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Study on Investigating the Prevalence, Identification, Assessment and Intervention of Dyslexia in Children: A Systematic Review of the Literature

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Abstract: Dyslexia is a developmental learning disorder that hinders reading and spelling abilities in individuals. Identifying children with dyslexia for research and appropriate interventions has been a key focus in recent decades. This systematic review employs thematic analysis to explore current knowledge on dyslexia, including prevalence, identification, assessment, and interventions in children, aiming to enhance our understanding of dyslexia research. Recent research has made strides in refining methods for identifying and assessing dyslexia, although its precise prevalence remains challenging to determine. Evolving interventions offer significant support for children with dyslexia. However, there is room for improvement in dyslexia studies, necessitating broader international collaboration and increased research efforts to enhance identification, assessment, diagnosis, and intervention methods. The findings made valuable contributions to future research under the topic of children with dyslexia, providing in-depth insights for further exploration in the field of dyslexia.

1. Introduction

The term "dyslexia" was introduced by Rudolph Berlin, an ophthalmologist and academic, in alignment with other diagnoses of the time such as alexia and paralexia (Berlin, 1887), as described by Foxhall (1969). During the late 19th century, as reading became more prevalent, medical doctors observed and described the condition of "word blindness," noting a significant discrepancy between writing skills and intellectual abilities (Morgan, 1896). Initially, early researchers attributed these challenges to language functions that were believed to be localized in the angular gyrus of the left hemisphere of the brain (Orton, 1963). In modern times, dyslexia is defined by Peterson and Pennington (2015) as a specific learning disorder characterized by difficulties in reading and spelling, which affect a significant number of children worldwide. The effects of dyslexia reach beyond academic performance and have substantial implications for self-esteem (Glazzard, 2010), overall academic achievement, and quality of life (Huang et al., 2020)[1-9].

From a cognitive perspective, dyslexia is often explored through the framework of phonological theory. This theory suggests that individuals with dyslexia may have a specific difficulty in

representing, storing, and/or retrieving speech sounds. It explains the reading challenges experienced by dyslexics by highlighting the necessity of learning the correspondence between written letters and their corresponding sounds in an alphabetic system (Raharjo & Wimbarti, 2020). Alternatively, the cerebellar theory of dyslexia, proposed by Nicolson and Fawcett (1990), suggests that dyslexia may arise from dysfunction or developmental abnormalities in the cerebellum, a brain region traditionally associated with motor coordination and control. According to this theory, the cerebellum plays a critical role in the acquisition and automatization of language skills, particularly in the domains of phonological processing and timing (Nicolson et al., 2001). Psychological theories of reading development, such as the Simple View of Reading and the Dual-Route Cascaded Model, have also contributed to our understanding of the intricate processes involved in reading and have helped identify specific areas in which children with dyslexia encounter difficulties. These theories highlight the importance of integrating phonological awareness, decoding skills, and language comprehension in reading development and underscore the need for effective interventions that target these specific areas[10-22].

2. Method

One of the main objectives of this study was to review past research on the prevalence, identification, assessment, and intervention of children with dyslexia. All articles reviewed were selected by searching on certification sites and includes articles on topics such as children with dyslexia, dyslexia prevalence, dyslexia identification, and dyslexia assessment, as well as dyslexia intervention. English-language articles published in Google Scholar were used that addressed the topic of the prevalence, identification, assessment, and intervention of children with dyslexia.

In the database search, keywords used included Children with dyslexia, Dyslexia prevalence, Dyslexia identification, Dyslexia assessment, Dyslexia intervention. Abstracts are reviewed in the page order displayed in the results until 31 articles matching the current study are selected. Major themes were extracted based on common discussions across multiple articles, while subthemes were identified as subsections of each major theme[23-29].

