# *Race and Preterm Births: A Protective Effect of the Military?*

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## *Introduction*

Although U.S. infant mortality has decreased over the past two decades, racial disparities in mortality rates have widened. African American babies are now 2.4 times more likely to die than white babies, up from 2.1 in 1983 (NCHS 2005). The primary cause of high infant mortality rates in the U.S. is complications associated with preterm delivery, such as low birth weight (NCHS 2009). And non-Hispanic black infants are twice as likely as non-Hispanic white children to be born preterm (Reagan and Salsberry 2005), and two times more apt to be underweight (Hogan and Feree 2001; MMWR 2002). Among infants who survive, such birth conditions can lead to long-term health and developmental challenges, causing continued racial disparities among children and adults. For example, low birth weight is associated with substantially higher risks of respiratory disorders and asthma, illness, poor vision, cerebral palsy, and reduced cognitive functioning (Boardman et al. 2002; Hack et al. 2002; Elo and Preston 1992).

For these reasons, prematurity and low birth weight are major public health concerns in the Unites States. Closing this birth weight gap has been identified as a primary health objective by the U.S. government (U.S. Department of Health and Human Services 2000); however, there remains substantial debate over the source of racial differences in these outcomes. Of hundreds of studies, none have been able to fully explain why African American infants have such high preterm and low birthweight rates.

It is likely that this stubborn gap in black-white infant health disparities reflects pervasive race inequality that is still present in 21st-century American life. This paper identifies a unique control group, Non-Hispanic blacks serving in the U.S. military, to re-examine the role of racial inequality in preterm birth outcomes. We look at the military as a rare environment where racial marginalization is considerably lessened in an attempt to understand how social environment can mitigate something as critical as infant wellbeing. Using the Pregnancy Risk Assessment Monitoring System (PRAMS) data, we examine how the structural conditions of military service may impact births among non-Hispanic whites and non-Hispanic blacks compared to their civilian counterparts. We find that the probability of an early preterm birth (less than 32 weeks) *is cut in half* for black women associated with the U.S. military, when compared to civilian black women. There appears to be a much lessened protective effect of the military service for white women.

***Literature Review***

Socioeconomic and behavioral factors have been implicated in the risk of low birth weight outcomes, although they often times have more predictive power among white women than black women (Cramer 1995; Berg, Wilcox and d'Almada 2001). When adjustments are made for differences across racial populations on a wide range of maternal characteristics, such as education, income, use of prenatal care, adverse health behaviors, marital status, and maternal age, the racial disparity in infant outcomes is still only partially explained (Berg et al. 2001; Hummer 1993; Hummer et al. 1999; Schoendorf et al. 1992; Sastry and Hussey 2003). In fact, in some analyses the risk of black low birth weights even increases when socioeconomic risk factors are lessened (Collins et al. 2004). It is likely that conventional socio-demographic measures inadequately capture the full range of inequality experienced by African Americans. For instance, Medicaid coverage in an understaffed and under-resourced inner city medical center is unlikely to provide the same quality prenatal care as that located in a suburban white community with a higher tax base. And income and education measures ignore the much more extreme racial differences in accumulated wealth, for example (Oliver and Shapiro 1997). Furthermore, the numerous pathways through which racially segregated conditions in poor neighborhoods impact birth outcomes have only recently begun to be explored (Buka et al. 2003; Morenoff 2003; Reagan and Salsberry 2005; Culhane and Elo 2005). Some researchers have begun exploring whether the inability to fully explain racial disparities in birth outcomes may stem from physiological or genetic differences (Wilcox and Russell 1986; Ven den Oord and Rowe 2000, 2001). A specific maternal gene said to be responsible for lowering birth weight (Hocher et al. 2000) occurs in Africans and African Americans more frequently than it does in whites (Siffert et al. 1999), and has been speculated to be the cause of continuing racial disparities in infant mortality (Ven den Oord and Rowe 2000). Genetic-based approaches, while gaining in popularity, have been controversial for reifying taxonomical classifications in the face of evidence that genetic variation is insignificantly patterned along racial lines (Frank 2001). In fact, research comparing birthweight between U.S. whites, U.S. blacks, and foreign-born blacks has found that race disparities are largest for native-born African Americans and concluded that race-differences are thus pathological rather than physiological (Kramer et al. 2006). On the other hand, there is a more subtle vein of research that considers the complex interplay between environmental conditions and biological responses. For example, there is growing attention given to the temporary intergenerational transfer of environmental influences. It has been argued that the hazardous impact of the slavery system on African American health may last several generations before dying out. Poor nutrition for multiple generations in the antebellum South may have caused "fetal programming," effects which may have lasted into subsequent generations today (Jasienka 2008). But the fact that the reproductive health risks of black immigrants increase over the length of residency in the U.S., whereas white immigrants retain their reproductive advantage (Culhane et al. 2002) indicates that structural inequalities unique to U.S. society are largely to blame.

A potentially promising avenue of research focuses on maternal stressful exposures and their physiological consequences (Giscombe and Lobel 2005; Culhane et al. 2002; Wadhwa et al. 2001). Chronic stress is linked to physiological outcomes like increased risk of infection, instability of the autonomic nervous system, and decreased uterine artery blood flow. This approach has been applied to the experience of racial discrimination and its impact on health outcomes, potentially offering additional insights on factors that contribute to racial disparities in birth outcomes and infant mortality. Although this literature has identified stronger associations between discriminatory experiences and mental health outcomes (Paradies 2006; Williams and Williams-Morris 2000; Kessler, Mickelson and Williams 1999), poor physical health outcomes have also been noted in some studies (Brondolo et al. 2003; La Veist, Sellers and Neighbors 2001; Tull et al 2001; Clark 2000). Of 27 analyses of the relationship between racism and low birth weight, 15 have shown positive associations, while 12 have shown no association (Paradies 2006). In one case-control study, self-reports of discrimination over the lifetime, as opposed to experienced just during the pregnancy, were significantly linked to adverse birth outcomes among African American infants (Collins et al. 2004). Such results support the "Geronimus weathering hypothesis," the theory that repeat exposure to adverse economic and social conditions over the lifetime leads to worsening health outcomes as the individual ages. The weathering hypothesis is based on findings showing increased incidence of low birth weight with advanced maternal age for black women but not for white women (Geronimus 1996). Furthermore, when isolated to women who have experienced cumulative disadvantage, the weathering effect applies to white women as well, even though their overall risk of low birth weight was still lower than for black women (Geronimus 2003). Some challenges that these types of studies are the difficulty of measuring subjective experiences, as well as pinpointing the physiological process through which prejudice exposure translates into physical outcomes. One way around this issue is to locate a place where the subjective experiences of race relations have been reported to be, on the whole, quite positive. We suggest the U.S. military.

