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Stress During Pregnancy Related to Children's Later Movement, Coordination

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The Impact of Maternal Gestational Stress on Motor Development in Late Childhood and Adolescence: A Longitudinal Study

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Stress experienced by mothers during pregnancy is related to their children's behavior, as well as mental and cognitive outcomes in middle childhood and into adolescence, but few studies have looked at the relationship between maternal pregnancy stress and children's motor development. Now a new longitudinal study has found that mothers who experienced more stressful events during their pregnancies had children who scored lower on a test of movement competence.

The study, by researchers at the University of Notre Dame Australia and the Telethon Kids Institute, appears in the journal *Child Development*.

To test the relationship between maternal stress and children's motor development, researchers followed 2,900 primarily Caucasian Australian mothers. When the women were 18 weeks pregnant, they were asked to complete a questionnaire about stressful events during their pregnancies. These events included financial hardship, losing a close relative or friend, separation or divorce, marital problems, problems with the pregnancy, losing a job, and moving residences. The moms completed the same questionnaire when they were 34 weeks pregnant.

When the children born of those pregnancies were 10, 14, and 17 years old, they were assessed on their overall motor development and coordination using a 10-item movement test. The test measured children's hand strength as well as their ability to touch a finger to one's nose and then back to the index finger, distance jump, walk along a line heel to toe, and stand on one foot. The test also measured their ability to move small beads from one box to another, thread beads onto a rod, tap a finger over 10 seconds, turn a nut onto a bolt, and slide a rod along a bar as slowly as possible. Children were grouped according to those born to mothers who experienced no stress during pregnancy, those born to moms who experienced fewer than three stressful events during their pregnancies, and those born to moms who experienced three or more stressful events during pregnancy.

The study found that children born to mothers who experienced more stressful events during pregnancy scored lower on motor development across all three survey years (ages 10, 14, and 17). This may suggest an accumulative effect of stress on the developing fetal motor system. The greatest differences in motor development outcomes were between individuals whose mothers experienced no stress and those who experienced high stress (i.e., more than three stressful events). Stressful events experienced in later pregnancy had more influence on children's motor development scores than those experienced earlier. According to the researchers, this may be related to the development of the cerebellar cortex, a part of the brain that develops later in pregnancy and that controls many motor outcomes.

Low motor development is defined by how children score on the test used in this study, with children who fall below a certain cutoff point having different manifestations of low motor development that involve poor fine motor skills or poor gross motor skills or both. Low motor development has been linked to poorer short- and long-term mental and physical health outcomes, so it is important to assess the early risk factors to provide early intervention and support. Children with low motor competence can have difficulty in everyday life with fine and gross motor tasks such as writing, throwing, and running. However, with intervention and support, this can be improved in a number of cases.

"Given our findings on the importance of mothers' emotional and mental health on a wide range of developmental and health outcomes, programs aimed at detecting and reducing maternal stress during pregnancy may alert parents and health professionals to potential difficulties and improve the long-term outcomes for these children," notes Beth Hands, professor of human movement at the University of Notre Dame Australia, who coauthored the study.

Adds Tegan Grace, a Ph.D. candidate at the University of Notre Dame Australia, another coauthor of the study: "Screening for postnatal depression occurs in most antenatal clinics in Australia. This cost-effective model could be used to screen for maternal stress throughout pregnancy as part of regular clinic visits." Pregnant women who are under stress could be counseled about cost-effective stress-reduction techniques such as gentle exercise, she suggests.

The study was funded by the National Health and Medical Research Council of Australia; the University of Western Australia (UWA); the Telethon Kids Institute; Edith Cowan University; Raine Medical Research Foundation; UWA Faculty of Medicine, Dentistry and Health Sciences; Women's and Infant's Research Foundation, and Curtin University.

The Raine Study is jointly conducted by the Telethon Kids Institute and the University of Western Australia. The study started in 1989, when 2900 pregnant women were recruited into a research study at King Edward Memorial Hospital to examine ultrasound imaging. The mothers were assessed during pregnancy and health and lifestyle information was collected on the mother and the father. After the children were born, they were assessed at birth, at 1 year, then 2, 3 and 5 years of age. Further followups of the cohort have been conducted at 8, 10, 14, 17, 20, and now 23 years. Find out more at http://rainestudy.uwa.edu.au.

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Summarized from *Child Development*, The Impact of Maternal Gestational Stress on Motor Development in Late Childhood and Adolescence: A Longitudinal Study by Grace, T, Bulsara, M (University of Notre Dame Australia), Robinson, M (The Telethon Kids Institute), and Hands, B (University of Notre Dame Australia).
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