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WOMEN'S PERCEIVED CONTROL OF THEIR BIRTH OUTCOMES IN THE CENTRAL PENNSYLVANIA WOMEN'S HEALTH STUDY:

Implications for the Use of Preconception Care

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Abstract

Purpose—This study examines nonpregnant women's beliefs about whether or not they can influence their future birth outcomes with respect to the baby's health and factors associated with internal locus of control for birth outcomes. Perceived internal control of birth outcomes could be a predisposing factor for use of preconception care, which is recommended for all women of childbearing age by the Centers for Disease Control and Prevention. The overall hypothesis is that internal control of birth outcomes is a function of prior pregnancy experiences, current health status and stress levels, access to health care, and sociodemographics.

Methods—Data are from the Central Pennsylvania Women's Health Study random digit dial telephone survey of 2,002 women ages 18−45; the analytic sample is 614 nonpregnant women with current reproductive capacity who reported that they are considering a future pregnancy. Internal control of birth outcomes is measured using 1) a 4-item Internal Control of Birth Outcomes Scale, 2) a single-item measure of Preconceptional Control, and 3) a score reflecting high internal control on both of these measures.

Findings—In multiple logistic regression analyses, internal control of birth outcomes is positively associated with older age (35−45 vs. 18−34 years), higher education (some college or more), marital status (currently married or living with a partner), and higher self-rated physical health status on the SF-12v2 (but not mental health status or psychosocial stress). Previous adverse pregnancy outcomes and current access to health care have no association with internal control for birth outcomes.

Conclusion—Variables associated with internal control of birth outcomes among women contemplating a future pregnancy are primarily sociodemographic and physical health related. Educational and social marketing efforts to increase women's use of preconception care may be particularly important for women who are likely to have lower internal control, including younger, less educated, unmarried, and less healthy women.

Prevention of adverse pregnancy outcomes—including preterm birth, low birthweight, infant mortality, birth defects, and maternal morbidity and mortality—is an important public health goal that has recently received renewed attention owing to the release of the Centers for Disease Control and Prevention's (CDC) “Recommendations to Improve Preconception Health and

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Health Care—United States" (CDC, 2006). These recommendations focus on improving pregnancy-related outcomes for infants and women by promoting women's health and health care before the first pregnancy and between pregnancies, which is a distinct departure from the traditional focus on the period during pregnancy. This shift reflects growing recognition that the prenatal period is too narrow a window in which to intervene to address many of the maternal health problems and risk factors that could impact negatively on both the mother's and the baby's outcomes (Misra, Guyer, & Allston, 2003). For example, promoting folic acid supplementation after prenatal care has been initiated may be too late to prevent neural tube defects because the neural tube closes by the 28th day of gestation (Biermann, Dunlop, Brady, Dubin, & Brann, 2006). In addition, chronic medical conditions in the mother, such as hypertension, increase risks for both the mother and the baby, yet often cannot be optimally managed during pregnancy because of potential harmful effects of pharmacologic therapy on the fetus (Roberts, Pearson, Cutler, & Lindheimer, 2003). Finally, evidence suggests that once pregnant, some women reduce their risks for adverse pregnancy outcomes but many do not (Anderson, Ebrahim, Floyd, & Atrash, 2006).

Two of the new CDC recommendations focus on individuals' responsibility for preconception health: 1) encouraging individuals and couples to have a reproductive life plan, and 2) increasing public awareness of the importance of preconception health behaviors and health services (CDC, 2006, 9−10). Underlying these recommendations is an assumption that women will be aware and inclined to act before pregnancy—or can be educated to recognize and take action before pregnancy—to optimize health outcomes for themselves and their newborns. Yet little research has been conducted on preconception awareness or attitudes regarding birth outcomes (Frey & Files, 2006).

