On the Home Front:

Stress and Adverse Birth Outcomes for Military Families

Christina M. Gibson-Davis

Heather M. Rackin

Duke University

Geeta K. Swamy

Duke University Medical Center

Draft: Not for citation or circulation.

Objectives: To determine if the incidence of adverse birth outcomes among mothers affiliated with the military increased concurrent with United States' military actions in Afghanistan and Iraq.

Methods: Data come from North Carolina Detailed Birth Records, a database of live births that occurred between 1996 and 2006 (n = 1,215,300). Regression models estimated the odds of preterm (less than 37 weeks) and low birth weight (less than 2,500 grams) births associated with military mothers as compared to civilian mothers, for both non-Hispanic white and non-Hispanic black women.

Results: Among non-Hispanic blacks, the predicted probability of military mothers having low birth weight births in 1996 was 3.49%, 26% lower than the 4.69% probability for civilian mothers. By 2006, the predicted probability had risen to 4.75% for military mothers, a 36% increase. The civilian rate of low birth weight births, by 2006, actually decreased to 4.50%. Non-Hispanic white military mothers exhibited a similar pattern. There was no significant increase in the predicted probability of preterm births for military versus civilian mothers, regardless of race.

Conclusions: Stress associated with the United States' invasion of Afghanistan and Iraq may account for the increased rate of low birth weight seen among military mothers.

Background

Stress is associated with a myriad of health problems, including adverse pregnancy outcomes [1-12]. This relationship has been observed in various populations and persists even after controlling for factors such as sociodemographic characteristics, presence of social support, and obstetric risk [1-5, 7, 13]. Both acute and chronic stressors have health effects; however, the most influential stressors are those that are perceived as negative and major [14].

One example of a major stressor is military conflicts. Those who are deployed, as well as their family members left behind, face uncertainty, loneliness, a loss of instrumental support, and a change in family structure. The United States is currently involved in two military conflicts, which are likely to have profound effects on both military members and their families. These wars in Afghanistan and Iraq, the most intense military efforts since the Vietnam War, are especially stressful because of the prolonged conflict, the real possibility of death and injury, and the long duration of deployments. Indeed, an emerging literature has documented the negative consequences on these wars on the health and well-being of veterans and their families [15-17].

Pregnant women and their fetuses represent a population that may be particularly vulnerable to the stresses of war. Prolonged physiological responses to stress may lead to dysregulation of the autonomic nervous system and the hypthalalamic-pituitary-adrenal (HPA) axis, which in turn can lead to adverse birth outcomes.[18-20] Altered levels of pituitary hormones including oxytocin and prostaglandins can cause premature contractions and preterm birth.[21] Activation of the HPA axis can alter the immune system and increase a pregnant woman's susceptibility to infection and inflammation,[22] both of which are associated with preterm birth.[23] Furthermore, vasoconstriction can reduce uterine and placental perfusion which restricts fetal growth and infant birth weight.[24]

Previous studies on the effect of the Gulf War on pregnancy outcomes have had inconsistent findings. Although some showed an effect of Gulf War deployment on birth defects [25], miscarriages [26], and spontaneous abortion [27], other studies found no effect on adverse reproductive outcomes [28, 29]. While these previous studies focused on women actively engaged in military service, the spouses and partners of those left behind are also likely to suffer adverse effects. Since women comprise only 15% of active duty military personnel [30], the majority of women giving birth in military hospitals are military spouses or partners. These women encounter significant stresses due to loss of partner support and financial burden, which have been associated with adverse birth outcomes [2, 10, 31]. The lack of a close confiding relationship with a partner is associated with an increased risk for small for gestational age births[2] while not living with a partner is associated with a higher risk for preterm birth[8] and lower birth weight [10]. Additionally, women left behind have the added stresses of sole responsibility for managing the household and single parenthood as well as dealing with the continued worrying about the well-being of their loved one.