***Making a Case for the U.S. Military Setting***

Marginalized socioeconomic conditions faced by African Americans in U.S. society are still ubiquitous enough so that locating similar populations of blacks and whites is challenging. For this reason the military environment is a useful counter-control to civilian society because large differences in social status, health, and economic well being across the races are notably mitigated there. In the military, prenatal healthcare is excellent and universal, residential and occupational racial integration is unusually high, economic inequality is linked to rank rather than race, and racial discrimination is considerably lessened—a confluence of conditions largely absent in the civilian world.

Within the Department of Defense (DoD), full health care coverage for service personnel and their families is part of the constellation of benefits provided to all active duty members. This includes prenatal care, and is an important departure from civilian life in that access to the same quality health care is available for all military members and their families, regardless of their race or income level. In addition to being universal, the quality of military health care has been found by civilian review boards to be very high (Rawlings and Weir 1992; OMB 2007).

Importantly, the military setting is also associated with other exceptions to normal conditions of race stratification in larger society. Racial inequality is substantially reduced in the armed forces due to the four following conditions: (1) an emphasis on racially integrated work and living environments; (2) top-down enforcement of equal opportunity policies; (3) a social hierarchy explicitly built upon rank rather than class and race; and (4) a disproportionately large African American population (Sampson and Laub 1996; Mare and Winship 1984; Moskos 1993; Moskos and Butler 1996). Furthermore, even though higher socioeconomic status does not shield even civilian middle-class blacks from segregated neighborhoods and schools (Jargowsky 1997; Massey and Denton 1993), lower quality health care (Institute of Medicine 2003), or from the cumulative experience of everyday acts of discrimination (Feagin and Sikes 1994), an additional counterfactual condition of the military is its well-known racial integration of living and working spheres. Black enlistees are three times more likely to say that race relations are better in the military than in civilian life; and whites are five times more likely to say so (Moskos and Butler 1996). Perhaps the best indication of greater racial equality in the military is that interracial marriage is more than double the civilian rate (Jacobson, Jacobson and Heaton 2003). In military surveys, black women and black men report higher job satisfaction and overall higher quality of life than any other group in the service (Lundquist 2008). It is not surprising then to find that some racial disparities and outcomes common among the civilian population do not apply to those in military service, even after taking the selectivity of military enlistment into account (Lundquist 2004a, 2004b, 2006, 2007). As such, it is of interest to evaluate whether improved birth outcomes are associated with the military environment.

The literature on African American reproductive outcomes has made it clear that macrolevel conditions can make entire subpopulations vulnerable to individual level risk factors (Culhane et al. 2002) But because current understandings of the complex interplay of these macrolevel factors remain so limited, and because controlling for the experience and impact of racism is so difficult, the military itself may serve as a proxy for this type of measurement given that race stress is likely to be lower there. African American soldiers and their spouses report significantly lower levels of economic stress and life dissatisfaction in the military compared to their lives as civilians before joining the military (Lundquist 2008). Stress stemming specifically from the experience of racial discrimination is also likely to be lower in the military based on surveys indicating that military members perceive racism to be less of a problem in the military (Moskos and Butler 1996). One drawback, however, is that military service is not a life long process, which means that Geronimus' weathering process has potentially already been in effect at least until age 18 when most enlistees join the military. On the other hand, the impact of weathering on low birthweight outcomes appears to be most intense by age thirty, and the average black soldier is only in his or her mid-twenties. An ideal population to examine would be children born to career military personnel who spent the first 18 years of their life in this type of environment, but we unfortunately have no way to identify such individuals in our data. In any case, we can assume that the military environment, while not necessarily able to reverse the build-up of allostatic load, may at least provide a reprieve from conditions leading to high maternal stress. While the military is in many ways a perfect setting in which to isolate some of the conditions associated with healthier birth outcomes, it is also has its own set of institution-specific stressors. As might be expected, military personnel and their families face very high levels of stress during war time due to deployment and just the anticipation of being deployed. Our data enable us to identify births occurring before and after the beginning of the Afghanistan and Iraq wars so that we can take this factor in consideration. But even in peacetime, military families are still subject to stressful family separation and frequent relocations. Our dataset allow us to take this into account with its Stressful Life Events module, which measures emotional, partner-related, and moving-related stress.

Military jobs tend to be more physically demanding than the average civilian job. There is mixed evidence that physical exertion leads to preterm deliveries (Mamelle et al., 1984), and more recent analyses find a positive correlation between exercise and healthy birth outcomes (Donahue and Starr 2009; Evenson et al., 2002). It is important to note that the DoD reassigns pregnant servicewomen to more sedentary desk jobs and relocates those stationed in remote locations (or at sea) to areas with access to prenatal medical care.

Finally, there is the fact that the military screening process selects for healthier recruits. Could this create a spurious relationship between better birth outcomes and military service? While the military health exam and the physical fitness test screens for minimally fit individuals[1], they do not necessarily select for *reproductively* fit people. Furthermore, we employ controls for pre-pregnancy health, like body mass index, diabetes, and hypertension measures. In addition, since

[1] Physical demands vary greatly across the military branches. Generally recruits must pass a standard physical exam by a doctor and perform a fitness test that involves running some distance ("walking is authorized but highly discouraged"), sit-ups and push-ups (low performance is if the recruit does less than ten repetitions of each exercise). http://www.physicallytrained.com/fm21-20/physical-fitness-training/army-physical-fitness-test.shtml)

women serving in the military cannot take part in combat, they are not subject to the same combat physical readiness criteria as men are.

***Other Military Studies***

Despite the benefits of diminished socioeconomic stratification and racial discrimination in the military setting, few studies have examined birth outcomes there. This is largely due to the fact that soldiers and their families, an institutionalized population, are left out of most survey samples as a matter of course. Two studies, however, have been able to utilize linked birth and death records for military hospitals. The first examined birth records for Army dependents at a Washington hospital and found that African American infant mortality rates were lower than average, and that there was no difference by officer or enlisted ranks (Rawlings and Weir 1992). The second study examined records from California military hospitals from 1985 and 1990 and found that racial disparities in low birth weight and infant mortality were considerably lessened than those among civilians, but still not obviated (Barfield et al. 1996). Another study among enlisted Army women found no black-white difference in preterm delivery among late-preterm gestations but differences at younger gestational age groups (Adams et al. 1993). A fourth paper, which used North Carolina birth records and identified military personnel by base zip codes, found that while there was still a gap between military black and white birth outcomes, the rates of low weight and preterm births were significantly reduced in the military population (Gibson-Davis 2009). They also found that the military advantage in healthier birth weights disappeared after the outbreak of wars in Iraq and Afghanistan.

