Pregnancy Risk Assessment Monitoring System (PRAMS) is a national state- and population-based surveillance system conducted by the Centers for Disease Control and Prevention (CDC) and state health departments. The system monitors maternal behaviors and experiences that occur before, during and after pregnancy of women who have live births in the United States.

The 2007 – 2008 PRAMS data comprised the 31 states and New York City that had survey response rates of 65% or higher, a recommended threshold established by the CDC. Each state surveyed a stratified sample monthly of 100 to 300 new resident mothers, with the schedule permitting participants to be sampled 2 to 4 months after delivery. After three mailings, women who had not responded were followed up by telephone to complete the survey. To maintain data integrity, the entire data collection period did not exceed 95 days. Upon completion, survey data were linked to selected data from birth certificates and weighted for sample design, non-response and non-coverage.

The CDC Institutional Review Board approved the use of the PRAMS data for this study, while the University of Kentucky Institutional Review Board waived its review due to the use of publically available, de-identified data.

Measures

Sample inclusion criterion was limited to participating sites that included all variables of interest in their 2007 – 2008 PRAMS survey: maternal socio-demographic (age, race/ethnicity, education, and income) and psychosocial characteristics (alcohol use, physical abuse, depression and stress). Variables that made up maternal socio-demographic characteristics were obtained both from birth certificates and the PRAMS core questionnaire, while maternal psychosocial characteristic variables were generated from both core and standard questionnaires.

PRAMS collects data on alcohol use 3 months before pregnancy and the last 3 months of pregnancy. For this study focusing on alcohol use during pregnancy, alcohol use behavior was assessed as the consumption of any amount of alcohol during the last trimester of pregnancy, because women commonly cease drinking after they learn they are pregnant.⁸ Physical abuse was assessed by the question: “During your pregnancy, did either your partner, ex-partner, husband or ex-partner push, hit, slap, kick, choke or physically hurt you?” Those who reported yes to this item were classified as physically abused. Depression was assessed by an affirmative response to an item asking whether the participant was diagnosed with depression during pregnancy. A stress index score was calculated by summing the number of stressful experiences in the past 12 months before pregnancy that were endorsed by the participant. Stressful experiences included: close family member sick or in hospital; separation or divorce from husband or partner; moving homes; homeless; husband or partner lost job; unwanted personal loss of job; argue with husband or partner more than usual; admission of unwanted pregnancy by husband or partner; inability to pay bills; partaking in physical fight; self, husband or

partner went to jail; someone close to went to jail; death of someone close to the participant. Stress index scores could range from 0 to 13.

Data Analysis

This study examines the associations of maternal socio-demographic and psychosocial characteristics with alcohol use during pregnancy. Frequencies were computed to observe the prevalence of selected maternal socio-demographic and psychosocial characteristics in the PRAMS participants overall and the subsample used in this study. Bivariate analyses were performed using chi-square analysis to examine associations between alcohol use during pregnancy and each selected maternal socio-demographic and psychosocial characteristic, except for stress index score. Mean stress index scores were compared between participants who did and did not report alcohol use during pregnancy using an independent samples t-test. All socio-demographic and psychosocial variables were then included in a multiple logistic regression to test the effects of maternal psychosocial characteristics on alcohol use during pregnancy, while controlling for selected socio-demographic characteristics. Missing values were excluded from all analyses via listwise deletion. All p values < .05 were considered statistically significant. All analyses were conducted with IBM SPSS Statistics 21.0.

Results

Sample

The final study sample consisted of 4,016 women with a recent live birth who responded to all the variables of interest. All participants lived in either Rhode Island or New York City, the only 2 sites that included all variables of interest in their PRAMS surveys. Participants were predominantly White (70%), between the ages of 25 and 34

years (51%), non-Hispanic (70%), attained more than a high school degree (51%), and had an annual household income of \$50,000 or more (37%) in the 12 months before pregnancy. Regarding psychosocial characteristics, 9% reported alcohol use, 4% physical abuse, 9% depression, 32% no stressor, and 25% at least one stressful experience on the stress index. Table 1 summarizes the socio-demographic and psychosocial characteristics of the sample, which were fairly similar to those of the full nationally representative sample.