It is important to note that the Gulf War lasted less than two months and had fewer than 200 U.S. combat casualties [32]. The Afghanistan and Iraq Wars began in 2001 and have yet to end. As of October 1st 2008, based on Department of Defense reports, there have been 4,781 U.S. service members who have died in the current conflicts [33]. It is clear that the Afghanistan and Iraq Wars differ greatly from the Gulf War in their severity, duration, casualties, injuries, and presumably the levels of stress they inflict on military families. Thus, we expect to see more appreciable effects on military families and birth outcomes during the present conflicts than was seen in the Gulf War, with an increasing rate of adverse birth outcomes as the number of deployments and causalities rise during the war period. Therefore, we sought to determine if mothers affiliated with the military had an increase in preterm birth and low birth weight during the Afghanistan and Iraq Wars.

Data and Methods

This study examines the rate of low birth weight and preterm birth among military and civilian mothers in the State of North Carolina between 1996 and 2006. Data come from the North Carolina Detailed Birth Record Database (NCDBR) which compiles questionnaires obtained at the time of birth certificate filing for all live births in the state. The NCDBR contains maternal and paternal demographic information (such as age, race and ethnicity, educational attainment, delivery hospital, and maternal residence at time of delivery), as well as information on the mother's health status and behaviors (maternal complications, parity, use of tobacco) and newborn health (birth weight, gestational age).

North Carolina has a heavy military presence, with nine military bases including Fort Bragg, Camp Lejeune, Pope Air Force Base, Seymour Johnson Air Force Base, Simmons Army Airfield, USCG Air Station, Cherry Point Air Station, New River Air Station and Cherry Point Naval Air Depot. Births were counted as occurring in the context of the military if the mother gave birth at a military hospital or if she resided in one of the five zip codes associated with the military bases in North Carolina. Nearly 98% of the military births occurred in the context of a military hospital, while about 2% were not in a military hospital but the mother resided in a military-related zip code. The NCDBR does not contain information on the mother's military status, so the sample cannot be divided into women in the military versus those who are partners or spouses of military personnel. However, because only 15% of active military personnel are women, we assume that the majority of military pregnancies observed in our sample are to women whose husbands or partners are active military personnel.

Starting with 1,215,300 singleton births with no congenital anomalies that occurred between 1996 and 2006, less than .38% of the sample (4,600 cases) was deleted because of implausible values on the dependent variables. To best approximate the military population, cases were excluded if the mother was younger than 18 (55,193 or 4.54% of the sample) or foreign born (189,876, 15.62%). Relaxing either of these criteria and controlling for mothers under the age of 18 or nativity did not substantially affect the results of our analysis. Hispanics, Asians, or mothers of another race or ethnicity (189,912, 15.63%) were also excluded, as were a small number of cases (17,442, 1.44%) that were missing covariate data. Individuals were excluded if they fell into one or more of the previous categories. The final dataset used for this analysis was 930,575 (76.57% of original sample) black or white singleton births.

Logistic regression was used to model the two primary outcomes of interest: low birth weight (less than 2,500 grams) and preterm birth (less than 37 weeks gestation). The sample population was divided by self-reported race into non-Hispanic whites and non-Hispanic blacks. Maternal socio-demographic covariates included age [18-24 years (y), 25-29 y (referent category), 30-34 y, 35-39 y, or 40+ y], marital status (not married referent category), and educational level [did not complete high school, completed high school (referent category), attended some college, completed college or graduate training]. Maternal health factors included parity, initiation of prenatal care in the first trimester and frequency of prenatal care, tobacco use during pregnancy, and maternal complications (additional models included an adequacy of prenatal care index instead of a measure of when prenatal care began, but including this variable had little effect on the results). Maternal complications included diabetes, anemia, chronic or pregnancy-related hypertension, previous preterm or low birth weight birth, or other complication (this latter category included cardiac disease, acute or chronic lung disease, hemoglobinopathy, or renal disease; the incidence rate for each of these conditions separately was less than 1%). Measured paternal characteristics were if the father was of a different race or ethnicity than mother, age (measured continuously, in years), educational level (defined in same way as mother), and if the father's name was listed on birth certificate. A dummy variable was also included if paternal education was missing. Sex of the infant was also included with male as the referent category.

