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Auditory Objective Measures
Electrophysiology & Auditory Evoked Potentials

Music and Hearing in the First Year of Life: A Systematic Literature Review on Inter Stimulus Intervals Used in Auditory Evoked Potentials

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Abstract

This study is an outcome of a Systematic Literature Review. It was analyzed the inter stimulus intervals (ISI) used in musical intervention research involving typically developing children during their first year of life. The bibliographic search covering 2023/2024 spanned databases including CENTRAL, EMBASE, PubMed, LILACS, SciELO, Scopus, Web of Science, and Google Scholar, using terms like "Evoked Potentials," "Auditory Evoked Potentials," and "Music." Out of 534 identified studies, 39 were fully analyzed, and five met the inclusion criteria, involving 13 to 29 children with a mean age of 16.72 weeks. Studies primarily focused on Mismatch Negativity (MMN), with ISI values of 600ms, 700ms, and 800ms. One study used CAEP with an ISI of 400ms, and another used FFR with ISIs of 270ms and 275ms. Larger ISI values in MMN studies showed greater sensitivity to musical exposure effects on auditory pathway maturation. Only one study showed a significant increase in MMN amplitude post-musical exposure. Children exposed to music had higher MMN amplitudes and decreased CAEP component latency compared to passive exposure.

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Objectifs

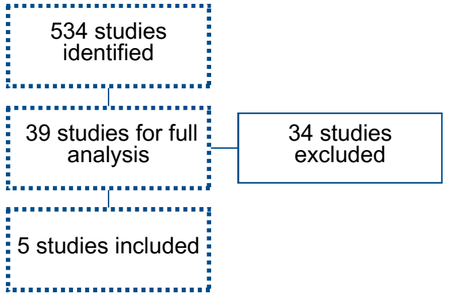
To analyze through a systematic literature review the inter stimulus intervals (ISI) used in studies that conducted musical intervention in typically developing children during the first year of life.

Méthodes et Matériels

This study is derived from the outcomes of a previous systematic review ((PROSPERO CRD42022366364) which was guided by the research question: 'Do auditory evoked potentials reflect the maturational process of the brainstem and auditory cortex following musical intervention during the first year of life?

Bibliographic search (2023/2024)

Résultats



Among the five selected studies:

- Mismatch Negativity (MMN) was the most researched component in the population under 12 months and the proposed ISI were 600ms (study 1), 700ms (study 2), and 800ms (study 3).
- One study used CAEP, with an ISI of 400ms
- One study used FFR, with ISIs of 270ms and 275ms.

- Brainstem and auditory cortex analysis used smaller ISI compared to MMN.
- Significant difference in MMN amplitude post-musical exposure was observed in only one study (Study 1).
- 2/3 studies using MMN as an electrophysiological measure, observed higher amplitudes of this component in children exposed to music compared to their counterparts.
- In the study where CAEP was used, children exposed to music classes for six months showed decreased latency in components P1, N1, and P2 compared to children in passive exposure.

Conclusion

Studies that conducted musical exposure during the first year of life in typically developing children used ISI ranging from 270ms to 800ms. Data suggest that in the case of MMN, larger ISI values showed greater sensitivity in demonstrating the effect of music on the maturation of the central auditory pathway.

Références

1. Cirelli LK, Spinelli C, Nozaradan S, Trainor LJ. Measuring Neural Entrainment to Beat and Meter in Infants: Effects of Music Background. Frontiers in Neuroscience. 2016 May 24;10.
2. Arenillas-Alcón S, Ribas-Prats T, Puertollano M, Mondéjar-Segovia A, Gómez-Roig MD, Costa-Faidella J, et al. Prenatal daily musical exposure is associated with enhanced neural representation of speech fundamental frequency: Evidence from neonatal frequency-following responses. Developmental Science. 2023 Jan 5;
3. Papatzikis E, Elhalik M, Inocencio SAM, Agapaki M, Selvan RN, Muhammed FS, et al. Key Challenges and Future Directions When Running Auditory Brainstem Response (ABR) Research Protocols with Newborns: A Music and Language EEG Feasibility Study. Brain Sciences. 2021 Nov 26;11(12):1562.