The use of auditory evoked potentials for people with learning disabilities: A scoping review summary

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Introduction
Auditory evoked potential (AEP) testing is often recommended for objective assessment of hearing in people with learning disabilities unable to complete behavioural hearing assessment. The theoretical rationale for using AEP testing in this population is clear, however the evidence base underlying these recommendations is generally not cited. The aim of the scoping review was to assess the robustness of the evidence underlying such recommendations.

Methods
The review was conducted according to the JBI methodology for scoping reviews. Studies evaluating adults and children aged 4 or over were included. Non-English language publications were excluded. Specific concepts assessed include the required frequency, feasibility, acceptability, and accuracy of performing AEP testing in this population.

Four electronic scientific databases were searched using combinations of key words associated with learning disabilities and AEPs such as auditory brainstem response (ABR), middle latency response (MLR), cortical auditory evoked potential (CAEP) and auditory steady-state response (ASSR). Articles were processed by independent reviewers against the inclusion criteria:

- Studies identified through database search (n=1875)
- Studies screened following removal of duplicates (n=1270)
- Full text studies reviewed for eligibility (n=82)
- Full text studies included (n=40)
- Studies excluded (n=1188)
- Studies excluded (n=42)

Review Findings
A total of 40 papers provided data for three test types; ABR (n=30), CAEP (n=10) and MLR (n=5). Four papers examined more than one test type. Despite including the search terms “auditory steady state response” and “ASSR”, no studies were found using this test type with this population.

Much of the literature in this area is dated, with almost half (44%) being over 30 years old. Only one study was published within the last 5 years (Fig. 1).

The majority of studies were conducted in the USA (29%). Only three countries provided data for use of MLR, and five countries for CAEP. Just one study was published within the last 5 years (Fig. 1).

The majority of studies were conducted 30-40 years ago and a participatory research paradigm (involving qualitative or mixed methodologies) is a more contemporary approach to including people in research generally, particularly those with learning disabilities.

The majority of studies did not address the issue of consent directly, so there remain unanswered questions regarding inclusion and acceptability.

Feasibility or practicality (clinician perspective)
Whilst some studies did mention reasonable adjustments that were made to encourage participation in testing, only two CAEP studies examined feasibility as a stated aim. However, these studies are over 50 years old using older equipment and testing protocols.

Sedation or “light anaesthesia” was used in 10/35 (29%) of non-CAEP studies. This has implications for study settings, ethical considerations and research personnel if sedation is required.

Studies commonly excluded participants on the basis of “ability”, “co-operation”, or “movement”. This often reduced participant numbers and may have impacted the statistical power of results.

Accuracy (concordance with behavioural testing & waveform interpretation)
Data regarding the accuracy of AEPs in determining hearing thresholds was only reported in three studies, all of which assessed individuals with Down’s Syndrome.

Indeed there is a strong preponderance in the literature towards testing those with Down’s Syndrome as a study population, and use of click ABR as a test method (Fig. 3). There is no published data regarding the accuracy of AEPs in the hearing assessment of those with other learning disabilities.

Required frequency of resorting to AEP testing
Due to the time- and resource-consuming nature of testing, AEPs are only used in the general population for those for whom behavioural results cannot be obtained reliably. None of the studies considered in this review evaluated how frequently AEP testing was required to obtain hearing thresholds in a clinical setting.

Discussion
The evidence base underlying the use of AEP testing in individuals with learning disabilities is limited. There are clear opportunities for future research in this area:

- An evaluation of the adaptability of assessments and the inclusion of people with learning disabilities.
- Feasibility studies using contemporary equipment and testing protocols.
- Frequency-specific comparison with behavioural testing.
- Determination of how frequently AEP testing is required to test individuals with learning disabilities.

References