Logistic regression models included an interaction term between year of birth and being a military mother to measure if the effect on military birth outcomes differed over time. Preliminary analyses indicated better model-fit with the year term squared, indicating a curvilinear relationship between being a military birth and the year of birth. Coefficients from the logistic regression models were used to estimate the predicted probabilities of having a low birth weight or preterm birth, for both race groups and military versus non-military mothers. Predicted probabilities were preferable to odds ratios given that the model estimates a curvilinear relationship rather than a constant rate of change. Therefore, the year chosen to compare to the omitted year would vary, making it difficult to interpret the results. Predicted probabilities show the predicted likelihood of the outcome and can be readily compared to any other year or any other group. Standard errors in the regression models were adjusted for possible non-independence of observations within zip code using Huber/White standard errors. All analyses were conducted using the statistical package Stata. [34]

Results

The military and civilian samples differed demographically (see Table 1). At baseline, the military sample was more likely to be white, married, younger, and having their first child.

<< Table 1 about here >>

They also had a higher rate of high school completion (but not college), and they were less likely to use tobacco during the pregnancy. Father's education was higher for those affiliated with the military. Additionally, military mothers were less likely to have any maternal complications, but more likely to be anemic. Differences in demographic characteristics between the military and civilian samples remained relatively constant over the period of study.

Our regression results are presented in two figures, which illustrate the predicted probability of having a low birth weight birth (Figure 1) or of experiencing a preterm birth (Figure 2).

<< Figure 1 about here >>

<< Figure 2 about here >>

For each outcome, the sample is divided separately into Whites (Panel A) and Blacks (Panel B), with separate curves comparing the probabilities for military versus civilian mothers for the years 1996 to 2006, adjusted for covariates. The odds ratios for selected covariates (military birth, year of birth, military birth interacted with year of birth, and year of birth squared) are presented in Table 2.

As shown in Figure 1, for whites, when first observed in 1996, the probability of a military mother having a low birth weight birth was 0.99%, and the probability for civilian mothers was 1.36%. Both groups showed a decreasing likelihood of having a low birth weight infant until 2001, when the probabilities for military mothers increased markedly, rising by about 26% from 2001 to 2006 (this curvilinear relationship is evident by the significant year of birth coefficient in Table 2). The trend for civilian mothers continued to decrease, until slight increases in the years 2004, 2005, and 2006. Because the odds of adverse birth outcomes was increasing for military mothers while decreasing for civilian mothers, the probability of a civilian and military mother having a low birth weight birth was nearly identical by 2006, at 1.18% for military mothers and 1.21% for civilian mothers.

For blacks, in 1996, the rate of low birth weight birth was 3.49%, one-quarter lower than the 4.69% probability for civilian mothers. By 2006, the predicted probability had risen to 4.75% for military mothers, a 36% increase. The rate for civilian mothers, by 2006, had actually decreased slightly, to 4.50%. It is true that the trend for black military mothers was upward sloping throughout the ten year time period, with the non-constant relationship indicated by the significant year of birth squared term presented in Table 2. Noticeably, though, the biggest rises in the likelihood of having a low birth weight birth occurred from 2001 to 2006, when the probability increased 23.1% (it increased 10.6% from 1996 to 2001). The increase in low birth weight births for military mothers was so large that by 2006, the risk of having a low birth weight birth was actually higher for military mothers than for civilian mothers.

As was found for low birth weight births, black mothers were more likely to have a preterm birth than were white mothers. For both whites and blacks, the military trend in preterm births closely mirrors the civilian trend, with slight increases until 2003 or 2004, followed by slight declines.

In additional models, we limited the sample to mothers who had no maternal complications. The results were substantially the same. From this, we conclude that the results are not being driven by the changing incidence of maternal complications over time.

