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Cedarville University

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Discovering Dyslexia: A Phenomenological Study of
Dyslexia Experiences Across Age Groups

A thesis submitted in partial fulfillment
for the requirements of the degree

Masters of Education

Shauna A. Karloski

Cedarville University

Abstract

This phenomenological study focuses on this research question: What types of experiences do students identified early with dyslexia have in comparison to those identified at a later stage in life? Five children and three adults ranging in age from 8-years-old to middle-age were asked to participate in this study. Each participant was interviewed about their diagnosis of dyslexia and what it is like to cope with the disorder in school and everyday life. Participants' accounts were reviewed and organized according to 11 major themes. These themes were compared and contrasted across age groups to look for similarities and differences in experiences. The results of the study indicated that dyslexia diagnosis and treatment has improved in recent years. However, progress can be made in educating others about dyslexia. Further research should be conducted to extend the generalizability of this study to a larger population with a more diverse demographic.

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Chapter 1: Introduction to the Study

Dyslexia, a learning disorder associated with language-based difficulties, is more prevalent in our school systems than some may think. While many students may experience issues with learning to read and write initially, students with dyslexia are affected throughout their lives. Studies estimate that 80% of individuals diagnosed as specific learning disability have dyslexia (Karande, Sholapurwala, & Kulkarni, 2011).

The first recorded medical case of a patient struggling to read for reasons other than optical issues was recorded by Johannes Schimdt, a Prussian physician, in the 1600s. In the 1800s, physician William Broadbent studied 10 cases of patients with aphasia and began to localize these issues to specific areas in the brain (Campbell, 2011). Just a few years later another physician, Kussmaul, coined the terms *word-blindness* and *word-deafness* to describe adults suffering from reading disabilities despite their typical sensory acuity and average intellect. Adding to Kussmaul's work, Ball described the autopsy of a man who experienced aphasia after suffering from numerous strokes. While examining the patient's brain, Ball determined that the cerebral lesion causing word-blindness and word-deafness, as he called it, was located in the parietal lobe, meaning these issues were receptive disorders. This viewpoint shifted the focus of the research from aphasia to reading difficulty. However, the first use of the term *dyslexia* occurred in 1884 with a German ophthalmologist named Berlin. He felt it was a better description of a reading problem based on neurological issues than *word-blindness* being used at that time by the medical community. German neurologist, Weissenberg, added to that definition by contrasting *alexia*, a condition where individual letters are not recognized;, *total alexia*,

absolute inability to read; *dyslexia*, a condition where letters were recognized; and *total dyslexia*, the inability to blend sounds into words (Anderson & Meier-Hedde, 2001).

Meanwhile in the United Kingdom in 1895, James Hinshelwood published the paper *Word-Blindness and Visual Memory* which connected this disorder to the area of the brain responsible for visual memory. By further analyzing a variety of cases of word-blindness, Hinshelwood created the new diagnostic categories of *letter-blindness*, *mind-blindness*, and *note-blindness* that were then linked to a specific injury to the brain (Campbell, 2011). The focus shifted from cases of patients with brain injuries to children with reading difficulties in 1896 when school doctor Kerr wrote about a boy with average math and handwriting skills who could not read or spell. Additionally, Morgan studied a 14-year-old named Percy who displayed average intelligence, but couldn't remember or retrieve written words (Anderson & Meier-Hedde, 2001). Each of these cases laid the groundwork for the first formal diagnosis of dyslexia referred to as congenital word-blindness in 1896 (Campbell, 2011).

Utilizing both Kerr and Morgan's research, Hinshelwood went on to make great strides in the areas of identification of word-blindness, remedial reading programs, and potential familial connections (Anderson & Meier-Hedde, 2001). Through his studies, Hinshelwood advocated for those who had previously been labeled "feeble-minded", but who truly suffered from dyslexia (Campbell, 2011). He also promoted individualized reading instruction centered on multisensory experiences to boost visual memory. Last, but not least, he hypothesized that because multiple family members across generations exhibited the same symptoms, they were inherited and not caused by cerebral disease or birth trauma (Anderson & Meier-Hedde, 2001).

Throughout the 1900s, many more cases of dyslexia were studied especially in the United States and Germany. Each of these cases described children of average or above average

intelligence who struggled with learning to read. Researchers concluded that this condition could be "fixed" as long as students received specialized instruction. In addition, these reports related this disorder to specific areas in the brain (Anderson & Meier-Hedde, 2001).

Today, the diagnosis and treatment of dyslexia continues to be studied and refined. In 2002, the International Dyslexia Association adopted the following definition of dyslexia (2016).

“Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.”

In addition, the Individuals with Disabilities Education Act 2004 (IDEA), Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act (ADA) ensure that students with dyslexia receive a proper education designed to meet their specific needs (International Dyslexia Association, 2012a).

Definition of Terms

Aphasia. An acquired language impairment affecting the production or comprehension of speech and the ability to read or write caused by a brain injury (National Aphasia Association, n.d.).

Americans with Disabilities Act (ADA). A federal law prohibiting discrimination and ensuring equality for persons with disabilities in regards to employment, state and local government services, public accommodations, commercial facilities, and transportation. It also mandates the creation of TDD/telephone relay services (United States Department of Justice Civil Rights Division, n.d.).

Congenital word-blindness. A term coined by James Hinshelwood to refer to the disorder now known as dyslexia (Anderson & Meier-Hedde, 2001).

Dyslexia. A language-based learning disability characterized by difficulties with specific language skills including spelling, writing, pronouncing words, and especially reading. This disorder affects individuals throughout their lives and qualifies students for special education and its corresponding services (International Dyslexia Association, 2012a).

Individuals with Disabilities Education Act 2004 (IDEA). A law ensuring services to children throughout the nation who have disabilities. IDEA governs how states and public agencies provide early intervention, special education and related services. Infants and toddlers with disabilities (birth-2) and their families receive early intervention services under IDEA Part C. Children and youth (ages 3-21) receive special education and related services under IDEA Part B (U.S. Department of Education, n.d.).

Section 504 of the Rehabilitation Act of 1973. A federal law that protects the rights of individuals with disabilities in programs and activities that receive federal financial assistance from the U.S. Department of Education. In addition, this law requires all school districts to provide a free appropriate public education (FAPE) to all qualifying students regardless of the nature or severity of the disability (U.S. Department of Education, n.d.).

Specific Learning Disability (SpLD). The group of neurodevelopmental disorders manifesting as *persistent* difficulties in learning to efficiently read (dyslexia), write (dysgraphia), or perform mathematical calculations (dyscalculia) despite normal intelligence, conventional schooling, intact hearing and vision, adequate motivation, and socio-cultural opportunity (Karande, Sholapurwala, Kulkarni, 2011).

Statement of the Problem

Despite the lack of identification, it is estimated that 15-20% of the nation's population exhibits some symptoms of dyslexia (International Dyslexia Association, 2012a). However, distinguishing between reading difficulties and dyslexia can be a difficult task especially with younger students. Studies indicate that appropriate early intervention provided in Kindergarten through third grade is extremely effective in closing the gap for struggling readers (International Dyslexia Association, 2012a). With that being said, a conclusive diagnosis of dyslexia cannot be obtained until a child is approximately 7-8 years old. This means a child could make it to third grade before any specialized instruction or treatment for dyslexia occurs (Karande, Sholapurwala, Kulkarni, 2011).

One of the simplest approaches to identify dyslexia is through teacher observations. As students begin learning to read and write, symptoms such as poor handwriting, confusion with left to right orientation, and difficulties in spelling can indicate a child may have dyslexia (Singer, 2014). Additionally, a history of language delay, lack of attention to the sounds of words, and family history are all indicators of dyslexia (Karande, Sholapurwala, Kulkarni, 2011).

The Hong Kong Behaviour Checklist for Primary Students was developed to assist teachers in determining if students may have Specific Learning Difficulties in Reading and Writing prior to referring the child to educational psychologists for more formal testing. This

brief checklist consists of 36 reading-related behavioral characteristics that teachers can easily observe during everyday classroom interactions with students. To make the most of this checklist, students should be assessed at the end of Kindergarten or beginning of first grade so that early intervention strategies can be implemented (Chan, Ho, Chung, Tsang, Lee, 2012).

In the United States, Response to Intervention (RTI) is being used to observe students for dyslexic tendencies. The goal of this method is to monitor student progress and implement incremental accommodations in order to address their needs. At Tier 1, students receive high-quality classroom instruction with their peers. If the student is still struggling, they move to Tier 2 interventions, which include small group instruction geared toward their specific difficulty. Finally, at Tier 3, students participate in individualized instruction (Snowling, 2013).

Several more formal screening tests, The Dyslexia Screener and The Dyslexia Early Screening Test (DEST), are specifically designed to systematically assess for dyslexia. The Dyslexia Screener is helpful for identifying three types of dyslexic coding patterns: dyseidnesia, deficit in perceiving whole words as visual structures and matching these whole words with auditory structures;, dysphonesia, deficit in phonetic word analysis synthesis;, and dysphoneidnesia, deficits in both eidetic and phonetic coding (Guerin, Griffin, Gottfried, Christenson, 1993). The DEST is comprised of a series of subtests that focus on phonological deficits, difficulties with rapid auditory processing, and issues with automatizing skills. The subtest scores are combined to create an "at risk quotient" (ARQ), which attempts to predict future literacy skills (Simpson, Everatt, 2005).

Even with the large variety of early screening methods, dyslexia can still go undiagnosed. Dyslexia screenings designed specifically for adults exist as well. These include The York Adult Assessment-Revised (YAA-R) and the Dyslexia Adult Screening Test (DAST). The YAA-R is

comprised of a battery of tests assessing reading, spelling, writing, and phonological skills. The purpose of this assessment is to identify university students with dyslexia in order to provide them with appropriate accommodations particularly with exams (Warmington, Stothard & Snowling, 2013). Similar to the DEST, the DAST consists of multiple subtests that assess areas of relative strength for individuals with dyslexia (Harrison & Nichols, 2005).

Identifying dyslexia is the first step to ensure students receive the necessary accommodations in order to excel in reading/writing throughout their schooling. With that being said, it is often difficult to discern between early reading difficulties and true dyslexia. Informal teacher observations, checklists, intervention strategies, and formal diagnostic screenings exist to ensure students with dyslexia are identified at a young age. However, screenings for students in higher education must also exist because dyslexia can go undetected for many years. This study takes a closer look at the experiences of students identified early with dyslexia and compares them with those identified at a later stage in life.

Scope of the Study and Delimitations

I am studying the phenomenon of being diagnosed with dyslexia as either a young child or as a teenager/adult. While I cannot fully determine every topic that may be discussed due to the open-ended nature of this study, the scope of this study is to compare and contrast experiences of students with dyslexia. Interview questions will ask participants to recount their personal thoughts and feelings of dyslexia identification and dealing with the disorder both at school and in their personal lives. By allowing interviewees to guide the discussion, I hope to "take a walk in their shoes" and develop a deeper understanding of what it's like to live with dyslexia.

Although studies report that early identification of dyslexia is required for students to receive the appropriate instructional accommodations they need to succeed in school, my goal with this study is not to support or refute these claims. In addition, a wide variety of assessment tools exist to diagnose dyslexia. This study does not aim to determine which identification methods are most effective or to make any recommendations of dyslexia evaluation procedures.

The historical and medical information about dyslexia contained in the literature review serve only to gain a better understanding of this complex disorder. Both DNA and brain research have found genetic connections between dyslexia among family members and make suggestions as to the cause of this disability. With that being said, this study will not focus on how the disorder may have come about. These topics will only be discussed if a participant incorporates family members with dyslexia into his/her responses.

Significance of the Study

While many studies exist to describe experiences with either early or late diagnosis with dyslexia, I have been unable to locate a source comparing the two phenomena. However, it can be ascertained from the various studies that do exist that these experiences tend to vary greatly depending upon the timeline of diagnosis and implementation of interventions. Students identified at an early age receive treatment almost immediately to inhibit them from falling behind their peers in reading/writing. However, those diagnosed later in life do not have those same advantages. Some may be provided with instructional supports in high school or college while others may never receive specialized treatment.

Making this diagnosis more difficult is the fact that dyslexia is often hard to define. A variety of formal definitions exist including the one cited above from the International Dyslexia Association. These conflicting descriptions of the disorder also lessen the ability of teachers to

understand the disability. Students with dyslexia qualify for special education services under several federal laws. However, even if the students are identified as dyslexic, implementing accommodations can be a struggle for teachers who truly do not know what the students are dealing with on a daily basis.

The present study aims to tell the stories of students with dyslexia so that others can grasp the scope of the disability and its implications. Teachers can be better prepared to refer potentially dyslexic students for further testing to ensure they are able to succeed in school. They can also provide appropriate instructional supports when they understand what their students are experiencing. Friends and family members can become more sympathetic as they help those with dyslexia cope with struggles during everyday experiences. Most importantly, everyone will be able to spend a day in the life of a student with dyslexia, regardless of their age, in order to reveal what you cannot learn from simply reading about the disorder.

Methods of Procedure

I began this study by focusing on this research question: What types of experiences do students identified early with dyslexia have in comparison to those identified at a later stage in life? I then conducted a full literature review of various topics surrounding the central focus of dyslexia. I thoroughly searched online databases such as Academic Search Complete, Educational Abstracts, ERIC, Digital Dissertations, PsychInfo, OhioLink, Christian Periodical Index, and Theological Research Exchange Network (TREN). In addition, I used the Google search engine to locate the websites of professional dyslexia organizations with articles and information on dyslexia. Last, but not least, my personal experience working with students with dyslexia helped me to add to my body of knowledge on the topic.

After perusing the extensive research described above, I analyzed each piece more carefully. I identified the major points of interest to me in studying experiences with dyslexia. These topics include Brain Research/Genetic Factors, Early Diagnosis, Later Diagnosis, and Living with Dyslexia.