Bivariate Analysis

Table 2 displays findings related to the bivariate analyses examining associations between each socio-demographic and psychosocial characteristic with prenatal alcohol use during the last trimester of pregnancy. Alcohol consumption during pregnancy was more frequently observed among women who were ≥ 35 years old, White, and non-Hispanic; who had more than a high school education; and who had a household income of \$50,000 or more in the 12 months before pregnancy. No significant difference in stress index scores was found between women who did [(M = 1.71, SD = 2.01)] versus did not [(M = 1.75, SD = 1.91)] use alcohol during pregnancy [t(3800) = 0.41, p = .68]. No significant associations were found between maternal psychosocial characteristics and alcohol use during pregnancy in the bivariate analyses.

Multiple Logistic Regression Analysis

The independent associations between socio-demographic and psychosocial characteristics and alcohol use during pregnancy are shown in Table 3, which presents estimates for adjusted odds ratios (aORs) for alcohol use during pregnancy. These socio-demographic and psychosocial characteristics accounted for a modest amount

(Nagelkerke $R^2 = 0.10$) of the predictability of the multiple logistic regression model, indicating that there are many other socio-demographic or psychosocial characteristics that are related to alcohol use during pregnancy.

Significant associations were observed between alcohol use during pregnancy and the following maternal characteristics: age, race, education, income level, physical abuse, and stress index score. The reference groups for age and race were selected based upon their achievement of the targets for alcohol abstinence in Healthy People 2010.⁸ Attainment of high school level of education was chosen as the reference group for education to assess how having less than a high school level of education versus having more than a high school level of education affects alcohol use during pregnancy. Alcohol use during pregnancy is positively associated with income, therefore the lowest income group was chosen as the reference group for income.⁸

Women aged 35 years or older had increased odds of consuming alcohol during pregnancy compared with women aged 20 – 24 years (aOR 2.11 [95% CI: 1.32 – 3.39]). Similarly, women who were White compared with Asian/Pacific Islander (aOR 1.72[CI: 1.02 – 2.92]), attained more than high school education compared with high school education (aOR 1.85[CI: 1.28 – 2.67]), and earned an annual income \$50,000 or greater compared with less than \$15,000 (aOR 2.24[CI: 1.42 – 3.55]), were more likely to consume alcohol during pregnancy. Of the psychosocial characteristics, women who were physically abused (aOR 1.94[CI: 0.99 – 3.79]) had higher odds of alcohol consumption during pregnancy than those who were not. Finally, for each additional stressful experience endorsed on the stress index, the odds of alcohol consumption during pregnancy significantly increased (aOR 1.09[CI: 1.01 – 1.18]).

Discussion

This study examined predictors of alcohol use during pregnancy, using PRAMS data, by focusing on select maternal socio-demographic and psychosocial characteristics. Determining the predictors of alcohol use during pregnancy is essential in the development of risk-specific interventions aimed at reducing the prevalence and negative consequences of this public health problem.

In accordance with several previous studies, the findings of this study revealed associations between socio-demographic characteristics - age, race, education, and income – and alcohol use during pregnancy.^{7,8} Being an older White woman with more than a high school level of education and earning a higher income was found to be associated with alcohol use during pregnancy. Verplanken and Wood postulate that in cases of repeat actions, such as behaviors, decision making recedes, allowing actions to be cued by the environment.¹⁶ This can be used to explain the association of older ages with alcohol use; as habits and behaviors, such as alcohol consumption, have become more ingrained and inflexible.

As aforementioned, these maternal socio-demographic and psychosocial characteristics differ from characteristics viewed as high-risk for other maternal harmful health behaviors. Therefore, inadequate assessment of maternal risk during prenatal care within this subgroup may underlie this disparity. Research shows health care providers often fail to conduct alcohol risk assessment and intervention due to lack of perceived self-efficacy, allowing those at risk to fall between the cracks.¹⁷ Also, due to the lack of threat these groups of women pose in regards to maternal risky behaviors, practitioners

could be less restrictive on them when it comes to recommendations such as the consumption of alcohol during pregnancy. These women may be trusted with the ability of being responsible enough not to abuse alcohol during pregnancy due to their age, race, level of education and socioeconomic status. Women have anecdotally reported receiving approvals from their obstetrician, gynecologist or health care provider regarding occasional consumption of alcohol during pregnancy, though there is little attention to this phenomenon in the literature.

