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The Relationship between Pregnancy Intention and Preconception Health Behaviors

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Abstract

Objective—To describe smoking, heavy drinking, and folic acid supplementation in preconception women and determine if the likelihood of healthy preconception behaviors differs by whether and when women intend future pregnancy.

Methods—Analysis was based on 35,351 nonpregnant women who participated in the 2004 Behavioral Risk Factor Surveillance System (BRFSS) who were of reproductive age (18–44 years), sexually active, and capable of future pregnancy. The association between future pregnancy intention and preconception behaviors was determined adjusting for diabetes, weight category, age group, race/ethnicity, marital status, education, income, and children living in household.

Results—Eighty-percent of women were non-smokers, 94.3% non-heavy drinkers, and 42.6% daily folic acid users. In adjusted analysis, only the odds of folic acid supplementation remained higher in women intending pregnancy in the next 12 months (adjusted odds ratio 1.57, 95% confidence interval 1.21–2.04) compared with women not intending future pregnancy. Women intending pregnancy later or ambivalent about future pregnancy were no more likely to be engaging in healthy preconception behaviors than women not intending future pregnancy.

Conclusion—Women intending pregnancy within 12 months were more likely to use folic acid, but pregnancy intention was not associated with preconception smoking or heavy drinking.

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INTRODUCTION

While the causes of adverse pregnancy outcomes are only partially understood, it is known that predictors include unintended pregnancy and suboptimal preconception health behaviors, such as smoking, alcohol use, and inadequate folic acid supplementation (Institute of Medicine, 1995, Visscher et al., 2003, Kesmodel et al., 2002, March of Dimes, 2006). While current evidence suggests that women with intended pregnancies have healthier prenatal behaviors than women with unintended pregnancies (Kost et al., 1998, Than et al., 2005), it is not well understood whether intention for future pregnancy impacts health behaviors during the preconception period.

In studies of pregnant women who are asked to recall pregnancy intention and preconception behaviors, women with intended pregnancies are more likely to report healthier preconception behaviors (e.g. drug use, smoking, and folic acid use)(Dott et al., 2010, Hellerstedt et al., 1998, Morin et al., 2002). Other studies report healthier behaviors among pregnant women compared with preconception women (Xaverius et al., 2009, Anderson et al., 2006), suggesting that behavior modification occurs, but not until after recognition of pregnancy. However, there is potential for recall and social desirability bias in studies of these types. Studies describing health behaviors in preconception women in regional samples have had conflicting results—one cross-sectional study of non-pregnant women reported women planning pregnancy in the next year were less likely to smoke and more likely to take multivitamins than women not planning pregnancy (Green-Raleigh et al., 2005)—an encouraging finding, suggesting that women intending pregnancy may change behaviors prior to conception. In contrast, a longitudinal analysis showed no association between pregnancy intention and preconception health behaviors (Chuang et al., 2010). The current study examines future pregnancy intention in relation to relevant health behaviors in non-pregnant reproductive-age women in a large, nationally representative population-based dataset.

METHODS

Study Sample

The Behavioral Risk Factor Surveillance System (BRFSS) is a standardized telephone survey of U.S. adults conducted annually by state health agencies in collaboration with the Centers for Disease Control and Prevention. Post-stratification weights are used to partially correct for any bias caused by non-telephone coverage, as well as differences in probability of selection and nonresponse. The 2004 version of the BRFSS is the most recent that contains a Family Planning section in the core survey that was administered by all states, allowing for nationally representative data on pregnancy intention. Women were eligible for the current analysis if they were of reproductive age (18–44 years, $n=72,768$). Women were excluded if they were pregnant ($n=3,082$); had a hysterectomy ($n=5,182$); had tubal sterilization/partner with a vasectomy ($n=17,069$); and not sexually active, had a same sex partner, or were missing family planning data ($n=12,084$), resulting in an analytic sample of 35,351 women.

Future Pregnancy Intention

The main independent variable, future pregnancy intention, was categorized as intending pregnancy in less than 12 months from now, between 12 months to less than 2 years from now, in 2 or more years from now, not wanting to have a child in the future, or not sure/ambivalent.