Currently, it is not known whether women contemplating pregnancy believe that they can increase the likelihood of having a healthy baby through any actions of their own. This is an important topic because it is relevant to developing effective health education and social marketing campaigns to increase preparation for childbearing, and women would not be expected to modify their health behaviors if they did not believe that their actions could influence their birth outcomes. Indeed, health beliefs can be key factors predisposing individuals to use of specific types of health services (Andersen, 1995), such as preconception care. Previous public health approaches related to pregnancy outcomes have focused on specific behaviors or services, such as promoting early initiation of prenatal care; smoking cessation during pregnancy, a key cause of prematurity and low birth-weight; folic acid supplementation among women of reproductive age for prevention of neural tube defects; and use of family planning services for prevention of teen pregnancy or for pregnancy spacing. However, efforts to promote more comprehensive approaches to improving preconception health may require attention to women's underlying beliefs and attitudes about their ability to influence their birth outcomes in general. The evidence that about one half of US pregnancies are unintended, that 1 in 20 women have an unintended pregnancy each year, and that poor and less educated women have more unintended pregnancies (Finer & Henshaw, 2006) suggests that many women may not prepare for pregnancy by taking appropriate actions to protect their own or their future baby's health.

The purpose of this paper is to examine nonpregnant women's beliefs about whether or not they can influence their future birth outcomes with respect to their babies' health. Perceiving internal control of birth outcomes would be expected to be associated with use of preconceptional health services as well as engaging in health-promoting behaviors before conception. The concept of locus of control, which originated with Rotter (1966) and has been applied in studies of health-related events, refers to a generalized expectancy about the causes of experienced outcomes. Measures of this construct assess individuals' beliefs in their ability to control events through their own efforts (internal control) as opposed to events being

controlled by external forces, such as chance or powerful others (Wallston, Wallston, & DeVellis, 1978). The generalized expectancy is thought to develop out of cumulative experience in relation to specific goal areas, including health (Lefcourt, 1991). Persons with internal control are hypothesized to be more likely to take actions to influence future events, including investing in their health through behavior change or use of health services. Although findings do not uniformly demonstrate that locus of control predicts health-related actions, recent applications in health care have found associations between internal control and reduced risk of severe asthma attacks resulting in emergency department visits and hospitalization for asthma (Calfee, Katz, Yelin, Iribarren, & Eisner 2006), adherence to colorectal cancer screening (Gili, Roca, Ferrer, Obrador, & Cabeza 2006), intention to adhere to medication among patients treated for breast cancer (Atkins & Fallowfield 2006), seeking written medical information among patients in rheumatology/pain clinics (Koo, Krass, & Aslani, 2006), pregnant women's interest in genetic screening and invasive testing (Lumley, Zamerowski, Jackson, Dukes, & Sullivan, 2006), and pregnant women's smoking and caffeine consumption (Labs & Wurtele, 1986).

Little is known about variables associated with whether or not nonpregnant women perceive that they can control the health of their future newborns. Because the number of actions that a prepregnant woman could take to improve her baby's health at birth is large (e.g., smoking cessation, folic acid supplementation, alcohol control, weight control, glycemic control for diabetes), we chose not to assess women's awareness or self-efficacy related to specific actions, but rather to investigate women's overall sense of control of their future birth outcomes. The general hypothesis is that perceived internal control of birth outcomes related to the baby's health is a function of prior pregnancy experiences, current health status and stress levels, access to health care, and sociodemographics. Prior adverse birth outcomes, poorer physical and mental health status, higher psychosocial stress, less access to health care, lower education, poverty, and religiosity are expected to be related to lower internal control of future birth outcomes. Rationales for specific measures are provided below.

Methods

Data Source and Sample

The data source for this study is the Central Pennsylvania Women's Health Study Phase I population-based survey, which has been described in detail elsewhere (Weisman et al., 2006). Briefly, a random-digit dial telephone survey of 2,002 women ages 18−45 was conducted in a 28-county region in Central Pennsylvania, with oversampling in rural counties and areas with high minority populations. Conducted in English and Spanish, the 30-minute interview covered health status and health behaviors, psychosocial stress, pregnancy history and intentions, health care access and use, and sociodemographics. The survey focused on a number of risk factors for preterm birth and low birthweight, 2 prevalent adverse pregnancy outcomes. All data are self-reported. The response rate was 52% and the cooperation rate (the proportion of all cases interviewed of all eligible households contacted) was 63%, which are consistent with random-digit dial survey trends reported by Curtin, Presser, & Singer (2005). Comparisons with US census data showed that the sample is highly representative of the target population with respect to age, race/ethnicity, educational level, and poverty status.

The analytic sample for this study consists of 614 nonpregnant women who were asked questions about any possible future pregnancy. This subsample was identified based on reproductive capacity (no reported hysterectomy, tubal ligation, or infertility) and pregnancy intent (reported “considering becoming pregnant” at some time in the future). Thus, these analyses are conducted on women who are contemplating a future birth.