These four studies consistently indicate promising reductions in poor infant health outcomes among the black military population; however, a drawback is that they are largely descriptive and most have been limited to military-specific populations. This analysis utilizes the rich individual, household, and state-level data collected by PRAMS to explore how the military context may mitigate conditions normally experienced by African American civilians. Controlling for important individual-level variation, like maternal socioeconomic status and household characteristics, we comparatively analyze the role of maternal health, medical coverage, risk behaviors, mental stress, previous birth outcomes, and prenatal care in the military relative to the civilian world in assessing poor infant health outcomes. Additional strengths of this paper include being able to extend the analysis to both civilians and military populations across multiple states and military branches, and to cover an expanded and more recent time period.

***Data and Methods***

The Pregnancy Risk Assessment Monitoring System (PRAMS) data derive from a multi-state survey which collects information from civilians and non-civilians by mail on an expansive array of maternal characteristics prior to conception, during pregnancy, and following the birth. Thirty states participate in PRAMS and sample respondents are drawn annually from state birth certificate records to take the survey. The PRAMS sample is constructed using stratified random sampling, with oversamples of minorities and women prone to adverse birth outcomes. (For more information on the data sampling methodology, see http://www.cdc.gov/prams/methodology.htm.) Women usually fill out the survey between 2 and 6 months after the baby was born. Response rates are high, at about 76%, and survey non-response is followed up with a phone call (Shulman et al. 2006 ). We use PRAMS data for phases 3, 4 and 5, which covers births over a ten-year period occurring from 1995 through 2005.

What makes this data unusual is the fact that military birth data is not only included, but the survey design allows us to identify it as such. The Center for Disease Control (CDC) granted our request to flag births linked to military hospitals. Although not all the states in our data have military hospitals with delivery services, we were able to identify additional military births based on survey answers to health insurance coverage that indicated DoD coverage (TRICare and Champus).[2]

Although the PRAMS program provides better data on the subject matter at hand than any other available dataset, there are nevertheless some limitations. The data are not nationally representative of all U.S. military and civilian births, as only thirty states participate in the PRAMS program. Another drawback is that too few of the states collect specific occupational data about the parents for inclusion in the analyses, leaving us unable to differentiate between births to female soldiers as opposed to those of wives and daughters (dependents) of U.S. service personnel. To reduce the likelihood of capturing non-soldiers in our subsample, we omit from the analyses all women who have no high school degree, have no health insurance, and who are younger than 18 (since one must have a diploma and be 17 in order to enlist (with parental permission) and because all enlistees are insured). This does not rule out all military dependents, but does reduce their presence in the subsample. Nonetheless, it is arguable that family members of soldiers are still more insulated from the day-to-day forces of racial stratification by virtue of their husband's or father's employment with the military and integrated living circumstances. However, it would have been useful to evaluate whether birth outcomes fall along a continuum based on military exposure, from African American civilians, to daughters of service personnel, to military wives, and finally to active duty females who experience the full effect of military exposure. In any case, not being able to distinguish whether mothers are soldiers or married to one will bias findings in the direction of underestimation of the role of the military in attenuating preterm births, rather than overestimation.

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[2] Not every PRAMS state survey collects insurance information in the same way. Some states did not ask about military-specific insurance in every phase. This means that we are able to identify military association for many women in the dataset, but not all. Women who gave birth in a year where military insurance status was not collected for certain states are therefore treated as civilians, even though they may be associated with the military. This potentially biases the data; however, it will *underestimate* the effect of the military on birth outcomes, a bias that we believe makes the study more rigorous despite the data drawbacks.

In recent years, the military has allowed women with military insurance to deliver in civilian facilities, although most still elect to use military hospitals (Harriot, Williams and Peterson 2005). A potential limitation is if there is selection bias where one race may be more or less likely to deliver outside the military hospital system (for example, if certain women are very high risk and deliver at a major medical center). But because we also have data on military insurance regardless of whether the mothers deliver in a civilian hospital or a military hospital, we ran sensitivity analyses to gauge how salient this potential bias may be. A final drawback is that from 2001 to the present the military has been involved in military engagements abroad. The possibility that data observations made during wartime are biased by higher possible exposure to emotional and physical stressors cannot be ruled out (again, this would at least underestimate the otherwise mitigating effect of military service on poor infant outcomes, rather than overestimate them). Nor can potentially biased response rates due to increased deployments or moves of dependents out of state be ruled out. We do, however, use measurements to control for pre and post war births, as well as different types of maternal stress.

The strength of the PRAMS dataset, however, clearly outweighs its weaknesses. The PRAMS data are uniquely suited for the proposed research design, being the only questionnaire to contain large enough samples of military births alongside comparable civilian births. It is a significant improvement over standard birth and death record data because it has a rich array of individual and household-level variables. And it is the first data available with a rich array of pre-pregnancy and prenatal risk and stress measures that can be used to look at military women.

Although low birth weight is the most commonly been used as a proxy for preterm birth, the Institute of Medicine has designated it a poor surrogate for preterm birth, and advocates that more studies use gestational age when available (Behrman 2007). Our basic analytic strategy takes advantage of the fact that the PRAMS data collects gestational age information and we model preterm births. We estimate a multinomial logistic model predicting the odds of having an early preterm birth (less than 32 weeks), a later preterm birth (between 32 and 36 weeks), or a full term birth (37 weeks and later). We run two models: the first compares non-Hispanic black military women to non-Hispanic black civilian women and the second compares non-Hispanic white military women to non-Hispanic white civilian women. We seek to understand whether, and to what extent, there is a protective effect of the military on the incidence of preterm births among both groups of women. These models will also tell us whether the known covariates of poor infant health outcomes for white military women compared to white civilians are similar or different from those for black military women and black civilian women.

We restrict our sample population to singleton births and, in an attempt to reduce the number of military dependents in our military subpopulation, as well as to make our military and civilian populations more comparable, we exclude all women who: are less than 18, have no high school degree, and who have no health insurance. The PRAMS data allow us to control for the role of a wide array of contextual characteristics that might impact poor infant health outcomes. In the analyses that follow we explore the effect of parental demographics, socioeconomic status, current and previous pregnancy characteristics, prenatal care, and maternal health and maternal stress, many of which were measured before and during the pregnancy.

*Data & Bivariate Analyses*

Table 1 shows the sample subpopulations and variables we use for our controls in the regressions. Without these variables, which adjust for selectivity of military status in subsequent regression models, it could plausibly be argued that any reductions in poor infant health outcomes are due to the military screening regimen rather than anything specific to the military environment itself. The data is subdivided into four columns. The leftmost columns show non-Hispanic blacks (n=967) and whites (n=3,042) affiliated with the military and the rightmost columns show non-Hispanic black (n=16,846) and white civilians (n=66,401). Because all our military women are 18 or older, have health insurance, and have a high school diploma, we adjusted the civilian data accordingly, so that they are more evenly matched with the military data on these characteristics. But for this reason, the comparison civilian sample underestimates how selectivity of military service alone creates sample characteristics that are less likely to lead to high risk birth outcomes, and so we show the original group of all civilians in Appendix 1 for reference

--Table 1 about here--

We exclude Latinos from our black and white sample mainly because preterm birth for Latinos (broadly defined) is low and equivalent to that of non-Hispanic whites. It is true that some Latina subpopulations, like Puerto Ricans, experience high infant mortality; however, we cannot identify such Hispanic subpopulations in the PRAMS data.[3] And while studies have shown that babies of black-white couples (Parker 2000) and foreign born blacks (Kramer et al. 2006) have generally better health outcomes than single-race or native-born black babies, neither mixed-race ethnicity nor nativity status is available in the standard PRAMS survey. Finally, we exclude multiple births from the analysis, since they are more likely to be preterm (CDC 2007).