Preconception Behaviors

Preconception behaviors were chosen that have been shown to impact pregnancy outcomes and were available in the BRFSS survey: 1) no current smoking (Do you now smoke cigarettes every day, some days, or not at all?)(Visscher et al., 2003, Ahern et al., 2003) 2) no heavy drinking (≤ 7 drinks/week)(Hanson et al., 1978, Kesmodel et al., 2002) and 3) daily folic acid supplementation (March of Dimes, 2006, Centers for Disease Control, 1992). Women who reported taking a daily multivitamin or other folic acid supplement were considered having daily folic acid supplementation (Centers for Disease Control and Prevention, 2008). Analysis of the folic acid variable was limited to the 14 states that obtained folic acid data (Arizona, Colorado, Florida, Kentucky, Minnesota, Montana, Nebraska, North Carolina, North Dakota, Puerto Rico, Texas, Virgin Islands, Virginia, and Wisconsin).

Definition of Covariates

Health-related and sociodemographic variables hypothesized to be associated with either pregnancy intention or the health behaviors of interest were included as covariates. Health variables were self-reported diabetes and weight category (using body mass index (BMI) derived from self-reported height and weight). Sociodemographic variables were age group, race/ethnicity, marital status, education, and annual household income. Additionally, we hypothesized that women with previous births would be more likely to be knowledgeable about pregnancy-related health behaviors, but since the 2004 BRFSS did not include an indicator of previous births, we included a variable to indicate whether any children under 18 were living in the household as a proxy.

Statistical Analysis

Weighted frequencies of the study variables are presented. Bivariate analyses describe associations of pregnancy intention with the preconception health behavior variables. Multivariable logistic regressions were modeled to adjust for all covariates. To account for the complex sampling design of the BRFSS survey, analyses were performed using SAS-callable SUDAAN 10 (RTI, Research Triangle Park, NC).

RESULTS

Table 1 shows the frequencies and bivariate associations of the study variables. Eight-percent of the study sample reported no smoking, 94.3% reported no heavy alcohol use, and 42.6% reported daily folic acid use. In bivariate analysis, each of the health behaviors was significantly associated with pregnancy intention. Lowest rates of smoking and heavy alcohol use were reported among women intending pregnancy in less than 12 months (18.5% and 4.4%, respectively), with the highest rates reported among women intending pregnancy in 2 or more years (24.0% and 7.9%, respectively). Similarly, the highest folic acid supplementation rates were reported among women intending pregnancy in less than 12 months (54.3%) and the lowest rates were reported among women intending pregnancy in 2 or more years (35.3%).

Table 2 shows the associations of future pregnancy intention and preconception health behaviors estimated in multivariable analyses. After adjusting for covariates, there was no association between pregnancy intention and non-smoking or no heavy alcohol use. Women intending pregnancy in less than 12 months had 57% higher odds of daily folic acid supplementation compared to those not intending any future pregnancy.

DISCUSSION

In this large nationally representative population-based study, women intending pregnancy soon were not more likely to report healthy preconception behaviors, other than a modest increase in folic acid use. This is contrary to literature describing recall of healthier preconception behaviors among women with intended pregnancies (Dott et al., 2010, Hellerstedt et al., 1998), suggesting possible recall bias in studies of that type. Our findings are similar to what we observed in a regional longitudinal study of preconception women showing no relationship between intention for future pregnancy and health behaviors (Chuang et al., 2010).

We found that obese women are less likely to be taking folic acid, which is of concern given the higher risk for neural tube defects, contraceptive nonuse, and unintended pregnancy in obese women compared with normal weight women (Doskoch, 2010, Stothard et al., 2009). Lower socioeconomic status and non-white race was also associated with less folic acid use, suggesting disparities in the uptake of guidelines recommending folic acid use for preconception women.

Limitations of this study include use of cross-sectional data, thus we were unable to evaluate how pregnancy intention may change over time, and whether preconception behaviors change accordingly. All data are self-report, which introduces the possibility of social desirability bias. Additionally, we were only able to report relevant preconception health behaviors that were available in the BRFSS survey.

CONCLUSION

In summary, preconception behaviors did not differ greatly by future pregnancy intention in this nationally representative sample from the BRFSS. Health behavior optimization should occur prior to conception, since organogenesis occurs in the earliest weeks of gestation (Korenbrod et al., 2002), often before pregnancy is recognized. Further research to understand determinants of preconception health behaviors will inform future interventions aimed at reducing preventable adverse pregnancy outcomes.

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Table 1

Weighted frequencies of study variables for non-pregnant women ages 18–44 for the study sample and stratified by pregnancy intention (n=35,351).