Measures

Dependent variables—The dependent variables include 3 measures of perceived control of future birth outcomes, defined in terms of the health of the baby. The first measure, Internal Control of Birth Outcomes Scale, is a modified version of a scale used by Misra, O'Campo, and Strobino (2001) based on the Parental Health Belief Scale developed by Tinsley and Holtgrave (1989). The original scale measured mothers' degree of perceived control (internality) with respect to their current children's health and was shown to be related to use of preventive health services for the child (Tinsley & Holtgrave, 1989). For a study of the determinants of preterm birth, Misra et al. (2001) modified the scale items to refer to postpartum women's perceived control of the health of the baby they had just delivered. The version of the scale used here measures a nonpregnant woman's perceived control of "the health of any baby you might have in the future." The scale score is a summated rating based on 4 items to which the woman agreed or disagreed using a 4-point response set (strongly agree, agree, disagree, strongly disagree) coded so that a higher score indicates higher internal control:

There is nothing I can do to make sure my child is born healthy.

It is my job as a mother to make sure my child is born healthy.

I could make very few choices that would affect my child's health at birth.

I could do many things to make sure my child is born healthy.

As shown in Table 1, the responses to the individual items are skewed toward high internal control. Cron-bach's α for the 4-item scale is 0.72 in our sample. (One item, "Bad luck could keep my child from being born healthy," was dropped from the scale owing to low item–total correlation.) The scale score was dichotomized at the median to study variables related to higher or lower internal control.

The second dependent variable is a single-item measure of Preconceptional Control: agreement or disagreement (on a 4-point response set) with the statement, "There are things I can do before I become pregnant to make sure my child is born healthy." Over half (54%) of women strongly agreed with the statement, 44% agreed, and 2% disagreed or strongly disagreed. The score was dichotomized to compare those who strongly agree with the statement versus all others.

Because neither of these measures of control of birth outcomes has been used in previous research related to the preconception period, we examined each measure's association with 2 actions consistent with preconception health promotion: using a daily multivitamin that contains folic acid (a health behavior) and receiving any pregnancy planning counseling from a health professional in the past year (an indicator of preconception health care use). Both measures of control were significantly ($p < .05$) associated with these actions, with higher internal control associated with more folic acid use and more pregnancy planning counseling received. Although the data are cross-sectional and we cannot ascertain whether or not locus of control predicts these actions, the associations are evidence of the construct validity of the 2 measures of internal control of birth outcomes.

Finally, these 2 measures of control are strongly associated ($\kappa = 0.60$, with 95% confidence interval of 0.54−0.66; $p < .0001$), and 80% of women reporting concordant responses on the 2 measures. The discordant responses are roughly evenly divided between the 2 possibilities for discordance: 9% of the respondents reported low Internal Control of Birth Outcomes and high Preconceptional Control; 11% of respondents reported high Internal Control of Birth Outcomes and low Preconceptional Control. Thus, a third dependent variable was constructed to reflect high internal control on both measures; for this combined measure, 45% of respondents were classified as high internal control, and 55% of respondents were classified as either low internal control on both measures or discordant responses.

Independent variables—The independent variables include 3 measures of pregnancy experiences that are expected to be related to perceived control of birth outcomes. First, having any prior live birth, regardless of outcome, is included as a dichotomous variable because having a prior live birth could sensitize women to both the risks of adverse outcomes and the potential actions to reduce risks. Second, having a history of an adverse pregnancy outcome is included as a dichotomous variable because these experiences could reduce women's sense of control over their birth outcomes. This variable is based on a complete pregnancy history taken during the interview and is defined as having at least 1 of the following outcomes: a preterm live birth (gestation <37 weeks); a low birthweight baby (<2,500 g); or a baby born with a birth defect or disorder (conditions reported included cleft lip/palate, club foot, congenital hypothyroidism, Down syndrome, dwarfism, heart defect, and polycystic kidney disease). Third, whether or not the respondent's mother experienced a preterm birth or low birthweight delivery is included as an indicator that the respondent might be at elevated risk for these outcomes owing to family history and therefore perceive less control over these outcomes.