Table 1 is grouped into five clusters of variables that are associated with birth outcomes: socioeconomic status, preconception health factors, prenatal care, pregnancy health factors, and mental health/stress characteristics.[4]

<u>Socioeconomic Status</u>

Infant mortality, prematurity, and low birth weight are highly correlated with socioeconomic status (Kramer et al. 2000). To that end the PRAMS data provide important direct and indirect

[3] Although Native American infant mortality is also quite high, the number of Native American births in the sample is too small for analysis.

[4] We do not introduce controls for labor complications because it over-controls for the outcome prediction, since the same factors predicting preterm births just as readily predict high risk labor. Briefly, there are no differences across the subpopulations on birth certificate reports of whether there were delivery or labor complications. About 83% of all births occurred without any such complications. Babies born with some kind of birth defect were rare, but appear to be most common among black military women, occurring among 3% of their births.

measures of economic stability, such as educational attainment, household crowding, welfare status, Medicaid receipt, and marital status.[5] Comparing across military women and their civilian comparison group (refined civilians), the Table shows that many more civilian women than military women have a college degree. College educated mothers generally experience better infant health outcomes (Schoendorf et al. 1992). White women in the data, regardless of military affiliation, are generally more highly educated. When compared to their same-race civilian peers, military women are about half as likely to have a college degree. Just as the military population has no members without a high school degree, this too is an artifact of military structure. Only commissioned officers have a college degree and the military maintains a very low officer-to-enlisted ratio. Yet, in comparing military members to the civilian population at large (see Appendix 1), it becomes clear that, by virtue of military screening requirements, military women are positively select at the lower end of the educational spectrum. Twenty-six percent of black civilian women and 12% of white civilian women lack a high school degree, compared to 0% of military women.

Welfare and Medicaid receipt are indicators of low income level and poverty, and both correlate to adverse birth outcomes (MMWR Report 2002; Cramer 1995). We include dummy variables for whether the mother received either of these types of assistance during her pregnancy. Welfare is defined in PRAMS as receiving Temporary Assistance for Needy Families (TANF), welfare, WIC, public assistance, general assistance, food stamps, or Supplemental Security Income. Black military women have lesser need for financial assistance than black women in the civilian world, with less than half as many on welfare and only a quarter as many on Medicaid. Whites overall have less welfare and Medicaid uptake, and the difference between white military and civilian

[5] PRAMS does not have adequate income information and we are not able to use income in our analysis. Income is commonly an unreliable variable in survey data, and it is further compromised here by the fact that PRAMS collected no one standardized income question, but rather left the wording and the salary brackets up to each state.

women is much less distinct than it is for black women. While it might be surprising that military women receive any public assistance at all, there is a small percentage of single mothers whose income level and number of children still qualify them for assistance, primarily in the form of WIC receipt.

In addition, we use a household crowding measure as another proxy for poverty. Households with large numbers of children have higher resource demands, and thus are also linked to poverty and higher infant mortality rates (Hummer et al. 1995). This variable is a ratio measure, which we created by dividing the number of rooms in a household by the number of people living there. The lower this variable, the more crowded the living conditions. The PRAMS data indicate that there is no difference between black and white military women (crowding in the military would not be affected by barracks since military personnel with offspring live outside of barracks). Black civilian women, however, live in more crowded households than white civilian women, a difference that is accentuated in the full population shown in Appendix 1.

As a final indication of socioeconomic status, we also control for marital status. Nonmarital childbearing is a predictor of poor infant health largely because it reflects inadequate household resources and disadvantage (Singh and Yu 1995; Eberstein, Nam and Hummer 1990). Table 1 shows that marital childbearing is much more common in the military than outside of it, and this is particularly true for black women. Almost 80% of black military mothers were married at birth, compared to 47% of black civilian women. Differences in marital status are even more pronounced when looking at the full spectrum of civilian women instead of the more selective civilian population shown in Table 1, with 50% fewer married black civilian women and 17% fewer married white civilian women (Appendix 1).

<u>Preconception Factors</u>

The next grouping of variables measures the mother's preconception characteristics as indications of her overall health and risk-taking behaviors prior to becoming pregnant, all of which are correlated with preterm and low weight births. Given the association between risky behaviors, such as alcohol consumption and especially cigarette smoking (Chomitz, Cheung and Lieberman 1995; Naimi et al. 2003), we incorporate controls measuring binge drinking and smoking.[6] Here we focus on whether such risk behaviors occurred in the three months prior to the conception. On these measures there are more race similarities than differences across military-civilian status. Two to four percent more black women than white women report ever having binge drunk in the three months before to their pregnancy. But in so far as smoking, black women are less than half smoked pre-pregnancy than whites. White military women are slightly more likely than white civilian women to have smoked.

We also include a variable indicating whether the mother was taking prenatal or multi-vitamins in the month prior to pregnancy. Fewer white military women report doing so than white civilian women, and there is no difference between black women. Overall, though, white women are more likely than black women to take vitamins.

The mother's weight prior to conception is also measured in this variable grouping. Slightly more military whites than military blacks were underweight, and slightly more military blacks were obese. When looking at whether women in the military tend to be of healthier weights than their non-military same race counterparts, the military environment seems to be more protective for black women than white women. Eleven percent fewer military black women were obese prior to conception, whereas four percent more white women in the military were overweight.

[6] Binge drinking is defined as five drinks or more at any given time. We do not use smoking frequency, but whether or not someone smoked. Women's reports of whether they smoked or not are accurate in the PRAMS, but the number of cigarettes smoked per day are less so (Carmichael et al. 2000).

Parity does not vary much across the four subpopulations in Table 1, except for the important fact that military blacks are about half as likely to be having a high order birth compared to civilian blacks ($4^{th}$ birth or higher). Generally black military women are on their second or third birth, while white military women are slightly more likely to be on their first.