	Weighted Frequencies (%)							p-value ¹
	Total	Intends Pregnancy				Ambivalent (23.7)		
		<12 months (9.3)	1–2 years (12.4)	2+ year (21.4)	Not at all (33.2)			
Healthy Preconception Behaviors								
No smoking	79.7	81.5	80.8	76.0	80.2	81.0	0.0002	
No heavy drinking	94.3	95.6	95.3	92.1	94.8	94.6	0.0002	
Folic acid use ²	42.6	54.3	46.8	35.3	42.2	42.6	<0.0001	
Health Related Variables								
Diabetes	1.5	2.1	1.2	1.2	1.7	1.5	1.10	
Weight Category ³							<0.0001	
Not overweight/obese	57.1	55.9	57.0	66.2	53.4	54.5		
Overweight	24.7	22.7	24.3	20.6	27.8	24.9		
Obese	18.2	21.4	18.8	13.2	18.8	20.6		
Sociodemographic Variables								
Age group							<0.0001	
18–24	29.9	17.5	27.9	60.5	18.1	24.8		
25–34	40.5	51.9	56.4	35.8	30.9	45.4		
35–44	29.6	30.5	15.7	3.8	51.0	29.8		
Race/Ethnicity							0.0001	
White, not Hispanic	62.0	63.2	65.4	64.4	59.6	60.7		
Black, not Hispanic	11.6	10.8	12.1	11.0	12.9	10.5		
Hispanic	19.5	18.2	16.5	16.8	21.1	21.9		

	Weighted Frequencies (%)						p-value ¹
	Total	Intends Pregnancy			Ambivalent (23.7)		
		<12 months (9.3)	1–2 years (12.4)	2+ year (21.4)			
Other	6.9	7.8	6.1	7.8	6.4	6.9	
Marital Status							<0.0001
Married	56.5	81.6	62.4	32.1	62.7	56.7	
Member of unmarried couple	8.7	5.0	10.0	11.4	6.7	9.9	
Never married	27.9	9.7	22.2	52.5	21.1	25.5	
Divorced/Separated/Widow	6.9	3.8	5.5	4.0	9.5	8.0	
Education							<0.0001
Did not graduate high school	10.1	8.6	7.3	8.3	12.2	10.8	
Graduated high school	24.7	22.6	22.1	23.4	26.6	25.5	
Some college/technical school	28.7	24.5	25.9	32.4	28.5	28.7	
College/technical school graduate	36.5	44.3	44.7	35.9	32.7	35.0	
Income							<0.0001
<\$15,000	10.7	7.7	7.6	12.7	11.0	11.4	
\$15,000–\$24,999	15.9	13.7	14.6	19.1	15.1	15.7	
\$25,000–\$34,999	11.7	8.6	13.1	12.7	11.3	12.0	
\$35,000–\$49,999	14.5	12.3	16.7	15.6	13.3	15.0	
\$50,000 or more	36.1	48.3	39.7	26.1	38.3	35.4	
Don't know/not sure/refused	11.0	9.4	8.3	13.8	11.0	10.6	
Children under 18 living in household							<0.0001
No	34.7	42.9	40.1	54.4	22.2	28.5	
Yes	65.3	57.1	59.9	45.6	77.8	71.5	

Data source: Women ages 18–44 participating in the 2004 Behavioral Risk Factor Surveillance System Survey who were not pregnant, had not had a hysterectomy or tubal sterilization, did not have a partner with a vasectomy, did not have a same sex partner and were sexually active.

¹ Chi-square statistics describing association between study variables and pregnancy intention.

² Folic acid data were determined from the 14 states with available data, n=9,279.

³ Weight category defined as not overweight/obese if body mass index (BMI) <25 kg/m², overweight if BMI 25 kg/m² to less than 30 kg/m², and obese if BMI ≥30 kg/m².