Having a formal definition and a better understanding of the history of dyslexia I began viewing the current diagnostic methods of dyslexia in light of previous methods. Initially, physicians and psychologists working to study the disability were the only ones who could identify dyslexia. Students who struggled with reading and writing in school were cast off as dimwitted and received no form of specialized instruction or support in helping them overcome the disorder. Through the years, further studies led to a more precise description of the disorder that enabled teachers to identify students and provide them with the instructional support they needed to succeed. Today, connections of dyslexia diagnosis among family members and extensive brain research make it easier to recognize the disorder. In addition, teacher observations combined with diagnostic screenings allow for identification of this disability as early as preschool.

By focusing on the screening methods and interventions for dyslexia I designed a list of open-ended interview questions. These questions guided my face-to-face and/or phone interviews of individuals who were diagnosed early with dyslexia and individuals diagnosed later in life. By creating open-ended questions, my interviewees were able to describe their experiences in-depth and add any additional details about topics I may not have thought of.

After conducting the interviews, I used my copious notes to create a transcription of each interview. I then analyzed the interviews for common themes related to the above-mentioned

topics. In addition, similarities and differences in experiences were explored as I discussed my research findings and composed my formal phenomenological research thesis.

Chapter 2: Plenary Literature Review

Brain Research/Genetic Factors

As early as the 1800s, studies of dyslexia indicated that the disorder was linked to specific areas in the brain and passed on from parent to child via genetics. At that time, however, medical technology did not allow for examination of living individuals and focused solely on the autopsy of brains of those with aphasia (Anderson & Meier-Hedde, 2001). This lack of medical evidence left many to create hypotheses throughout the years about the cause of dyslexia including Sara S. Sparrow and Paul Satz in the 1970s (Fletcher & Morris, 2011).

Sparrow and Satz, neuropsychologists at the University of Florida, theorized that developmental dyslexia resulted from a delay in the maturation of the left cerebral hemisphere of the brain. Because of this delay, skills that are typically acquired at specific ages do not appear until a later time. This idea led dyslexia to be viewed as a multifaceted, developmental disorder that was caused by lack of ability to acquire the necessary language skills at the appropriate age. Sparrow and Satz further predicted that it was possible to identify students who would develop dyslexia and other reading disorders as early as Kindergarten by screening them using tests that assessed lateralized sensory, motor, and language functions. As this hypothesis was tested, Sparrow and Satz discovered that their theory of laterality was correct. With this confirmation, Sparrow, Satz, and other colleagues went on to initiate Kindergarten screening examinations on a large scale in the 1970s (Fletcher & Morris, 2011).

In the early 1980s, Norman Geschwind conjectured that a consistent amount of language brain tissue exists in an individual's brain and is either contained mostly in the left hemisphere or split evenly between both hemispheres for those who are left-handed or ambidextrous. Individuals with dyslexia, though, were believed to be lacking language brain tissue and what

they did have was split as evenly as possible across both hemispheres. As researchers Kemper and Galaburda began to test Geschwind's hypothesis, they determined that he was only partially correct. While the language brain tissue was split evenly between both hemispheres, the amount that existed was not insufficient. Rather than the quantity of the brain matter being the issue, it was determined the quality of the language brain tissue was the cause of dyslexia. During 16-24 weeks gestation, neurons created from neural stem cells must migrate, sometimes great distances, to the cortex or a subcortical nucleus. In order for this process of neural migration to occur properly, controls directed by gene function must be in place (Galaburda, 2005). In dyslexic brains, though, neurons that would normally drop out during this process remain viable and large groups of neocortical cells form in clumps on the cerebral cortex (Kender & Kender, 1998). These abnormalities are centralized in the cortex of the left hemisphere surrounding the sylvian fissure including regions such as the temporooccipital cortex, which is responsible for letter strings and words (Galaburda, 2005). As a result of this incomplete migration, neuronal cells fail to create an inhibitory influence on other nerve cells. Galaburda concluded that this was the potential reason dyslexic brains had more nerve cells than brains of those without dyslexia. Further research conducted by Galaburda and Steinmetz determined that symmetry in the brain was not the lone cause of dyslexia. They discovered that the corpus collosum, the band of fibers connecting the two hemispheres, was much larger in the brains of those with dyslexia. Despite these findings, researchers could not yet causally link these brain abnormalities with dyslexia (Kender & Kender, 1998).

As these breakthroughs were made, the focus in research began to shift from brains of dyslexics to molecular genetics. Through extensive studies, researchers were able to pinpoint three specific genes, KIAA0319, DCDC2, and DYX1C1, that they believe to be linked with a

higher risk for developmental dyslexia (Skeide et al. 2015). The question for Galaburda was, is there a genetic connection between the dyslexia susceptible genes and the neuronal migration genes? A collaborator on Galaburda's research, Joe LoTurco, and his colleagues from the University of Connecticut began to investigate. Through RNA genetic techniques, they determined that the region of the gene *DYX1C1* that causes the neural migration abnormality correlated to the region of the gene that is mutated in people with dyslexia in Finland. However, this connection was not found in American or English people with dyslexia. This finding led researchers to conclude that the mutation in *DYX1C1* is only relevant in Finns and not other ethnic groups and that other dyslexia-susceptible genes must be connected with neural migration abnormalities in more diverse populations (Galaburda, 2005).

Utilizing the results of this and many other studies Galaburda (2005) concluded that multiple developmental steps must occur in order for a person with a genetic risk for dyslexia to actually develop the disorder. First, the genetic mutation for neuronal migration must be present with no interference from other genes. Second, as the brain undergoes plasticity changes in response to the neural migration, this causes changes to the organization of the cortex and sometimes subcortical regions of the brain. As a result, some individuals, (more likely males than females), develop temporal auditory processing issues that lead to long-term difficulties in reading acquisition and performance manifested as developmental dyslexia (Galaburda, 2005). Researchers today continue to study genetic factors linked to dyslexia in order to fully pinpoint the cause of this disorder (International Dyslexia Association, 2015).

Another method of analyzing those with dyslexia is magnetic resonance imaging (MRI) and functional MRI (fMRI) testing. These exams have been used to actively study those with dyslexia as they complete reading and language activities in order to reveal even more

information about the brain structure of these individuals. During testing, researchers and medical professionals can determine which area of the brain is being utilized during a specific task by noting an increase in blood flow to that region (International Dyslexia Association, 2015).

Reading involves many cognitive processes and utilizes a variety of areas located in the left hemisphere of the brain. The frontal lobe is responsible for controlling the organization, production, and manipulation of language and speech and is also significant for silent reading proficiency. The parietal lobe controls sensory perceptions and links spoken and written language to memory to create meaning so that we can comprehend what we hear and read. The occipital lobe is involved in visual perception allowing us to identify letters. Last, but not least, the temporal lobe is connected with verbal memory and crucial for language processing and reading. Additionally, two systems, the left parietotemporal system and the left occipitotemporal system, process language within and between lobes. The first system enables word analysis, which is a process connected to mapping letters and written words with their corresponding sounds. It is also responsible for comprehending written and spoken language. The latter system controls automatic, rapid access to whole words and is important for reading fluency (Hudson, High & Otaiba, 2007).

The question now is, how are these areas in the brain different in those with dyslexia? First, people with dyslexia have less gray and white matter as well as altered white matter integrity in the left hemisphere occipitotemporal and parietotemporal systems (International Dyslexia Association, 2015). Gray matter is mostly composed of nerve cells and is what we see when viewing a brain. White matter is located within the depths of the brain and is made of connective fibers covered in myelin. Having less gray matter causes issues when processing the

sound structure of language (phonological awareness) and lacking white matter lessens the capability or effectiveness of the regions of the brain to communicate with each other. This, along with the asymmetrical hemispheres of the brain, is linked with reading and spelling difficulties exhibited by people with dyslexia (Hudson, High & Otaiba, 2007). Additionally, studies have discovered that dyslexic brains lack neuronal size asymmetry that is found in typical brains. However, a link between this abnormality and dyslexic tendencies is still being researched (Zeffiro & Eden, 2000).

As expected the functionality of a dyslexic brain indicates that certain weaker areas of the brain are under activated and to compensate other areas of the brain are over activated when undergoing language-related tasks. One specific study conducted by Shaywitz et al. in 2002 took a closer look at 144 right-handed children with and without reading disabilities. The children were asked to identify names or sounds of letters, sound out nonsense words, and sound out and compare meanings of real words while being both in and out of an fMRI machine. The results showed that children identified with a reading disability had less activation in all areas of the brain associated with reading. Furthermore, children with a reading disability revealed a disruption in the rear reading systems in the left hemisphere crucial for skilled, fluent reading. This problem led these children to try to balance out these struggles by using a less efficient, frontal system. Shaywitz concluded this is why even when students with dyslexia learn to read they still struggle with fluency on grade-level passages (Hudson, High & Otaiba, 2007). Another study conducted by Rumsey et al. in 1992 compared adults with dyslexia and those without on rhyme detection tests. The study found that adults with dyslexia had a lesser increase in regional cerebral blood flow (rCBF) in two temporoparietal areas of the left hemisphere of the brain. Paulesu et al. in 1996 further studied people with and without dyslexia during short-term

memory and rhyming tasks. It was discovered that those with dyslexia lacked activation in the insula area of the brain that links Broca's area and Wernicke's area leading researchers to label dyslexia as a "disconnection" syndrome (Zeffiro & Eden, 2000).

Still today, additional studies are being conducted to causally link specific areas of the brain and genetic abnormalities with a variety of reading disorders including dyslexia. While there is no cure for dyslexia, using the information gleaned from these studies, researchers can now provide teachers and parents with a list of predictors to determine if a student is at risk for having dyslexia. This allows for early identification and treatment of the disorder.

Early Diagnosis

Early diagnosis of dyslexia is key in ensuring students are able to succeed in language-based tasks like their non-dyslexic peers. However, discerning between a student who simply struggles with reading and a student who truly has a reading disorder such as dyslexia can be a difficult task. What makes this especially complex is that young, preschool-age students are still learning basic phonological awareness and letter identification skills. What may seem like a basic mistake in the process of learning to read is actually an indicator of a bigger problem that needs to be addressed. Through the work of many researchers, though, a wide variety of screening tools and dyslexia assessments have been created to help teachers make the distinction between struggling readers and students with dyslexia.

In 1995, Margaret H. Hill from the Texas State Council of the International Reading Association decided to investigate the dyslexia identification practices of 300 school districts in Texas. In order for a child to qualify as handicapped under Section 504 of the Rehabilitation Act of 1973 the Texas Education Agency (TEA) requires evaluation procedures that are validated and geared toward a specific disability. For dyslexia, the prescribed course of action consists of

four phases, but teachers found it especially difficult to discern between students with dyslexia and students with other reading, writing, and spelling learning disabilities. It was discovered that only 16% of schools were using the TEA definition of dyslexia exactly and 18% of students with dyslexia were placed in special education. Just 3.5% of schools screened students for reading, writing, or spelling issues separately while only 1.4% tested for language disorders as a whole. Further analysis of Texas' definition of dyslexia found that it was much more exclusive than other accepted definitions of dyslexia such as Kamhi's from 1992. This contrasting definition along with vague guidelines for identifying students with dyslexia led schools to adopt their own policies and procedures for screening students for dyslexia. Teachers utilized intelligence tests, achievement tests, reading inventories such as the *Gates MacGinitie Reading Test*, and writing scores from informal writing samples, the *Texas Assessment of Academic Skills*, or the *Test of Written Language*. However, Hill believes if a more formal and inclusive definition of dyslexia such as Kamhi's were to be employed, tests of phonological processing would be much more beneficial in identifying students with dyslexia. Some districts did utilize out-of-date phonological assessments as well as tests of visual/auditory perception, visual motor integration, and listening comprehension to aid in their decisions. In the end, Hill concluded that until a more precise definition of dyslexia is agreed upon by the TEA, districts will continue to use whatever methods they choose to label students as dyslexic and these children will not receive the appropriate interventions to help them succeed (Hill, 1995).

Other states including California and Louisiana have also passed legislation to ensure that students with specific learning disabilities, including dyslexia, are properly identified and supported in the educational system. However, it was once again noted that a systemized approach to identifying these students was needed in order to follow through with this

requirement because teacher referrals alone are not sufficient. A review of currently available tests revealed that they were too time-consuming to be administered on a regular basis.

Therefore, Griffin, Walton, and Christenson developed The Dyslexia Screener (TDS) in 1988 as a quick screening procedure to identify three dyslexic coding patterns: dyseidesia, deficit in perceiving whole words as visual structures and matching these whole words with auditory structures; dysphonesia, deficit in phonetic word analysis synthesis; and dysphoneidesia, deficits in both eidetic and phonetic coding (Guerin, Griffin, Gottfried, Christenson, 1993). In order to verify the concurrent validity of this exam, Guerin, Griffin, Gottfried, and Christenson (1993) studied a nonreferred sample of 105 children at age 10 participating in the Fullerton Longitudinal Study (FLS) to compare the results of TDS with the Reading Cluster of the Woodcock-Johnson Psycho-Educational Assessment Battery (WJ). The sample included 60 males and 45 females. Of these children 96 were white and 9 were from other racial groups. The IQs of the children ranged from 84-145 and they all came from middle-class families. Each child was given the WJ Reading Cluster subtests that included Letter-Word Identification, Passage Comprehension, and Word Attack (pronouncing written nonsense words) as well as TDS in the laboratory by FLS staff. Analyzing 100 students' tests scores, researchers found five children whose TDS scores placed them in the borderline dyslexic group, 12 who were mildly below normal, two who were moderately below normal, and two who were markedly below normal. A significant correlation between these scores and the WJ Reading Cluster scores for girls, boys, and the entire group was revealed. In addition, TDS scores correlated negatively, significantly, and in the low-to-moderate range with IQ. Through stepwise multiple regression analyses, researchers discovered that TDS scores were uniquely linked to the prediction of reading achievement as measured by the WJ Reading Cluster assessments and teacher ratings on the

Child Behavior Checklist. Using a prediction-performance comparison matrix, statistics revealed that the TDS is more effective as a screener for boys than girls, but across the entire sample the sensitivity of the TDS was 75% and the specificity of the TDS was 88%. All in all, the various analyses conducted in this study confirm that TDS is a valid instrument for screening students for dyslexia. Since it requires only five minutes administering it is also an efficient method to identify students with dyslexia. With that being said, TDS was found to be 100% effective in assessing boys for dyslexia, but not as effective for girls, so further research should be conducted on this and other screening methods to find the most useful tool for the job.