Measures of health status and stress are included because poorer health status, especially poorer mental health and stressful experiences, is expected to be related to less perceived internal control (Lefcourt, 1991). The health status measures include 2 norm-based summary measures from the SF-12 v2™ Health Survey standard interview based on 4-week recall (Ware, Kosinski, Turner-Bowker, & Gandek, 2002): the Physical Component and Mental Component scores, dichotomized at the median for this sample (54.51 for the Physical Component and 51.37 for the Mental Component, with higher scores reflecting better health status). Because the Mental Component score does not specifically address depression, we also included a 6-item Depressive Symptoms scale developed from the Center for Epidemiologic Studies Depression Scale; this scale assesses the frequency of symptoms in the past week and is scored as a dichotomy reflecting high or low risk for psychological distress, particularly depression (Sherbourne, Dwight-Johnson, & Klap, 2001). To measure psychosocial stress, we used a 12-item Psychosocial Hassles Scale, measuring the degree to which common stressors—for example, money worries, problems with family or friends—were perceived as stressful in the past 12 months; this measure was adapted from a scale used by Misra et al. (2001) and is dichotomized at the median to represent high and low levels of psychosocial stress.

Access to health care was measured in 2 ways: having “a regular doctor or other health professional you usually go to when you are sick or want medical advice” and having any gap in health insurance coverage (i.e., any time in the past 12 months with no private or public health insurance coverage of any kind compared with continuous insurance coverage for the past 12 months). Because having a regular health care provider and/or continuous health insurance coverage increase the likelihood that a woman can obtain needed health care services, these variables are expected to be related to greater perceived control of health outcomes.

Sociodemographic variables include age (dichotomized to compare women in the peak reproductive years [ages 18−34] with women in the older reproductive years [35−45]), because older reproductive-age women are expected to perceive higher control for birth outcomes; race/ethnicity (categorized as white non-Hispanic vs. “other” owing to the small numbers of specific non-white subgroups in this sample), with white non-Hispanic women expected to have higher internal control; marital status (categorized as married or living with a partner vs. other), with married or partnered women expected to have higher internal control; employment status (categorized as employed full or part time vs. not employed), with employed women expected to have higher internal control; educational level (categorized as high school graduate or less vs. any college or more), with more highly educated women expected to have higher internal control; poverty status, based on household income and composition, categorized as poor (below the federal poverty level) or near poor (below 200% of the federal poverty threshold) versus not poor, with nonpoor women expected to have higher internal control; and religious

service attendance in a typical month (categorized as <4 times per month vs. ≥4 times per month). Although prior research on the association between locus of control and religious involvement shows mixed results, religious coping might be expected in situations where little direct control is possible; therefore, this measure is included to explore whether higher religious observance is associated with lower internal control beliefs related to birth outcomes (Fetzer Institute, 2003; Koenig, McCullough, & Larson, 2001).

Analytic Methods

Bivariate analyses were conducted using the χ^2 test for all categorized independent variables with each dependent variable. Independent variables were examined for multicollinearity before conducting multiple logistic regression analyses, and no problems were detected. Logistic regression models were computed for each of the dependent variables and produced estimates of relative risk based on the adjusted odds ratios and 95% confidence intervals. The logistic regression models employ listwise deletion, and the principal source of missing data is the household income question, a component of poverty level; those missing on this item did not differ significantly from other respondents on the locus of control measures, so the results are not expected to be biased due to missing data.

Results

Table 1 provides variable definitions and univariate statistics for the dependent and independent variables. The table also shows bivariate associations between each of the independent variables and the 3 outcome variables. Independent variables that are significantly associated with the dependent variables in bivariate analyses include the SF-12 Physical Component Score, any health insurance gap in the past 12 months, age, marital status, and education.

Table 2 shows the results of multiple logistic regression models for the 3 dependent variables measuring perceived control of birth outcomes. None of the measures of birth experiences or of health care access attain statistical significance in any of the models. Among the health status and stress measures, only the SF-12 Physical Component score attains significance; this variable increases the odds of high internal control in the Internal Control of Birth Outcomes model and the combined measure model, but not for the Preconceptional Control model. Among the sociodemographics, age is significant in all 3 models, with older age (35−45 years) associated with higher internal control compared with younger age (18−34 years). Marital status (not being married or living with a partner, compared with married or living with a partner) reduces the odds of high internal control in 2 of the models (Preconceptional Control and the combined measure). Lower education level (high school graduate or less, compared with some college or more) reduces the odds of high internal control in all 3 models. In the multiple logistic regression models, the effect of a gap in health insurance is not statistically significant.