Prenatal Care

Access to, quality of, and timing of prenatal care is an important predictor of infant health outcomes (Alexander and Korenbrot 1995; Hummer 1993). We control for this dimension of preterm risk with an Adequacy of Prenatal Care Utilization index (developed by Kotelchuk 1994), which divides the respondent's total number of prenatal visits by the number of visits suggested by the American College of Obstetricians and Gynecologists (ACOG), adjusted for the trimester timing of those visits. The index ranges from 1 to 4, where 1 is inadequate (at less than 50% of expected visits), 2 is intermediate (at 50%-79%), 3 is adequate (at 80%-109%), and 4 is adequate plus (at 110% or more of expected visits). Our data show that even in the military where healthcare is universal and free, black military women's prenatal care is underutilized relative to white military women. Four percent more black military women fall into the inadequate category and 7% fewer fall into the adequate plus category. Still, the prenatal care utilization gap is more narrowed than that between black and white civilians. The difference the military makes for black women's prenatal care is more obvious when looking at the full sample of black civilians in Appendix 1. Twelve percent more black women in the military fall into the adequate or adequate plus dimensions of prenatal care utilization. For white women, however, prenatal care utilization and adequacy is slightly lower for white military women than white civilians.

Pregnancy Factors

Maternal health is a powerful determinant of infant outcomes. We control for drinking and smoking behaviors during the pregnancy, maternal age, diabetes, hypertension, pregnancy weight gain, and previous birth characteristics (if any). Teenage births are associated with poor birth outcomes (Fraser et al. 1995), as are births occurring at older ages (Fretts et al. 1995). In addition, the weathering hypothesis predicts that low birth weight is most prevalent for black women at advanced maternal ages (Geronimus 1996). Given the age structure of military service, it is not surprising that, compared to civilians, large majorities of military women fall into the 20-29 birth age category, the healthiest ages for reproduction. Correspondingly, fewer military women have their babies at older ages compared to civilians, again, a component of the age structure of military service. Interestingly, the incidence of teen births (because of our selective sample in Table 1, this only includes ages 18 and 19) is lower than the civilian average for black women in the military, but higher for white women in the military.

Drinking and smoking are especially detrimental for fetal health. Comparing frequencies of binge drinking and smoking behaviors during the last trimester of the pregnancy, Table 1 shows that binge drinking is very rare across all the groups of women. In so far as smoking, fewer black women than white women smoked in both military-civilian comparison groups.

Pregnant women who are underweight and/or who have poor nutrition tend to have preterm births and below average weight babies (Goldenberg and Culhane 2007). We control for underweight pregnancies with a dichotomous (0 or 1) weight gain adequacy measure that considers the recommended pregnancy weight based on the mothers' pre-pregnancy body mass index. There are no racial differences in this measure; however, it is notable that between 6%-7% fewer military women gain the full weight they should.

Some medical conditions during pregnancy are important to take into account, since they can lead to preterm births. Two of these are diabetes and hypertension, which we consider in our analysis. Table 1 shows that, while hypertension and diabetes are generally rare, diabetes is halved among military blacks compared to civilian blacks.

For those who have given birth before (between 50%-60% of the sample), past pregnancy characteristics and pregnancy interval lengths are predictors of subsequent pregnancy outcomes (Rawlings, Rawlings and Read 1995). Previous low birth weight and spacing of less than 2 years between births are associated with low birth weight and preterm births. The data in Table 1 indicate that black women, regardless of military status or civilian status, are more likely than white women to have had a baby with low birth weight in the past. Since the data do not provide information on military timing, we are unable to determine whether these births occurred before or during women's association with the military. (The average stint of military service is one term, a period between 2 and 6 years.) It also appears that, for white women, birth intervals are shorter in the military than in civilian society. Military blacks have similar birth spacing as civilian blacks, although when compared to the full sample of blacks (Appendix 1) they have longer periods of spacing between births.

Finally, this section of Table 1 also lists the gender of the baby and the year in which it was born. Male infants are more likely than girls to be born preterm (Cooperstock and Campbell 1996). Table 1 shows that there is no difference across the PRAMS subpopulations on the baby's gender, nor is there any difference in the average year in which babies were born across the surveys (2001).

<u>Mental Health/Stress</u>

Evidence in the literature links reports of high stress levels during pregnancy to higher risks of very low birth weights (Sable and Wilkinson 2000). To gauge the full spectrum of potential stressors, we use information on whether the mother's pregnancy took place before or after military engagements had begun in Afghanistan and Iraq (for military women), whether the mother reported the pregnancy was mistimed, and stress levels during the twelve months before birth.

One study has shown that the incidence of low birth weight increased among military mothers during wartime, although no such effect was found for preterm births (Gibson-Davis

2009). Table 1 shows that equal numbers of black military women and white military members had their pregnancies prior to the outbreak of war. We define pre-war as being pregnant before October 2001, when the United States invaded Afghanistan.

PRAMS respondents were asked whether they became pregnant before they were ready, on time, or too late. Table 1 shows the percentages of women whose pregnancies were reported as mistimed (either too late or too early). When comparing by race, majorities of black women are more likely than white women to report mistimed pregnancies. Mistiming is reduced among the black military subpopulation compared to civilians, but slightly increased among the white military women compared to civilians.

We divide stress levels into five types, all of which occurred during the 12 months before birth. Emotional stress includes reports where a family member had been sick or if a family member or a friend had died. Financial stress includes if the respondent or their partner had lost a job or if they couldn't pay bills. Partner-related stress is if there was marital conflict, separation or divorce, or if the partner hadn't wanted the baby. Traumatic stress includes reports of homelessness, having had a physical fight, incarceration of respondent or partner, and a drinking or substance abuse problem for someone close to them. The Abuse stress measure accounts for whether the mother experienced physical vioelnce from her partner and/or from someone other than their partner. Relocation stress measures stress related to changing residence. One difference that is especially notable is the fact that black military women have such low reported financial stress compared to civilians. Most of the remaining stresses are similar across military and civilian groups, although they are slightly higher for white military women than white civilian women. The one exception, where black and white military women report very high levels of stress, is when it comes to relocating their residence, a well known and frequently occurring event in the lives of military families. Overall, black women as a whole report more stress than white women, but the differences are less in the military environment. Reduced stress associated with the military for black women is particularly pronounced when comparing to the full civilian population in Appendix 1.

In sum, the descriptive data support our assertion that the incidence of preterm birth among black women will be improved in the military environment. The relationship between the military and preterm births is less clear, however, for white women. The overall pattern emerging in Table 1 is that black military women are better off than black civilian women along a variety of dimensions. These are the more socioeconomically selective civilian women; when comparing to the *average* black civilian population (Appendix 1), it is fair to say that they are far more advantaged. We tend to find the opposite effect with white women, who are, on average about the same or even slightly worse off than their comparison white civilian group. However, when compared to the *average* white population (Appendix 1), they too are (slightly) more advantaged. Thus, it appears that compared to same-race civilians, military blacks are much more positively select than are military whites. Despite this, when considering the white and black subpopulations directly, comparisons show that whites are still more advantaged than blacks. Their advantage is notably reduced in the military setting. How might these factors affect the incidence of preterm birth? Figure 1 shows that, before any of these factors are controlled for, preterm births are highest for black civilian women and lowest for white military women.