Discussion

This study has investigated if the rate of adverse birth outcomes for North Carolina women affiliated with the military increased concurrently with the wars in Afghanistan and Iraq. Before the wars, military mothers, both blacks and whites, were less likely than civilian mothers to have an adverse birth outcome. Since the beginning of military conflict in 2001, however, the relative gap between civilian and military mothers in the rate of low birth weight births decreased substantially. By 2006, white military mothers were almost as likely to have a low birth weight birth as were white civilian mothers; for blacks, the rate of low birth weight births was actually higher for military mothers than for civilian mothers. Notably, though, a similar effect was not found for preterm births. For both whites and blacks, there was no increase in the rate of preterm births over the period observed.

Though not directly observed in our data, we hypothesize that the increase in low birth weight births is because of the stress placed on military spouses. Major stresses, such as those caused by a loved one's deployment, have been well-documented as having an adverse effect on birth outcomes [2-5, 7, 13, 35-39]. The absence of a spouse may be particularly critical, as having a supportive partner has been correlated with improved birth outcomes [2, 10, 31]. When coupled with the logistical and financial strains of deployment, women whose partners are deployed in war may be particularly vulnerable to the effects of stress [40].

It is unclear why we found an effect of the war on low birth weight and not preterm birth. Our findings are consistent with Wadhwa et al. [1] who found that low birth weight, but not preterm birth or gestational age, was associated with stressful life events. It is possible that life stress affects pregnant women and fetuses in different ways. For example, acute stress that directly and acutely influences the mother may lead to contractions and preterm labor without affecting placental perfusion and thus the weight of the newborn. Contrarily, chronic stress that influences and impairs placental function may directly interfere with the fetus' development and growth leading to smaller newborns.

We cannot rule out that there is some unmeasured factor which explains the previous findings, such as a change in the composition of the military. For example, if more unhealthy individuals and their partners were more likely to enroll in the military during wartime, then that would explain the increase in adverse birth outcomes. To address this concern, we restricted the sample to mothers with no maternal complications and found similar results to those presented. A second composition change refers to socioeconomic status. If during wartime those affiliated with the military are more likely to have low socioeconomic status which is associated with adverse birth outcomes, then we could expect more adverse birth outcomes during war years as opposed to pre-war years. If this was true, we would expect to see a decline in the years of education completed (a measure of socioeconomic status) for those having a military birth over time. However, there was actually a slight increase in the years of education for women affiliated with the military over the study period. Other demographic characteristics, such as race and ethnicity, remained relatively constant over our study period.

While use of the NCDBR provides a large sample size over a 10-year time span for analysis, we cannot directly examine or prove that increased stress due to the wars in Iraq and Afghanistan accounted for the worsening birth outcomes found for military mothers. Nevertheless, based on previous literature about the dangers of chronic and prolonged stress and the lack of social and instrumental support, we hypothesize that military mothers face a unique set of circumstances that may result in increased levels of psychosocial stress, decreased support, and many related life changes.

Though the armed forces offer a wide variety of programs to military families, our results suggest that the military may consider implementing screening programs focused on pregnant women. Identification of women who are at a particularly high risk for depression or anxiety would allow for additional logistical support to this vulnerable group. No social program or service will be able to completely compensate for a war-time deployment, but the potentially negative effects may be mitigated if pregnant mothers are provided with additional supports during this critical time for both themselves and their children.

REFRENCES

1. Wadhwa PD, Sandman CA, Porto M, Dunkelschetter C, Garite TJ. The Association between Prenatal Stress and Infant Birth-Weight and Gestational-Age at Birth: A Prospective Investigation. American Journal of Obstetrics and Gynecology 1993;169(4):858-865.

2. Mutale T, Creed F, Maresh M, Hunt L. Life Events and Low-Birth-Weight: Analysis by Infants Preterm and Small-for-Gestational-Age. British Journal of Obstetrics and Gynaecology 1991;98(2):166-172.

3. Khashan AS, McNamee R, Abel KM, Pedersen MG, Webb RT, Kenny LC, et al. Reduced Infant Birthweight Consequent Upon Maternal Exposure to Severe Life Events. Psychosomatic Medicine 2008;70(6):688-694.