Researchers Fawcett, Singleton, and Peer (1998) set out to accomplish this task by analyzing the Dyslexia Early Screening Test (DEST) and the Cognitive Profiling System (CoPS 1) in the United Kingdom. These assessments are designed to be administered by classroom teachers to students as young as 4 years of age in order to prevent these students from failing to learn to read. Reading instruction is much more rapid in the UK than in the United States. Students begin learning letter sounds in the first week of school and progress to simple consonant vowel consonant words by the second term. At the end of year 1, students are expected to have read their first book and continue to soar upwards in reading achievement. The 1993 Education Act along with the 1994 Code of Practice clearly outline the proper method of identifying and supporting children with specific learning difficulties such as dyslexia in the mainstream school. It is estimated that 4% of all children will be severely dyslexic and around 6% will be mildly or moderately dyslexic. Through a five-stage process teachers are expected to identify, monitor, and support students within the classroom so that only 2% of children with special needs require outside support. However, teachers worry that they will be unable to fulfill the requirements of this legislation. Fortunately, the DEST and CoPS 1 have been designed to

enable teachers to accomplish this task quickly and easily so that all students with dyslexia can receive the appropriate accommodations in school.

The CoPS 1 is a computerized psychometric assessment that takes approximately 45 minutes to administer. It is intended for children age 4 years 0 months through 8 years 11 months in order to identify cognitive strengths and weaknesses that provide an early indication of risk for dyslexia and other learning disabilities. CoPS 1 is capable of being given by educators and psychologists, but requires expertise in these fields in order to accurately interpret the results. In creating this assessment, researchers decided to make the test computerized to ensure precision, objectivity, and flexibility as well as limit training for teachers. They also felt that a computerized test was more attractive and less threatening for students. CoPS 1 was designed based on research carried out at the University of Hull Department of Psychology between 1990 and 1996. Of the 27 computerized exams that were created and given to 5-year-old children, eight were found to be effective in predicting dyslexia. The most satisfactory tests were then combined to create CoPS 1 which was standardized on a new sample of over 800 students. CoPS 1 also underwent a longitudinal study that used correlations, regression analyses, and discriminate function analyses. The results found that CoPS 1 was highly correlated to other tests of phonics skills and reading ability and outperformed other screening devices widely used in the UK. Currently the English version of CoPS 1 is used in over 1,000 schools in the UK and elsewhere throughout the world and a Swedish version was developed and is utilized in over 200 schools and centers. Additional versions in various languages are being created and researched as is a form of the exam to be used for children ages 9 years 0 months through 15 years 11 months (Fawcett, Singleton, and Peer, 1998).

The DEST was designed with information gleaned from various studies of dyslexic students as they performed a wide range of tasks including motor skill, speed of processing, and cognitive skills. The results of these studies indicated that phonological difficulties should be the main focus of the DEST, but the exam also includes assessments of memory, knowledge, and motor skills. To make the test more cost-effective it was created in a paper format and did not require a specialist to complete. Instead, classroom teachers were trained to administer the test to students in about 20 minutes total. Each subtest gives the child a score of high risk (--), moderate risk (-), neutral (0), or above average (+ or ++). The prototype DEST was evaluated in a pilot study consisting of over 100 schools nationwide. The schools rated the screening tool for ease of use. Teachers reported that the DEST accurately identified at-risk students and some of which had gone unnoticed by the teachers' assessments. They felt the tool was very useful and stated they would like to see it used regularly in schools. However, study results did indicate the DEST was only accurate for children under 6 1/2 years of age and, instead, the Sheffield Dyslexia Screening Test (DST) was modified to fit those over this age. Both the DEST and DST were formally published in 1996. In March of 1997, the DEST researchers initiated a longitudinal study to confirm that students identified as at-risk at age 5 were formally diagnosed with dyslexia later on. Through correlation and other statistical analyses, it was determined that the DEST rates high on dyslexia prediction and could become even more accurate with the addition of a category of mild risk. The purpose of the DEST, though, is to not only identify the students who are at-risk, but to ensure that they receive appropriate remediation to improve their skills in areas of weakness. Researchers believe both the DEST and DST are suitable screening tools that could be utilized in the US and other English-speaking countries as well (Fawcett, Singleton, and Peer, 1998).

Extending the research of Fawcett, Singleton, and Peer, Simpson and Everatt (2005) conducted an additional study on the DEST to further assess the accuracy of the exam in predicting future literacy success in comparison with other school-based measures. Participants in the study included 45 boys between the ages of 4 years 6 months and 5 years 4 months who came from middle-class families with parents working in professional occupations. During Phase 1 of the study, researchers administered 9 of the 10 subtests (excluding the Postural Stability Test due to parental approval issues) to the students and scored them to get an at-risk quotient (ARQ) for each participant. Testing took place in a separate room to limit distractions and lasted about 20-25 minutes per student. The raw score of each subtest was compared to the DEST manual's age appropriate norms to establish an at-risk index that was quantified to get each child's ARQ. An ARQ of 1 or greater indicates strongly that a child is at-risk for dyslexia. Phase 2 of the study occurred five months after the initial screening. It was comprised of skill tests that assessed letter names and sounds, upper and lower case letters, non-word reading, and rhyme detection and was administered by one of the school's specialist teachers trained in assessment techniques. Again, the testing was performed in a separate room away from classroom distractions, but only took 15-20 minutes per student. Phase 3 began 14 months after the initial screening. Students were given the Schonell Single Word Graded Reading Test and the Vernon Graded Word Spelling Test. A specialist teacher administered the single-word reading test individually, while classroom teachers gave the single-word spelling test to students in three forms. Phase 4 was conducted 20 months after the initial screening and included single-word reading, single-word spelling, and text-reading assessments. The first two were the same exams used in Phase 3 and the third was the Primary Reading Test given to the group as a whole by classroom teachers. After calculating means and standard deviations for each of the exams used in the study and correlating those with

the DEST, it was confirmed that the ARQ is related to future reading and spelling ability. With that being said, some subtests, such as phonological discrimination and rhyme/first sound detection, were poorly related to literacy skills. Additional regression analyses found that certain subtests of the DEST, as well as school attainment measures, were more valuable in predicting reading ability than the overall ARQ score. The same conclusions applied to predictions of spelling ability as well. In the end, the DEST subtests of sound order and rapid naming along with school attainment measures of lower case letter names are better predictors of future literacy ability than the accumulative ARQ in the early years of schooling. These results are similar to those discovered by Simpson and Everatt in a study of the DEST conducted in 2001 on an older cohort of boys, but contradicts the findings of Fawcett et. al (1998). Of particular interest with this study is the Sound Order Test, which was created based on work by Tallal in 1980. The reasoning behind this portion of the DEST was to assess for auditory processing deficits, but recent research has led to contradictory findings of a causal link between auditory processing issues and dyslexia. Additionally, this subtest requires students to attach a verbal label to non-verbal sounds, which calls upon phonological awareness and working memory and could result in poor performance on this task regardless of auditory processing ability. This study also discovered that both the rhyming subtest of the DEST and school-based rhyme measures were poor indicators of future literacy ability. It could be that the tests used were simply not sensitive enough to pick up on rhyming skills with the participating group, but future screening methods may need to include additional phonological processing tasks in order to fully assess students across the entire age range suggested by the DEST. Another conclusion drawn from this study is that while the DEST is designed to be administered across a wide age range of students, it may be better to vary the test items used depending upon the age of the student being tested. For this

reason, school-based attainment measures were found to be more insightful in predicting future literacy acquisition than the DEST subtests. In conclusion, Simpson and Everatt believe that the DEST is useful for providing teachers with each student's strengths and weaknesses, but may not be the most cost-effective or efficient method for screening students for reading and spelling difficulties they may develop in the future.

In China, Chan, Ho, Chung, Tsang, and Lee (2012) studied the Hong Kong Behaviour Checklist for Primary Students; another screening tool with the potential to predict dyslexia at a young age. As discussed in other studies, many feel that teacher observations along with reading-related behavior checklists are adequate for identifying students with dyslexia and other reading disabilities. Generic, global checklists as well as behavior-specific checklists have been designed to assess students for a variety of behavioral disorders including dyslexia. In between the extremes of these two types of checklists fall the domain specific checklists. This is the category the Hong Kong Behaviour Checklist of Specific Learning Difficulties in Reading and Writing (HKBCL) falls under. The HKBCL was designed in conjunction with an extensive review of literature and previously created checklists as well as teacher input. After creation, the checklist underwent a psychometric evaluation with 353 students in grades 2 through 4, was revised, and retested with 216 Grade-1 students. Through these studies, the HKBCL became three different versions; a 45-item version for Grade-1 students, a 63-item version for Grade-2 students, and a 65-item version for Grade-3 and above students. These versions of the checklist were put to use in many public schools. However, researchers wanted to revise the HKBCL to be utilized as a brief screening measure across all primary grades. In the current study, researchers created a new version of the HKBCL that included a common set of items for all primary grades and assessed the validity of the redesigned checklist as a brief dyslexia screening measure. Participants in the

study included 1,063 Hong Kong Chinese schoolchildren that were referred by teachers for Education Bureau (EDB) services because of suspected learning difficulties. Students were studied across two academic years between September 2006 and August 2008. Using HKBCL and Hong Kong Test of Specific Learning Difficulties in Reading and Writing (HKT) data gathered from the four EDB regional offices, it was determined that 544 children were formally diagnosed with dyslexia by educational psychologists from the EDB and 519 children did not have dyslexia. For the HKBCL, teachers are asked to record the frequency of occurrence of various behaviors on a scale of 1 to 5 with 1 being never observed and 5 being often observed. In scoring, only ratings of 4 and 5 are counted in order to create a dichotomous score that is calculated easily by teachers. This dichotomous score is what is used in data analyses in this study. The HKT is a battery of 12 tests given individually to students assessing literacy, naming speed, phonological awareness, phonological memory, and orthographic knowledge. Each test is scored individually and then combined to result in five composite scores representing the five domains of the test. To be considered dyslexic, students must score 7 or below on the literacy domain and one or more of the cognitive skill domains. This gives them a dyslexia diagnosis variable of 1 as opposed to a 0 for those who do not meet the scoring requirements. Data analyses began with psychometric evaluation of teachers' dichotomous responses on the HKBCL items. Specially selected HKBCL items were then put through Rasch measurement model analysis using the *Winsteps* Version 3.61.2 computer program. These analyses assessed the assumption that the items work in unison to result in responses to test items. Finally, the validity of the revised checklist was analyzed through correlation with external measures of literacy and cognitive skills from the HKT. Results of these analyses found that apart from six items that were later removed from the checklist, the newly-designed 42-items of reading-related

behavioral characteristics could be interpreted as a unidimensional scale that assesses a global dimension of dyslexic function. Additional results found that none of the items on the checklist favored a specific age group, but that two of the items related to attention and concentration favored boys over girls and two of the items were more likely to be observed in students with dyslexia. Furthermore, person estimates or person logit scores on the HKBCL correlated with external validation measures of HKT test scores revealing that the HKBCL is an effective tool for identifying students with dyslexia. In the end, there are limitations to this study that need to be addressed in future research. These include the representativeness of the government school-referred sample of participants, the inclusion of behaviors not related to reading and writing on the checklist using dichotomous scoring, the use of a common set of items across multiple grade levels, and the utilization of Rasch analyses for revising the checklist. In the future, a study should be conducted using a Likert rating system to better assess the validity of the HKBCL. With that being said, this study has been useful in finding an efficient and effective screening measure to place students on a scale of global dyslexic dysfunction.

Taking a slightly different approach to dyslexia identification, a group of Finnish researchers, Puolakanaho, Ahonen, Aro, Eklund, Lappanen, Poikkeus, Tolvanen, Torpp, and Lyytinen (2007), conducted a study aimed at creating a clinically usable and cost-conscious method for evaluating individual children's risk for developing a reading disability (RD) such as dyslexia. They gathered data from 198 children participating in the follow-up project of the Jyväskylä Longitudinal Study of Dyslexia (JLD). Of these participants, 106 had a familial risk and 92 had no familial risk of developing RD. Utilizing identified predictors of dyslexia researchers analyzed children over three years starting at the age of 3 1/2 in order to determine if they were able to accurately predict dyslexia and other reading disorders. They gathered data on

the skills of phonological awareness, rapid naming (RAN), short-term memory, expressive vocabulary, pseudoword repetition, letter naming, and performance IQ. Additionally, parental education was classified using a 7-point scale. In order to separate the children into RD and non-RD groups, assessments of reading and spelling that focused on accuracy of reading/writing and fluency of reading were administered. These tests involved the tasks of reading words and nonwords, spelling words and nonwords, reading text, reading nonword text, and a standardized reading achievement test. After logistic regression analyses were conducted, the results of the study found that familial risk status was an important predictor of RD in all models. At the ages of 3 1/2 and 5 1/2 letter knowledge and RAN were significant predictors, but at age 4 1/2 letter knowledge and phonemic awareness were significant predictors. Even with a 90% sensitivity cutoff level and weighted scores, the results remained the same. Puolakanaho et al. were able to use this information to create a probability curve capable of calculating an individual child's risk of RD simply by entering the relevant scores. This curve also revealed that familial risk dramatically increases the likelihood of developing RD, and good early development of letter-naming skills dramatically decreases the likelihood of developing RD. At ages 4 1/2 and 5 1/2 children with low letter knowledge can have a lower risk of RD if they have increased skills in either RAN or phonological awareness. In the end, Puolakanaho et al. concluded that it is possible to identify children with a predisposition for RD as early as 3 1/2 years of age, which is approximately 5 years before dyslexia can formally be diagnosed. However, this study should be compared to a more normative sample prior to putting these prediction procedures into practice because there is a potential for false positives to occur. This model, therefore, is best suited in identifying those who will not have RD than those who will end up with RD.