Discussion

These analyses show that perceived internal control of birth outcomes related to the baby's health are most strongly associated with sociodemographic variables and with physical health status. This means that women who are more likely to perceive that they can control their future birth outcomes, and therefore who may be more predisposed to preconceptional interventions, are of older reproductive age, more highly educated, married or living with a partner, and in better physical health. The finding with respect to age may reflect a failure of public health interventions to reach younger women with information about the role of a wide range of behaviors and their own health status in affecting fetal health (Anderson et al., 2006). Women with more education have likely had greater exposure to newer evidence about these issues.

The finding that married women have higher levels of internal control may relate to their primary responsibility for their families' health, including making medical appointments for family members.

Women who have low internal control, and therefore who may be in greater need of information and resources related to preconceptional interventions, are of younger reproductive age, less well educated, not married or partnered, and in poorer physical health. Interestingly, women who have had a prior adverse pregnancy outcome (a preterm birth, low birthweight baby, or baby with a birth defect) do not differ from women who have had no prior adverse outcome with respect to level of perceived control of birth outcomes. This unexpected finding may reflect the fact that this study sample consists only of women who are contemplating a future pregnancy; women with a prior adverse pregnancy outcome who are contemplating a future pregnancy may tend to have higher internal control for birth outcomes than women with a prior adverse outcome who are not contemplating a future pregnancy. In addition, neither overall mental health status, depressive symptoms, psychosocial stress, nor health care access is associated with perceived control of birth outcomes.

Several implications of these findings for health education and social marketing related to preconception health and health care are noteworthy. Because preconception health care is not readily available and is not currently covered by health insurance (Johnson, 2006), internal control of birth outcomes could be a key factor in women's predisposition to seek preconception care. However, if educational or marketing messages to encourage use of preconception care appeal mainly to women with high internal control for birth outcomes, they are likely to be most effective with older, more highly educated, married or partnered, and healthier women. These women may be least in need of preconception care. Rather than reverse-targeting women with less need, an alternative strategy would be to target those women likely to have low internal control—that is, women who are younger, less well educated, unmarried, or in poorer health–with preconceptional health messages. Alternatively, educational campaigns could seek to increase self-efficacy for influencing birth outcomes among women whose internal control is likely to be low. Such approaches would address groups of women who are less likely to be actively planning a pregnancy and women with health problems or health risks that could be amenable to treatment or prevention preconceptionally.

Additionally, a possible explanation for our finding that the experience of a prior adverse pregnancy outcome was not associated with perceived control of birth outcomes (either negatively or positively) is that internal control for birth outcomes may not readily be influenced. The malleability of perceived control for birth outcomes has not been studied. If perceived control of birth outcomes is not readily influenced by pregnancy-related experiences, then efforts to increase women's use of preconception care might appropriately be focused on increasing self-efficacy for specific actions to improve birth outcomes among women who are at higher risk based on a prior adverse pregnancy outcome.

Some limitations of this study should be noted. First, the data are cross-sectional, so it is not possible to conclude that the independent variables "caused" the level of perceived control of birth outcomes. For example, it is not clear whether perceived higher overall health status preceded the perception of greater internal control, and it is possible that higher levels of perceived control contributes to reports of better health status, for example. Longitudinal data would be required to specify the timing of events, and also to permit analyses of the impact of perceived control on subsequent use of preconception health services. In addition, the perceived control variables were measured only among women who reported that they were considering a future pregnancy, so pregnancy intent could not be examined as a covariate in this analysis. Because some women who were not considering a future pregnancy might become pregnant, their exclusion from these analyses could have biased the results in unknown ways if there

were systematic differences in perceived control between women who are and are not considering a future pregnancy.

In sum, this is the first study to examine internal control of birth outcomes in a sample of nonpregnant women of childbearing age who are contemplating a future pregnancy. Our findings show variability in women's internal locus of control for birth outcomes, using 3 measures of perceived control. Sociodemographic factors and physical health are the strongest predictors of these measures of control. Given the potential effect of internal control on women's use of preconception care and health-promoting behaviors, interventions might target women likely to have the lowest levels of internal control, including younger, less educated, unmarried, and less healthy women.