4. Pagel MD, Smilkstein G, Regen H, Montano D. Psychosocial Influences on New Born Outcomes: A Controlled Prospective-Study. Social Science & Medicine 1990;30(5):597-604.

5. Williamson HA, Lefevre M, Hector M. Association between Life Stress and Serious Perinatal Complications. Journal of Family Practice 1989;29(5):489-494.

6. Newton RW, Hunt LP. Psychosocial Stress in Pregnancy and Its Relation to Low-Birth-Weight. British Medical Journal 1984;288(6425):1191-1194.

7. Dole N, Savitz DA, Hertz-Picciotto I, Siega-Riz AM, McMahon MJ, Buekens P. Maternal Stress and Preterm Birth. American Journal of Epidemiology 2003;157(1):14-24.

8. Nordentoft M, Lou HC, Hansen D, Nim J, et al. Intrauterine Growth Retardation and Premature Delivery: The Influence of Maternal Smoking and Psychosocial Factors. American Journal of Public Health 1996;86(3):347.

9. Hedegaard M, Henriksen TB, Sabroe S, Secher NJ. Psychological Distress in Pregnancy and Preterm Delivery. British Medical Journal 1993;307(6898):234-239.

10. Ramsey CN, Abell TD, Baker LC. The Relationship between Family Functioning, Life Events, Family-Structure, and the Outcome of Pregnancy. Journal of Family Practice 1986;22(6):521-527.

11. Reeb KG, Graham AV, Zyzanski SJ, Kitson GC. Predicting Low-Birth-Weight and Complicated Labor in Urban Black-Women: A Biopsychosocial Perspective. Social Science & Medicine 1987;25(12):1321-1327.

12. Berkowitz GS, Kasl SV. The Role of Psycho-Social Factors in Spontaneous Preterm Delivery. Journal of Psychosomatic Research 1983;27(4):283-290.

13. Sable MR, Wilkinson DS. Impact of Perceived Stress, Major Life Events and Pregnancy Attitudes on Low Birth Weight. Family Planning Perspectives 2000;32(6):288-294.

14. Thoits P. Stress, Coping, and Social Support Processes: Where Are We? What Next? . Journal of Health and Social Behavior 1995(Extra Issue):53-79.

15. Hotopf M, Hull L, Fear NT, Browne T, Horn O, Iversen A, et al. The Health of Uk Military Personnel Who Deployed to the 2003 Iraq War: A Cohort Study. The Lancet;367(9524):1731-1741.

16. Gibbs DA, Martin SL, Kupper LL, Johnson RE. Child Maltreatment in Enlisted Soldiers' Families During Combat-Related Deployments. JAMA 2007;298(5):528-535.

17. Vasterling JJ, Proctor SP, Amoroso P, Kane R, Heeren T, White RF. Neuropsychological Outcomes of Army Personnel Following Deployment to the Iraq War. JAMA 2006;296(5):519-529.

18. Chrousos GP, Gold PW. The Concepts of Stress and Stress System Disorders: Overview of Physical and Behavioral Homeostasis. JAMA, The Journal of the American Medical Association 1992;v267(n9):p1244(9).

19. Sandman CA, Wadhwa PD, Chicz A, Dunkel-Schetter C, Porto M. Maternal Stress, Hpa Activity, and Fetal/Infant Outcome. Annals of the New York Academy of Sciences 1997;814(Neuropeptides in Development and Aging):266-275.

20. Goland RS, Jozak S, Warren WB, Conwell IM, Stark RI, Tropper PJ. Elevated Levels of Umbilical Cord Plasma Corticotropin-Releasing Hormone in Growth-Retarded Fetuses. J Clin Endocrinol Metab 1993;77(5):1174-1179.

21. Quareto H, Fry C. Placental Corticotropin Releasing Factor May Modulate Human Parturition. Placenta 1989;10:439-43.

22. Jemmott JB, Locke SE. Psychosocial Factors, Immunologic Mediation, and Human Susceptibility to Infectious Diseases: How Much Do We Know?. [Article]: Psychological Bulletin January 1984;95(1):78-108.