Researchers Thompson, Hulme, Nash, Gooch, Hayiou-Thomas, and Snowling (2015), from the United Kingdom, conducted a study based on Puolakanaho et al. Their goals were to extend the work of Puolakanaho et al. to an English-speaking sample of children, identify a set of predictors of dyslexia as defined by poor word reading and spelling, and to estimate the risk of dyslexia to an individual at different developmental stages. They began their study by recruiting children using advertisements in newspapers, nurseries, and web pages of support agencies for children with reading and language difficulties and speech and language therapy services. Participants were then broken into four groups using a two-stage process; family risk (FR) only, language impairment (SLI) only, FR-SLI, and control. The longitudinal study analyzed students yearly from around the age of 3 1/2 to 8. The children were assessed using a variety of tests that measured nonverbal ability, language measures, phonological measures, rapid automatized naming (RAN) of colors, objects, and digits, executive skills, motor skills, and literacy measures. Composite scores of each area were analyzed with a four-stage procedure using a model with the predictors of familial risk and language skills at various ages, a model substituting core measures of letter knowledge, phonological awareness, and RAN for the language composite, a model with additional measures of executive and motor skills assessing whether features of comorbidity increase the probability of a child developing dyslexia over core measures at each time, and best-fitting models with ROC analyses to investigate the accuracy with which dyslexia could be predicted, and to plot the probability curves of individual risk of dyslexia. The results of the study indicated that family risk status was predictive of dyslexia at every time point that was analyzed, but language was not a significant predictor when family risk was involved. Language became a significant predictor of dyslexia, however, at around 5 years of age. Researchers then concluded a preschool screening of familial risk and letter knowledge is the best tool to predict

dyslexia early on. At older ages, though, a dyslexia assessment should consist of phonological awareness and some RAN tasks to more accurately identify the disorder. In addition, this study extended the work of Puolakanaho et al. in two ways. First, researchers determined that at age 4 1/2 executive skills increased the likelihood of predicting dyslexia. Second, they discovered that by age 6 familial risk is no longer a significant predictor of dyslexia when viewing core cognitive skills, but motor skills aided in correctly predicting the disorder. With that being said, there were several limitations to this study that must be addressed in further studies. Participants were drawn from a high-risk sample so generalizability is low and methodological differences between this and other studies may have yielded results that are at odds with typical findings. Overall, this study reveals that family risk must be taken into account in order to identify dyslexia at an early age rather than simply screening the child for reading and language difficulties.

Yet another approach to discovering dyslexia was piloted by Ball, Becker, Boys, Davies, and Noton (2001). Because the project team was representative of the dyslexia advisory service, the speech and language therapy service, the psychological service, and school special education needs teachers, each of the researchers was already familiar with dyslexia and the difficulties faced by students with the disorder. They focused on students' deficits in phonological development, auditory short-term sequential memory, and word finding. The research project aimed to create a method of identifying potentially dyslexic children by the end of Year 1 (Kindergarten) and implement an intervention program to aid in literacy acquisition as well as improve the efficiency of identifying and supporting students with dyslexia at this grade level. Additionally, the researchers hoped to reduce the number of students in Key Stages 2 and 3 referred for special services due to severe dyslexic difficulties and facilitate classroom teachers

to take responsibility for identifying and effectively teaching students with dyslexia. A small-scale pilot study was conducted with 12 schools varying in geographical region. In the spring of 2000, 435 participating students in Year 1 were screened using six sub-tests assessing syllable blending, syllable segmentation, rhyme detection, phoneme blending, phoneme segmentation, and initial/final phoneme identification. An analysis with a ceiling point of eight errors was conducted in collaboration with participating classroom teachers to identify a group of target children within each selected school. Agreed upon interventions consisting of a resource book, games, and activities at three levels supported students with syllables, rhyme, and phonemes and a record-keeping system was put into place. As students reached a target level in the intervention process, they were released from the group. Interventions continued through the Autumn Term of 2000. Additional phases were designed to be implemented in the Spring of 2001 and Summer of 2001, but were not completed at the time of this publication. Phase 1 involved retesting students using the screening test and having teachers complete a questionnaire to determine the students that needed to remain in the program. Phase 2 required the teachers to complete a dyslexia checklist for each identified student, and an Individual Reading Analysis Form X, Rapid Naming sub-test from the Dyslexia Screening Test, and a drawing and writing task to be completed by each student and administered by the project team. At the end of Phase 2, teachers would be trained on implementing and analyzing these assessments for future students in need. Students identified with dyslexia by these exams would begin Key Stage 2 with an Individual Education Plan (IEP) designed collaboratively with the school and the Wiltshire Dyslexia Advisory Service. The pilot study results found 195 students scored at a level that required intervention. The project team predicted that at the end of Phase 2 students who scored poorly due to other difficulties would be separated from this group so that only 5% of the original

students remained with three times more boys than girls. The hope is that as these students proceed through the program with the appropriate interventions in place, they will demonstrate progress in literacy and significantly decrease the number of students identified with severe dyslexia later in life. Reports from participating schools and teachers thus far have been positive and indicative of future use of this screening process as part of their school's policy. One conclusion drawn from the pilot study was that problems with initial/final phoneme identification were typically the result of struggles with understanding the task or a speech impairment and therefore this sub-test is not as useful as initially thought and possibly could be removed from future screening tests. Also, this screening identified some students who seemed to be doing well with reading in the classroom. This could be caused by test anxiety or illness or these students may have already developed strategies to compensate for their issues with phonics indicating they do need interventions. More information about students falling into this category will be analyzed after Phase 2. As this study continues through Phase 2, more information about the success of this screening in identifying students with dyslexia and possibly other learning disorders will be determined. It is a hope of the researchers that this project will be expanded to improve the assessments and intervention materials, adjust procedures and data analysis, and incorporate additional schools in order to make a positive impact on the education of students with dyslexia.

In the United States, a similar approach known as Response to Intervention (RTI) is being implemented. Utilizing this method, students who struggle with reading and literacy are consistently monitored by classroom teachers as they progress through three tiers of intervention. In the first tier, students participate in regular classroom instruction potentially geared toward struggling learners. If the student continues to have difficulties they move to the second tier

where they receive instruction in a small group. After that, students enter Tier 3, which involves individualized interventions (Snowling, 2013). Using her knowledge of the United States' use of RTI, Snowling (2013) studied the potential of the Early Years Foundation Stage Profile (EYFSP) to screen for language and literacy difficulties and compared its effectiveness to RTI. She and other researchers began by analyzing students' data from the EYFSP in one local education authority consisting of three cohorts of children within 50 primary schools between September 2006 and July 2009. This exam is comprised of 13 scales assessing six areas of learning including personal, social and emotional; communication, language and literacy; problem solving, reasoning and numeracy; knowledge and understanding of the world; physical development; and creative development. Each scale contains nine points where points 4-8 are the early learning goals; point 9 indicates the child is working beyond early learning goals, and points 1-3 identify a student working below the early learning goals. Examining correlations between the EYFSP and Key Stage 1 Attainments, it was determined that scores for communication, language and literacy (CLL) were strongly linked with performance two years later in reading and writing. In addition, to validate teacher ratings on EYFSP scale scores and Key Stage 1 assessments, a representative subsample of 360 children in year 3 were assessed using a battery of objective tests. This follow-up study confirmed that CLL score on the EYFSP was a good predictor of later literacy performance and that teachers' assessments of students through ongoing observations are valid measures of student's current development as well as reasonable predictors of future literacy progress two years later. Overall, this study highlights that the early years are an essential foundation in learning and reveal that students assessed at age 5 can be identified with a high potential of developing dyslexia and other educational struggles. Combining these findings with RTI, students who are screened and identified for potential CLL

problems can participate in a program of supported interventions in order to reduce the risk of under or over-identifying students with learning disorders like dyslexia.

Today in England, students participate in a systematic phonics approach to teaching reading. While learning in this manner, students who are struggling are being carefully monitored by teachers as they progress through a series of phonics phases that move from rhyming and alliteration skills at phase 1 to fluency with letter-sound knowledge even of unfamiliar reading and spelling words at phase 6 (Snowling, 2013). An additional study conducted by Snowling (2013) categorized students at "dyslexia risk status" if they had not met the goals of phase 2, providing sound when shown any grapheme that has been taught, by the end of their fourth term in school. Of the students in that study, 16.4% were considered to be behind in phonics skills, which was a bit higher than average prevalence rates for dyslexia. Not wanting to trust teachers' judgments alone, researchers assessed students at the end of year 1 on various reading skill tests and compared them with a representative sample of children of the same age and gender. It was confirmed that teachers were correct in identifying the students as behind, but they were unsure if that meant the students should be labeled as dyslexic. Using a working definition of dyslexia, the researchers questioned if the students identified demonstrated poor phonological awareness, poor verbal memory, and slow verbal processing speed. They determined that this was the case and these children should be considered dyslexic. In conclusion, researchers felt that these studies proved there is no need to implement costly screening procedures to identify students with dyslexia. Rather, teachers can utilize information already gathered through consistent observations and teacher assessments and work more quickly to implement appropriate interventions by the end of year 1.

All in all, an immense amount of screening devices and identification methods have been created to diagnose young children with dyslexia. Even with extensive research studies, though, a unanimous conclusion of the best tool for the job has yet to be found. In addition, some students with dyslexia still are not identified with the disorder until later in life. This makes catching up to their peers in literacy achievement very difficult. However, to aid in this process, researchers have also developed tests of dyslexia for older students and adults.

Later Diagnosis

Similar to the Dyslexia Early Screening Test (DEST), the Dyslexia Adult Screening Test (DAST) was developed from the Dyslexia Screening Test (DST) as a quick and effective screening tool for identifying areas of weakness and strength in adults in order to diagnose those with dyslexia and provide them the support they need to succeed in higher education. The DAST is comprised of 11 subtests; rapid naming, one-minute reading test (fluency), postural stability, phonemic segmentation, two-minute spelling test, backward digit span (working memory), nonsense passage reading, non-verbal reasoning, one-minute writing test, verbal fluency, and semantic fluency. The DAST is scored by averaging the index of each individual test to derive an at-risk quotient (ARQ) just like the DEST. An ARQ greater than 1.0 indicates the student needs to be further assessed for dyslexia. In order to assess the effectiveness of the DAST in detecting students with dyslexia, it was compared to the Adult Dyslexia Index (ADI) method used to diagnose students for the purpose of special examination provision and application for the Disabled Students' Allowance. The ADI is an algorithmic system that tests students on the Arithmetic, Digit Symbol, Information, and Digit Span subtests of the Wechsler Intelligence Scale (WAIS-R ACID profile); spelling ability; and nonsense passage reading. In addition, students must have a previous diagnosis of dyslexia. Based on specific scoring criterion, students

are rated on each subtest. A total score of 2.5 or higher indicates dyslexia, a score of 1 or less indicates no dyslexia and a score between 1 and 2.5 indicates borderline dyslexia. Before comparing the ADI and DAST, researchers first checked the validity of the ADI against clinical judgments on 105 cases. Data analysis confirmed the ADI as an appropriate method of identifying students with dyslexia. After that, researchers administered a prototype of the DAST to 150 non-dyslexic students and 20 dyslexic students who were not part of the initial ADI study. The 20 dyslexic students were also given the ADI. The results of this study discovered 14 out of 15 students identified by the ADI were also labeled as at risk by the DAST and three out of four borderline dyslexic students were deemed at risk by the DAST. One student with dyslexia was missed by the DAST, but further research found the reason behind this was that the student had a high IQ with a childhood diagnosis of dyslexia and had improved her literacy skills to almost the normal range of her peers. To solve this issue, though, researchers added a non-verbal ability test to the DAST. Analysis of each subtest also revealed the need to make the phonemic segmentation, postural stability, backward span, nonsense passage reading, and rapid naming sections more challenging in the updated version of the DAST. In the end, researchers feel the DAST is a quick, cost-effective method to screen students for dyslexia prior to recommending a more thorough examination for a formal diagnosis by a trained psychologist. The researchers in this study recommend a combination of the DAST and the ADI to assess and identify higher education students with dyslexia (Nicolson & Fawcett, 1997).

An additional study of the DAST conducted by Harrison and Nichols (2005) further investigated the test's ability to correctly identify students with specific learning disabilities (SLDs) such as dyslexia. In Ontario, Canada about 4% of the school-aged population is formally diagnosed with a learning disability, however, 85% of these students are not identified until they

reach college or university. One major problem is that it is not possible to spend large amounts of time and money testing any student who struggles for an SLD. Therefore, the Learning Opportunities Task Force (LOTF) was established to research transition and post-secondary educational issues and provided the perfect platform for assessing the validity of the DAST in diagnosing students with SLDs. Researchers hypothesized that this study would yield a high true positive rate and low false positive rate like the Nicolson Fawcett validation study from 1997. The study participants consisted of 117 students with dyslexia and other SLDs enrolled in the LOTF-funded and supported pilot programs and 121 students recruited from the general post-secondary population. All of the students attended one of six institutions and ranged in age from 17 to 54 years old. Students with SLDs were administered a demographic questionnaire along with the DAST and researchers were given permission to access their IQ and aptitude scores gathered as part of their participation in the LOTF programs. Students without SLDs were also administered a demographic questionnaire and the DAST. In addition, they were surveyed about their academic history, subjects of difficulty, reading skills, and reading ability. IQ or aptitude scores were not gathered for the students without dyslexia, but all met the same acceptance criteria for enrollment in the same institutions as the SLD students and none were at risk for withdrawal from the institutions for poor academic performance. All data was collected in the 2002-03 school year. The results of the study found that the DAST correctly identified 87 of the 117 students (74%) who were already diagnosed with an SLD and 102 of the 121 students (84%) without an SLD. However, this means the DAST misidentified 30 of the 117 students (26%) who were already diagnosed with an SLD and 19 of the 121 (16%) of students without a SLD. These misidentified cases were not borderline students. Similar results were revealed when viewing the subtests individually. ARQ scores from the DAST were also compared with ratings of past

reading problems, self-rated reading skill, and reading enjoyment in the comparison group, but no correlation was found. In conclusion, the hypothesis for this study was only partially supported. While the DAST did have a relatively high true positive rate for students with SLDs, the false positive rate was significantly higher than the 0% rate reported by Nicolson and Fawcett in 1997. Additionally, the scores indicating high risk for dyslexia on various subtests were similar to Nicolson and Fawcett's findings with the SLD group, but not the comparison group. Therefore, in order to obtain a sensitivity rate of at least 90% as recommended, the ARQ cut-off would need to be 0.55 and would result in 33% of students in the comparison group being falsely identified. It also appears that the DAST in its current form lacks both convergent and discriminant validity. Limitations of this study, though, include biased self-ratings due to social desirability effects, conflicting definitions of dyslexia and SLDs used for diagnosis, and lack of time to assess discrepancies for undiagnosed learning disabilities. Overall, it appears that the DAST currently is not a practical tool for screening large groups of students for SLDs, but could possibly serve as an efficient and cost-effective instrument after further revision and validation.

