Critical Review: What is the efficacy of auditory training in the treatment of individuals with (Central) Auditory Processing Disorder (CAPD or APD)?

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(Central) auditory processing disorder (C)APD has been defined as a neural deficit in the processing of auditory stimuli and its underlying brain activity (Chermak & Musiek, 2007), although there is no consensus in the field surrounding its definition, diagnosis, assessment or intervention (DeBonis & Moncrieff, 2008; McArthur, 2009). Auditory training is one form of intervention often used to treat (C)APD, yet the studies supporting its efficacy as a legitimate treatment have a number of shortcomings, ultimately leaving the reader with a number of questions regarding the validity of the results.

Introduction

(Central) auditory processing disorder (C)APD is a controversial disorder in a number of respects; it is plagued by a lack of consensus in the field regarding its definition, diagnosis, assessment and intervention (DeBonis & Moncrieff, 2008; McArthur, 2009). Chermak and Musiek (2007) defined (C)APD as a perceptual processing deficiency concerning acoustic stimuli and its underlying brain activity. Furthermore these authors state that while (C)APD can coexist with other disorders, it is not caused by other disorders.

Intervention for individuals with (C)APD is rather eclectic, with no gold standard existing to date (DeBonis & Moncrieff, 2008). Forms of intervention include but are not limited to: environmental modifications, compensatory training, and auditory training (Bellis & Anzalone, 2008).

Results

The Schochat, Musiek, Alonso & Ogata (2010) article looked at mid-latency characteristics in children with (C)APD and how these characteristics responded to auditory training. There were 30 participants in the (C)APD group between the ages of 8 and 14, as well as 22 age and gender matched individuals in the control group. The authors implemented an auditory training program lasting 8 weeks, once a week for 50 minutes

ear on at least two out of four tests in the central auditory test battery. The article by Samelli and del Nero Mecca (2010) mentioned where their (C)APD participants were recruited from but did not mention the criteria for this diagnosis. While the aforementioned authors stated that their subjects performed poorly on tests of auditory processing, none explicitly specified what tests were used to make this diagnosis.

While acknowledging the challenges associated with diagnosing individuals with (C)APD, the lack of sufficient descriptions and inconsistency of methods used in these studies brings into question the validity of the subject pool. All four articles provided insufficient information regarding their subjects considering the lack of consensus surrounding this population. For instance, the authors neglect to mention who the referral source(s) were, where their subjects were recruited from, with the exception of except Samelli and del Nero Mecca (2010) and the one control group used, and in two out of four studies which specific tests were used to confirm the diagnosis of (C)APD. Subsequently, whether the subjects are an accurate representation of this population is questionable based on the information provided by the current literature.

Single Group Pre-Post Test Design

A single group pre-post test design is considered level 3 experimental evidence (OCEBM Table of Evidence Working Group*). It measures a single group of subjects before and after an experimental manipulation (Archibald, 2010). This allows the author to measure the change allegedly resulting from the experimental manipulation by gathering both baseline and post-experimental data. While this type of study offers a good starting point, limitations of this design include no control groups to document that the change was only in the experimental condition. The Alonso & Schochat (2009), Samelli & del Nero Mecca (2010), and Zulcman & Schochat (2007) articles all used a single group pre-post test design. While this choice of design did address the articles objectives, it appears to have been dictated by the resources available (e.g. small group of children with (C)APD available for the study may have not permitted the inclusion of a (C)APD control group), and therefore has the potential to be improved by increasing the number of subjects and therefore the power of the experiment, as well as adding a control group of matched peers. See discussion of control groups below.

Case Control Study

A case control study is considered level 2b experimental evidence (OCEBM Table of Evidence Working Group*). It consists of at least one experimental group that has a matched control group and is quasi-experimental since the groups are not fully randomized (Archibald, 2010). Generally, it is considered a higher level of evidence compared to the single group pre-post test design since it includes a matched control group. The Schochat, Musiek, Alonso & Ogata (2010) article used a mixed case control study design, which consisted of a
(performance of the experimental group before and after an auditory training program), as well as a between groups component (differences between the control and experimental groups). This design was appropriate for this study and offered a more comprehensive measurement of the effectiveness of auditory training; a suggestion to further improve this study would be the addition of a second control group of matched individuals with (C)APD who did not receive auditory training or received a different type of training. See below for further discussion of the advantages of including a control group in an experimental study.

Size of the Experimental Group

Ideally a study will recruit a large number of subjects which gives the experiment more pont morewh

A subsequent area of study, which may enhance the efficacy of research findings, is the use of electrophysiological measures to assess the performance of an individual with (C)APD prior to and following auditory training, in conjunction with behavioural measures. Plasticity of the nervous system seems to underlie auditory training and these changes can be monitored through electrophysiological measures, such as the P300 wave latency and mid latency response (MLR) amplitude as exemplified by the Alonso & Schochat (2009) and Schochat, Musiek, Alonso & Ogata (2010) studies. These results offer support to the efficacy of auditory training in the treatment of (C)APD and future research may benefit from including this additional type of measurement.

Considering the state of the current literature, clinicians