Published in final edited form as:
Birth. 2009 September ; 36(3): 200–207. doi:10.1111/j.1523-536X.2009.00324.x.

Exercise During Pregnancy and Cesarean Delivery: North Carolina PRAMS, 2004-2005

Marit L. Bovbjerg, MS and
Pre-doctoral Fellow in the Department of Epidemiology, University of North Carolina at Chapel Hill Gillings School of Global Public Health, Chapel Hill, North Carolina, USA

Anna Maria Siega-Riz, PhD, RD
Associate Professor and Associate Chair, Department of Epidemiology and Associate Professor, Department of Nutrition, University of North Carolina at Chapel Hill Gillings School of Global Public Health, Chapel Hill, North Carolina, USA

Abstract

Background—The current rate of cesarean delivery in the United States is 31 percent. Previous studies have suggested that exercise during pregnancy may be associated with a lower risk of cesarean delivery, but sample sizes were small and methods often inadequate. This study examined whether or not an association exists between prenatal exercise and delivery mode using data from the 2004 and 2005 North Carolina Pregnancy Risk Assessment Monitoring System (PRAMS) survey.

Methods—PRAMS postpartum questionnaire responses about frequency of exercise during the last 3 months of pregnancy for 1,955 women without a prior cesarean delivery were linked to birth certificates.

Results—Among 1,342 women delivering at term, exercise was not associated with delivery mode in this data set: compared with women exercising less than once a week, neither women exercising 1 to 4 times per week nor those exercising 5 times or more per week had an altered risk of cesarean [RR (95% CL) 0.89 (0.69, 1.15), 1.04 (0.66, 1.64), respectively, adjusted for parity, gestational age, hypertension]. Among 613 women delivering preterm, the results were also not statistically significant, but a compelling trend toward a protective effect could be seen [RR (95% CL) 0.65 (0.38, 1.13), 0.62 (0.29, 1.33)].

Conclusions—Maternal self-reported frequency of exercise during pregnancy was not associated with a reduced risk of cesarean delivery. Larger studies with better exposure ascertainment may provide a more definitive answer.

Keywords

physical activity; exercise; pregnancy; cesarean; labor outcome

Rates of cesarean delivery in the United States rose steadily throughout the 1980s and 1990s, prompting the Centers for Disease Control and Prevention to make reduction in the number of cesareans among low-risk mothers one of the goals of Healthy People 2010 (1). Unfortunately, since 2000, the rate of cesarean delivery has risen even more sharply, and is currently over 31 percent (2). This rate is of concern from a public health perspective because the procedure is not risk free. Available evidence suggests that although some of the

Corresponding Author: Marit L. Bovbjerg, Department of Epidemiology, University of North Carolina, Gillings School of Global Public Health, CB # 7435, McGavran-Greenberg Hall, Chapel Hill, NC 27599, kmarit@email.unc.edu.

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recent rise in cesarean deliveries results from the corresponding rise in maternal obesity (3), the increase in cesareans cannot be attributed entirely to a worsening of maternal or fetal risk profiles.(4-6) This suggestion implies that some of the cesarean sections performed each year in the U.S. may be medically unnecessary, exposing women and babies to risks without proved benefit.(7-8) Interventions aimed at reducing cesarean delivery rates should thus be a public health priority.

Physical activity has many known health benefits, including increased control in many chronic diseases (9,10); decreased risks of cardiovascular disease, diabetes, obesity, certain cancers, and hypertension (11); and improved mental health (12,13). Exercise during pregnancy in healthy women has been shown to reduce the risks of both gestational diabetes and preeclampsia, control weight gain, and maintain or increase fitness.(14-17) Both the American College of Obstetricians and Gynecologists and the Society of Obstetricians and Gynecologists of Canada currently recommend that in the absence of certain rare and well-defined complications, pregnant women should exercise for 30 minutes at a moderate intensity on most, if not all, days of the week.(18,19) However, it is estimated that fewer than 20 percent of eligible pregnant women currently meet these standards.(20)