In the meantime, other screening tools such as the York Adult Assessment Battery-Revised (YAA-R) are also being used in UK universities to identify and support students with dyslexia in higher education. Warmington and Snowling, from the University of York and Stothard from the University of Durham (2013), studied the YAA-R in order to determine its effectiveness in accomplishing this task. The YAA-R is comprised of a battery of assessments covering reading, spelling, writing, and phonological skills and takes approximately 60 minutes to complete. The results of the YAA-R provide a learning profile for each student that can be utilized by educators to prepare support services such as specialized examination arrangements. In this study, participants consisted of 106 adults without dyslexia and 20 adults with dyslexia

enrolled in various UK universities and studying a range of subjects. Those with dyslexia were selected based on a previous formal diagnosis of dyslexia as well as a standard score of 100 or less on all standardized measures of literacy and average scores on standardized measures of cognitive ability. Also, 20 of the adults without dyslexia were paired with the 20 adults with dyslexia based on general cognitive ability for validation purposes. All of the participants were assessed for reading accuracy, reading time, reading rate, reading comprehension, summarization skills, spelling, phonological processing, and speed of writing using the YAA-R. Students were also measured on cognitive ability using various standardized measures. All of the tasks were administered individually in a 90-minute session. Descriptive statistics for the performance of the normative (non-dyslexic) sample on all measures found scores on the standardized measures of literacy to be on the upper end of average with the exception of the comprehension test. Correlation analyses to assess validity of the YAA-R measures as concurrent predictors of reading found that all standardized measures of literacy and vocabulary correlated moderately and significantly with each other and all YAA-R measures correlated moderately with standardized measures except for rapid naming (RAN). A comparison between the adults without dyslexia and those with dyslexia using a multivariate analysis of variance revealed that adults with dyslexia were significantly impaired on standardized measures of literacy and performed significantly poorer on the YAA-R with the exception of précis time, spoonerism, and RAN object rate. Furthermore, logistic regression analyses found that using literacy measures the YAA-R classified 93% of students with dyslexia and by adding in phonological awareness measures this rate rose to 95%. Overall, this study confirms that the YAA-R is a suitable tool for assessing higher education students for dyslexia. The assessment is easy to administer, cost-effective, and analyzes not only skills identifying dyslexia, but also additional skills required to

succeed in the university learning environment. The YAA-R has been shown to be reliable with a sensitivity rate of 80% and specificity rate of 97% when using the test in its entirety and a 75% sensitivity rate and 99% specificity rate when utilizing just the reading comprehension, writing précis, RAN digits, and spoonerism tests. Therefore, this test can be used in full form or short form to accurately identify university students with dyslexia to provide them the appropriate supports for success.

Yet another screening tool being utilized in UK universities to assess students for dyslexia is the Bangor Dyslexia Test (BDT). The BDT was one of the first dyslexia screening tests created in the UK in 1983. It was designed by Tim R. Miles and is composed of 10 subtests to be used in identifying dyslexia in people from 7 years old through adulthood. What makes this dyslexia screening tool different from others is that it is quick and easy to administer, but doesn't directly assess reading and spelling skills. Instead, the BDT conceptualizes underlying literacy difficulties faced by those with a multitude of oral language difficulties. Some of the tests were validated on a cohort of children ages 10-11 participating in the Child Health and Education Study, but no normative measures or tests of validation have been performed using an adult population. Therefore, this study is designed to assess whether the BDT is adequate and reliable to be used with adult students in predicting dyslexia. Researchers hypothesized that the BDT scores would correlate more strongly with standardized measures of literacy than nonverbal cognitive measures and that dyslexia risk status as determined by the BDT would predict fully diagnosed (by an educational psychologist) dyslexia status and dyslexic versus non-dyslexic group membership in logistic regression. Participants for the study included 373 dyslexic students screened from September 2004 through October 2008 at the Miles Dyslexia Centre at Bangor University and a control group of 40 psychology undergraduates recruited from Bangor

University students who had no history of learning difficulties. Each participant took the BDT, which is comprised of eight skill-based tasks and two anecdotal queries about persisting confusion of the letters *b* and *d* and report of other family members with similar difficulties. On each subtest a student may receive a score of plus (+) indicating dyslexic, minus (-) indicating non-dyslexic, or zero (0) indicating not clearly dyslexic or non-dyslexic based on correct responses as well as the assessor's judgment of difficulty experienced by the test taker. Overall, five or more pluses in children and four or more pluses in adults designates dyslexic and three or less pluses designates non-dyslexic. In addition, each dyslexic participant was interviewed about current and prior academic difficulties, general background, medical history, and post-secondary experience including educational or work activities and assessed using a timed free-writing test to assess writing speed and four subtests of the DAST. Students who were found to be at risk for dyslexia or other learning disabilities were further tested with the Wechsler Adult Intelligence Scale III (WAIS III), Wide Range Achievement Test II (WIAT II), Wide Range Achievement Test III (WIAT III), and/or Wechsler Objective Reading Dimensions (WORD). Participants in the control group were tested on measures of literacy attainment using the WRAT IV and verbal and non-verbal ability using the Wide Range Intelligence Tests (WRIT). Performances on all measures were compared using multivariate analysis of variance (MANOVA) followed up with univariate analyses (ANOVA) with Bonferroni-adjusted alpha level. As expected, the dyslexic group performed worse than the control group on literacy measures. To determine if the nonverbal ability could have confounded performance on literacy measures, additional analyses of covariance, controlling for nonverbal IQ, were performed and revealed that group differences on literacy measures remained significant. Researchers also analyzed potential influences of age, gender, and language on the background measure attainments, but no significant differences

were found. In focusing specifically on the reliability of the BDT, it was discovered that while the subtests are consistent in measuring what is intended, the overall reliability of the test as a whole is lower than what is considered ideal. However, the validity of the BDT was established for each subtest and the assessment as a whole with dyslexic students scoring significantly higher than non-dyslexic students across all measures. Further analysis found that both the dyslexic group and control group obtained the highest positive indicators on the Digits Forward, Digits Reversed, and Tables subtests and the lowest positive indicators on the Months Forwards subtest. Additionally, the construct validity and divergent validity of the BDT were confirmed by comparing BDT scores with other measures used in this study. Last, but not least, logistic regression analysis was conducted to determine predictive validity of the BDT. Results found that the screening tool was able to predict dyslexia by classifying 94% of participants correctly with a sensitivity rate of 96.4% and specificity rate of 82.5%. Overall, this study concluded that the BDT is not as reliable as researchers had hoped, but is comparable to the DAST and the YAA-R. Furthermore, with the exception of the Months Forwards, Months Reversed, Polysyllabic Words, and Subtraction subtests, the BDT is a valid measure of dyslexic status in adults. In the end, this study reveals that the BDT is a quick and adequately accurate dyslexia screener, but it may be more suited for non-academic settings such as training and employment (Reynolds, Caravolas, 2016).

As an alternative to traditional paper and pencil screening tools, computerized assessments have also been developed to identify adults with dyslexia. At the higher education level, it can be very difficult to distinguish between adults with dyslexia and those with poor literacy skills because many dyslexics have developed coping mechanisms or received specialized instruction to improve reading proficiency at a younger age. In developing dyslexia-

screening tools the goal is to reduce the number of misclassifications (false positives and false negatives) to ensure that all students receive the support they need to succeed. Computerized assessments can be very beneficial in accomplishing this task because they provide more precise measurement and immediate results, are entirely standardized, and can be mainly self-administered. Also, test-takers often prefer computerized tests because they feel more relaxed and confident and the assessments take less time lowering frustration and boredom levels. In a study conducted by Singleton, Horne, and Simmons (2009) adult students were screened for dyslexia using three specially designed computerized tests that did not focus solely on reading and spelling ability, but relied heavily on phonological processing, lexical access, and working memory. Participants in the study included 139 students (70 with a formal diagnosis of dyslexia and 69 without dyslexia) from two universities, three colleges of further education, and three adult learning centers. Each student was administered a computerized Word Recognition Test, Word Construction Test, and Working Memory Test. Additionally, all participants took the Wide Range Achievement Test (WRAT-3) to check differences in conventional literacy skills between groups. For all assessments the scores between the dyslexic and non-dyslexic group were statistically significant. Post hoc analysis comparing institutions found that on the Word Construction test means of students in universities or further education were significantly higher than those in adult learning. It was also discovered that students with dyslexia enrolled in further education and adult learning were relatively more impaired on both Word Recognition and Word Construction than the non-dyslexic students enrolled in these institutions. Gender was not a significant factor with any other variables. After analyzing the full versions of each of the computerized tests, adaptive versions of the Word Recognition and Word Construction tests were created. Descriptive statistics comparing the full and adaptive forms of these assessments

found that the adaptive versions did not alter the significance levels in any way. To increase the discriminatory power of the adaptive versions of the three tests, researchers combined the scaled scores of each individual test to create a combined score ranging from 3 to 27. Discriminant function analysis was conducted on the combined scores to determine validity as a dyslexia-screening tool. The results showed that scores between 3-11 indicate a low risk of dyslexia, scores between 12-14 indicate a borderline risk of dyslexia, and scores between 15-27 indicate a high risk of dyslexia with a sensitivity rate of 90.6% and a specificity rate of 90.0%. When comparing the predictive accuracy of the computerized tests with that of the WRAT-3 it was discovered that the WRAT-3 does not misclassify non-dyslexics, but it does misclassify dyslexics giving a lot of false negatives. In the end, utilizing the adaptive versions of the three computerized tests provides institutions of higher learning with a tool to screen students for dyslexia in about 15 minutes. While it is uncertain how these computerized assessments compare to conventional screening tools like the widely used DAST, this study shows that these tests can be used as effective measures for identifying dyslexia in adults with an effect size of 2.07. In higher education, further education, adult learning, and employment the implementation of computerized dyslexia screening tools may prove very beneficial as a valid and practical method to help those adults with dyslexia receive the support they need to overcome their literacy difficulties.

When assessing adults for dyslexia to support them in higher education, efficiency is a necessity. Therefore, Wolff and Lundberg (2003) developed a group-screening tool to decrease the time it takes to screen students for dyslexia. The test focuses on phonological awareness, phonological representations, working memory, timing aspect, and self-reports of dyslexia. To assess the effectiveness of this tool, researchers studied 117 students in adult education centers

for secondary education (high school) in western Sweden. Of these participants 50 were assigned to the dyslexic group based on their enrollment in courses for students with reading disabilities, previous diagnoses of dyslexia, and teacher ratings. The other 67 participants formed the control group because they did not suffer from any reading disability, but had a history of school failures like the students in the dyslexic group. Each participant completed a set of tasks including working memory, reversed spoonerism, phonological choice, orthographic choice, vocabulary with phonologically confusable alternatives, self-reported dyslexic problems, and word reading in a group of around 20 students. The testing of each group took approximately 40 minutes to complete. After all of the students were assessed, a comparison of scores revealed that on each task researchers could differentiate between students in the dyslexic group and non-dyslexic control group. A MANOVA was performed as well and found a significant overall effect distinguishing between dyslexics and non-dyslexics using their combined score on all subtests. Further analyses located only one gender difference in the dyslexic group where females scored higher than males on the orthographic choice task. In addition, distributions for the two groups revealed high, but not perfect discrimination between groups when viewing composite factor scores and bi-modality with only a few cases positioned "incorrectly" when looking at self-reported dyslexia symptoms. After optimizing the weights of each subtest, logistic regression analysis resulted in perfect discrimination between the two groups. In the end, it was determined that the group screening battery as a whole was able to successfully identify dyslexic students as compared to non-dyslexic students, but that the vocabulary and spoonerism subtests did not discriminate between the students as well on their own. With that being said, Wolff and Lundberg believe that it is possible to implement a non-vocal phonologically based group assessment, like the one in this study, as an effective screening tool to identify students with

dyslexia. To ensure students are not misidentified an additional individual follow-up assessment should be utilized. This will also make sure students receive individualized interventions based on their specific needs.

