Sound and Premature development:

How a mother's voice and heartbeat affects the growth of premature babies

Alexander Reyna

Engineering and Science University Magnet School

Mr.Tynes

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Abstract

Many of the articles that I have looked into and research about this topic of sound and premature development all point to the same direction of what sound should be played to the baby, the mother's voice and rhythmic beating of her heart. While a few of my notes have shown that the sound of the mother breathing and the movement of the lungs to help out as well, it is most likely the mother's voice and beating of her heart that will allow the premature baby's brain to improve in growth. What it all comes down to is the sound of the mother's voice to the premature infant that will help its brain fully develop, especially when dealing with babies that are suffering from opioid withdrawal from the mother. The baby's growth has been halted when it was a fetus inside the mother's womb due to them taking medications, prescribed or illegally purchased. The baby would suffer more than a premature infant would because the opioid withdrawal can cause serious birth defects, behavior issues, or sudden infant death syndrome due to the infant not being able to properly grow inside the mother's womb. With this research in had this can help both opioid withdrawal infants and premature infants to develop better and healthy from the sounds of the mother, more effective with the mother's voice and the sound of her heart beat.

Effects of sound in premature development

Many premature babies are known to be less developed than those born at the right time, and one major issue is trying to find out how to boost their development so they can grow up without any problems with their hearing and responding to their senses.

Method

Doctors from Rutgers University and Harvard Medical School discover by creating a womb-like environment with incubators using sounds of the mother's voice and heartbeat, can boost the growth of premature babies brains. Cognitive scientist Karin Stromswold of Rutgers University, New Brunswick, New Jersey stated"This is the kind of study where you think ‘Yes, I can believe these results,’ " because they fit well with what scientists know about fetal brain development.” (Science Magazine, 2015)

Results

Dr.Amir Lahav from Harvard Medical School did a test where he and his colleagues ask over 40 mothers to participate in their test by singing lullabies such as “Twinkle twinkle little star.” and reading stories like *Goodnight moon.* They then recorded the sound of their heart beats and removed all high pitch frequencies and played for 3 hours per day for a group of 12 babies, while another group received standard care. The results are as shown here

Table 1. (PNAS 2015 March, 112 (10) 3152-3157)

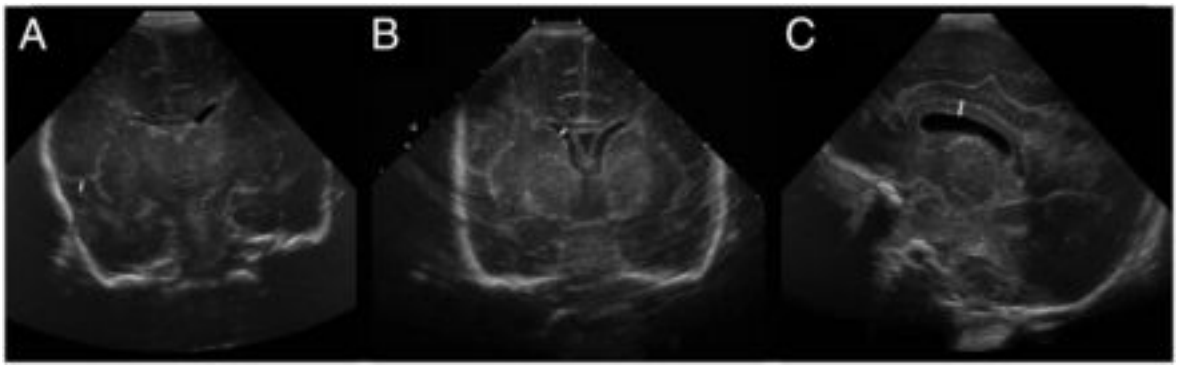
Newborn characteristics

Parameters	Maternal sounds	Control	*P* value
Subjects, *n*	21	19	NA
Female, *n* (%)	9 (43)	4 (21)	0.141
Birth GA (wk)	28.9 ± 1.9	29.6 ± 2.1	0.262
Birth weight (g)	1,310 ± 344	1,397 ± 369	0.441
1-min Apgar	5.48 ± 2.50	5.26 ± 1.91	0.766
5-min Apgar	7.29 ± 1.52	7.68 ± 1.00	0.537
HC at 1-mo cUS (cm)	29.3 ± 2.6	29.9 ± 2.8	0.481
PMA at 1-mo cUS (wk)	33.06 ± 1.92	33.87 ± 2.12	0.211
Mechanical ventilation (d)	2.52 ± 2.87	3.47 ± 8.08	0.616
Antenatal corticosteroids, *n* (%)	13 (62)	11 (58)	0.796

- cUS, cranial ultrasound; GA, gestational age; HC, head circumference; NA, not applicable; PMA, postmenstrual age.