--Figure 1 about here—

Based on the characteristics shown in Table 1, it is not surprising that the gap between civilian and military blacks in the incidence of preterm births is greater than that between the white groups of women. Fewer black military women than black civilian women had a preterm birth, and this is particularly true of births earlier than 32 weeks, the more life-threatening type of early birth. Even so, black women in the military are still more prone to giving birth too early than either white civilians or white military women. In the multivariate analyses that follow, we analyze the race-specific gap in preterm births among military and civilian women to understand how the covariates from Table 1 might be influencing the trends shown in the Figure.

*Multivariate Analyses*

Tables 2 and 3 show abbreviated results from a nested series of multinomial models which gauge the effect of military status on the likelihood of 1) early preterm birth versus a full term birth and 2) late preterm birth versus a full term birth. We run our analyses in a series of nested sub-models which consecutively gauge the role of 1) socioeconomic status 2) basic demography 3) prenatal care 4) maternal physical health 5) previous birth characteristics (if any) 6) risk behaviors 7) mental stress 8) labor characteristics on the likelihood of preterm birth. For ease of interpretation, we focus on the military coefficient and how its association with preterm births is affected as each grouping of covariate controls are added into the model. In subsequent models (Table 4 and 5) we expand our focus to the role of each of these control variables in order to understand how the military environment differs from the civilian context in mediating preterm birth outcomes.

--Table 2 and 3 about here--

Table 2 analyzes the subpopulation of black women while Table 3 analyzes the white subpopulation. Focusing first on Table 2, it is clear that there is an association between military affiliation and the reduced probability of early preterm birth for black women, as shown at the top of the table. There is no such relationship, however, for late preterm births, even though the direction of the effect is also negative (bottom half of the table). Inclusion of the various groupings of control variables mediate the relationship between military status and the prevalence of early preterm births only to a certain extent. Before multivariate controls, black military women are 45% less likely (e.g. (1-exp(-0.59) than civilian black women to have a premature birth that occurred before 32 weeks of gestation. The magnitude of this effect does not reduce very much even as more covariates are added into the model; however, its statistical significance weakens slightly upon the inclusion of socioeconomic status characteristics. Once all of the variables are included remains an unexplained gap between black civilian and black military women in the incidence of early preterm births. Black military women are still about half as likely as black civilian women to have an early preterm birth.

Turning to Table 3, we explore whether this same military effect holds for white women. It turns out that it does, but more weakly. Early preterm births, shown at the top of the page, are no less likely among white military women than white civilian women, although the direction of the military coefficient remains negative throughout the addition of the variable clusters. There is, however, a protective association with the military for white women when it comes to the likelihood of late preterm births, shown at the bottom of the page. White military women are about 19% (e.g. (1-exp(-0.21) less likely than white civilian women to have late preterm births. This relationship is marginally significant (at $p<.10$) and gains slightly in strength and statistical significance upon the addition of controls for prenatal care adequacy.

Tables 2 and 3 suggest that there is protective effect of the military in reducing early preterm births, the higher risk category of premature births, for black women and later preterm births for white women. The attenuation of preterm births among military women is only somewhat explained by the contextual data. Why is there a stronger protective effect for black military women than white military women? This may be because, while prenatal and health care, for example, are measured in the PRAMS data, racial discrimination is not. We have no controls per se for heightened racial equality, racial integration, or lessened racial discrimination, and therefore the coefficient for military affiliation itself may have to stand in as a default proxy for such conditions.

Because early preterm births are notably less prevalent among blacks in the military and late preterm births are less common among white women in the military, it is of interest to assess how the predictors of such births may vary in the military compared to among civilian women. Table 4 looks at black military women and black civilian women separately and shows just the early preterm birth vs. full term birth model results. Table 5 shows the same results for whites, but for late preterm birth vs. full term birth model results.

--Table 4 about here--

**Note: Table 4 & 5 Analyses, discussion section and conclusion section currently underway!**

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## Table 1. Military & Equivalent Civilian Births: Weighted PRAMS DATA 1995-2000

| | Military | | Civilian | | |
|---|---|---|---|---|---|
| | Black | White | Black | White | Sig Diff |
| *n* | N=967 | N=3,042 | N= 16,846 | N= 66,401 | Key |
| **Socioeconomic Status** | | | | | |
| Education: | | | | | |
| College degree | 14% | 27% | 23% | 45% | a b c d |
| Associates degree | 42% | 33% | 35% | 27% | a b c d |
| High school degree | 44% | 40% | 42% | 28% | a b d |
| No high school degree | 0% | 0% | 0% | 0% | |
| On Welfare | 9% | 5% | 20% | 4% | a b c d |
| On Medicaid | 10% | 4% | 38% | 11% | a b c d |
| Household Crowding | 0.982 | 0.974 | 0.907 | 0.971 | b c d |
| Married | 79% | 94% | 47% | 89% | a b c d |
| **Preconception Factors** | | | | | |
| Binge Drank Pre-Pregnancy | 14% | 10% | 13% | 11% | a b d |
| Smoked Pre-Pregnancy | 9% | 24% | 10% | 21% | a b d |
| Multivitamins Before Pregnancy | 57% | 66% | 57% | 71% | a b d |
| Underweight | 10% | 14% | 9% | 14% | a b c |
| Overweight | 15% | 14% | 16% | 11% | b d |
| Obese | 20% | 16% | 31% | 18% | a b c d |
| Parity: | | | | | |
| first birth | 40% | 47% | 40% | 43% | a b d |
| second/third birth | 53% | 46% | 50% | 50% | a c d |
| fourth birth or higher | 6% | 7% | 10% | 6% | b c |
| **Prenatal Care** | | | | | |
| PNC Inadequate | 11% | 7% | 14% | 5% | a b c d |
| PNC Intermediate | 10% | 11% | 9% | 8% | b d |
| PNC Adequate | 35% | 33% | 31% | 36% | a b c d |
| PNC Adequate Plus | 43% | 50% | 45% | 51% | a b c d |
| **Pregnancy Factors** | | | | | |
| Maternal Age | | | | | |
| <20 | 5% | 7% | 9% | 3% | b c d |
| 20-29 | 70% | 63% | 53% | 45% | a b c d |
| 30-35 | 17% | 22% | 23% | 33% | a b c d |
| 36-39 | 7% | 7% | 11% | 16% | b c d |
| 40+ | 0% | 1% | 2% | 2% | a b c d |
| Binge Drank During Pregnancy | 0% | 0% | 0.010% | 0.15% | c d |
| Smoked During Pregnancy | 4% | 9% | 5% | 10% | a b c d |

| | | | | | |
|---|---|---|---|---|---|
| Weight Gain Adequate | 41% | 42% | 48% | 48% | c d |
| Hypertension While Pregnant | 7% | 7% | 6% | 5% | b d |
| Diabetes While Pregnant | 2% | 3% | 4% | 3% | a b c |
| Previous preterm birth | 9% | 5% | 9% | 5% | a b |
| Interval between births <2yrs | 14% | 17% | 14% | 15% | a b d |
| Male Birth | 50% | 51% | 50% | 51% | |
| Timing of Birth: | | | | | |
| Year | 2000.9 | 2000.9 | 2001.1 | 2001.1 | d |