The maternal psychosocial characteristics findings of this study also correlate with previous studies that show associations between alcohol use during pregnancy and physical abuse and stress, while controlling for maternal socio-demographic characteristics.^{7,11,18} Skagerstrom et al provided two possible explanations for these associations: they attributed the associations to coping mechanisms used by women, such as self-medication, which in this instance is the use of alcohol, and also discussed the possibility that women who drank might also have partners who drank and could get violent as a result of drinking.⁷ Beydoun et al shed additional insight on the association of physical abuse and alcohol use during pregnancy, stating physically abused women may lack the social support needed to maintain a positive lifestyle and avoid alcohol consumption.¹¹ The independent effect of stress on alcohol use may manifest differently among different socio-demographic subgroups. For the higher educated, higher income, older women, increased stress could be attributed to balancing occupational and personal duties. The workforce environment has been shown to provide both physical and psychosocial stress during pregnancy, which has been associated adverse birth outcomes such as preterm birth and low birth weight.¹⁹

The findings concerning depression in this study differ from that found in other studies, which found an association between depression and alcohol use during pregnancy.¹⁴ A possible explanation for this disparate result could be the instrument used in measuring depression, which in this study was a self-reported diagnosis of depression sometime during pregnancy.

Limitations

A limitation of this study is the narrowing of the original PRAMS study sample to only those participants residing in Rhode Island and New York City, due to the restricted availability of all variables of interest in only these 2 sites. Although the subsample used in this study was quite similar to full PRAMS sample on measured variables (see table 1), this may limit the external validity of the study, and findings should be replicated in nationally representative samples.

The study used PRAMS data, which is a self-reported surveillance system. As with all self-report surveys, some bias is possible. Because surveys were generally administered 2 to 4 months after delivery, recall bias may have been present. The use of surveys in the collection of PRAMS data, as opposed to face-to-face clinical assessments, mitigates the potential social desirability bias to some extent.

The cross-sectional nature of the survey made it impossible to account for the timing of potential predictors and outcomes in the analyses. A related limitation is the reliance on self-reported alcohol use during the last trimester of pregnancy. The time frame for alcohol use variables included in PRAMS makes it impossible to investigate use of alcohol before pregnancy, as well as changes in drinking during the course of pregnancy. Focusing on different time frames and temporal sequences would give a more

accurate picture of the issue. Future research should utilize longitudinal designs to test the temporal effects of the risk factors identified in this study on alcohol use during pregnancy.

Finally, depression for this study was defined as participant report of a diagnosis of depression sometime during pregnancy. Other measures of depression may yield different results. To remedy this, the presence of depressive symptoms before and during pregnancy should be assessed and accounted for in future studies.

Conclusions

Achieving the Healthy People 2020 target for alcohol use during pregnancy will entail addressing the multifaceted nature of the problem. Pregnancy provides increased motivation to eliminate unhealthy behaviors; therefore, pregnancy is a unique opportunity to positively impact women's lives to reduce harmful behaviors.⁶ This study focused on maternal socio-demographic and psychosocial characteristics, and their relation to alcohol use during pregnancy. The socio-demographic characteristics of the at-risk population for alcohol use during pregnancy in this study differ from those of other maternal harmful health behaviors. Therefore addressing this problem through interventions created to target other maternal harmful health behaviors will be unsuccessful.

A community intervention tailored specifically towards this at-risk group headed by the state health departments in coalition with community stakeholders, such as the local March of Dimes, should be implemented to tackle the issue. This intervention should emphasize abstinence from alcohol use during pregnancy, mandate risk

assessment and intervention follow up be carried out by health care practitioners, and help connect people to needed services, such as rehabilitation facilities, counseling, and intimate partner violence shelters or help centers. Coalition members such as the March of Dimes could create a campaign aimed towards this issue, and ensure the enforcement of these objectives, by mandating their partner sites to abide by them.