Previous studies have suggested that an association may be shown between increased exercise during pregnancy and a decreased risk of cesarean delivery,(21-26), although other studies showed an increased risk (27) or reported mixed results.(28) Many of the results in previous studies were imprecise because sample sizes were small. None of the previous studies was population based, raising the possibility that selection bias contributed to the findings. Only one previous study addressed possible confounding in the analysis.(21)

This study examined whether or not an association existed between prenatal exercise and delivery mode, using data from the 2004 and 2005 North Carolina Pregnancy Risk Assessment Monitoring System (PRAMS) survey. These data represent an improvement over previous efforts because of the large, population-based sample.

Methods

PRAMS

The Pregnancy Risk Assessment Monitoring System (PRAMS) was initiated in 1987 by the Centers for Disease Control and Prevention, in response to concerns about a lack of progress in achieving infant mortality and low birthweight goals. The Centers for Disease Control and Prevention funds data collection, but data are collected separately by each state—currently, 30 states plus the District of Columbia participate in PRAMS. Data collection protocols are standardized, so data are comparable across states and over time.

The PRAMS collects data (via questionnaire) about risk factors before, during, and immediately after pregnancy from a random sample of women (1,300 to 3,400 women per state per year) who have recently given birth. Population groups at high risk of infant mortality or low birthweight are oversampled. Questionnaire data are then linked to birth certificates, and are used by researchers; by local, state, and national public health workers; and by government officials and agencies.

The questionnaire has two parts: the first part is a set of 56 core questions, asked by all states; the second part is a set of standardized questions from which individual states may choose if they wish to add to their own questionnaire. Thus, all states collect the core questionnaire data, which include topics such as attitudes and feelings about the most recent pregnancy, content and source of prenatal care, alcohol and tobacco use, physical or emotional abuse, pregnancy-related morbidity, infant health care, contraceptive use, and mother's knowledge of pregnancy-related health topics (e.g., folic acid, tobacco use). Each state also then collects additional data based on its own needs; additional questions are comparable across the states that use them because they are chosen from the standardized list. Additional topic areas that may be chosen by states include breastfeeding, supplement and/or medication use, social history and support, postpartum depression, physical activity, and use of assisted reproductive technology.

This analysis uses data from 2,230 women at risk of a primary cesarean section who participated in the 2004 and 2005 North Carolina PRAMS surveys, which included supplemental standardized questions about physical activity. According to the Centers for Disease Control and Prevention's data collection protocol, a pre-letter was mailed to sampled mothers, followed by an initial information packet with a questionnaire. For nonresponders, this packet was followed by an additional reminder letter, a second questionnaire, and finally a third questionnaire. Nonresponders to the third questionnaire were then contacted by telephone if possible, and the questionnaire was administered by means of a telephone interview.

Questionnaires and telephone interviews in North Carolina were available in both English and Spanish. Return of the questionnaire or completion of the telephone interview was considered consent to participate; this analysis using de-identified PRAMS data was approved by the Institutional Review Board at the University of North Carolina at Chapel Hill in North Carolina.

Exposure

Data on leisure-time exercise during pregnancy come from the questionnaire. The exact wording of the question is: "During the *last 3 months* of your most recent pregnancy, how often did you participate in any physical activities or exercise for 30 minutes or more? (For example, walking for exercise, swimming, cycling, dancing, or gardening.) Do not count exercise you may have done as part of your regular job." Four answer choices were offered: "less than 1 day per week"; "1 to 4 days per week"; "5 or more days per week"; and "I was told by a doctor, nurse, or other health care worker not to exercise."

The 275 women who reported being told not to exercise were dropped from this analysis, since their level of exposure was not measured, leaving 1,955 women. We *a priori* decided not to collapse any of the remaining three categories, since women who exercised less than once a week were considered essentially nonexercisers, and therefore were different from women who exercised at least once a week. On the other end of the spectrum, only those women who exercised for 5 days or more per week met the current American College of Obstetricians and Gynecologists guidelines for exercise during pregnancy (19); we thought it was important to keep these women separate.