Table 2

Multivariable association of future pregnancy intention and preconception health behaviors among non-pregnant women ages 18–44.¹

	<i>Preconception Health Behaviors</i>		
	No Smoking	No Heavy Drinking	Folic Acid Use ²
	Adjusted OR (95% CI) n=33,077	Adjusted OR (95% CI) n=32,896	Adjusted OR (95% CI) n=8,669
Future Pregnancy Intention			
Intends pregnancy <12 months	0.87 (0.73–1.04)	1.01 (0.69–1.46)	1.57 (1.21–2.04)*
Intends pregnancy in 1 – 2 years	1.05 (0.87–1.28)	1.29 (0.93–1.79)	1.23 (0.97–1.56)
Intends pregnancy in 2+ years	1.07 (0.91–1.26)	1.33 (1.01–1.76)*	0.84 (0.66–1.07)
Does not intend pregnancy	Reference	Reference	Reference
Not sure/Ambivalent	1.09 (0.95–1.26)	1.07 (0.83–1.37)	1.04 (0.85–1.28)
Health Related Variables			
Diabetes	1.08 (0.75–1.55)	1.50 (0.69–3.23)	0.82 (0.48–1.39)
Weight Category			
Not overweight or obese	Reference	Reference	Reference
Overweight	0.90 (0.79–1.01)	1.46 (1.17–1.82)*	1.07 (0.89–1.27)
Obese	0.85 (0.75–0.98)*	2.15 (1.60–2.89)*	0.78 (0.64–0.95)*
Sociodemographic Variables			
Age			
18–24	Reference	Reference	Reference
25–34	0.97 (0.83–1.12)	1.31 (1.03–1.67)*	1.16 (0.93–1.43)
35–44	1.21 (1.03–1.44)*	1.40 (1.06–1.83)*	1.46 (1.14–1.86)*
Race/Ethnicity			
White, not Hispanic	Reference	Reference	Reference
Black, not Hispanic	2.62 (2.20–3.11)*	2.51 (1.80–3.50)*	0.67 (0.51–0.89)*
Hispanic	5.12 (3.96–6.63)*	1.57 (1.03–2.38)*	0.69 (0.56–0.85)*
Other	1.88 (1.51–2.34)*	2.09 (1.39–3.14)*	0.91 (0.63–1.31)
Marital Status			
Married	Reference	Reference	Reference
Cohabiting	0.44 (0.36–0.53)*	0.42 (0.30–0.59)*	0.74 (0.53–1.03)
Never married	0.50 (0.44–0.58)*	0.32 (0.25–0.41)*	0.97 (0.79–1.20)
Divorced/Separated/Widowed	0.35 (0.30–0.42)*	0.34 (0.25–0.46)*	1.05 (0.82–1.33)
Education			
Less than high school	0.17 (0.14–0.22)*	0.87 (0.53–1.40)	0.50 (0.36–0.70)*
High school only	0.28 (0.24–0.33)*	1.01 (0.77–1.32)	0.69 (0.57–0.85)*
At least some college	0.44 (0.38–0.50)*	0.67 (0.53–0.85)*	0.97 (0.80–1.16)

	<i>Preconception Health Behaviors</i>		
	No Smoking	No Heavy Drinking	Folic Acid Use ²
	Adjusted OR (95% CI) n=33,077	Adjusted OR (95% CI) n=32,896	Adjusted OR (95% CI) n=8,669
College or technical school graduate	Reference	Reference	Reference
Income			
<\$15,000	0.84 (0.69–1.03)	1.38 (0.97–1.96)	0.55 (0.40–0.77)*
\$15,000–\$24,999	0.75 (0.64–0.89)*	1.60 (1.19–2.16)*	0.76 (0.59–0.97)*
\$25,000–\$34,999	0.70 (0.59–0.84)*	1.61 (1.14–2.27)*	0.96 (0.76–1.21)
\$35,000–\$49,999	0.84 (0.72–0.98)*	1.35 (1.05–1.73)*	1.02 (0.82–1.27)
\$50,000 or more	Reference	Reference	Reference
Don't know/not sure/refused	0.99 (0.80–1.23)	2.02 (1.40–2.91)*	0.63 (0.47–0.83)*
Children under 18 living in household (Any vs. None)	1.15 (1.02–1.30)*	1.83 (1.49–2.25)*	0.91 (0.77–1.07)

Data source: Women ages 18–44 participating in the 2004 Behavioral Risk Factor Surveillance System Survey who were not pregnant, had not had a hysterectomy or tubal sterilization, did not have a partner with a vasectomy, did not have a same sex partner and were sexually active.

¹ Adjusted for all variables in the table.

² Folic acid analysis was limited to the 14 states with available data, n=9,279.

* p<0.05

Abbreviations: OR=odds ratio; CI = confidence interval