23. Creasy RK, Gummer BA, Liggins GC. System for Predicting Spontaneous Preterm Birth. Obstetrics & Gynecology 1980;55:692-5.

24. Teixeira JMA, Fisk NM, Glover V. Association between Maternal Anxiety in Pregnancy and Increased Uterine Artery Resistance Index: Cohort Based Study. British Medical Journal 1999;318(7177):153(1).

25. Kang H, Magee C, Mahan C, Lee K, Murphy F, Jackson L, et al. Pregnancy Outcomes among U.S. Gulf War Veterans: A Population-Based Survey of 30,000 Veterans. Annals of Epidemiology 2001;11(7):504-511.

26. Unit GWIR. Health of Uk Servicewomen Who Served in the Persian Gulf War: Results of the King's College Survey
into the Health of Military Personnel. In: Conference on Federally Sponsored Gulf War Veterans' Illnesses Research; 1999; Washington, D.C.; 1999.

27. Rajab KE, Mohammad AM, Mustafa F. Incidence of Spontaneous Abortion in Bahrain before and after the Gulf War of 1991. International Journal of Gynecology and Obstetrics 2000;66(1):139-144(

28. Cowan DN, DeFraites RF, Gray GC, Goldenbaum MB, Wishik SM. The Risk of Birth Defects among Children of Persian Gulf War Veterans. New England Journal of Medicine 1997;336(23):1650-1656.

29. Penman AD, Traver RS, Currier MM. No Evidence of Increase in Birth Defects and Health Problems among Children Born to Persian Gulf War Veterans in Mississippi. Military Medicine 1996;161(1):1-6.

30. Bureau USC. Women's History Month: March 2006. In: Facts for Features: U.S. Census Bureau; 2006.

31. Norbeck JS, Anderson NJ. Psychosocial Predictors of Pregnancy Outcomes in Low-Income Black, Hispanic, and White Women. Nursing Research 1989;38(4):204-209.

32. Presidential Advisory Committee on Gulf War Veterans' Illnesses. Washington, D.C.: Government Printing Office; 1996.

33. Defense USDo. Operation Iraqi Freedom (Oif) U.S. Casualty Status Fatalities Operation Enduring Freedom (Oef) U.S. Casualty Status as of October 1, 2008, 10 A.M. Edt. In: Office of the Assistant Secretary of Defense (Public Affairs); 2008.

34. StataCorp. Stata Statistical Software: Release 10. In. College Station, TX: StataCorp LP; 2007.

35. Ahluwalia IB, Merritt R, Beck LF, Rogers M. Multiple Lifestyle and Psychosocial Risks and Delivery of Small for Gestational Age Infants. Obstetrics & Gynecology 2001;97(5, Part 1):649-656.

36. Dominguez TP, Schetter CD, Mancuso R, Rini CM, Hobel C. Stress in African American Pregnancies: Testing the Roles of Various Stress Concepts in Prediction of Birth Outcomes. Annals of Behavioral Medicine 2005;29(1):12-21.

37. Dooley D, Prause J. Birth Weight and Mothers' Adverse Employment Change. Journal of Health and Social Behavior 2005;46(2):141-155.

38. Gorsuch RL, Key MK. Abnormalities of Pregnancy as a Function of Anxiety and Life Stress. Psychosomatic Medicine 1974;36(4):352-362.

39. Hedegaard M, Henriksen TB, Secher NJ, Hatch MC, Sabroe S. Do Stressful Life Events Affect Duration of Gestation and Risk of Preterm Delivery? Epidemiology 1996;7(4):339-345.

40. Haas DM, Pazdernik LA, Olsen CH. A Cross-Sectional Survey of the Relationship between Partner Deployment and Stress in Pregnancy During Wartime. Women's Health Issues 2005;15(2):48-54.