3. Discussion

3.1 Prevalence of Children with Dyslexia

3.1.1 Worldwide Prevalence of Dyslexia

There is no definitive answer about the prevalence of dyslexia, as indicators of dyslexia, including dyslexia, tend to be continuously distributed in the population (Fletcher et al., 2019). Besides, different operational definitions may yield different prevalence estimates (Wagner et al., 2020). Moreover, estimating prevalence becomes difficult due to the unreliability of commonly used identification procedures (Wagner et al., 2020). Scholars have found that approximately 5% to 10% of clinic patients and 17.5% of students are estimated to have dyslexia in the English-speaking world (Cavalli et al., 2018). Up to 15% of the population in Europe had dyslexia or a similar type of learning disorder (European Dyslexia Association, 2022). In non-English-speaking countries, such as Japan, the prevalence of dyslexia is usually lower than the typical English rate of 5% to 10% (Landerl & Moll, 2010)[30-37].

3.1.2 Prevalence of Dyslexia in China

Chinese is one of the most widely spoken languages in the world, however, Chinese dyslexia research lags behind English (Lin et al., 2020). Surveys show that children of school age have a

prevalence of Chinese language dyslexia ranging from 3.0% to 12.6% (Gu et al., 2018). Nevertheless, there were variations in the incidence of Chinese dyslexia reported in the literature as a result of different methods, tests, and definitions used for diagnosis. According to a study from Lin et al. (2020), the prevalence of dyslexia in Shantou City, China was found to be 5.4%. Besides, the prevalence of dyslexia in boys was found to be significantly higher than in girls, with boys accounting for 8.4%, girls accounting for 2.3%, and the gender ratio is 3.7:1.0. In addition, the prevalence of dyslexia from grade 2 to grade 5 was 6.7%, 5.4%, 4.4% and 6.1% respectively, while there was no significant difference in the prevalence among the above four grades. The results of this study show that the Chinese reading ability of children with dyslexia was low in all assessments[38-45].

3.1.3 Prevalence of Dyslexia in Non-English Speaking Countries

In terms of non-English speaking countries except China, there are three studies conducted in the first language that were reviewed in this literature review, which are carried out in the Middle East, Southeast Asia, and Southern Europe respectively. To be specific, the primary objective of a study from Yavari et al. (2019) conducted in Iran was to determine the prevalence of dyslexia among students in the Arak region, in which 2135 students in grades one through six were assessed. The results showed that the prevalence of dyslexia among all students was 9.9%. At the same time, the researchers found that dyslexia was more prevalent among boys than girls, with 9.1% in girls and 10.6 % in boys in Arak. In addition, fourth grade students were found to have the highest prevalence of dyslexia, thus the prevalence of dyslexia did not decrease with increasing grades. Another study was carried out from Rachmawati et al. (2019) in Bandung, Indonesia found that 3% of children have mild levels of dyslexia, 33% have moderate levels of dyslexia, 42% have severe levels of dyslexia, 13% are at risk of dyslexia, while 9% have not yet identified the severity levels. Moreover, a study conducted by Barbiero et al. (2019) in Italy found that only 1% of 1,365 children screened were formally diagnosed with dyslexia before the study, whereas by the end of the study the prevalence had risen to 3.1-3.2%. As a result, it concluded that two-thirds of children aged 8-10 were not diagnosed with dyslexia. Overall, the prevalence of dyslexia varies between countries and regions, with language, cultural context, and assessment methods influencing the reported rates[46].

3.2 Identification of Children with Dyslexia

3.2.1 Difficulties Present in Identifying Dyslexia Disorders

3.2.1.1 The Definitions of Dyslexia

The definition of dyslexia is constantly changing. In the Western world of the 1950s and 1960s, dyslexia at this stage was a term used to describe right-brain thinkers who were difficult, imaginative and multidimensional in reading and thinking (Parveen & Baig, 2021). In recent years, there has been a consensus about the definition of dyslexia that the main feature of dyslexia is problems with reading. Simply, it is a learning difficulty with reading and spelling. DSM-IV and ICD-10 define dyslexia as a specific and persistent learning disability affecting the acquisition and development of the written language code, such as reading and spelling, and causing a significant handicap to academic achievement or daily activities (APA, 2013; WHO, 2016)[47].