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Biography

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References

Andersen RM. Revisiting the behavioral model and access to medical care: Does it matter? Journal of Health and Social Behavior 1995;36:1–10. [PubMed: 7738325]

Atkins L, Fallowfield L. Intentional and non-intentional non-adherence to medication amongst breast cancer patients. European Journal of Cancer 2006;42:2271–2276. [PubMed: 16644208]

Anderson JE, Ebrahim S, Floyd L, Atrash H. Prevalence of risk factors for adverse pregnancy outcomes during pregnancy and the preconception period—United States, 2002− 2004. Maternal and Child Health Journal 2006;10:S101–S106. [PubMed: 16710762]

Biermann J, Dunlop AL, Brady C, Dubin C, Brann A. Promising practices in preconception care for women at risk for poor health and pregnancy outcomes. Maternal and Child Health Journal 2006;10:S21–S28. [PubMed: 16927159]

Calfee CS, Katz PP, Yelin EH, Iribarren C, Eisner MD. The influence of perceived control of asthma on health outcomes. Chest 2006;130:1312–1318. [PubMed: 17099005]

Centers for Disease Control and Prevention (CDC). Recommendations to improve preconception health and health care— United States: A report of the CDC/ATSDR Preconception Care Work Group and the Select Panel on Preconception Care. Morbidity and Mortality Weekly Report 2006;55:1–23. [PubMed: 16410759]

Curtin R, Presser S, Singer E. Changes in telephone survey nonresponse over the past quarter century. Public Opinion Quarterly 2005;69:87–98.

Fetzer Institute. Multidimensional measurement of religiousness/spirituality for use in health research: A report of the Fetzer Institute/National Institute of Aging Working Group. Author; Kalamazoo, MI: 2003.

Finer LB, Henshaw SK. Disparities in rates of unintended pregnancy in the United States, 1994 and 2001. Perspectives on Sexual and Reproductive Health 2006;38:90–96. [PubMed: 16772190]

Frey KA, Files JA. Preconception healthcare: what women know and believe. Maternal and Child Health Journal 2006;10:S73–S77. [PubMed: 16775757]

Gili M, Roca M, Ferrer V, Obrador A, Cabeza E. Psychosocial factors associated with the adherence to a colorectal cancer screening program. Cancer Detection and Prevention 2006;30:354–360. [PubMed: 16963195]

Johnson KA. Public finance policy strategies to increase access to preconception care. Maternal Child Health Journal 2006;10:S85–S91.

Koenig, HG.; McCullough, ME.; Lareson, DB. Handbook of Religion and Health. Oxford University Press; New York: 2001.

Koo M, Krass I, Aslani P. Enhancing patient education about medicines: factors influencing reading and seeking of written medicine information. Health Expectations 2006;9:174–187. [PubMed: 16677196]

Labs SM, Wurtele SK. Fetal health locus of control scale: development and validation. Journal of Consulting and Clinical Psychology 1986;54:814–819. [PubMed: 3794026]

Lefcourt, HM. Locus of control.. In: Robinson, JP.; Shaver, PR.; Wrightsman, LS., editors. Measures of personality and social psychological attitudes. Academic Press; San Diego: 1991.

Lumley MA, Zamerowski ST, Jackson L, Dukes K, Sullivan L. Psychosocial correlates of pregnant women's attitudes toward prenatal maternal serum screening and invasive diagnostic testing: Beyond traditional risk status. Genetic Testing 2006;10:131–138. [PubMed: 16792517]

Misra DP, Guyer B, Allston A. Integrated perinatal health framework: A multiple determinants model with a life span approach. American Journal of Preventive Medicine 2003;25:65–75. [PubMed: 12818312]

Misra DP, O'Campo P, Strobino D. Testing a socio-medical model for preterm delivery. Paediatric and Perinatal Epidemiology 2001;15:110–122. [PubMed: 11383575]

Roberts JM, Pearson G, Cutler J, Lindheimer M. Summary of the NHLBI Working Group on Research on Hyper-tension During Pregnancy. Hypertension 2003;41:437–445. [PubMed: 12623940]

Rotter JB. Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs 1966;80:1–28. [PubMed: 5340840]

Sherbourne CD, Dwight-Johnson M, Klap R. Psychological distress, unmet need, and barriers to mental health care for women. Women's Health Issues 2001;11:231–243. [PubMed: 11336863]

Tinsley BJ, Holtgrave DR. Maternal health locus of control beliefs, utilization of childhood preventive health services, and infant health. Developmental and Behavioral Pediatrics 1989;10:236–241.