***SIGNIFICANCE KEY:*** *a where sig diff ≤.05 between black military and white military*
*b where sig diff ≤.05 between black civilian and white civilian*
*c where sig diff ≤.05 between black civilian and black military*
*d where sig diff ≤.05 between white civilian and white military*

| **Weighted PRAMS DATA** | **Refined Military** | | **Refined Civilian** | | **Sig Diff** |
|---|---|---|---|---|---|
| | **Black** | **White** | **Black** | **White** | Key |
| **Mental Health/Stress** | | | | | |
| Took place post-War | 51% | 52% | -- | -- | |
| Not pregnant on time | 65% | 51% | 70% | 49% | a b c d |
| Emotional Stressors | 35% | 34% | 36% | 32% | b d |
| Financial Stressors | 25% | 21% | 42% | 22% | a b c |
| Partner-related Stressors | 45% | 30% | 47% | 24% | a b c d |
| Traumatic Stressors | 19% | 12% | 20% | 11% | a b d |
| Relocation Stressors | 54% | 58% | 32% | 30% | a b c d |
| Abuse Stressors | 42% | 36% | 42% | 34% | a b d |

***SIGNIFICANCE KEY:*** *a where sig diff ≤.05 between black military and white military*
*b where sig diff ≤.05 between black civilian and white civilian*
*c where sig diff ≤.05 between black civilian and black military*
*d where sig diff ≤.05 between white civilian and white military*

Table 2: PRAMS Data 1995-2005, Multinomial Logistic Regression Preterm Birth Likelihood for Blacks in Military vs. Black Civilians

**1. Predicting Early Preterm Birth (Vs. full term birth)**

| | **Model 1** | | | **Model 2** | | | **Model 3** | | | **Model 4** | | | **Model 5** | | | **Model 6** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variables | Coef | SE | | Coef | SE | | Coef | SE | | Coef | SE | | Coef. | SE | | Coef. | SE | |
| | - | | | - | | | - | | | - | | | | | | | | |
| ***In Military*** | ***0.59*** | ***0.16*** | *** | ***0.54*** | ***0.16*** | ** | ***0.52*** | ***0.16*** | ** | ***0.51*** | ***0.16*** | ** | ***-0.60*** | ***0.18*** | ** | ***-0.55*** | ***0.18*** | ** |
| SES variables | | | | included | | | included | | | included | | | included | | | included | | |
| Preconception variables | | | | | | | included | | | included | | | included | | | included | | |
| Pregnancy factors | | | | | | | | | | included | | | included | | | included | | |
| Prenatal care variables | | | | | | | | | | | | | included | | | included | | |
| Stress variables | | | | | | | | | | | | | | | | included | | |

+p< .10; *p<.05; **p<.01; ***p<.001

**2. Predicting Late Preterm Birth (Vs. full term birth)**

| | **Model 1** | | **Model 2** | | **Model 3** | | **Model 4** | | **Model 5** | | **Model 6** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variables | Coef | SE | Coef | SE | Coef | SE | Coef | SE | Coef. | SE | Coef. | SE |
| | - | | - | | | | - | | | | | |
| ***In Military*** | ***0.13*** | ***0.14*** | ***0.03*** | ***0.14*** | ***0.00*** | ***0.14*** | ***0.01*** | ***0.15*** | ***-0.04*** | ***0.15*** | ***-0.03*** | ***0.16*** |
| SES variables | | | included | | included | | included | | included | | included | |
| Preconception variables | | | | | included | | included | | included | | included | |
| Pregnancy factors | | | | | | | included | | included | | included | |
| Prenatal care variables | | | | | | | | | included | | included | |
| Stress variables | | | | | | | | | | | included | |

+p< .10; *p<.05; **p<.01; ***p<.001

Table 3: PRAMS Data 1995-2005, Multinomial Logistic Regression Preterm Birth Likelihood for Whites in Military vs. White Civilians

**1. Predicting Early Preterm Birth (Vs. full term birth)**

| | Model 1 | | Model 2 | | Model 3 | | Model 4 | | Model 5 | | Model 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variables | Coef | SE | Coef | SE | Coef | SE | Coef | SE | Coef. | SE | Coef. | SE |
| ***In Military*** | ***-0.20*** | ***0.28*** | ***-0.21*** | ***0.28*** | ***-0.23*** | ***0.28*** | ***-0.19*** | ***0.28*** | ***-0.38*** | ***0.29*** | ***-0.34*** | ***0.29*** |
| SES variables | | | included | | included | | included | | included | | included | |
| Preconception variables | | | | | included | | included | | included | | included | |
| Pregnancy factors | | | | | | | included | | included | | included | |
| Prenatal care variables | | | | | | | | | included | | included | |
| Stress variables | | | | | | | | | | | included | |

+p< .10; *p<.05; **p<.01; ***p<.001

**2. Predicting Late Preterm Birth (Vs. full term birth)**

| | Model 1 | | | Model 2 | | | Model 3 | | | Model 4 | | | Model 5 | | | Model 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variables | Coef | SE | | Coef | SE | | Coef | SE | | Coef | SE | | Coef. | SE | | Coef. | SE | |
| ***In Military*** | ***-0.21*** | ***0.12*** | + | ***-0.21*** | ***0.12*** | + | ***-0.23*** | ***0.12*** | + | ***-0.22*** | ***0.12*** | + | ***-0.28*** | ***0.12*** | * | ***-0.26*** | ***0.12*** | * |
| SES variables | | | | included | | | included | | | included | | | included | | | included | | |
| Preconception variables | | | | | | | included | | | included | | | included | | | included | | |
| Pregnancy factors | | | | | | | | | | included | | | included | | | included | | |
| Prenatal care variables | | | | | | | | | | | | | included | | | included | | |
| Stress variables | | | | | | | | | | | | | | | | included | | |