However, there are still some differences. For instance, Nuzhat et al (2021) believed that dyslexia mostly involved difficulty in phonetic mapping, when patients struggle to connect different orthographic representations to particular sounds. According to some scholars, dyslexia causes problems with sequential sequencing, causing a person to see a group of letters but not understand their proper sequence. Jamil et al. (2019) also have a similar idea that dyslexic people truly have

trouble with their ability to use certain language abilities, especially while reading the content. Besides, Yuen et al. (2022) emphasized that dyslexia is an example of a life-span learning impairment disease. Dyslexics have trouble reading and writing characters accurately, which has a significant negative impact on their academic achievement. In addition, there are studies that dyslexia is a sign of inadequate cognitive flexibility (Hammill et al., 2020; Ferrara et al., 2022). There is also a research that does not base on extrinsic behavioral performance but rely on functional MRI (fMRI) to observe altered brain structure and function in dysfunctional counties (Tomaz Da Silva et al., 2021).

3.2.1.2 Factors Causing Dyslexia

Almost all studies of dyslexia suggest that it requires early recognition to prevent, and that if found later, it may be irreversible, and that dyslexia can be inherited. But because young children are in development, in many cases it is impossible to tell whether the child is caused by poor reading performance or real dyslexia. Some children even need to be older to be identified, which has a serious impact on children (Parveen & Baig, 2021; Nuzhat et al., 2021; Jamil et al., 2019; Yuen et al., 2022; Tomaz Da Silva et al., 2021).

Identification of dyslexia is often confounded by environmental, cultural, and economic disadvantages. Some methods do not differentiate garden variety poor readers from students with dyslexia, a shortcoming that results in much confusion in the field regarding incidence rates and prognosis. Whether the exclusion criteria were the presence of serious comorbidities, such as attention deficit / hyperactivity disorder (ADHD), autism spectrum disorder (ASD), and psychiatric disorders (Nuzhat et al., 2021; Jamil et al., 2019; Yuen et al., 2022; Tomaz Da Silva et al., 2021; Hammill et al., 2020; Ferrara et al., 2022).

3.2.2 Techniques for Identifying Dyslexia

3.2.2.1 Physiological Technique

Various approaches have been conducted to detect dyslexia using machine learning. Some researches used an eye-ball tracker to analyze the eyeball movement, applied CNN on neuroimages for biomarkers, analyzed brain images, tried to increase the performance by applying the result OCR and so on and so forth (Nuzhat et al., 2021; Jamil et al., 2019; Yuen et al., 2022). Although the biomarkers can be tracked, the equipment for assessments is expensive, and scaling up the assessment procedure is challenging. These remedies are not appropriate for regular use at home or school (Yuen et al., 2022).

3.2.2.2 Localization Test

As people pay more attention to dyslexia, increasing countries pay more attention to the tests and systems that are more in line with their own country. Some studies in English-speaking countries mainly use English reading tests, such as the Reading Comprehension Test consisting of 20 sentences (Nuzhat et al., 2021). While, Arabic researchers Jamil et al. (2019) used the Reading Test in One Minute (RTOM) of words in Arabic vocalized to test for dyslexia in Arabic speakers. Chinese researchers Yuen et al. (2022) design and develop a mobile app with AWS cloud platform as server. The system allows parents to upload their own written photos of their children and then intelligently identify them to remind parents that their children are at risk of dyslexia. Hammill et al. (2020) designed a revised discrepancy method for Identifying Dyslexia to make sure the accuracy of the test. In the future, localized tests and systems will be more widely used and will provide more information for the study of dyslexia.

3.3 Assessment of Children with Dyslexia

Early identification of dyslexia in children is crucial to ensure timely intervention and support. It is important to understand that the diagnosis of dyslexia goes beyond relying solely on intelligence tests like the Wechsler Intelligence Scale for Children (WISC-III). While these tests provide valuable insights into a child's cognitive abilities, including verbal and non-verbal reasoning skills, they do not specifically target dyslexia diagnosis. The criteria used for diagnosing dyslexia are specified in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), which offers guidelines for identifying specific learning disorders, including dyslexia (Raharjo & Wimbarti, 2020). Therefore, this systematic literature review aims to investigate the various screening tools and assessment approaches employed in identifying dyslexia, encompassing both standardized tests and observation-based techniques.