TABLES

Table 1: Means and Standard Deviations, North Carolina Detailed Birth Record Database
By Race and Military Status, 1996

	Blacks		Whites	
	Military	Civilian	Military	Civilian
Pregnancy Outcomes				
Low birth weight	.08	.12	.03	.05
Preterm	.08	.13	.05	.07
Demographics				
Education				
Mother	13.1	12.6	13.2	13.4
	(1.51)	(1.8)	(1.73)	(2.26)
Father	11.4	7.6	12.8	12.4
	(4.31)	(6.36)	(2.77)	(4.15)
Age				
Mother	25.4	25.3	24.9	27.5
	(4.81)	(5.59)	(4.56)	(5.52)
Father	24.3	19.3	25.5	28.3
	(9.44)	(14.25)	(6.32)	(9.3)
Father different race	.21	.42	.13	.11
Married	.81	.35	.96	.85
First Birth	.42	.37	.49	.45
Maternal health				
Mother smoked	.03	.12	.12	.18
Prenatal care visits	13.71	11.75	12.98	13.36
	(5.48)	(4.52)	(4.72)	(3.52)
Any maternal complication	.20	.17	.12	.13
Diabetes	.03	.03	.03	.03
Anemia	.09	.03	.05	.01
Chronic hypertension	.01	.02	.00	.01
Pregnancy hypertension	.07	.06	.04	.06

Previous low birth weight	.02	.02	.01	.01
Other maternal complication	.01	.03	.01	.02
Sample size	*706*	*20,902*	*2,451*	*56,664*

Standard deviations are in parenthesis.

Table 2: Logistic Regressions of Low Birth Weight and Preterm Births Over Time for Military and Civilian

	LBW OR (95% CI)		Preterm OR (95% CI)	
	Black	White	Black	White
Military Birth	.735***	.722***	.702*	.728**
	(.639, .846)	(.614, .850)	(.520, .948)	(.581, .910)
Year of Birth	.996	.990***	1.000	1.006**
	(.990, 1.003)	(.985, .995)	(.995, 1.005)	(1.002, 1.009)
Mil X Year Interaction	1.037 **	1.031**	1.010	1.007
	(1.010, 1.065)	(1.009, 1.053)	(.973, 1.050)	(.993, 1.022)
Year of Birth Squared	1.002*	1.006***	.999	.998**
	(1.000, 1.004)	(1.004, 1.007)	(.998, 1.001)	(.997, .999)
Observations	*250,684*	*679,878*	*250,684*	*679,878*