Wallston KA, Wallston BS, DeVellis RF. Development of the multi-dimensional health locus of control (MHCL) scale. Health Education Monographs 1978;6:161–170.

Ware, JE.; Kosinski, M.; Turner-Bowker, DM.; Gandek, B. How to score version 2 of the SF-12 Health Survey. Lincoln, QualityMetric Incorporated; RI: 2002.

Weisman CS, Hillemeier MM, Chase GA, Dyer AM, Baker SA, Feinberg M, et al. Preconceptional health: risks of adverse pregnancy outcomes by reproductive life stage in the Central Pennsylvania Women's Health Study (CePAWHS). Women's Health Issues 2006;16:216–224. [PubMed: 16920525]

Table 1

Variables, Variable Definitions, Sample Frequencies, and Bivariate Associations (Base *n* = 614)

Variable	Definition	Frequencies (*n*)	Bivariate Associations With Outcomes		
			% with High Internal Control of Birth Outcomes	% with High Preconceptional Control	% High Control on Both
Dependent Variables					
Internal Control of Birth Outcomes Scale	Score on 4-item scale measuring internal control for future baby's health (see text):				
	≤Median score: low internal control	44% (273)			
	>Median score: high internal control	56% (341)			
	Individual items: “There is nothing I can do to make sure my child is born healthy.”				
	Strongly disagree	67% (413)			
	Disagree, agree, or strongly agree “It is my job as a mother to make sure my child is born healthy:”	33% (200)			
	Strongly agree	60% (370)			
	Agree, disagree, or strongly disagree	40% (243)			
	“I could make very few choices that would affect my child's health at birth:”				
	Strongly disagree	58% (355)			
	Disagree, agree, or strongly agree	42% (259)			
	“I could do many things to make sure my child is born healthy:”				
	Strongly agree	67% (410)			
	Agree, disagree, or strongly disagree	33% (205)			
Preconceptional Control	“There are things I can do before I become pregnant to make sure my child is born healthy:”				
	Strongly agree	54% (332)			
	Agree, disagree, or strongly disagree	46% (282)			
High internal control (both measures)	High internal control on both measures	45% (275)			
	Other combination of responses	55% (336)			
Birth Experiences					
Prior live birth	Any prior live birth	48% (295)	58	57	46
	No prior live birth	52% (319)	54	52	44

Variable	Definition	Frequencies (*n*)	Bivariate Associations With Outcomes		
			% with High Internal Control of Birth Outcomes	% with High Preconceptional Control	% High Control on Both
Any prior preterm birth, low birthweight (LBW) baby, or birth defect	Any baby born preterm, at LBW, or with a birth defect (see text)	10% (59)	51	53	42
		90% (552)	56	54	45
	No prior adverse outcome				
Mother had adverse birth outcome	Mother had any preterm birth or LBW baby	17% (100)	62	58	48
	Mother did not have adverse outcome	83% (494)	54	53	44
Health Status and Stress					
SF-12 physical component	Norm-based score (see text)				
Summary	≤54.51	44% (269)	49**	51	39**
	>54.51	56% (341)	61	57	50
SF-12 mental component	Norm-based score (see text)				
Summary	≤51.37	55% (334)	54	52	43
	>51.37	45% (276)	59	57	48
Depressive symptoms	Score on 6-item scale measuring symptoms of depression in past week (see text)				
	Depression risk	18% (110)	50	54	41
	No depression risk	82% (503)	59	54	46
Psychosocial hassles	Score on 12-item scale measuring degree to which common hassles are perceived as stressful in past 12 months (see text)				
	≤16 (median): low stress	46% (282)	53	55	45
	>16 (median): high stress	54% (332)	58	53	45
Health Care Access					
Regular provider	"Do you have a regular doctor or other health professional you usually go to when you are sick or want medical advice?"				
	Yes	84% (516)	56	54	45
	No	16% (97)	52	54	44
Health insurance gap	Any time in past 12 months without health insurance coverage of any kind?				
	Yes	23% (144)	54	47*	42