3.3.1 Phonological Awareness Assessment

Phonological awareness is the ability to recognize and control spoken phonemes. As dyslexia affects phonological processing, assessing a child's phonological awareness is crucial for identifying reading difficulties. Andresen and Monsrud (2021) found that Norwegian schools refer students to educational-psychological services for reading assessment. Thereafter, a diagnosis of dyslexia may be made, leading to the implementation of remedial reading instruction if necessary. The diagnostic process often involves a test battery that assesses various aspects of dyslexia, including working memory, decoding problems, phonological deficit, and rapid automatized naming (RAN). In Norway, standardized diagnostic test batteries such as Logos (Høien, 2014) and STAS (Klinkenberg & Skaar, 2003) are commonly used. Logos, developed by Logometrica, is a computer-based test widely utilized by educational-psychological services in Norway for dyslexia assessment (Andresen & Monsrud, 2021). It demonstrates high reliability (≥0.80) on most subtests and acceptable or good validity (Høien, 2014). However, it should be noted that diagnostic criteria and tests may vary slightly among different educational-psychological services, resulting in variations in the provision of remedial reading instruction across geographical areas in Norway (Andresen & Monsrud, 2021).

The STAS (Standardized Test of Abilities in Spelling), introduced by Klinkenberg and Skaar (2003), is a comprehensive assessment tool specifically designed to evaluate decoding and spelling skills in students from 2nd grade through secondary school. It comprises both screening and individual tests, providing a detailed evaluation of reading abilities (Lindstrom, 2018). The screening index of the STAS identifies students at risk of decoding and spelling difficulties, with those scoring one standard deviation below the mean on decoding tasks across three subtests qualifying for further individual assessment (Sleeman et al., 2022). The individual tests in the STAS provide a more in-depth understanding of an individual's decoding and spelling abilities and can be administered to older children or adults, although they are not standardized for those age groups (Galuschka et al., 2023). While limited information is available regarding the validity and reliability of the STAS Junior, correlations between teachers' assessments and the subtests are generally acceptable (Lindstrom, 2018).

The Comprehensive Test of Phonological Processing (CTOPP) developed by Torgesen et al. (1994) to evaluate various aspects of phonological processing abilities in children and adults. CTOPP provides valuable information about an individual's phonological coding skills, which are closely linked to reading and spelling proficiency. The measure of phonological coding within the CTOPP assesses a person's ability to manipulate and process the phonological components of language, including phoneme blending, phoneme segmentation, and phoneme manipulation. After revision, CTOPP-II was introduced which includes ten core and two supplementary subsets that specifically target phonological coding skills (Wang & Fan, 2021). Some of these subtests include

elision, blending words, and sound matching (Wagner et al., 2020). The CTOPP provides standardized scores that can be compared to age-appropriate norms, allowing clinicians to assess an individual's phonological coding abilities relative to their peers.

3.3.2 Reading and Spelling Assessment

Assessing a child's reading and spelling abilities is fundamental in identifying dyslexia. Standardized tests including the Gray Oral Reading Tests (GORT), the Wechsler Individual Achievement Test (WIAT), and Woodcock-Johnson Tests of Achievement are commonly used to assess reading skills (Roitsch & Watson, 2019). These assessments measure a child's reading accuracy, reading speed, and reading comprehension abilities, providing a comprehensive profile of their reading skills. In addition to standardized tests, informal measures, such as running records, teacher observations, and writing samples, may also be employed to gather a more holistic understanding of a child's reading and spelling difficulties.

