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Rhymes can inspire reasoning during the third trimester in the womb

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Mozart, Beethoven or even Shakespeare—pregnant mothers have been known to expose their babies to many forms of auditory stimulation. But according to researchers at the University of Florida, all a baby really needs is the music of mom's voice.

Research published in the most recent issue of the journal *Infant Behavior and Development* shows that babies in utero begin to respond to the rhythm of a nursery rhyme—showing evidence of learning—by 34 weeks of pregnancy and are capable of remembering a set rhyme until just prior to birth. Nursing researcher Charlene Krueger and her team studied pregnant women who recited a rhyme to their babies three times a day for six weeks, beginning at 28 weeks' gestational age, which is the start of the third trimester of pregnancy.

"The mother's voice is the predominant source of sensory stimulation in the developing fetus," said Krueger, an associate professor in the UF College of Nursing. "This research highlights just how sophisticated the third trimester fetus really is and suggests that a mother's voice is involved in the development of early learning and memory capabilities. This could potentially affect how we approach the care and stimulation of the preterm infant."

Krueger's team recruited 32 pregnant women during their 28th week of pregnancy, as determined by fetal ultrasound. The participants were between 18 and 39 years of age, spoke English as a primary language and were pregnant with their first baby. Once recruited, the women were

randomly assigned to either an experimental or a control group. The mean age of the women in the group was 25. In addition, 68 percent of the women were white, 28 percent were black and 4 percent were of another race or ethnicity.

From 28 to 34 weeks of pregnancy, all mothers in the study recited a passage or nursery rhyme out loud twice a day and then came in for testing at 28, 32, 33 and 34 weeks' gestation. To determine whether the fetus could remember the pattern of speech at 34 weeks of age, all mothers were asked to stop speaking the passage. Then the fetuses were tested again at 36 and 38 weeks' gestational age.

During testing, researchers used a fetal heart monitor, similar to what is used during traditional labor and delivery, to record heart rate and determine any changes. Researchers interpret a small heart rate deceleration in the fetus as an indicator of learning or familiarity with a stimulus.

At testing, the fetuses in the experimental group were played a recording of the same rhyme their mother had been reciting at home but spoken by a female stranger. Those in the control group heard a different rhyme also spoken by a stranger. This was to help determine if the fetus was responding simply to its mother's voice or to a familiar pattern of speech, which is a more difficult task, Krueger said.

The researchers found that the fetus' heart rate began to respond to the familiar rhyme recited by a stranger's voice by 34 weeks of gestational age—once the mother had spoken the rhyme out loud at home for six weeks. They continued to respond with a small cardiac deceleration for as long as four weeks after the mother had stopped saying the rhyme until about 38 weeks. At 38 weeks, there was a statistically significant difference between the two groups in responding to the strangers' recited rhymes—the experimental group who heard the original rhyme

responded with a deeper and more sustained cardiac deceleration, whereas the control group who heard a new rhyme responded with a cardiac acceleration.

Further research is needed to more fully understand how ongoing development affects learning and memory, Krueger said. Her aim is to recognize how this type of research can influence care in preterm infants and their long-term outcomes.

"This study helped us understand more about how early a fetus could learn a passage of speech and whether the passage could be remembered weeks later even without daily exposure to it," Krueger said. "This could have implications to those preterm infants who are born before 37 weeks of age and the impact an intervention such as their mother's voice may have on influencing better outcomes in this high-risk population."

Provided by University of Florida