After being published as the Duvan Dyslexia Screening Battery, this group-screening test was also studied by Green, Tonnessen, Tambs, Thoresen, and Bjertness (2009) using 15-16 year-olds from Oslo, Norway. Their goal was to examine the occurrence of self-reported dyslexia and reading/writing difficulties among adolescents and associate this data with scores on the Duvan adjusting for gender, ethnicity, and general ability. Participants in the study were 319 tenth-grade students from three schools with significant demographic variations to ensure the sample was representative of the overall population of Norway. The students each completed a questionnaire discussing dyslexia diagnosis as well as year of birth, gender, parental occupational status and country of birth, health and illnesses, social support, and educational ambitions. Participants also were given the Duvan Dyslexia Screening Battery, which is comprised of a 15-item self-report on dyslexic symptoms and tasks of working memory, vocabulary, spoonerisms, phonological choice, and orthographical choice. Finally, students were assessed using the Raven's Standard Progressive Matrices to determine general ability. Students were tested in their 12 classrooms with groups ranging in size from 19-31 with the exception of one group of seven students. The assessments took approximately 90 minutes to complete. The data gathered was examined using one-way ANOVA analyses that compared mean scores in general ability between various subgroups. Pairwise comparisons with Tukey correction and univariate and multivariate linear regression analyses were also performed. The results of the study revealed that dyslexia was reported by 8.2% of the sample and reading/writing difficulties (RWD) were reported by 24.5% of the sample with 10.4% reporting severe or moderate RWD. On the Duvan, the scores of

students with dyslexia were nearly identical to those reporting moderate RWD and the lowest scores were of those with severe RWD. Differences between groups on the Duvan subtests were significant except for the vocabulary task among the dyslexic and non-dyslexic groups. There were no significant differences between those with dyslexia and those without on the test of general ability. In addition, gender (male), ethnicity (minority background), low general ability, self-reported dyslexia, and self-reported RWD were significant predictors of poor scores on the Duvan. With a response rate of 90% researchers feel that this study is representative of the participating schools as a whole. However, the translation of the Duvan from Swedish to Norwegian, the difficulty of the vocabulary task, lack of data on confounding variables, and misunderstanding of the tasks by students are all limitations of this study. In the end, Green et al. believe the two questionnaire items about dyslexia and RWD are significant predictors of Duvan scores and could be used as a quick screening tool for dyslexia and literacy problems among adolescents. Further research on the effectiveness of the Duvan screening tool, though, is needed.

Regardless of the method of diagnosis, both children and adults identified with dyslexia must cope with the disorder throughout their lives. In school, students face many struggles with learning to read, write, and spell and struggle with these skills as materials get increasingly more difficult with each grade level. In addition, literacy skills are a necessity in the workforce and everyday life so those diagnosed with the disorder always face obstacles they must overcome.

Living with Dyslexia

Students with dyslexia require educational supports throughout schooling. A wide variety of accommodations have been implemented to help these students succeed. Students can use colored overlays to make letters and words more prominent during reading instruction. Audio versions of text or orally administered tests/assignments help students who cannot decode well to

access grade-level work (Kender & Kender, 1998). Modified assignments and extended time to complete exams/assignments also support students with dyslexia in school. For students who are really struggling, a tutor or instruction focused on areas of strength can be helpful (International Dyslexia Association, 2012b). Most importantly, interventions should be systematic and focus on phonemic awareness, phonics, and fluency (Hudson, High & Otaiba, 2007).

Researchers Bowyer-Crane et al. set out in 2008 to assess the ability of early interventions to strengthen the foundational skills of reading, writing, and spelling for students identified as at-risk for literacy problems. The phonology with reading program (P+R) being studied focused on developing decoding skills as opposed to the alternative oral language program (OL) that focuses on improving spoken language skills. P+R is comprised of training in letter-sound knowledge, segmenting and blending, and reading from texts selected at the appropriate student level. Trained assistants implemented interventions every day for 20 weeks to children in Year 1 (Kindergarten) classes. Instruction took place in small groups or individualized sessions. Results of the study found that students who participated in P+R did significantly better than those in OL on tests of phoneme awareness, letter-sound knowledge, and reading and spelling skills at the end of intervention and the gains were maintained even after the program ended. In addition, 50% of students in P+R moved from the at-risk category to the typical level of reading skills for their age group while 68.1% of the OL group stayed at-risk. Better yet, 7.1% of P+R students rose to above average reading scores. With that being said, no single intervention strategy is appropriate for all students with dyslexia (Snowling, 2013).

Another method for early literacy development involves multisensory instruction. It is called VAKT, which stands for visual, auditory, kinesthetic, and tactile and represents the different learning styles of students. Developed by Grace Ferdinand this approach starts with

seeing the word forms in a variety of ways. After that, students learn the sounds of the letters and link phonemes with their visual symbols. Using eye, lip-throat, and hand movements, such as tracing letters/words, students participate in the kinesthetic and tactile aspects of instruction. To make learning meaningful for the student instruction begins with word forms the child can relate to by drawing on their background experiences. VAKT has been used successfully to teach students with dyslexia how to read and is found to be more effective than traditional phonics instruction (Kender & Kender, 1998).

A more systemized form of VAKT that is also used is called the Gillingham-Stillman approach. Created in 1963 at the Orton Institute, this method uses VAKT techniques along with conventional phonics and structural analysis in an incremental program. Research on the effectiveness of this method, though, is very limited (Kender & Kender, 1998).

Parents of students with dyslexia play an important role in helping their children succeed as well. Teachers and parents can work together to share information about a student's strengths and weaknesses. Having teachers who listen to parents' concerns and answer questions can help form a lasting relationship that will guide the student with dyslexia in the classroom and at home. In addition, teachers need to make sure parents understand the symptoms of dyslexia and ways to help their student work through them. Last, but not least, teachers can refer parents to outside organizations to provide additional support and information (Hudson, High & Otaiba, 2007).

After students complete their education, they enter the workforce, but those with dyslexia still must face their literacy struggles. The Americans with Disabilities Act of 1990 was amended in 2008 (ADA) and prevents discrimination of individuals with disabilities by employers. Under the law, companies must meet workers' requests for reasonable accommodations so they have an equal opportunity to work. By providing training materials and other written information in

accessible formats, employers can help those with dyslexia overcome some of their literacy hurdles. In addition, restructuring job tasks and providing assistive technology enables those with dyslexia to perform their jobs to best of their ability despite their disorder (International Dyslexia Association, 2012b).

As with any disability, those with dyslexia suffer socially and emotionally as well. A study by McNulty (2003) compares and analyzes the life stories of 12 adults diagnosed with dyslexia. In conducting this research he hoped to help parents and professionals better understand what it was like to live with the disorder so they could be more sensitive, supportive, and provide more effective interventions. As I have discovered, McNulty found no other published studies discussing this exact topic. The few studies he was able to review discussed adaptations for students with dyslexia as well as personality traits of those with the disorder. In addition, he reviewed literature on psychotherapeutic techniques and ethnographic studies of individuals with a variety of learning disabilities. With little to no prior research on the emotional effects of dyslexia, McNulty set out to address the question, "What are the life stories of adults who were diagnosed with dyslexia as children?" He believed that by systematically studying those with dyslexia he would be able to obtain a survey of the emotional issues connected with living with the disorder throughout life. Using the life story method, McNulty studied the phenomenon of dyslexia as experienced by many individuals and compared and contrasted their varying accounts. Participants were recruited via advertisements and screened to ensure they were diagnosed with dyslexia prior to age 14 and that their symptoms matched those on the dyslexia checklist developed by the researcher and a licensed clinical psychologist. In the end, 12 adults were selected to participate. They ranged in age from 25 to 45 and included eight males and four females. The participants were from middle-class backgrounds and had at least a high

school degree. Each of the 12 participants were interviewed during one to two meetings lasting between 1 1/2 to 2 1/2 hours and a transcript of the interview was used to create a story in the participant's own words. Stories were then reviewed by the participants for accuracy before being compared to the other stories by the researcher. After analyzing the stories using Atkinson's framework, McNulty compiled a collective story that was reviewed again by participants. While the study was being conducted, McNulty made some observations about the participants' attitudes. He noticed that initially the participants were excited to share their stories, but as they read through the transcripts they became self-conscious and fearful. At the end of the study, though, participants reported feeling validated that they had finally opted to tell others about their life experiences with dyslexia. The findings of this study reveal an emotional story of shared experiences and struggles from the participants. From an early age many of the participants noticed they had difficulties with spoken language, attention, and/or coordination making them different than other children their age. By elementary and middle school, they had encountered unexplained issues and failures that others linked to lack of intelligence and motivation. Some described these experiences as "traumatic" because they felt shame, humiliation, and anger as they dealt with their disorder. Reading aloud was one of the worst memories for a lot of the participants. In addition, the process of being tested and diagnosed with dyslexia was highly stressful as participants confirmed their fears that "something is wrong with me". Once diagnosed, participants then had to cope with their learning differences. Some participants had an affirming experience because they received appropriate adaptations and were able to overcome their struggles and increase their self-esteem. Other participants had adversarial experiences whereby others misunderstood dyslexia and attacked the individual's intelligence or motivation instead of addressing the true issue. The alternative experience occurred with other

participants who participated in various activities unaffected by dyslexia in order to maintain their self-esteem. Last, but not least, participants had absence experiences in which they lacked others who understood or accepted them and became very lonely and isolated from their peers. As the participants entered adolescence they either found their niche and were able to be successful or didn't find their niche and continued to struggle. As adults the participants embraced one of four ways of life. The first lifestyle is tentative compensation in which they continued to face difficulties and struggled with their jobs and/or personal lives leading to continued self-esteem issues and a sense of insecurity. Second, they lived an alternative compensation life. This means the participants found their way in an area unaffected by dyslexia and felt secure in this area of expertise. However, many reported they were under challenged at their jobs. The gifted overcompensation lifestyle was taken on by some of the participants whereby they sought careers in an area of giftedness. In their jobs and everyday life, though, they often tried to overcompensate for past failures by focusing on current achievements. Finally, participants embodied a compensation lifestyle. This occurred when they gradually implemented adaptations that enabled them to overcome their difficulties and succeed in further education and careers. Overall, the varying life experiences of participants left them feeling emotionally insecure, self-conscious, and lacking self-esteem. Others who knew the participants were sometimes surprised to hear they felt this way. Participants developed various coping mechanisms to deal with their emotions. Some situated struggles in the context of achievements to avoid bitterness and improve self-esteem. Others viewed their learning difficulties as learning differences that resulted in unique strengths and an appreciation for diversity. In addition, this method of coping promoted adaptation and self-esteem. A third coping mechanism utilized by participants was discussing the experience with others who understand. This was therapeutic,

boosted self-esteem, and balanced out bad past experiences of misunderstanding and trauma. Participants also visualized confronting adversaries and thanking allies to bring about positive thoughts and disperse negative ones. Lastly, for certain participants, parenting a child with a learning disability helped them to improve their self-concept by teaching their child to adapt. The results of this study led the researcher to conclude that there is a major need for early diagnosis and treatment of dyslexia. Because dyslexia is genetically linked in some way, it is important for adults with dyslexia to watch for the signs of the disorder so their children receive the help they need as soon as possible. Teachers, too, need to be educated about the symptoms of dyslexia and be prepared to provide interventions. Additionally, both teachers and parents need to be supportive and work to lessen misunderstandings about the disorder. Students with dyslexia need to be protected from traumatic experiences as much as possible. Teachers and parents should explain the disorder to other students and those who misunderstand dyslexia to reduce the stigma of learning disabilities and ensure the child feels accepted. In order for those with dyslexia to receive the appropriate support, though, high-quality tests must be developed to make the process of diagnosis less difficult. During this procedure, parents and professionals need to take time to explain dyslexia to the child in a positive manner. Most importantly, those with dyslexia need to be taught how to properly cope both functionally and psychologically so they can find their niche as they grow older. In adulthood, continued support as they persevere through their struggles in the workforce and everyday life is extremely important in helping those with dyslexia reach their full potential. There are limitations to this study, however. First, this is a qualitative study that cannot equate to a quantitative study on the same topic. Second, not all participants could provide testing reports of their diagnosis and those who did were diagnosed using a variety of formal and informal methods. All participants were included despite their lack

of records. All participants came from middle- or upper-class backgrounds so their experiences may not be comparable to those from lower-class families. The stigma and emotional trauma of being diagnosed with dyslexia could have had an effect on the participants' responses as well. Finally, with only 12 participants the data pool for this study was rather low. With that being said, McNulty felt that the extensive nature of the interviews lends credibility to the results of this study and provides implications for all involved in the diagnosis and support of those with dyslexia.

Chapter 3: Methodology

Introduction to the Method

I began this study by focusing on my research question, what types of experiences do students identified early with dyslexia have in comparison to those identified at a later stage in life. I was interested in determining how they were identified and what they remembered about coping with the disorder both in school and in their personal lives. Additionally, I wanted the participants to have the opportunity to tell others about the disorder in their own words. Utilizing a phenomenological approach I began by constructing a brief list of interview questions that would enable me to obtain a view into the participants' life-worlds (See Appendix A). I also designed two Informed Consent Forms, one for adults and one for minors, as required by Cedarville University's Institutional Review Board (See Appendix B).

Participants

For my research study, I contacted past students and former coworkers who were diagnosed with dyslexia or had family members that I knew had the disorder. After conducting my first child interview, I was given phone numbers for several other adults and a child with the disorder by the participant's mother who tutors students with dyslexia. Through these various connections I selected my research participants. The participants did not receive any incentives for being interviewed for the study and volunteered freely after reviewing the study synopsis, informed consent, and interview questions.

The research participants were made up of five children and three adults. The children ranged in age from 8 to 17 years old. There were four males and one female. I did not request exact ages from the adults, but they included college-age through middle-age. There were two females and one male. One of the adult females is currently attending college while the other

adult female was a high school graduate. The adult male was a college graduate with a triple major. All of the participants lived in small- to medium-sized towns outside of Pittsburgh, Pennsylvania.

Instrumentation

I created the interview questions used in this study specifically to compare life experiences of those diagnosed with dyslexia at an early age and later in life. View the interview questions used for this study in Appendix A. The participants were interviewed in their own homes or via phone between July 21, 2016 and July 25, 2016.

Interview Development

I started developing my interview questions by brainstorming various questions surrounding the diagnosis of dyslexia and coping with the disorder in everyday life and school. By focusing in on my research question I slowly began eliminating and combining questions. In the end, I chose just seven questions because I wanted the research participants to have the leeway to go into as little or as much detail as they felt comfortable doing. I also kept the questions as simplistic as possible and grouped similar questions together so that during the interviews participants didn't feel overwhelmed and could give just one succinct answer for multiple questions if they chose to do so. If I had included more questions I believe many would not have wanted to participate due to the amount of time that would have been required of them.