The Woodcock-Johnson Tests of Achievement (WJ-III) has been widely used as a comprehensive assessment tool designed to measure the academic skills and abilities of individuals in many studies (Abu-Hamour et al., 2012; Lindstrom, 2018). The WJ-III offers valuable information about an individual's abilities across different academic areas, encompassing reading, writing, mathematics, and oral language. The WJ-III consists of a battery of subtests that assess specific academic skills and abilities. These subtests cover a broad range of areas, including reading fluency, reading comprehension, spelling, written expression, mathematical calculations, mathematical reasoning, and oral language proficiency (Lindstrom, 2018). Each subtest is carefully designed to measure specific aspects of academic achievement, providing a comprehensive profile of an individual's strengths and weaknesses. The assessment process involves administering the subtests to the individual and scoring their responses according to standardized procedures. The results are then compared to age-based norms, allowing for a meaningful interpretation of the individual's performance relative to their peers (Roitsch & Watson, 2019). The WJ-III provides standardized scores that enable professionals, such as psychologists, educators, and clinicians, to identify specific areas of strength and weakness, diagnose learning difficulties, and guide educational interventions and support. Also, the WJ-III is highly regarded for its reliability, validity, and comprehensive coverage of academic skills in dyslexia (Lindstrom, 2018).

Other than that, the Wechsler Individual Achievement Test (WIAT) developed by David Wechsler, is a comprehensive assessment tool designed to measure the academic achievement of individuals from ages 4 to 85 years. The latest version of WIAT is the fourth edition which is widely used in testing the level of dyslexia (Dombrowski & Casey, 2022). This is agreed by Beaujean and Parkin (2022) who found WIAT provides valuable information about an individual's performance in various academic domains, including reading, writing, mathematics, and oral language. One of the strengths of the WIAT is its comprehensive coverage of academic skills across different domains. This allows for a holistic assessment of an individual's academic achievement and aids in identifying specific areas that may require intervention or additional support. The WIAT is also known for its strong psychometric properties, including reliability and validity, ensuring that the assessment results are accurate and reliable (Dombrowski & Casey, 2022).

In addition, the first edition of Gray Oral Reading Tests (GORT) developed by Dr. William S. Gray in 1963 which used to evaluate oral reading skills in individuals from early childhood to adulthood (McBride et al., 2018). The GORT provides valuable information about an individual's reading fluency, accuracy, and comprehension. The GORT consists of various graded passages of increasing difficulty, which are read aloud by the individual being assessed. The passages cover different genres and content, allowing for a comprehensive evaluation of oral reading abilities (McBride et al., 2018). Past study examined by Keenan and Meenan (2012) used this assessment to

diagnose children with comprehension deficient by measuring the individual's reading performance based on factors such as reading rate, accuracy, expression, and comprehension. One of the strengths of the GORT-3 is its focus on assessing not only accuracy and fluency but also comprehension. By including comprehension questions related to the passages, the GORT provides insights into an individual's understanding and interpretation of the material being read (Tong et al., 2017). Moreover, in China, a locally developed dyslexia assessment tool called the Chinese Reading Ability Test (CRAT) has been utilized. This assessment is specifically designed for students in grades 3 to 5 of primary school. The CRAT has demonstrated satisfactory test-retest reliability and internal consistency, indicating its suitability for assessing dyslexia in this population (Huang et al., 2020). As shown in Figure 1:

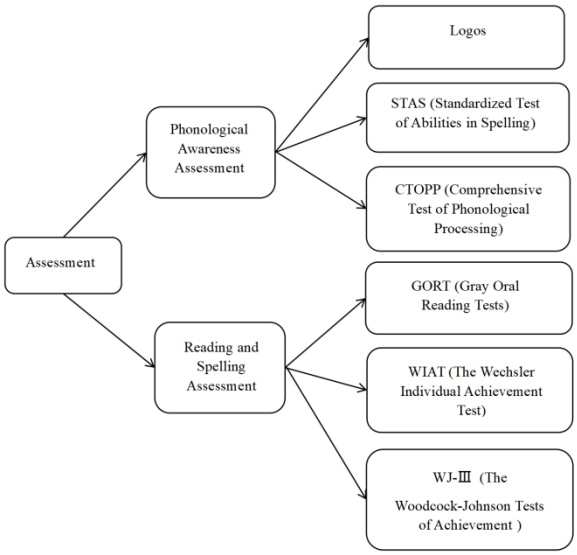

Figure 1: Types of Assessment for Children with Dyslexia

3.4 Intervention of Children with Dyslexia

3.4.1 Mobile-Based Game Intervention

Using technological tools has been found to facilitate interventions for children with learning disabilities (Cidrim & Madeiro, 2017). It was found that mobile based game interventions can be an effective and engaging way to support children with dyslexia. Utilizing the widespread accessibility and availability of mobile devices, these interventions can be easily integrated into daily life. Mobile games provide opportunities for targeted practice, reinforcement, and skill development in areas such as phonemic awareness, reading comprehension, visuospatial processing, and attention by combining the power of technology with evidence-based strategies.