Outcome

Delivery mode is available from the North Carolina birth certificate, where it is indicated as vaginal, vaginal birth after cesarean (VBAC), primary cesarean, or repeat cesarean. As mentioned above, this study included only those women at risk for a primary cesarean section. Therefore, it included all women in the North Carolina PRAMS sample from 2004 and 2005 whose delivery mode was a vaginal or primary cesarean; it did not include those whose delivery mode was VBAC or repeat cesarean.

Covariates

We examined several covariates, some of which were recorded on the birth certificates and some of which come from the PRAMS questionnaire. Covariates included gestational age/

preterm delivery; maternal education; frequency of prepregnancy physical activity (30+ minute bouts of exercise during the 3 months before pregnancy: <1 / week, 1-4 / week, ≥5 / week); parity; prepregnancy body mass index (BMI, kg/m^2); maternal age at delivery; hypertension (chronic, pregnancy-induced, preeclampsia, eclampsia); diabetes (preexisting or gestational); and pregnancy complications for which exercise is contraindicated (vaginal bleeding, incompetent cervix, placenta problems). These variables were chosen based on our reviews of the literature and understanding of the relevant physiology. We did not examine gestational weight gain as a covariate because it might be on the causal pathway.

Data analysis

We conducted bivariable analyses to examine crude differences among different levels of exposure. Continuous variables were compared with *t* tests (maternal age) or Wilcoxon rank sum tests (body mass index, gestational age); categorical variables with chi-square tests (or Fisher exact tests if any cell counts were <10).

We then used binomial regression to examine the association between frequency of exercise during the last 3 months of pregnancy and delivery mode while accounting for covariables, building the model using backward stepwise selection. Binomial regression was chosen because the outcome was relatively common (25%); therefore, odds ratios as estimated by logistic regression would not be accurate estimates of the risk ratio.

We *a priori* decided to stratify results based on whether or not the mother delivered preterm because of the exposure definition, which refers to exercise during the last 3 months of the pregnancy. Because physiologic changes are so rapid during pregnancy and timing of exercise has not yet been examined in relation to delivery mode, we thought it was important to separate term and preterm births. We also decided *a priori* to include gestational age in our final model as a continuous variable to control for residual confounding following stratification on preterm birth status (we would be unable to test gestation age reliably as a confounder because of collinearity with preterm birth status).

Covariables were chosen based on a directed acyclic graph (DAG) (29). All covariables were first assessed as possible effect modifiers by calculating crude risk ratios across categories of the modifier. Any variables whose stratified Mantel-Haenszel (log-rank) homogeneity test p value was ≤ 0.2 were considered effect modifiers (a relatively high p value was chosen because of sparse data in the upper level of exercise, which lowered power to detect heterogeneity). Frequency of exercise during the 3 months before pregnancy and the global contraindications to exercise variable met these criteria, and interaction terms were therefore included in initial models.

All other covariables were then tested as possible confounders. A confounder by definition must be associated with the exposure and causally related to the outcome. Thus covariables were evaluated for association (via a chi-square test or a Wilcoxon rank sum test, as appropriate) with both exposure and outcome; any covariable that was associated with both the exposure and the outcome at the level of $\alpha < 0.15$ was included in initial models as a confounder. A relatively high alpha was chosen to compensate for low power due to small numbers of women exercising 5 or more times per week. Variables that met this criterion were hypertension, parity, maternal education, diabetes, maternal age, and pregravid body mass index.

The initial model therefore included interaction terms between the exposure (frequency of exercise during the last 3 months of the most recent pregnancy) and frequency of exercise during the 3 months before that pregnancy, between the exposure and the global contraindications to exercise during the pregnancy variable, and between the exposure and preterm birth status. It also included as confounders gestational age, pregravid body mass index, parity, maternal education, and hypertension. Categorical variables were entered as nominal variables because there was no reason to assume linearity in the log risk; continuous variables (gestational age, pregravid body mass index) were allowed to depart from linearity via restricted cubic splines.