An approach towards physical abuse includes ensuring screening and assessment by health care providers during prenatal care, as well as raising awareness on the issue of physical abuse and its effect on pregnancy. Women's empowerment seminars and workshops should also be held as part of community events to help increase local knowledge about the availability and accessibility of services. Studies show health care practitioners reported low self-efficacy for screening and assessment of physical abuse; therefore, health care provider trainings should be carried out to increase self-efficacy.¹⁷ Home visit nurses could also be used to extend care services and support to the affected population, modeled on existing programs that screen for abuse but do not elevate risk in the home.²⁰

Despite the laws set to protect against discrimination, the US Equal Employment Opportunity Commission reported a 65% increase in pregnancy-related complaints between 1992 and 2007.²¹ The creation of a labor union dedicated to fight for the rights and accommodation of pregnant women in the workplace, would help reduce some stress placed on pregnant women. Under such a union, risk assessment of work place hazards and reassignment of duties for pregnant women would be enforced in workplaces.²¹ Also, it should address issues such as lactation rooms in office buildings, that way breastfeeding mothers can either breastfeed or pump their breast milk. Studies show

making the workplace a conducive and favorable environment for pregnant women reduces stress during pregnancy and the amount of sick days taken by this population; thereby rendering a competent workforce.²¹

Due to the prevalence of depression in women, especially during pregnancy, and the impact depression has been found to have on pregnancy and birth outcomes, additional questions assessing depression in multiple ways should be included on the PRAMS core questionnaire, which is used by all participating states, as opposed to the standard questionnaire with optional use.

This study can be enhanced on in the future to include additional psychosocial characteristics such as pregnancy intention and maternal alcohol use 3 months prior to pregnancy. A longitudinal design would allow for assessment of maternal behavioral changes during pregnancy, as well as the effect of pregnancy intention on maternal behavior, which may shed more insight on intervention channels to reduce alcohol use during pregnancy.

Alcohol is reported as one of the most used legal substances among women of reproductive age, and its use during pregnancy is one of the most preventable causes of birth defects and developmental disorders such as in Fetal Alcohol Spectrum Disorders.¹ In order to reduce the use of alcohol during pregnancy and the incidence of alcohol related birth defects and disorders, action has to be taken; effective and efficient guidelines, interventions and policies need to be created and implemented to help change health behavior.

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Table 1. Prevalence of selected maternal socio-demographic and psychosocial characteristics of 85,549 women participating in the Pregnancy Risk Assessment Monitoring System (PRAMS), 2008, and the specific study sample, N=4016.

Characteristics	PRAMS Sample n = 85,549	Study Sample n = 4016
	N (%)	N (%)
Maternal Socio-demographics		
Age (Years)		
< 20	9,036 (10.60%)	334 (8.30%)
20 - 24	20,490 (24.00%)	831 (20.70%)
25 - 34	42,644 (49.90%)	2,048 (51.00%)
≥ 35	13,374 (15.60%)	803 (20.00%)
Race		
White	53,206 (64.50%)	2,769 (70.40%)
Black	14,242 (17.30%)	777 (19.80%)
Asian/Pacific Islander	7,478 (9.10%)	277 (7.00%)
Other	7,536 (9.10%)	108 (2.70%)
Hispanic	12,582 (15.30%)	1,072 (29.90%)
Education		
Less than High School	15,165 (18.0%)	713 (18.40%)
High School	24,767 (29.300%)	1,169 (30.20%)
More than High School	44,535 (52.70%)	1,987 (51.40%)
Income Level		
Less than \$15,000	24,538 (31.10%)	1,126 (31.00%)
\$15,000 – \$24,999	10,853 (13.80%)	499 (13.70%)
\$25,000 – \$49,999	16,311 (20.70%)	672 (18.50%)
\$50,000 or more	27,156 (34.40%)	1,333 (36.70%)
Maternal Psychosocial Characteristics		
Alcohol Use During Pregnancy	5,541 (6.60%)	371 (9.40%)
Physical Abuse During Pregnancy	3,226 (3.90%)	151 (3.80%)
Depression During Pregnancy	361 (9.00%)	361 (9.00%)
Stress During Pregnancy		
Mean + σ	1.93 (2.02)	1.74 (1.92)

