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A systematic review of music and dyslexia

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ABSTRACT

Systematic reviews of research provide valuable information for researchers, clinicians, and educators. A single Cochrane Review reports on music and dyslexia; however, the struct inclusion criteria used in the study required randomized controlled trials (RCT) which resulted in no study being able to be included. The purpose of this systematic review was to identify and analyze research on music and dyslexia. Through computer-based searches utilizing specific keywords and the ancestry approach, 23 studies met inclusion criteria. Once identified, each study was reviewed according to participants, age, purpose, independent and dependent variables, and results. A table was created to outline the analysis of each study. The majority of the 23 articles in the review included children. A few studies focused on the challenges of studying music, in particular problems with reading notation, that students with dyslexia may experience and most of the other studies explored how music can be used to improve literacy skills, or at least be used as a means to test for neural processing of auditory information, and thus could offer the potential to inform early diagnosis. The findings from this review reveal that music training is considered to function as a remediation tool to improve literacy skills for children with dyslexia, although the specific type of music support to achieve predictable outcomes needs to be further investigated. Some limitations, implications for clinical practice, and suggestions for future research are provided.

Review of literature

Developmental dyslexia is defined as a specific learning disability that affects reading acquisition despite adequate education, socio-cultural opportunities, average or above average intelligence, and without sensory defects in vision and hearing. Cognitive difficulties associated with developmental dyslexia include speech perception, learning the sounds of letters, and recognizing and manipulating the basic sounds of language. Low reading comprehension, poor spelling, and difficulties with accurate and/or fluent word recognition are often present. Dyslexia is a neurological condition with a genetic basis and the difficulties are typically a result of a phonological deficit (International Dyslexia Association, 2002; Siegel, 2006). People with dyslexia may also have difficulty in areas such as organization, abstract reasoning, attention, and long- or short-term memory.

Dyslexia is a heterogenetic term indicating a fundamental deficit in phonological processing (the manipulation of sounds). Researchers have conjectured that the disorder is primarily in the left hemisphere of the brain. There has been recent research into various subgroups of the disorder. This research identifying subgroups may be more effective in labeling specific reasons for the learning differences and improve the ability to develop interventions that will help develop literacy skills (Jednorog, Gawron, Marchewka, Heim, & Grabowska, 2014; Lorusso, Cantiani, & Molteni, 2014). Although these studies tend to focus on improving literacy skills, it is important to recognize that people with dyslexia often possess strengths in other areas such as the ability to think in pictures instead of words, being highly intuitive and insightful, having vivid imaginations, and being able to perceive multidimensionality (Davis, 2010; Eide & Eide, 2011). There are also social implications for people with dyslexia as learning disabilities can affect an individual's life beyond academics. Therefore, heightening awareness to an individual's strengths is important because people with dyslexia can often develop a poor self-image and feel less intelligent than their peers. Potentially resultant of learning differences with their peers, people with dyslexia may also benefit from psychological interventions and it is therefore important for clinicians to understand possible psychological needs of people with dyslexia. Creative arts therapeutic approaches targeting both academic skills related to dyslexia as well as confidence and esteem may be of particular relevance.

Dyslexia is one of the most common learning disabilities. MedlinePlus, a service of the U.S. National Library of Medicine, reported that dyslexia can affect up to 10 percent of people. If

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specialized training is not taken, people with dyslexia may experience difficulty reading and writing through adulthood. However, with proper help, people with dyslexia can improve their literacy skills. Early identification and treatment can be beneficial in helping individuals achieve self- and instructor-oriented goals in school and life (International Dyslexia Association, 2002).

Although dyslexia is considered a learning disability, some people prefer the term "learning difference" because the word "disability" is focused on weaknesses and has negative connotations that may inadvertently lead to lack of confidence in the learner. People with dyslexia do possess the ability to improve their language and literacy skills through different teaching approaches. Most scholarly works endorse the terminology "learning disabilities" to ensure that individuals are appropriately identified to receive the support and services provided by the law. The Individuals with Disabilities Education Act (IDEA) is a law that preserves the rights of those with disabilities to equal treatment. Thus, the term learning disability is important for proper categorization and for funding various treatment services.

There is a growing body of research that links reading failure to auditory processing disorders (Tallal, 2012). Tallal and Gaab (2006) suggested relationships between musical training, auditory processing, language, and literacy skills. More recently, Tallal (2012) demonstrated how auditory interventions can improve reading. Results indicated improved attention, listening, and reading skills in children after a variety of auditory training approaches ranging from musical training to neuroplasticity-based auditory training (Tallal, 2012). Because the processing deficit can vary between individuals, therapists are needed to design specific interventions based on the individual's needs.