From the initial model, interaction terms were tested for significant contribution to model fit by means of analysis of deviance, beginning with the least significant term. A *p* value of 0.2 was used to allow for evidence of effect modification to surface despite small counts in some strata. Neither of the interaction terms tested (exposure/prepregnancy exercise, exposure/exercise contraindications) met this criterion, and both were dropped in subsequent models.

Potential confounders (including prepregnancy exercise and exercise contraindications, as interaction terms were dropped) were then tested for significant contribution to model fit using the same approach. Based on these results, the final model contained as confounders gestational age, hypertension, and parity; it contained preterm birth as an effect modifier. All analyses were conducted with S-Plus version 7.0 for Windows (30).

Results

During 2004 and 2005, 70 and 71 percent (respectively) of women contacted participated in the PRAMS surveys. The median gestational age for the women in our sample was 38 weeks (31% delivered preterm, defined as delivery before 37 completed weeks). The median maternal age at delivery was 27 years; the median pregravid body mass index for these women was 24 kg/m^2. Fifty-two percent of the women were primiparous; 29 percent had completed high school, 22 percent had completed some college, and 28 percent had completed 4 years of college.

The current American College of Obstetricians and Gynecologists recommendation for exercise during pregnancy among low- and moderate-risk women is 30 minutes on most days of the week (19). In these data, approximately 7 percent of women met this definition (Tables 1 and 2). Of those who did meet this definition (those who exercised ≥ 5 times/ week), 23.0 percent delivered by means of cesarean section, compared with 22.8 percent among those who exercised 1 to 4 times per week and 26.9 percent among those who exercised less than once a week.

Of the 1,955 women in our sample, 613 delivered preterm babies, and the remaining 1,342 women delivered at term. Characteristics of these women are shown in Tables 1 and 2. Among women delivering preterm, increased frequency of exercise during the last 3 months of pregnancy was associated (unadjusted analysis) with slightly longer gestations, lower parity, increased frequency of prepregnancy exercise, reduced prevalence of hypertension, and reduced prevalence of pregnancy complications for which exercise would be contraindicated (Table 1). In addition, among women delivering preterm, increased frequency of exercise during the last 3 months of pregnancy may be associated (unadjusted analysis) with lower pregravid body mass index, fewer cesarean deliveries, and fewer years of maternal education. Among women delivering at term, increased frequency of exercise during the last 3 months of pregnancy was associated (unadjusted analysis) with slightly longer gestations, younger maternal age, fewer years of formal education, lower parity, and increased frequency of prepregnancy exercise; increased exercise may also be associated with lower pregravid body mass index among women delivering at term (Table 2).

Results from the final model are presented in Table 3. As expected, risk of cesarean delivery decreased with increasing parity and was increased for those women who reported hypertensive complications of pregnancy. Among women delivering at term, frequency of exercise does not appear to be associated with delivery mode. Among women delivering preterm, the results are harder to interpret. Although not statistically significant, the point estimates suggest a strong trend toward a protective effect of exercise during pregnancy on the risk of cesarean delivery. However, the estimates are imprecise and we cannot rule out a harmful effect (compared with women exercising <1 time per week, neither women exercising 1 to 4 times per week nor those exercising 5 or more times per week had a statistically-significant change in cesarean risk: risk ratio [95% CI] 0.65 [0.38, 1.13], 0.62 [0.29, 1.33], adjusted for parity, hypertension, and gestational age).

Discussion

Previous studies have suggested the possibility of an association between increased frequency of exercise during pregnancy and a reduced risk of cesarean delivery, although these studies have methodological problems that limit their interpretation. These problems include small sample sizes (median sample size 131), selection bias, and inappropriate statistical methods. This study using PRAMS data included 1,955 women sampled at random from the population of all women in North Carolina who had recently given birth; several variables were available to include as effect modifiers or confounders. Although our study's larger sample size and better confounder control represent improvements over previous efforts, the results must be interpreted with caution, since PRAMS oversamples women at risk for infant mortality or low birthweight, thus somewhat limiting generalizability.

