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

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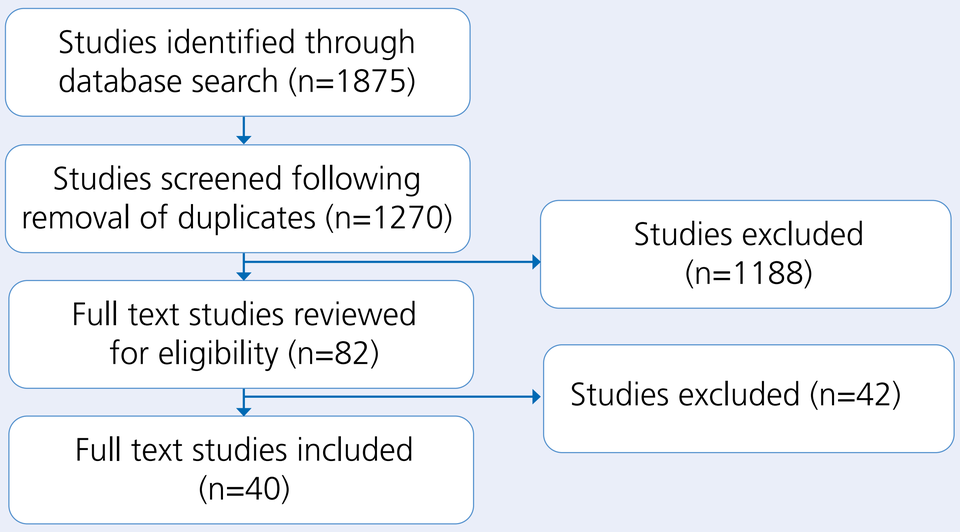
Introduction

Auditory evoked potential (AEP) testing is often recommended for objective assessment of hearing in people with learning disabilities unable to complete behavioural hearing assessment[1,2]. 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[3]. 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:



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 completed in the UK (Fig. 2):

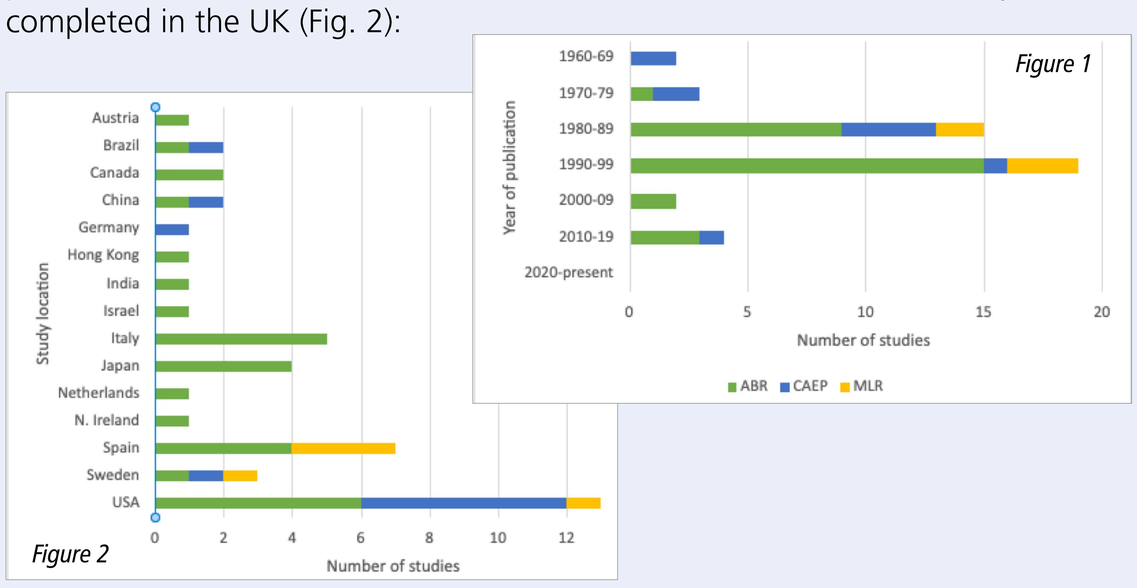


Figure 2

Figure 1

Acceptability (patient / carer perspective)

None of the studies reviewed aimed to assess the acceptability (to the individual or caregiver) of performing AEP testing in this population. This is unsurprising, as that 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.

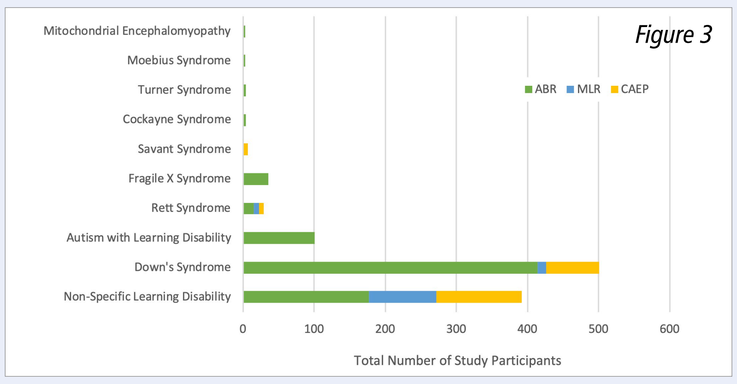


Figure 3

None of the studies assessed concordance of MLRs, CAEPs, or frequency-specific ABRs with behavioural testing. Indeed many studies excluded those with pre-identified hearing loss. Several studies did compare click ABR testing to behavioural test results in those with a variety of learning disabilities.

The most commonly-assessed concept throughout the studies reviewed was the comparison of AEP waveforms between those with and without learning disabilities. Across all types of AEP, the consensus is that testing yields interpretable waveforms in the majority of cases, although there are often statistically significant differences in waveform latency and sometimes suprathreshold amplitude, often speculated to be related to the differences in neurophysiology underlying the learning disability. Given that waveform latency is not a primary consideration when estimating hearing threshold, this should not preclude the use of AEPs for this purpose.

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

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