Procedure

After receiving approval of my study including my interview questions by Cedarville's Institutional Review Board, I began to actively seek out participants. I started by contacting former students and staff who I knew had dyslexia or were connected with someone with the disorder. I provided each potential participant with an informed consent form and copy of the

interview questions. As potential participants agreed to take part in the study I scheduled interviews with them at their homes or over the phone. While completing my first interview, I was able to discuss my study further with a former coworker and parent of a research participant. She provided me with additional potential participants she knew. I was then able to contact them and they, too, agreed to be interviewed for my study. Through these various connections I completed my interviews of five children and three adults with dyslexia.

During the interviews I ensured participants were comfortable and didn't have any additional questions or concerns that needed addressed prior to starting the interview. I began each interview with the first question on the list and went in sequential order through the remainder of the questions. As the participants answered each question, I typed their responses into a Microsoft Word document. If I needed additional time to type, I would ask the participant for a moment to finish typing their response before they proceeded. I also asked participants for clarification or to provide more details as needed throughout the interviews. At the end of each interview I allowed the participants to tell me anything else they felt I needed to know about dyslexia.

After completing the interviews, I began comparing and contrasting the data. I reread each interview highlighting important information. Then, I color-coded the information by overarching themes. For example, most interviewees stated that they felt different and realized they were not like their peers. For each instance of this type of experience discussed in the interviews I highlighted it in yellow. I also created a master list of themes and their corresponding colors so I could easily review the transcripts and locate each specific topic discussed across the interviews. While color-coding the information, I adjusted and regrouped the topics into cohesive categories represented across multiple interviews. Once I color-coded all

of the major themes I then began to look for similarities and differences in responses. Any responses that were common to three or more participants I categorized as a similarity, but topics discussed by just one or two participants I considered a difference. The exception to this rule was in the case of specific examples that were grouped together as part of a larger topic. I summarized these findings to complete the results and analysis chapter of my research thesis.

To conclude my research thesis, I discussed my findings in light of the current literature, my research data, and my personal knowledge of dyslexia. I provided suggestions and considerations for using this data to inform others about dyslexia symptoms, diagnosis, and support emphasizing the importance of early diagnosis. Additionally, I interpreted the data from a Biblical worldview. Finally, I completed my thesis by pinpointing the strengths and limitations of my study and proposed further research to more thoroughly study the topic of dyslexia with a varied demographic and larger population to increase generalizability.

Chapter 4: Results and Analysis

Introduction

As I analyzed my interviews in light of my research question, what types of experiences do students identified early with dyslexia have in comparison to those identified at a later stage in life, I began to see patterns in the participants' discussions. I examined each interview highlighting significant statements and color-coding them according to themes. While studying the interviews I reworked the themes to create a cohesive list of 11 major topics discussed throughout the interviews. The themes are as follows: Formal Diagnosis, Informal/Self-Diagnosis, Frustrations/Struggles, Additional Difficulties, Coping Mechanisms, Feeling Different, Lacking Care/Understanding, People with Dyslexia are Smart, Inherited Disorder, Need to Seek out Help/Care, and Desire to Do Well.

Similarities in Dyslexia Experiences

In analyzing similarities, I first noticed that all of the children (A-E) were formally diagnosed while only Adult C was tested and diagnosed with dyslexia. Adults A and B were informally/self-diagnosed based on information they had gathered about the disorder through research for themselves and their children.

A major focus of the interviews was the frustrations and struggles faced by the participants and the coping mechanisms they have used to overcome the disorder. The earliest memories of having dyslexia for all of the children (A-E) and adults (A-C) were difficulties with reading, writing, spelling, and/or math in school. Children B, D, E, and Adult C also mentioned homework being time-consuming to complete. Each participant discussed additional difficulties they faced outside of school, too. Children A, C, D, and E had issues with memorization and Adults B and C still have trouble spelling when they write. With that being said, all of the

participants have learned to cope with the disorder in order to succeed both in school and in their every-day lives. Children B, C, and D as well as Adult C participated in specialized tutoring programs using the Barton or Wilson method. Child A and Child E are still enrolled in tutoring. Child C remembered breaking words down by sounds and letters and memorizing tricky words such as those with silent letters during tutoring. Child E likes using letter tiles to spell out words and practice making words with the same sounds/letter combinations. Adult C even commented that she still uses rules she learned in tutoring to help her when reading, writing, and spelling. All of the children (A-E) and Adult C also had IEPs or 504 Plans with accommodations to support them in the regular classroom. Child A and Child B listened to books on CD or followed along with more advanced readers so they could participate in the regular reading class. Child A and Child C both utilized memorization techniques. Child B and Adult C had designated note-takers during class and untimed tests with modifications.

In addition, all of the participants cited feeling different than their peers at one time or another. Child A said he felt awkward when he had to leave the regular classroom for specialized instruction or tutoring especially since his classmates knew where he was going. Children A, B, C, and D and Adult C also discussed feeling embarrassed or singled out in the regular classroom because they couldn't read, write, spell, or complete tests/activities as quickly as their peers. They worried that they wouldn't be able to do class work their friends were doing and were fearful of writing on the board or reading aloud in class. Similarly, several participants discussed how others often don't care and don't understand dyslexia. Teachers were called out by Child A, Child B, Adult A, and Adult B as being the people who didn't know enough about dyslexia. Child B was told she didn't have the disorder and could overcome anything if she put her mind to it while Child A emphasized the importance of teachers providing appropriate accommodations

such as listening to books on tape to help students overcome dyslexia. Both Adults A and B remarked that teachers are not trained sufficiently in dyslexia diagnosis and intervention and felt that if they were better prepared they would be able to simply observe the student working in the classroom and notice a difference in those with the disorder. Child C commented, most people think of dyslexia as mixing up words and seeing things backwards and that isn't what it is at all.

In the end, all of the participants had the same message to others about what it is like to live with dyslexia. Having dyslexia does not mean that you are dumb, stupid, or can't succeed. Dyslexia is simply a learning difference that requires extra help and support. They remarked that having dyslexia is not easy. It is a daily struggle and can be very annoying, but if you work hard you can overcome it. You will think differently than others, but by being patient, accommodating your struggles, and focusing on your other gifts you can learn to deal with the disorder.

Differences in Dyslexia Experiences

The age/grade level of diagnosis varied in all of the participants. Child A and Child E were identified in Kindergarten, Child D in second grade, Child C in third grade, and Child B in fourth grade. Adult C was formally diagnosed in fourth/fifth grade. Of the adults that were informally/self-diagnosed, Adult A determined he had the disorder in college around the age of 18/19. Adult B didn't conclude she had dyslexia until she was around middle-age and had a child diagnosed with the disorder. Accordingly, both Adults A and B noted that dyslexia is an inherited disorder. Adult B knew her child didn't get the disorder from her father, which led her to the conclusion that she must have dyslexia. After studying the disorder, Adult A determined that other family members including his father, brother, nephew, and own children likely had the disorder as well and that it is more prominent in boys. Child B and Adult B both faced difficulties in receiving the diagnosis and support they needed. Child B struggled through school

starting in Kindergarten. She repeated first grade, attended remedial reading classes, and even tried to memorize words just so she could keep up with her peers. When she was finally tested for a reading deficiency in third grade they discovered she was extremely far behind, but it wasn't until fourth grade she was formally diagnosed with dyslexia. Her mother and the fourth-grade teacher were friends and the teacher called her at home one night to tell her that her daughter had dyslexia, but the school psychologist couldn't tell her that because she wasn't allowed to diagnose it. After speaking with a dyslexia expert, the mother of Child B confronted the school and they agreed to make her an IEP. However, the school didn't follow the IEP so her mother had to hire an advocate in order for Child B to finally get the accommodations and tutoring she should have been getting all along. Adult B commented that she wished her parents had been advocates for her, but it just didn't happen and therefore she never got the support she needed to succeed in school.

Each of the participants stated that their earliest memory of dyslexia was having difficulty with reading, writing, spelling, and/or math, but the age/grade level they first noticed these issues varied among them. Child A and Child B began struggling in Kindergarten, Child C and Child D were in first/second grade, Child E and Adult A noted problems in second grade, and Adult C didn't realize anything was wrong until third grade. Adult B did not cite a specific age/grade she first remembered having dyslexia. Additionally, all of the participants faced frustrations outside of school, but the specific tasks were unique to just one or two individuals. Child A had trouble memorizing the days of the week, Child C and Child D had to review football plays and baseball hand signals repeatedly to memorize them, and Child E couldn't remember memory verses for church. Child B works all summer long to memorize and perfect cheerleading routines because she struggles with directional difficulties. Adult B also faced

directional difficulties when she was in marching band, silk line, and played the bells. She noted that anything that requires movement, coordination, and remembering which way to go is nearly impossible for her. Adult A was in an apple fight as a child and has partial loss of eyesight in his left eye making reading even more of a struggle and Adult C said she can't do word searches.

In coping with the disorder, each individual has come up with some specific methods of instruction and techniques that work for them in school and their everyday lives. Child A focuses on events to remember the days of the week while Child C used stories to learn the multiplication facts. Child B never could memorize the multiplication or division facts so she has the accommodation of using a calculator in her IEP. In addition, she has a limited amount of homework and spelling is only graded if it has been checked by a teacher/adult three or more times. Child C asks a lot of questions and focuses carefully on the steps of each task in order to stay on track and not get confused. Child D has to work at a slower pace especially in math in order to succeed. Child E is happy to miss regular reading class for tutoring because he knows what he is learning will be helpful to him later on. Adult A never received any specialized instruction or support in school, but found his niche in the fields of science and technology. A triple major in Biology, Chemistry, and Medical Technology, he read very slowly and carefully, utilized computers to aid in organization, and credits it to God's good will that he excelled in college. Growing up, Adult A found he was capable of fixing up old cars and technology and used that to make money. After college, he worked in a reference hospital, then became an insurance case manager, and now works in a lab. He copes with eyesight problems by relying on his other senses, especially the sense of touch, and knows that his issues are more problematic if he is tired. Similarly, Adult B received no tutoring or accommodations in school and therefore took only the high school classes she knew she could pass and never attended college. However,

working with her children has made her a better reader. She also references a dictionary or Google in order to spell check notes.

While all of the participants felt different because they had the disorder, Child B and Child C had fathers who thought they were just being lazy and not working hard enough in school making them feel even more upset and "dumb". Once the students were diagnosed, though, the fathers began to understand the disorder and realized it wasn't a lack of effort at all. Adult A had a unique experience growing up in a mill town where education wasn't considered important. The goal in school was for you to be able to read a newspaper and to have a second- to fourth-grade education and that was it. After that, they expected you to quit school by the age of 16 and to start working in the mill where you could make upward of \$40,000/year. Since no one put much stake in education including the teachers, no one cared that he was struggling to read in school and they certainly didn't understand that it was dyslexia. Child A and Adult A were the only ones to express a desire to do well in school. Child A remembered knowing how to spell the word *friend* in second grade and not being the first one out in the game of Sparkle which made him feel proud. In addition, as he continued on in school, he progressed in reading eventually ending up in enrichment classes. Child A also enjoys writing and finds that even though it is difficult and time-consuming for him to get words down, he can write pages and pages because he loves to write. Adult A discovered that once he left his mill town public school and started attending a private Catholic school, there were teachers who actually cared about him so he began trying harder in school to prove to them he could succeed and make them happy.

Summary

As I reviewed participants' interviews to determine similarities and differences in experiences of students identified early with dyslexia as compared to those identified at a later

stage in life I pinpointed 11 major themes consistently represented across interviews. Six participants, all five children and one adult, were Formally Diagnosed with dyslexia while the other two adults were Informally/Self-Diagnosed. All of the participants faced Frustrations/Struggles in school as well as Additional Difficulties outside of school. However, many of these experiences were unique to just one or two individuals. All participants implemented Coping Mechanisms according to their distinctive circumstances as well, but many utilized similar methods to overcome the disorder. Feeling Different was common among the participants, but only a few felt they were Lacking Care/Understanding in their experiences. People with Dyslexia are Smart was another theme common to all participants. Only two adults noted that dyslexia was an Inherited Disorder and one child and one adult had the Need to Seek out Help/Care. Finally, one adult and one child expressed a Desire to Do Well.

Chapter 5: Discussion and Implications

Introduction

Of the individuals diagnosed with specific learning disability 80% have dyslexia, making it a relatively common disorder (Karande, Sholapurwala, Kulkarni, 2011). However, some people are not formally diagnosed despite the immense number of screening tools designed for those from preschool-age through adulthood. This becomes an issue as these individuals move through schooling and into the workforce. Difficulties with reading, writing, and spelling can cause them to struggle to succeed and lead to feelings of stupidity and hopelessness. With that being said, many people with dyslexia are formally diagnosed and receive the specialized instruction needed to overcome the disorder. Even those who are not formally diagnosed typically develop coping mechanisms in order to move past the disorder and find success in their own way.

In this study, I interviewed eight individuals with dyslexia. Six were formally diagnosed, and two were self-diagnosed based on information gleaned from their own research on the disorder. Each participant faced a variety of challenges in school and their everyday lives. Yet, each one of them was able to rise above the disorder through tutoring and other methods of coping to succeed in their own right. In analyzing what types of experiences students identified early with dyslexia have in comparison to those identified at a later stage in life, the similarities and differences of the individuals were very interesting to observe. I believe everyone can learn something about dyslexia by reading these stories.

Interpretation of the Results

As I began exploring participants' interviews, I was first struck by the fact that Adult A and Adult B were never formally diagnosed with dyslexia. Instead, they were self-diagnosed as

they researched the disorder. Not surprising, though, is that these two participants were much older than the rest of the individuals I interviewed. Adult C had been formally diagnosed, but she is between 20 and 30 years younger than the other two adult participants. In addition, it took until fifth grade for Adult C to be diagnosed and Child B, who is 17, wasn't diagnosed until fourth grade. However, Children A, C, D, and E were diagnosed at a younger age. This reveals that in training educators on identifying dyslexia we are moving in the right direction. I believe, though, that there is still work to be done. Dyslexia is easily observable if teachers know what to look for. By educating pre-service teachers about dyslexia and how to distinguish it between other reading disorders and slow learners, more and more students can be diagnosed at an early age so they have an even higher likelihood of overcoming the disorder.