Raharjo and Wimbarti (2020) hypothesized that mobile games could be used to intervene with dyslexia in children. Specifically, the game-based learning mode is designed for children under 8 years old with several game-based learning models developed throughout. In this regard, the researchers found that a game-based approach was the most appropriate technical approach for early intervention in Sinhala dyslexia. Additionally, several characteristics were identified that should be addressed when designing and developing effective learning models in Sinhala to support dyslexic students (Raharjo & Wimbarti, 2020), namely: specific characteristics of Sinhala affecting dyslexic children, dyslexic students in Difficulties faced when reading and recognizing the alphabet, and selecting the appropriate alphabet and related content when developing effective learning models of Sinhala.

Similarly, Cidrim et al. (2018) discovered *Desembaralhando* as a mobile application to support interventions for dyslexic children. The activity of thinking about letter mirroring or inversion, specifically the letter a/e and b/d pairs, was chosen for the study, as observed during written language appropriation in these subjects. With easy-to-interact screens and a fun interface, this mobile application is designed to hold children's interest, and instead of presenting activities that explain their mistakes, therefore, they can learn by trying it themselves (Cidrim et al., 2018).

Beside that, Kariyawasam et al. (2019) propose many gamified approaches to screen and intervene for learning disabilities while the vast majority of them are in English. However, primary school children aged 6 to 7 have not been specifically focused in the design of the applications. For this matter, Kariyawasam et al. (2019) state that a mobile application has been presented in Sinhala that provides screening with highly accurate results and interventions without the need for a separate application.

Moreover, a research from Holz et al. (2018) mentioned that children with dyslexia should receive evidence-based digital game-based interventions to maximize engagement, motivation, and learning until their reading and spelling skills allow them to participate in age-appropriate social, cultural, and educational activities. Digital game-based interventions are the top digital interventions for children with learning disabilities and are an extension of computer-based interventions (Holz et al., 2018). Since Digital game-based interventions is expected to be engaging and fun, and therefore naturally motivating (Ronimus & Lyytinen, 2015), motivational design for using digital game-based interventions in the home setting is critical, while learning effectiveness is considered the most important aspect in schools (Ronimus & Lyytinen, 2015).

3.4.2 Rhythm/Music-Based Intervention

Recently, research into the brain basis of developmental dyslexia is giving rise to a new wave of innovative treatments aimed at developing cognitive and perceptual skills that may be involved in the reading process, thus improving reading skills in an indirect way (Frey et al., 2019 & Pecini et al., 2019). Scholars found a relationship between rhythm processing and reading tests hypothesis that music training can improve dyslexia-related difficulties (Flaugnacco et al., 2015). Research from Cancer et al. (2019) confirmed the potential of Rhythmic Reading Training to improve reading speed by comparing reading performance before and after training. In addition, Rhythmic Reading Training had specific effects on reading speed and a greater effect on reading processes involving phonological processing and letter-sound mapping. Furthermore, it was found that all children and pre-adolescents with dyslexia can benefit from Rhythmic Reading Training, regardless of their intelligence (Cancer et al., 2019).

Similarly, Cancer et al. (2020) also revealed that compared to spontaneous development, Rhythmic Reading Training has been shown to improve reading speed and accuracy in Italian children with dyslexia. Again, Rhythmic Reading Training was found to be an effective alternative to other dyslexia intervention methods. Specifically, it seems to be particularly useful for improving reading speed (Cancer et al., 2020). Compared to conventional interventions, Cancer et al. (2020) emphasized Rhythmic Reading Training is a user-friendly and adaptable training method that does not require a specific administration environment or extensive training for its implementation. Besides, it appears to be more inclusive than other known music-based training (Gordon et al., 2015) as it does not require a trainer with specialized musical knowledge or a specific facility for practice. Furthermore, it does not exclude children with limited musical aptitude or interest, as would be the case with specialized music training.