Our results suggest that there may be an association between frequency of prenatal exercise and delivery mode among women delivering preterm (although results were not statistically significant), but not among women delivering at term. This finding could be by chance, it could be a true difference in pathways leading to cesarean delivery among preterm births, or it could indicate that timing of exercise during pregnancy is important physiologically. We are unable to determine which of the three is correct, given the data; future studies should address timing of exercise in relation to gestational age at delivery.

Definitions of "exercise during pregnancy" have varied widely among studies on this topic. Some used self-identified "athletes," "runners," or "exercisers" (24, 26, 27); others used definitions involving intensity or frequency (21, 25, 28), and one was an intervention study (25). This study used the PRAMS survey, which asked women how frequently they exercised for 30 minutes or more during the last 3 months of their most recent pregnancy. Although our results indicate that perhaps prenatal exercise is associated with delivery mode among women who delivered preterm (Table 3), in neither stratum (preterm or term deliveries) was a dose-response relationship seen for the effects of exercising 5 or more times per week as opposed to exercising 1 to 4 times per week. This finding may be an artifact of low numbers in the 5 or more times a week stratum, or of poor exposure characterization, or a true lack of dose-response effect. Indeed, among preterm births in this study, it appears that a threshold effect is seen, rather than a dose-response relationship. We cannot comment on the appropriateness of the American College of Obstetricians and Gynecologists guidelines as they relate to delivery mode based on our data.

Future studies on this topic should use more detailed exposure data, including frequency, intensity, and duration of exercise, and also timing of the exercise in relation to gestational age as discussed above. Future studies should also incorporate data about household and occupational physical activity, since lack of this information is a limitation of PRAMS. Improvement in future efforts could be made by collecting physical activity data prospectively. Women in our study (who were questioned within 6 months postpartum) may not have recalled physical activity data from their most recent pregnancy entirely accurately; however, it is unlikely that they did so differentially based on delivery mode.

All studies to date (including ours) have used cesarean delivery as the outcome in a crude (binary yes/no) manner. In current clinical practice, a woman may have a cesarean delivery for any number of reasons, including previous cesarean, placenta previa, malpresentation, patient/provider choice (truly “elective”), labor dystocia, cephalopelvic disproportion, failure to progress, umbilical cord prolapse, or placental abruption. Prenatal exercise could affect a woman’s risk of cesarean delivery through many possible pathways. For instance, perhaps exercise reduces (or increases) the probability that a fetus will adopt a breech or transverse lie at term. In that case, cesarean deliveries because of malpresentation would be less (or more) likely. Perhaps women who exercise have stronger abdominal muscles, allowing them to be more efficient during the second stage of labor, thus reducing dystocia/disproportion/failure to progress cesarean deliveries. Exercise is known to improve self-efficacy; it may be that women who have increased self-efficacy are more likely to have a “can do” attitude toward labor, and therefore would be less likely to request an elective cesarean. Many more etiologies are possible to determine which prenatal exercise could affect delivery mode; lumping all outcomes together under “cesarean delivery yes or no” may not be the best way to address the question. Future studies should attempt to elucidate indication for cesarean section as a first step toward determining which biologic pathway(s), if any, is relevant.

Conclusions

Overall the body of literature in this field thus far is provocative, and when taken as a whole, suggests that exercise during pregnancy may be associated with a reduced risk of cesarean delivery (although results of our study suggest that this relationship may be limited to women delivering preterm). However, poor exposure and outcome ascertainment make synthesis of results difficult at best. Given the rapidly increasing rates of cesarean delivery (and their associated morbidities and mortality) in the United States, attempts to quantify all risk factors for cesarean section should be a high research priority. If the association between physical activity during pregnancy and cesarean delivery proves robust in future studies using more detailed exposure and outcome definitions, possible etiologies can be explored and intervention studies to determine causality could be conducted. If the association proves causal, encouraging pregnant women to exercise could represent a low-cost, low-risk approach to reducing the number of cesarean deliveries.

