# Fetal heart rate yields clues to children's later development

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Variations in heart rate patterns provide information on how the nervous system functions in adults and children. Obstetricians have long considered heart rate patterns to be important indicators of fetal well-being during the prenatal period as well as in labor and delivery. Now a new study has found that heart rate patterns before birth also predict the rate at which children develop through their toddler years.

The research, conducted by scientists at Johns Hopkins Bloomberg School of Public Health, the National Institutes of Health, and Johns Hopkins Medical Institutions, appears in the November/December 2007 issue of the journal *Child Development*.

In the study, scientists measured fetal heart rate and variability (the degree to which heart rate gets faster and slower within a specific time period) six times from 20 through 38 weeks of gestation in 137 healthy women with normal pregnancies. They then examined the children born to those women when the children were between the ages of 24 and 36 months, looking at their mental, motor, and language abilities.

After about 28 weeks of gestation, greater variation in fetal heart rate predicted better performance on a standardized developmental exam administered when the children were 2 years old, and more proficient language ability when the children were 2-1/2 years old, the study found. Also, fetuses that showed more rapid gains in heart rate variation beginning at 20 weeks gestation progressed through mental, motor, and language milestones as children more quickly than fetuses with slower

gains in heart rate variation.

The results suggest that the foundations of individual differences in children's development originate during gestation, and that the developmental momentum of the fetal period continues after birth. In short, individual differences in variations in fetal heart rate as early as midway through pregnancy appear to provide information about children's developing nervous systems after birth and through the toddler years.

"Further demonstration that these and other indicators of fetal functioning supply important information about the developing nervous system will enrich our understanding of the importance of the prenatal period for later life," according to Janet DiPietro, a professor in the Department of Population, Family, and Reproductive Health and Associate Dean for Research at Johns Hopkins Bloomberg School of Public Health, who is the lead author of the study.

"In turn, such knowledge can contribute to the formulation of strategies focused on improving prenatal functioning in these arenas by facilitating pregnancy well-being. However, since current obstetric care already routinely evaluates heart rate patterning as an indicator of fetal distress, pregnant women do not need to seek out additional information about their baby's heart rate from their providers."

Source: Society for Research in Child Development