+p< .10; *p<.05; **p<.01; ***p<.001

## Appendix 1. Military & All Civilian Births Weighted PRAMS Data

| | Military | | All Civilians | |
|---|---|---|---|---|
| 1995-2000 | Black | White | Black | White |
| *n* | N=967 | N=3,042 | N= 59186 | N= 170,000 |
| **Socioeconomic Status** | | | | |
| Education: | | | | |
| College degree | 14% | 27% | 12% | 33% |
| Associates degree | 42% | 33% | 24% | 24% |
| High school degree | 44% | 40% | 39% | 31% |
| No High school degree | 0% | 0% | 26% | 12% |
| On Welfare | 9% | 5% | 38% | 12% |
| On Medicaid | 10% | 4% | 70% | 31% |
| Household Crowding | 0.982 | 0.974 | 0.844 | 0.934 |
| Married | 79% | 94% | 29% | 76% |
| **Preconception Factors** | 50% | | 17% | |
| Binge Drank Pre-Pregnancy | 14% | 10% | 15% | 30% |
| Smoked Pre-Pregnancy | 9% | 24% | 9% | 18% |
| Multivitamins Before Pregnancy | 57% | 66% | 53% | 64% |
| Underweight | 10% | 14% | 13% | 16% |
| Overweight | 15% | 14% | 15% | 11% |
| Obese | 20% | 16% | 29% | 19% |
| Parity: | | | | |
| first birth | 40% | 47% | 40% | 43% |
| second/third birth | 53% | 46% | 47% | 49% |
| fourth birth or higher | 6% | 7% | 14% | 8% |
| **Prenatal Care** | | | | |
| PNC Inadequate | 11% | 7% | 25% | 10% |
| PNC Intermediate | 10% | 11% | 9% | 8% |
| PNC Adequate | 35% | 33% | 27% | 34% |
| PNC Adequate Plus | 43% | 50% | 39% | 49% |
| **Pregnancy Factors** | | | | |
| Maternal age | | | | |
| 18-19 | 5% | 7% | 21% | 9% |
| 20-29 | 74% | 70% | 58% | 57% |
| 30-35 | 17% | 22% | 15% | 26% |
| 36-39 | 7% | 7% | 7% | 12% |
| 40+ | 0% | 1% | 1% | 1% |
| Binge Drank During Pregnancy | 0% | 0% | 0.32% | 0.18% |
| Smoked During Pregnancy | 4% | 9% | 9% | 18% |
| Weight Gain Adequate | 41% | 42% | 46% | 46% |
| Hypertension While Pregnant | 7% | 7% | 6% | 5% |

| | | | | |
|---|---|---|---|---|
| Diabetes While Pregnant | 2% | 3% | 3% | 3% |
| Interval between births <2yrs | 14% | 17% | 20% | 17% |
| Previous preterm birth | 9% | 5% | 9% | 6% |
| Male Birth | 50% | 51% | 51% | 51% |
| Timing of Birth: | | | | |
| Year | 2000.9 | 2000.9 | 2001.09 | 2001.13 |

| **Weighted PRAMS DATA** | **Refined Military** | | **Unrefined Civilian** | |
|---|---|---|---|---|
| | **Black** | **White** | **Black** | **White** |
| **Mental Health/Stress** | | | | |
| Took place post-War | 51% | 52% | 53% | 53% |
| Not pregnant on time | 65% | 51% | 76% | 55% |
| Did not Want Pregnancy | 13% | 6% | 22% | 8% |
| Emotional Stressors | 35% | 34% | 39% | 35% |
| Financial Stressors | 25% | 21% | 45% | 33% |
| Partner-related Stressors | 45% | 30% | 53% | 31% |
| Traumatic Stressors | 19% | 12% | 28% | 17% |
| Relocation Stressors | 54% | 58% | 36% | 37% |
| Abuse Stressors | 42% | 36% | 48% | 38% |

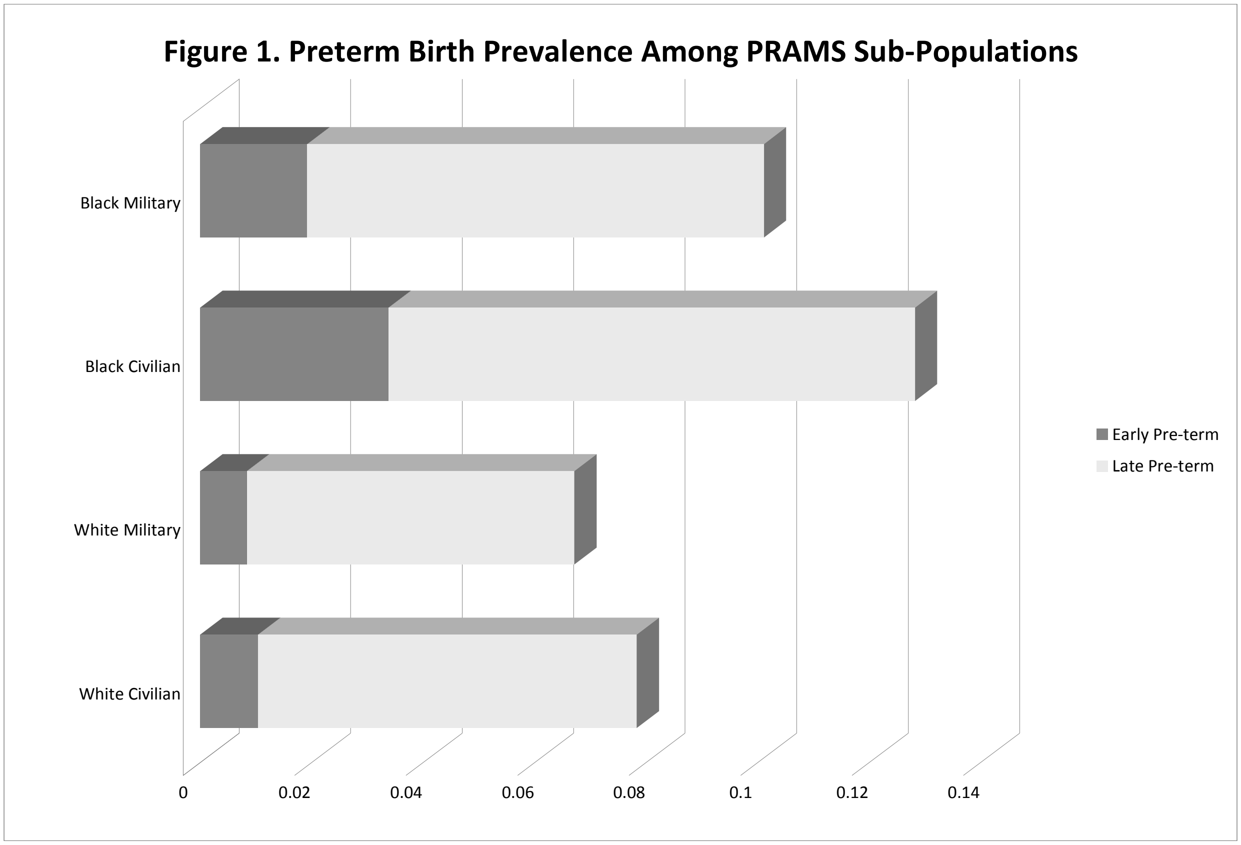
Figure 1. Preterm Birth Prevalence Among PRAMS Sub-Populations
Black Military
Black Civilian
White Military
White Civilian
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
Early Pre-term
Late Pre-term