

## **Digging Deeper: Stress and Gestation**

**1. What is the main question the paper is trying to answer? Identify the question and any hypotheses the authors mention. Is this related to a set of observations, a long-standing question, or a theoretical prediction?**

These researchers were trying to test if stress in pregnant mothers increases the chances of post-term birth. They related this to observations of stress early in pregnancy causing problems and made this theoretical prediction based on what might happen if stress occurs late in pregnancy. They hypothesized that making gestation longer than usual (post-term) may be an adaptive response to stress late in pregnancy.

**2. Was the study well designed to address the hypothesis (or hypotheses)?**

This was a difficult study to design because it was observational and based on data collected in the past. Because of this, there was no way to control for other occurrences that may have influenced the results.

**3. What are the data presented in the paper? If they presented actual data, what was their sample size (e.g., people, animals, or habitats, etc.)?**

The researchers presented data on gestational age, sex, ethnicity of the mother, and date of birth for all single children (no twins, etc.) born from October 1996 to November 2005. This amounted to 4,376,335 births. Using this data, they calculated the odds of post-term births for each month cohort (meaning each group that had gotten pregnant during the same month between that time frame). Rather than presenting the real numbers of this data though, the authors present values that had been altered according to the distance of each data point from the mean of each group (the z score).

**4. What did the researchers conclude and do they provide enough evidence to support their conclusion?**

The results did not support the prediction that pregnancies started in December of 2000 (which would be at term in September, 2001) had higher chances of being delivered post-term. They did find that those in the 33<sup>rd</sup> through the 36<sup>th</sup> week of the pregnancy were more likely to be born post-term. It would have been helpful if they had provided raw data rather than standardized data. While it's hard to say what caused the difference they found, they did say they knew of no way a pregnancy during that time would be affected, yet pregnancies further along wouldn't be affected. So they did not really find a good way to fully support their results and conclusions.

**5. What possible explanations for the results are considered in the article? Do they cover all the possibilities? Is each explanation given fair consideration?**

They propose two main possible explanations: 1) there may be a "sensitive window" during the 33<sup>rd</sup> to 36<sup>th</sup> weeks of pregnancy during which stress could cause delayed delivery (but they don't know of any way this period could be affected without also affecting later weeks of pregnancy); or 2) the stress felt by the people in the study were more stressed by the events in the weeks following September 11<sup>th</sup> than they were by the events on that actual day. There is also the possibility that the events of September 11<sup>th</sup> disrupted normal medical processes (such as inducing labor, etc.). While the authors

mention this possibility, they do not take it seriously; there was no reference to any study or investigation of a short or delayed effect like this, which definitely could have occurred, and the data for which may well be readily available.

**6. Did the researchers identify any issues with their data or methods? Were there any issues they didn't mention?**

The researchers admit a few different flaws or limitations to their study:

- 1) The data used are based on month, rather than week, so they cannot know what actual weeks may have been the affected time period;
- 2) The measure of gestational age is based on reporting of the last menstrual period by pregnant mothers, and this value is often not very precise
- 3) The event of September 11<sup>th</sup> may be so extreme that these results can't be applied to more general environmental stressors.

**7. What could the researchers have investigated more thoroughly or explained better?**

They could have done some investigation into whether normal medical practice was indeed delayed for any time in the weeks following September 11<sup>th</sup> (looking at c-sections performed, etc.); they could have investigated other stressful events that may have occurred during that time. Additionally, information on the mechanism by which pre-term births are thought to be affected by stress would have been helpful.

**8. Why is this study important? Was it interesting to you? (And if so, why?)**

Understanding the effects of stress on pregnancy and gestation length are important, as gestation length has a direct effect on the health outcome of newborn babies and can also affect the health of mothers. This article is also interesting not only because it relates human stress and reproduction (two areas of physiology that will affect a large portion of humans), but because it alerts many of us to some of the potential consequences that we may not have been aware of regarding major events like September 11<sup>th</sup>.