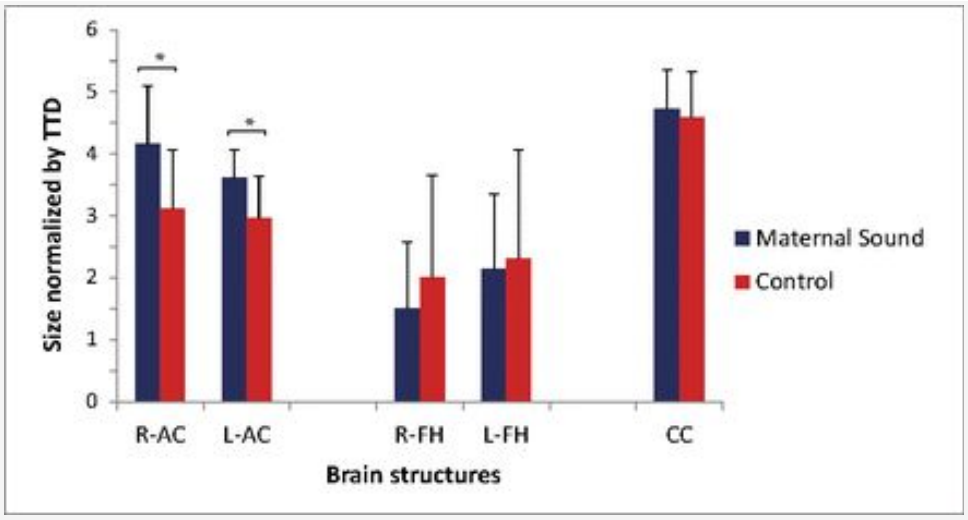
Shown in Table 1, the maternal sounds and control groups did not significantly differ in the following characteristics: sex, birth gestational age, birth weight, 1-min Apgar, 5-min Apgar, head circumference and postmenstrual age at 1-mo cranial ultrasound, days on mechanical ventilation, and administration of antenatal corticosteroids.

Fig. 1 (PNAS 2015 March, 112 (10) 3152-3157)



Shown are measurements (white lines) of the (A) thickness of the AC in the coronal plane, (B) width of the FH of the lateral ventricle in the coronal plane, and (C) width of the body of the CC in the midsagittal plane.

Fig. 2 (PNAS 2015 March, 112 (10) 3152-3157)



Mean brain measurements are shown for the maternal sounds (blue) and control (red) groups in normalized arbitrary units, including the right and left AC thickness (R-AC and L-AC), right and left FH width (R-FH and L-FH), and width of the body of the CC. All measurements were individually normalized by the transtemporal diameter (TTD) of the newborn. This is shown in more detail in table 2, where hard numbers are use to show

Table 2. (PNAS 2015 March, 112 (10) 3152-3157)

Anatomical size of brain structures

Brain structure (width)	Maternal sounds	Control	*P* value
Auditory cortex			
R-AC	4.16 ± 0.94	3.11 ± 0.44	0.000

L-AC	3.62 ± 0.95	2.96 ± 0.68	0.015
Frontal horn			
R-FH	1.50 ± 1.07	2.00 ± 1.66	0.270
L-FH	2.15 ± 1.20	2.31 ± 1.75	0.723
Corpus callosum	4.72 ± 0.64	4.59 ± 0.73	0.578

- Measurements normalized for each infant by the TTD.

In-text citation

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1) Webb, A. R., Heller, H. T., Benson, C. B., & Lahav, A. (2015, March 10). Mother's voice and heartbeat sounds elicit auditory plasticity in the human brain before full gestation. Retrieved March 05, 2018, from http://www.pnas.org/content/112/10/3152

2) Underwood, E., MervisMar, J., CleryMar, D., & Stokstad, E. (2017, December 09). Sound of mom's voice boosts brain growth in premature babies. Retrieved March 05, 2018, from http://www.sciencemag.org/news/2015/02/sound-mom-s-voice-boosts-brain-growth-premature-babies