

In 2000, Catherine Monk, William Fifer, Michael Myers, Richard Sloan, Leslie Trien, and Alicia Hurtado published “Maternal stress responses and anxiety during pregnancy [5]: Effects on fetal heart rate,” hereafter “Maternal stress: Effects on fetal heart rate,” in which the authors conducted a study on how pregnant women’s stress and anxiety affects the health of their fetuses. Previous studies had shown that stress and anxiety during pregnancy [5] could cause fetal abnormalities. In their article, Monk and colleagues reported that the fetuses of anxious pregnant women were more likely to have elevated heart rates and increased stress when exposed to stressors than fetuses of non-anxious women. The authors’ findings indicated that fetuses of anxious women display more biological markers of stress than fetuses of non-anxious women.

In “Maternal stress: Effects on fetal heart rate,” Monk and her colleagues report the findings of their research on how maternal stress during pregnancy [5] affects fetal health and development. Monk worked in the Department of Psychiatry and the Behavioral Medicine Program at Columbia University [6] in New York City, New York. Co-authors William Fifer, Michael Myers, and Richard Sloan were also affiliated with Columbia University [6], while Leslie Trien and Alicia Hurtado were associated with the New York State Psychiatric Institute in New York City, New York. All of the authors focused on how fetuses were affected by the pregnant woman’s pre-birth stress.

Prior to the work of Monk and her co-authors, other researchers had associated the stress and anxiety experienced by pregnant women with fetal risks and abnormalities. For example, stress experienced by pregnant women had been linked with low fetal birth weights and premature birth. Researchers had also linked exposure to prenatal stress with low Apgar scores, which is a measure of the health of an infant immediately after birth. During the 1990s, scientists conducted animal experiments that suggested a relationship between maternal stress during pregnancy [5] and offspring’s ability to regulate stress. For example, researchers found that rats exposed to prenatal stress expressed more anxiety and fear once born. Other researchers found that monkeys prenatally exposed to stress exhibited poorer motor skills. Scientists also conducted human studies during the 1990s that pointed to a relationship between maternal emotions during pregnancy [5] and altered fetal physiology and behavior. For example, a 1995 study reported that infants born to depressed women had altered central nervous system [7] development, exhibited less activity and endurance, and exhibited more irritability. The authors of “Maternal stress: Effects on fetal heart rate” looked further into how prenatal stress impacts fetal physiology and behavior.

Monk and colleagues aimed to directly measure the effects of maternal biological responses to stress on fetal behavior. In “Maternal stress: Effects on fetal heart rate,” the authors describe how they measured a number of pregnant women’s biological responses to stress, how fetal heart rate changed as a result of exposure to maternal stress, and how fetal heart rate responded to maternal anxiety, which the authors used to create two different stress-level groups. After identifying those effects, Monk and her co-authors concluded that fetuses of anxious women were more likely to have elevated heart rates when exposed to stressors than fetuses of non-anxious women, which showed that prenatal exposure to stress may have negative effects on a fetus [8].

In the methods section, the authors outline how they selected the women they worked with and how they measured those women’s stress levels. The authors experimented on twenty pregnant women, all of whom were nonsmokers and thirty-five to thirty-eight weeks into pregnancy [5]. The mean age of the pregnant women was twenty-six years old. To collect data, the authors instructed the women to complete a self-report measure of state anxiety, which is a questionnaire that measures anxiety. The authors describe that they then attached electrodes to the pregnant women to measure the electrical activity generated by the heartbeat of the woman and the fetus [8]. The electrodes also monitored the women’s breathing. The authors measured the women’s blood pressure throughout the experiment and used an ultrasound [8] to measure fetal heart rate.

Continuing in the methods section, the authors describe one of tests they used to induce stress in their test subjects. To monitor
Sources


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**Subject**
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