

Noise disrupts the tactile skills of premature babies

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Credit: Anna Langova/public domain

Premature birth is a harsh change of environment for a baby. Until birth, the baby is confined to the mother's womb, surrounded by soft lighting and filtered noise. When infants are born, they are attacked by several visual, sound, and tactile stimulations. These stimulations thus constitute unpleasant factors for them. Their impact has not been studied in depth yet. Researchers from the University of Geneva (UNIGE), in

collaboration with the neonatal team of the Grenoble university hospital (CHU), and the French National Center for Scientific Research (CNRS) examined the consequences of noise on the sensory abilities of premature babies. For the first time, this enabled the researchers to reveal the effect of a negative stimulus on the sensory functions of newborns. These results are available on the website of the journal *Scientific Reports*.

In a so-called "normal" pregnancy, there are approximately 40 weeks of amenorrhea (the number of weeks since the end of the last menstrual period of the mother). Premature babies between weeks 28 and 33 of amenorrhea, or approximately two months before delivery, run the risk of developing neuro-developmental difficulties and disorders due to the prematurity in and of itself, and due to an unfavorable post-natal environment as well.

Preemies are indeed constantly surrounded by loud noise, such as the noise from feed pump alarms, which ring eight times per day. The impact of the noise itself has already been examined. It has been proven that it disturbs the infants' sleep, vital signs, and autoregulatory capacity. But how does it impact the infants' precocious tactile abilities?

"Multisensory integration, the interplay between all senses, is fundamental for all individuals, and little is still known about that of preemies," explains Edouard Gentaz, a psychology professor at the UNIGE School of Psychology and Education Sciences. "We already know that premature newborns are capable of memorizing the shapes of small objects (prisms and cylinders), and of distinguishing them from each other starting from week 28 of amenorrhea. As such, we wanted to assess the impact of daily noise on the precocious tactile abilities of newborns. We observed that this has a real impact on the sensory learning of the child," explains Fleur Lejeune, a psychology instructor at the UNIGE School of Psychology and Education Sciences, and the first

author of the study.

The harmful impact of noise on tactile abilities proven

To prove this, 63 babies were randomly divided into two groups and placed into silent and noisy environmental conditions. The study started with the infants in the silent environment. In the first part of the experiment, the so-called habituation phase, the researchers placed a prism in the hands of the babies. As soon as the infant released the object, the researchers put it back in the infant's hands. As the experiment went on, the infant always released the prism more quickly. This means the infant gradually lost interest for an object that became familiar to him or her. In the second part of the study, the so-called test phase, a second cylindrically shaped object was given to only half of the babies. The other half of the babies received the prism again. The researchers were able to observe that babies receiving the new object usually held it for a longer time, compared to those who held the same object as before. Thus the shortened holding time was not due to fatigue, but to lack of interest in an object that the baby became familiar with.

However, regarding the infants placed in a noisy environment, the researchers observed that they had more problems becoming familiar with the prism during the habituation phase. As the testing continued, the holding time did not decrease, as if it was more difficult to memorize the object in the presence of noise. Moreover, during the test phase, the newborns held the new cylindrical object as well as the already familiar prism for a longer time. This shows that the newborns did not distinguish the two shapes from one another. The habituation process thus did not seem to be effective enough in the presence of noise.

"Our study shows there is precocious functional communication between

the tactile and auditory modalities of premature babies," explains Edouard Gentaz. "At the hospital, the baby constantly has to submit to noise from various alarms that activate the baby's auditory sensoriality. This disturbs its tactile sensoriality," adds pediatrician Johanna Parra from the neonatal unit in Grenoble.

These results highlight the importance of implementing environmental measures in neonatal units in order to reduce noise levels, e.g. via architectural considerations and the choice of equipment. Indeed, the neonatal period is critical for the genesis of neural pathways, and the precocious sensory experience plays a major role in brain development. "As [noise](#) impairs the tactile abilities of [premature babies](#), we may wonder what the long-term impact of such auditory stimulation may be on their neural development," says Fleur Lejeune.

More information: Fleur Lejeune et al. Sound Interferes with the Early Tactile Manual Abilities of Preterm Infants, *Scientific Reports* (2016). [DOI: 10.1038/srep23329](https://doi.org/10.1038/srep23329)

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