FIGURES

Figure 1

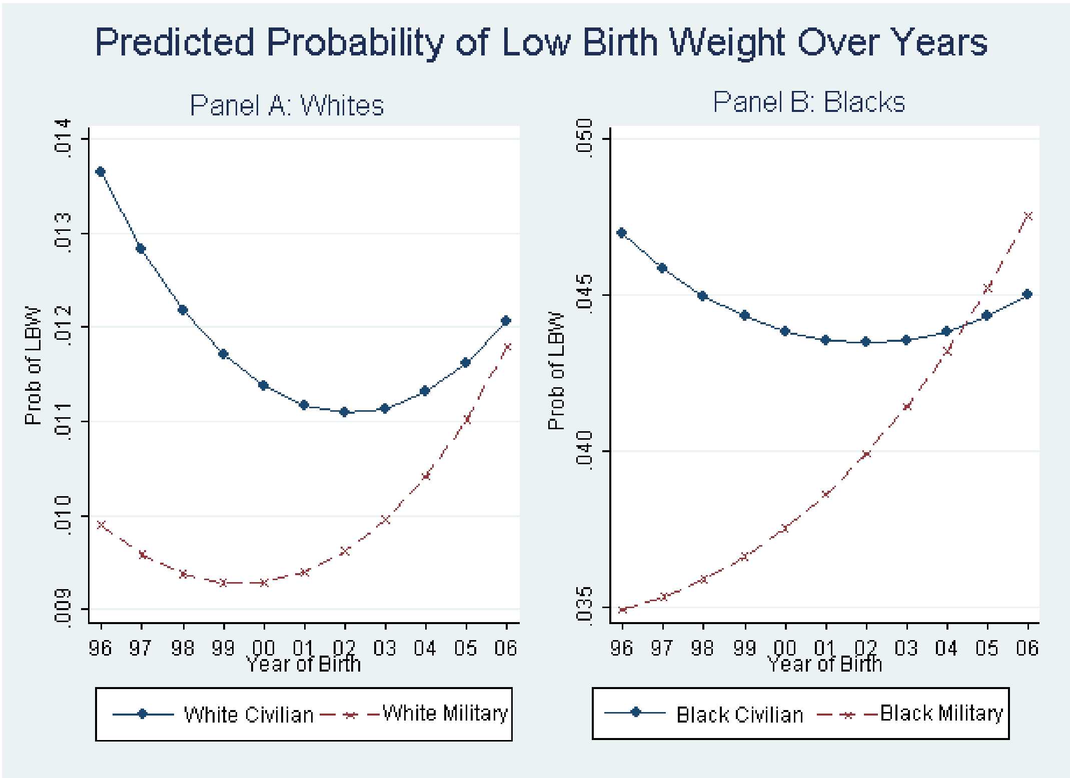
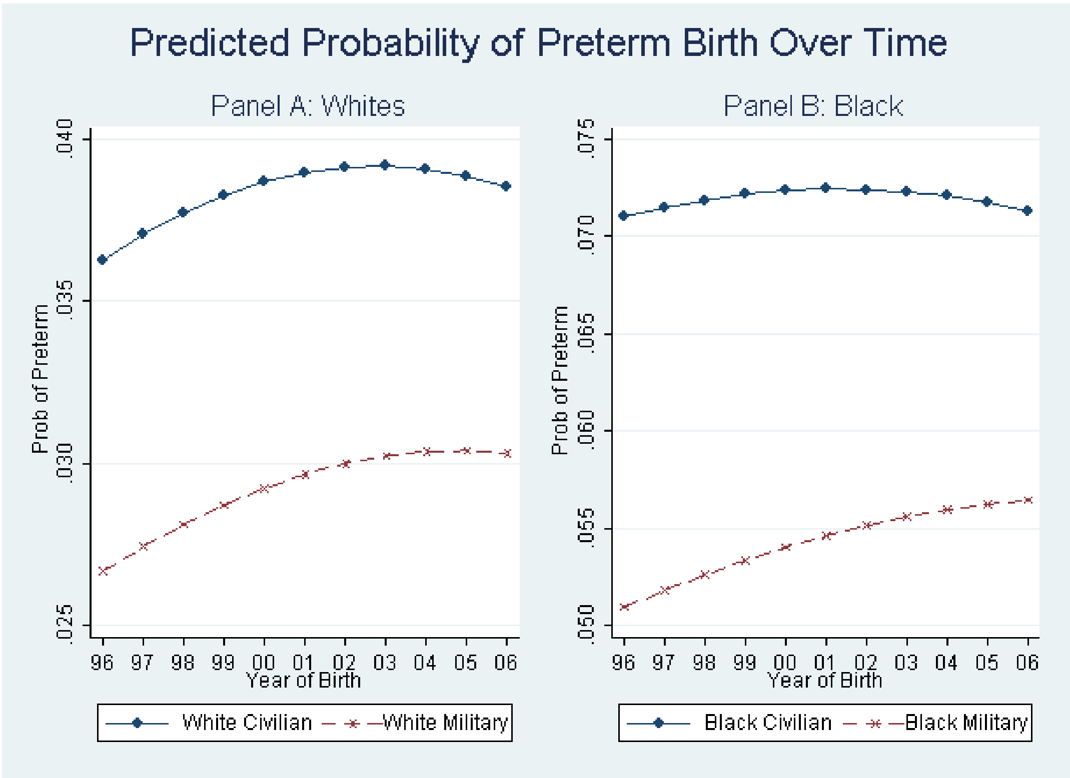


Figure 2



Predicted Probability of Preterm Birth Over Time
Panel A: Whites
Panel B: Black
Prob of Preterm
.025
.030
.035
.040
.050
.055
.060
.065
.070
.075
96 97 98 99 00 01 02 03 04 05 06
Year of Birth
White Civilian
White Military
Black Civilian
Black Military