Acknowledgments

We would like to thank the North Carolina PRAMS Working Group and the Centers for Disease Control and Prevention.

Marit Bovbjerg received partial support from the National Institute of Child Health and Human Development, National Institutes of Health, Bethesda, Maryland, USA

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Table 1

Characteristics of women who delivered preterm, North Carolina PRAMS 2004-2005.

Characteristic		Overall (n=613)		Exposure Category[a] <1 / week (n=370)		1-4 / week (n=198)		≥5 / week (n=45)	
		No.	***(%)***	**number**	***percent***	**number**	***percent***	**number**	***percent***
Cesarean delivery									
	No	395	(64)	226	(61)	136	(69)	33	(73)
	Yes	218	(*36*)	144	(39)	62	(31)	12	(27)
Maternal education[b]									
	<12	123	20	72	20	36	19	15	33
	12	203	33	132	36	58	29	13	29
	>12	286	48	165	45	104	52	17	38
parity[c]									
	1:	328	54	185	50	121	61[d]	22	49
	2:	141	23	91	25	41	21	9	20
	3+:	144	24	94	25	36	18	14	31
prepregnancy exercise[e]									
	<1 / wk:	301	49	258	70	37	19[d]	6	13[d]
	1-4 / wk:	239	39	96	26	137	69	6	13
	≥5 / wk:	72	12	15	4	24	12	33	73
diabetes[f]									
	no:	529	86	315	85	174	88	40	89
	yes:	84	14	55	15	24	12	5	11
hypertension[g]									
	no:	427	70	245	67	143	73	39	89[d]
	yes:	180	30	122	33	53	27	5	11
exercise contraindications[h]									
	no:	405	66	230	62	141	71[d]	34	76
	yes:	208	34	140	38	57	29	11	24

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Characteristic	Overall (n=613)		Exposure Category[a] <1 / week (n=370)		1-4 / week (n=198)		≥5 / week (n=45)	
	No.	***(%)***	**number**	***percent***	**number**	***percent***	**number**	***percent***
	mean (SD)	median	mean (SD)	median	mean (SD)	median	mean (SD)	median
gestational age[i]	32.6 (3.8)	34	32.3 (3.9)	34	33.1 (3.5)	34[d,k]	33.1 (4.2)	34[d,k]
maternal age at delivery	26.8 (6.3)	26	26.8 (6.4)	26	26.9 (6.0)	27	26.1 (7.0)	25
pregravid BMI [m]	25.8 (7.0)	24.2	26.2 (7.0)	25	25.5 (6.9)	23.4	24.2 (6.7)	23.5

[a] frequency of 30+ minute bouts of physical activity during the last 3 months of the most recent pregnancy

[b] completed years

[c] PRAMS samples women who have recently given birth; therefore by definition the sample includes no nulliparous women

[d] significantly different than <1 / week, $p < 0.05$ (for categorical variables, the test is for the entire distribution)

[e] frequency of 30+ minute bouts of physical activity during the 3 months immediately prior to the most recent pregnancy

[f] self-reported presence of pre-existing or gestational diabetes

[g] self-reported presence of chronic hypertension, pregnancy-induced hypertension, pre-eclampsia, or eclampsia

[h] self-reported presence of vaginal bleeding, placental problems, or incompetent cervix at any point during the most recent pregnancy

[i] at birth, completed weeks

[k] the Wilcoxon rank sum test examines the distribution based on rank order; it is possible for the distributions to be different though the medians are the same

[m] body mass index, kg/m^2

Table 2

Characteristics of women who delivered full term, North Carolina PRAMS 2004-2005.