Treatment programs for people with dyslexia can be implemented in various formats by therapists, tutors, and classroom teachers. Most programs that develop literacy skills use a multisensory approach. A popular system is the Orton-Gillingham approach, which is a structured, sequential, and cumulative system to language-based learning that utilizes the three learning modalities: visual, auditory and kinesthetic. This multisensory approach was developed in 1935, and is widely used to this day (International Dyslexia Association, 2002).

Systematic Reviews are tools that facilitate the appraisal, summarization, and synthesis of large quantities of research in a rigorous and unbiased manner. Systematic Reviews are important as they can provide a comprehensive overview of studies and thus provide researchers, clinicians, and educators with information that show the scope of research on a specific topic. Researchers have conducted systematic reviews on music and youth with disabilities (Brown & Jellison, 2012; Jellison, 2000). Cochrane Reviews are a specific type of systematic review that often includes meta-analyses. Composed exclusively of randomized controlled trials (RCTs), Cochrane Reviews provide the highest levels of evidence concerning the efficacy of preventative, therapeutic, and rehabilitative regimens.

In 2012, a Cochrane Review was published: "Music education for improving reading skills in children and adolescents with dyslexia" (Cogo-Moreira et al., 2012). As this was a Cochrane Review, the review was to exclusively include RCTs. However, no RCT study was found resulting in no data synthesis or effect size. Research using randomized controlled designs has a higher level of evidence because the process randomizes which participants are placed in treatment and control groups. By comparing the outcomes between the two groups, there is a reduced chance for experimental bias. Although there is an eventual need for RCTs, it would be first beneficial to have an overview of the existing research concerning music and dyslexia in a systematic review. With over twenty years of research on music and dyslexia, it is important to identify and analyze the current research in order to develop a research agenda to strengthen the literature base and provide better treatment to people with dyslexia.

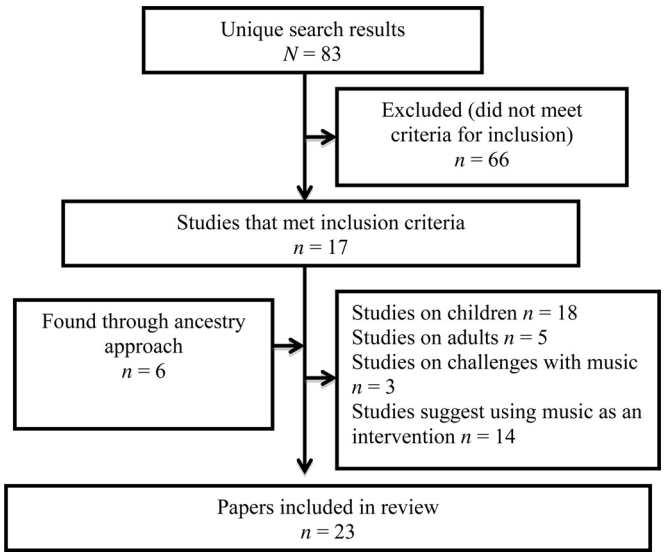

Fig. 1. Flowchart of the search processes used to find all articles for inclusion.

The aim of this current study was to systematically identify and compile all studies on music and dyslexia for a comprehensive overview of what has been tested and where further research is needed. Studies will be analyzed and characteristics of each study will be categorized based on the purpose, factors, goals presented, and results.

Method

Inclusion criteria

- Study must be in English;
- All ages for participants were included;
- Must include music and dyslexia as a keyword, topic, or subtopic;
- Must be published in a refereed journal.

Search strategy

Potential studies for this review were identified using computer-based searches using keywords "music" and "dyslexia". The search engines used were PsychINFO (14), PubMed (25), OVID (34), and ERIC (CSA) (24) for a total of 97 studies. Through the computer-based searches, 17 studies were identified as meeting the criteria for inclusion. An additional six studies were found through examining reference lists. The goal was to locate every article that examined music variables and included people with dyslexia or implications for people with dyslexia. See Fig. 1 for an outline of the search process used to find all articles for inclusion.

Categories and criteria for analysis

Each study that met inclusion criteria was reviewed, analyzed, and entered into an Excel spreadsheet. The information documented included the purpose of the study, specific number of participants, range of the ages, design of the study, independent variable, dependent variable, behaviors observed, and the results/conclusions. Table 1 represents the systematic analysis of all the studies on music and dyslexia. Criteria and categories for analysis are described below.