Studies show that musical instruction can help dyslexic students with rhythm, hand-eye coordination, and direction. Compared to the traditional music course, the intervention program had a greater positive effect on dyslexic students' stimulus-recognition abilities. It appears that

multisensory, kinetic, and spatial activities have aided students with dyslexia by making the learning process more efficient, enjoyable, and full of fun (Bouloukou et al., 2021). Beside that, it was seen that the improvement in rhythmic perception among students who participate in the interventional music program is more pronounced than among those who participate in the conventional music program (Bouloukou et al., 2021).

3.4.3 Remedial, Compensatory, and Mixed Approaches

Dyslexia, a prevalent learning condition that impacts reading and writing skills, poses substantial scholastic obstacles for youngsters. Numerous strategies have been created by researchers to address the various needs of children with dyslexia. Dyslexic children require ongoing, specialized interventions to improve their spelling (Wanzek & Vaughn, 2008). Special educators can use three types of rehabilitation approaches to facilitate students' acquisition of knowledge and strategies (Chapleau & Beaupré-Boivin, 2019), namely remedial, compensatory, and mixed approaches. It was discovered that in remedial approaches, the special educator focuses on the development of learners' deficient knowledge and strategies (Chapleau & Beaupré-Boivin, 2019). Besides, compensatory approaches emphasize the consolidation of learner-accessible knowledge and learning-promoting strategies. For instance, a special educator using a compensatory approach with children with dyslexia may implement interventions focusing on morpheme knowledge and derivational morphology-based spelling strategies (Berninger et al., 2008). In addition, the special educator combines remedial and compensatory activities to meet the needs of the students and allow them to develop their skills in a mixed approach (Chapleau & Beaupré-Boivin, 2019). As shown in Figure 2.

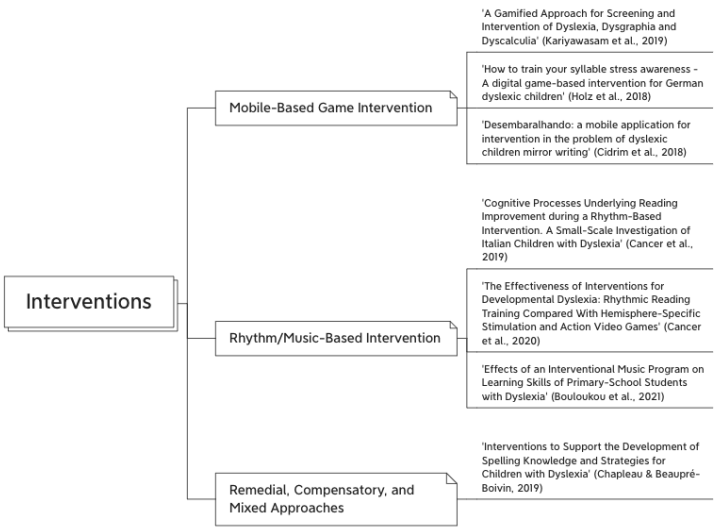

Figure 2: Types of Interventions for Children with Dyslexia

4. Conclusion

The frequency of dyslexia is unknown since it is hard to diagnose and outcomes vary between research settings, according to the literature review. Current mainstream dyslexia assessment methods include Phonological Awareness Assessment and Reading and Spelling Assessment. Many countries are also developing other tests and systems to improve diagnosis accuracy and convenience. Additionally, conventional dyslexia interventions include Mobile-Based Game

Intervention, Rhythm/Music-Based Intervention, Remedial, Compensatory, and Mixed Approaches. The study of dyslexia needs more countries and researchers to improve identification, evaluations, diagnosis, and intervention. This study makes an important contribution to understanding the current status of dyslexia. By raising awareness of dyslexia, people can learn more and take action. For teachers, professionals, and educators, understanding the specific conditions of dyslexia can not only detect children's abnormalities in time, but also better understand the psychology of children with dyslexia, so as to provide proper intervention.

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