Characteristic		overall n=1342		exposure category[a] <1 / week n=692		exposure category[a] 1-4 / week n=552		exposure category[a] ≥5 / week n=98	
		No.	***(%)***	**number**	***percent***	**number**	***percent***	**number**	***percent***
Cesarean delivery									
	no	1,070	(80)	550	(79)	443	(80)	77	(79)
	yes	272	(20)	142	21	109	20	21	21
maternal education[b]									
	<12	284	21	137	20	110	19	37	38[c]
	12	358	27	190	28	141	26	27	28
	>12	697	52	362	53	301	55	34	34
parity[d]									
	1	681	51	332	48	301	55[c]	48	49
	2	361	27	187	27	152	28	22	22
	3+	300	23	173	25	69	18	28	28
prepregnancy exercise[e]									
	<1 / wk	549	41	423	61	108	20[c]	18	18[c]
	1-4 / wk	619	46	233	34	360	65	26	27
	≥5 / wk	172	13	36	5	82	15	54	55
diabetes[f]									
	no:	1208	90	622	90	499	90	87	89
	yes:	134	10	70	10	53	10	11	11
hypertension[g]									
	no:	1127	85	582	85	463	84	82	85
	yes:	203	15	101	15	87	16	15	15
exercise contraindications[h]									
	no:	1119	83	572	83	472	85	75	77
	yes:	223	17	120	17	80	15	23	23

Characteristic	overall n=1342		exposure category[a] <1 / week n=692		1-4 / week n=552		≥5 / week n=98	
	No.	***(%)***	**number**	***percent***	**number**	***percent***	**number**	***percent***
	mean (SD)	median	mean (SD)	median	mean (SD)	median	mean (SD)	median
gestational age[i]	39.0 (1.2)	39	38.8 (1.2)	39	39.1 (1.3)	39[c,k]	39.0 (1.3)	39
maternal age at delivery	27.1 (6.1)	27	27.4 (6.2)	27	27.0 (6.2)	27	25.5[c] (6.5)	25
pregravid BMI [m]	25.2 (6.1)	23.8	25.7 (6.4)	24.1	24.6 (5.5)	23.4	24.8 (6.5)	22.8

[a] frequency of 30+ minute bouts of physical activity during the last 3 months of the most recent pregnancy

[b] completed years

[c] significantly different than <1 / week, $p < 0.01$ (for categorical variables, the test is for the entire distribution)

[d] PRAMS samples women who have recently given birth; therefore by definition the sample includes no nulliparous women

[e] frequency of 30+ minute bouts of physical activity during the 3 months immediately prior to the most recent pregnancy

[f] self-reported presence of pre-existing or gestational diabetes

[g] self-reported presence of chronic hypertension, pregnancy-induced hypertension, pre-eclampsia, or eclampsia

[h] self-reported presence of vaginal bleeding, placental problems, or incompetent cervix at any point during the most recent pregnancy

[i] at birth, completed weeks

[k] the Wilcoxon rank sum test examines the distribution based on rank order; it is possible for the distributions to be different though the medians are the same

[m] body mass index, kg/m^2

Table 3

Risk of cesarean delivery, North Carolina PRAMS 2004-2005 (adjusted for gestational age).

Variable		RR[a]	95% CL[b]
Frequency of exercise during pregnancy[c]			
	<1 / wk	1.	--
	1-4 / wk	Preterm: 0.65	0.38, 1.13
		Term: 0.89	0.69,1.15
	≥ 5 / wk	Preterm: 0.62	0.29,1.33
		Term: 1.04	0.66, 1.64
Parity			
	1	1.	--
	2	0.58	0.46, 0.74
	3	0.61	0.45, 0.82
	4	0.52	0.33, 0.82
	5+	0.32	0.14, 0.71
Hypertension[d]			
	no	1.	--
	yes	1.69	1.39, 2.06

[a] Risk ratio.

[b] confidence limits

[c] self-reported frequency of 30+ minute bouts of exercise during the last 3 months of pregnancy

[d] self-reported presence of chronic hypertension, pregnancy-induced hypertension, preeclampsia, or eclampsia at any point during the most recent pregnancy.