Variable	Definition	Frequencies (*n*)	Bivariate Associations With Outcomes		
			% with High Internal Control of Birth Outcomes	% with High Preconceptional Control	% High Control on Both
	No	77% (469)	56	56	46
Sociodemographics					
Age (yrs)	18−34	90% (547)	54**	51***	43**
	35−45	10% (64)	72	75	64
Race/ethnicity	White, non-Hispanic	87% (533)	57*	56	47
	Other[a]	13% (78)	45	44	35
Marital status	Married or living with a partner	64% (392)	60**	59**	49*
	Never married, widowed, divorced/separated	36% (218)	48	46	38
Employment status	Employed part- or full-time	76% (464)	57	54	46
	Not employed	24% (149)	50	53	44
Educational level	High school graduate or less	34% (209)	42***	43***	32***
	Some college or more	66% (405)	63	60	52
Poverty	Poverty or near poverty	33% (171)	55	53	44
	Not poverty	67% (342)	60	59	50
Religious service attendance	<4 times in a typical month	67% (412)	53	52	42
	≥4 times in a typical month	33% (201)	60	59	50

[a] About half of the “other” category is black, non-Hispanic.

* Bivariate association significant $p < .05$ (χ^2 test).

** Bivariate association significant $p < .01$(χ^2 test).

*** Bivariate association significant $p < .001$(χ^2 test).

Table 2

Multiple Logistic Regression Analyses of Internal Control of Birth Outcomes and Preconceptional Control

	Internal Control of Birth Outcomes Scale (High control)	Preconceptional Control (High control)	High Internal Control on Both Measures
Birth experiences			
Prior live birth	0.89 (0.55−1.44)	0.85 (0.52−1.37)	0.79 (0.50−1.27)
Any prior preterm birth, LBW, or birth defect	0.84 (0.43−1.65)	0.89 (0.46−1.74)	0.95 (0.49−1.86)
Mother had adverse birth outcome	1.54 (0.90−2.62)	1.43 (0.84−2.42)	1.29 (0.77−2.15)
Health status and stress			
SF-12 physical component	**1.67 (1.22−2.48)**	1.35 (0.91−2.01)	**1.59 (1.07−2.37)**
SF-12 mental component	1.36 (0.88−2.08)	1.20 (0.78−1.84)	1.22 (0.80−1.86)
Depression (high risk)	0.89 (0.52−1.54)	1.21 (0.70−2.11)	0.92 (0.53−1.60)
Psychosocial hassles (high stress)	1.13 (0.74−1.72)	0.88 (0.58−1.35)	0.92 (0.61−1.39)
Health care access			
Has regular provider	1.19 (0.68−2.11)	0.82 (0.46−1.45)	1.07 (0.61−1.88)
Insurance gap, past 12 months	1.04 (0.65−1.68)	0.79 (0.49−1.28)	1.03 (0.64−1.66)
Sociodemographics			
Age (35 − 45 vs. 18 − 34)	**2.69 (1.35−5.39)**	**3.87 (1.85−8.10)**	**2.97 (1.56−5.65)**
Race/ethnicity (other vs. white non-Hispanic)	0.80 (0.43−1.47)	0.80 (0.43−1.49)	0.88 (0.47−1.63)
Not married or living with partner	0.67 (0.43−1.05)	**0.48 (0.31−0.75)**	**0.57 (0.36−0.89)**
Not employed	0.98 (0.60−1.59)	1.12 (0.71−1.88)	1.27 (0.78−2.07)
High school or less (vs. some college or more)	**0.48 (0.31−0.74)**	**0.52 (0.33−0.81)**	**0.47 (0.30−0.74)**
Poverty or near poverty (vs. not poverty)	1.31 (0.82−2.09)	1.20 (0.75−1.91)	1.32 (0.83−2.10)
Religious service attendance	1.29 (0.85−1.95)	0.99 (0.66−1.51)	1.09 (0.72−1.64)
Overall test of null hypothesis (no effects): Wald χ^2	36.35; df = 16; p = .003 n = 483	37.60; df = 16; p = .002 n = 481	34.75; df = 16; p = .004 n = 481

Data are presented as adjusted odds ratios and 95% confidence intervals; statistically significant results ($p < .05$) are shown in bold.