Table 2. Chi Square analysis of selected socio-demographic and psychosocial characteristics on maternal alcohol use during pregnancy – Pregnancy Risk Assessment Monitoring System (PRAMS), 2008 (n = 4016)

Characteristics	Alcohol Use During Pregnancy		X ² (p-value)
	No N (%)	Yes N (%)	
Maternal Socio-demographics			
Age (Years)			55.66 (< .001)
< 20	318 (8.90%)	14 (3.80%)	
20 - 24	777 (21.60%)	47 (12.70%)	
25 - 34	1,831 (51.00%)	190 (51.20%)	
≥ 35	666 (18.50%)	120 (32.30%)	
Race			13.55 (< .01)
White	2,448 (69.70%)	288 (78.90%)	
Black	712 (20.30%)	51 (14.00%)	
Asian/Pacific Islander	254 (7.20%)	19 (5.20%)	
Other	99 (2.80%)	7 (1.90%)	
Hispanic	993 (30.8%)	59 (18.50%)	21.14 (< .001)
Education			70.80 (< .001)
Less than High School	669 (19.4%)	32 (8.80%)	
High School	1,089 (31.5%)	70 (19.20%)	
More than High School	1,695 (49.1%)	263 (72.10%)	
Income Level			102.02 (< .001)
Less than \$15,000	1,049 (32.50%)	61 (17.30%)	
\$15,000 – \$24,999	453 (14.00%)	39 (11.00%)	
\$25,000 – \$49,999	628 (19.50%)	38 (10.80%)	
More than \$50,000	1,095 (34.00%)	215 (60.90%)	
Maternal Psychosocial Characteristics			
Physical Abuse During Pregnancy	128 (3.60%)	20 (5.40%)	3.10 (.08)
Depression During Pregnancy	318 (8.90%)	37 (10.00%)	0.52 (.47)

Table 3. Multiple Logistic Regression: Effects of psychosocial characteristics on maternal alcohol use during pregnancy, controlling for socio-demographic characteristics – Pregnancy Risk Assessment Monitoring System (PRAMS), 2008 (n = 2905)

Characteristics	Odds Ratio ^a	95% C.I	<i>p</i> -value
Maternal Demographics			
Age (Years)			
< 20	1.31	0.64 – 2.66	.46
20 - 24	Ref.	Ref.	< .001
25 - 34	1.21	0.78 – 1.89	.40
≥ 35	2.11	1.32 – 3.39	< .01
Race			
White	1.72	1.02 – 2.92	.04
Black	1.36	0.74 – 2.50	.38
Asian/Pacific Islander	Ref.	Ref.	.04
Other	0.44	0.10 – 1.97	.28
Hispanic	0.74	0.52 – 1.07	.11
Education			
Less than High School	1.17	0.69 – 1.98	.57
High School	Ref.	Ref.	< .01
More than High School	1.85	1.28 – 2.67	< .01
Income Level			
Less than \$15,000	Ref.	Ref.	< .001
\$15,000 – \$24,999	1.30	0.80 – 2.13	.29
\$25,000 – \$49,999	0.86	0.52 – 1.43	.56
More than 50,000	2.24	1.42 – 3.55	< .001
Maternal Characteristics			
Physical Abuse During Pregnancy	1.94	1.00 – 3.79	.05
Depression During Pregnancy	1.11	0.69 – 1.80	.66
Stress During Pregnancy	1.09	1.01 – 1.18	.02
Note: Sample size for this analysis was reduced due to listwise deletion for multiple logistic regression analysis.			
^a Adjusted odds ratio			
^b The adjusted odds ratio for Stress During Pregnancy represents the increase in odds for each one-point increase on the stress index score.			