Better yet, all of the children (A-E) and Adult C were able to receive tutoring and appropriate accommodations to enable them to work through their difficulties in school. This highlights the importance of early diagnosis of dyslexia. With specialized learning programs in place, individuals with the disorder can improve their literacy skills and even move past their peers in school. However, those who are not formally diagnosed and do not receive the help they need, like Adult A and Adult B, are forced to find their own ways of coping. Adult A was able to seek out caring individuals who supported him and find additional areas he could thrive in to become a triple major in college and work in the fields of science and technology. However, Adult B never obtained the help she needed and instead made her way through high school taking simplistic classes she knew she could pass and never attending college because she was afraid of failing. By ensuring special education programs include a dyslexia tutoring program, these students can be taught to read, write, and spell just like their peers.

Despite what some individuals believe, those with dyslexia are highly intelligent and desire to do well. They are not lazy or stupid. Therefore, they need to be given the opportunity to move past their struggles and demonstrate what they are capable of in spite of their learning disorder. It saddened and shocked me to see that, Child B's mother had to hire an advocate to get the school district to help her daughter. These individuals should not be forced to advocate for themselves and find help, but should be given the support they need by the school whose job it is to provide them with a free, appropriate education. Additionally, teachers need to ensure they understand how to support those with dyslexia in the regular classroom. They must keep in mind that tests and homework can be a huge struggle and that by limiting answer choices and creating time limits on homework you are not allowing these students to "take the easy way out", but are enabling them to show what they have learned in a way that works best for them.

Last, but not least, everyone needs to realize that these individuals just want to be like everybody else. They do not want to be singled out in class to read, write, or spell because they know they are not capable of doing what their peers do. They do not want to leave the regular classroom for tutoring and be asked by their friends where they are going. They do not want to struggle and require specialized tests and tools to help them when their classmates can do things without accommodations. However, these are all problems they must cope with because they have dyslexia. Not only do they struggle in school, but they also face additional challenges in sports, church, and everyday life. By simply showing grace, care, and understanding, those with dyslexia do not have to feel different, but instead can go on living their lives knowing they have the care and support they need to accomplish the tasks before them. My biggest take away from this research project is that those with dyslexia just want others to know that if given the opportunity they can succeed.

Relation of the Results to the Literature

As research continues to become available about the source of dyslexia, many studies point to genetics as a key factor. In my study, both Adult A and Adult B mentioned that in their own research on dyslexia they learned that the disorder was inherited. Adult B knew that her daughter had the disorder, but her husband did not which led her to the conclusion that she must be the one with dyslexia. As she learned about dyslexia and worked with her daughter she confirmed her self-diagnosis. Adult A, after studying the disorder, felt he could possibly diagnose several male family members with the disorder as well. To me, this makes diagnosing the disorder in the future simpler. As more of today's students are properly identified with dyslexia, they will later be able to watch for the symptoms they exhibited in their own children and discuss the potential diagnosis with educators. These teachers can, in turn, assess the students and, if necessary, provide early interventions before the child faces significant struggles and frustrations as they learn to read, write, and spell.

In recent years, the development of tests and measures to diagnose dyslexia has become more prominent as well. These assessments can identify individuals who are at-risk for dyslexia and other reading problems as early as preschool-age. However, most schools do not utilize such tools and instead rely on teacher observations to locate struggling students. This can be both good and bad. While tests for dyslexia can be costly and time-consuming, they are much more precise at pinpointing students' struggles early on. Through this study, it is apparent that the ability of teachers to recognize students with dyslexia has improved through the years, but with Adult C and Child B not being diagnosed until fourth/fifth grade there is still room for growth. There are multiple ways to solve this issue. First, pre-service teachers can receive more training on dyslexia and methods of identification. Second, schools can establish a testing routine for

early childhood students. In this way, students will be diagnosed at a young age and be able to receive specialized tutoring making literacy tasks much easier as they continue on in school. Colleges and high schools could implement dyslexia assessments as well since many older individuals were never formally diagnosed, but still face struggles in school. This, I believe, would be a great start to bridge the gap in identifying and treating dyslexia so everyone has the opportunity to succeed in school.

Educators, though, are not the only individuals who could benefit from learning about dyslexia. Dyslexia affects an individual in all facets of their life. All of the children (A-E) and adults (A-C) deal with struggles from memorizing routines and plays for sports to spelling words correctly in text messages and written notes. They often feel alone in coping with the disorder and think that others do not understand them or don't care about them. Therefore, anyone who works with children with dyslexia should familiarize themselves with the disorder and how to support those with it. In addition, I believe we need to be more cautious of the things we say to those who seem to have difficulties with literacy. Individuals with dyslexia are smart and should not be treated as if they don't understand or can't do something because of their disorder. Instead, we should treat them with respect and do our best to help them work through their struggles without making them more frustrated and upset.

Biblical Integrative Component and Implications

As part of God's creation, every individual is created in the image of God. Genesis 1:27 states, "So God created mankind in his own image, in the image of God he created them; male and female he created them" (The Holy Bible: New International Version, 2011). Even those with dyslexia were designed with great talents to bring glory to God. By putting down those with dyslexia and not providing the support and accommodations they need, we are denying them the

ability to live out God's plan for their lives to the best of their ability. We are essentially saying that they are not as worthwhile or important as those without dyslexia and many of my research participants discussed feeling this way at one time or another. However, in the eyes of God we are all equal.

In light of these facts, it is even more important that educators take the time to understand those with dyslexia and to work hard to provide the help students need to overcome the disorder. Parents and children should not have to fight for programs and tools that should be freely given to them as part of an appropriate education. No one should be made to feel as if they are dumb. Instead, all individuals with dyslexia should be loved and cared for as part of God's special creation. Furthermore, they should be given what they need to succeed in school and their everyday lives in order to fulfill God's plan for them and bring Him glory, honor, and praise.

Strengths of the Study

This study utilized a phenomenological approach to compare those identified early with dyslexia and those identified later in life. By keeping my interview questions broad and asking for participants to elaborate as they told their stories, I was able to successfully compile eight different accounts describing life with dyslexia.

In my study, I included five different children ranging in age from 8 to 17 and three adults from college-age through middle-age. Prior to conducting interviews, I thoroughly explored the prior literature on the history of dyslexia, connections to brain research and genetics, wide variety of diagnostic assessments for early childhood through adulthood, and living with the disorder. This enabled me to be more receptive and understanding of the participants' experiences and helped me in analyzing the data I collected.

During the interviews I made sure to take copious notes of the stories being described and asked for the participants to repeat anything I may have missed. I read through each interview several times while conducting my data analysis and modified the major themes until the topics were grouped into subjects covering all of the events described without overlap. I then thoroughly compared and contrasted experiences between age groups recording all the similarities and differences I noticed. Finally, I interpreted the data in light of my research, the literature, and my personal experiences in order to provide educated suggestions for teachers and the general population in supporting those with dyslexia in school and their everyday lives.

Limitations of the Study

While my research incorporated a wide age range of children and adults, the number of male participants (five) surpassed the number of female participants (three) and age groups such as early childhood students and young adults were not adequately represented. In addition, my participants were all Caucasian, middle-class, and from a small area of western Pennsylvania. This made demographic diversity low and limited generalizability to a smaller population.

In conducting my interviews, I chose to keep my questions simplistic in order to allow the participants to guide the interviews. This did not result in many in-depth discussions and, without prompting, many of the answers I received were only one to two sentences in length. I especially found it difficult to obtain longer responses from the children. Furthermore, siblings and parents were always in the room when I conducted interviews with the children. On one hand, this helped them to feel more comfortable, but on the other I believe they were sometimes afraid to say something inappropriate or embarrassing in front of others and held back in describing some of their experiences. Four interviews were conducted over the phone and four

interviews were conducted in person, which could also have had an effect on the responses I received.

Last, but not least, due to the phenomenological design of this study, human error is a significant limitation in the data analysis and discussion of the research. While I exercised extreme care in highlighting the major themes discussed in the interviews and comparing and contrasting participants' experiences, there is the possibility that I improperly grouped the themes and/or missed some similarities or differences in the participants' life stories. Also, the suggestions provided in the discussion portion of the research thesis are my opinions based on this research, my plenary literature review, and my own knowledge. While I believe these implications are significant, others may find them unimportant or may glean additional takeaways from reviewing the data.

Suggestions for Future Research

Additional phenomenological studies of dyslexia are needed in order to further explore what it is truly like to live with this disorder. In conducting my literature review, I was able to locate only one other study that allowed those with dyslexia to share their life stories. By conducting similar studies with a more diverse group of participants from a larger demographic region, the results of the study will be able to be generalized to provide more significant implications for educators and the general population. Future research should include an equal number of males and females from early childhood through late adulthood that are both formally and self-diagnosed with dyslexia. Having interviewees who have participated in a variety of tutoring programs and received many different accommodations would also be beneficial. More in-depth interview questions and discussions would provide a clearer picture of the life of someone with dyslexia. Furthermore, utilizing a team of researchers that include dyslexia

specialists, special education teachers, regular classroom teachers, and adults from the general population would result in a more detailed analysis with varying points of view and a wider range of suggestions for supporting those with dyslexia in school and their everyday lives.

Appendices

Appendix A: Interview Questions

1. At what age were you identified with dyslexia? What can you tell me about the process of being identified with dyslexia?
2. What is your earliest memory of having dyslexia?
3. Describe some memorable school experiences you have had in coping with dyslexia.
4. Describe some memorable experiences in everyday life you have had in coping with dyslexia.
5. What would you like to tell others about what it is like to have dyslexia? What do you think would be helpful for them to understand about the disorder?

Appendix B: Informed Consent

INFORMED CONSENT-MINOR

TITLE: Discovering Dyslexia: A Phenomenological Study of Dyslexia Experiences Across Age Groups

I agree to allow my child _____ to take part in a research study titled "Discovering Dyslexia: A Phenomenological Study of Dyslexia Experiences Across Age Groups", which is being conducted by Shauna Karloski from the Department of Education at Cedarville University (Phone number: 724-954-7574) under the direction of Dr. Stephen Gruber from the Department of Education at Cedarville University (Phone number: 937-766-4496). My child's participation is voluntary; I and my child can refuse to participate or stop taking part at any time without giving any reason, and without penalty. I can ask to have information related to my child returned to me, removed from the research records, or destroyed.

REASON/PURPOSE:

The purpose of the study is to investigate experiences with coping with dyslexia in educational and everyday settings. While many studies exist that describe experiences with either early or late diagnosis with dyslexia, I have been unable to locate a source comparing the two experiences. Making this diagnosis more difficult is the fact that dyslexia is often hard to define. This study aims to tell the stories of students with dyslexia so that others can better understand this disability.

BENEFITS:

I may not benefit directly from this research. However, it may provide me with an outlet for releasing frustrations or give me a sense of empowerment by discussing my dyslexia experiences and helping others better understand this disorder.

PROCEDURES:

If I volunteer to take part in this study, I will be asked to be interviewed in person or via phone about my dyslexia. I will review the attached interview questions in order to be prepared to discuss the topics provided during this study. I understand that the interview will be open-ended allowing me to describe any experiences I feel may be helpful for this study. My responses will be typed by the researcher during the interview. The study will take approximately an hour, but may take longer depending on the depth and breadth of the responses I provide.

DISCOMFORTS OR STRESSES:

The discomforts or stresses that may be faced during this research are: the disclosure of confidential information (common) and/or emotional stress (rare). Since the interview will be personal in nature, I will be free to decide if I want to answer a question or discuss a proposed topic or not. If at any time during the interview I feel uncomfortable or appear to be upset I will be given the option to end the interview, change the topic, or continue the discussion. I will not be penalized in any way if I choose not to answer a question or to end the interview and not complete the study.

RISKS:

No risks are expected.

CONFIDENTIAL, ANONYMOUS, OR PUBLIC:

Any information obtained in connection with this study that can be identified with me will remain confidential unless required by law. At no time will any information about me be given to anyone outside the research study. The documents recording my interview responses will be deleted when the research is finished. The results of the study will be published as part of the requirements of the researcher's Masters in Education program with Cedarville University and may be presented at professional meetings, but my name and any identifying information will not be revealed.

FURTHER QUESTIONS:

The researcher will answer any further questions about the research, now or during the course of the project, and can be reached by telephone at: 724-954-7574.

FINAL AGREEMENT & CONSENT FORM COPY:

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

PARENTAL PERMISSION:

Please sign both copies, keep one and return one to the researcher.

Name of Researcher: _____ Date: _____

Signature: _____

Telephone: _____ Email: _____

Name of Parent/Guardian: _____ Date: _____

Signature: _____

Additional questions or problems regarding your child's rights as a research participant should be addressed to Dr. Dennis Sullivan, Chair, Institutional Review Board, Cedarville University, Cedarville, OH 45314; Telephone (937)766-7573. Email Address: IRB@cedarville.edu

INFORMED CONSENT-ADULT

TITLE: Discovering Dyslexia: A Phenomenological Study of Dyslexia Experiences Across Age Groups

I agree to take part in a research study titled "Discovering Dyslexia: A Phenomenological Study of Dyslexia Experiences Across Age Groups", which is being conducted by Shauna Karloski from the Department of Education at Cedarville University (Phone number: 724-954-7574) under the direction of Dr. Stephen Gruber from the Department of Education at Cedarville University (Phone number: 937-766-4496). My participation is voluntary; I can refuse to participate or stop taking part at any time without giving any reason, and without penalty. I can ask to have information related to me returned to me, removed from the research records, or destroyed.

REASON/PURPOSE:

The purpose of the study is to investigate experiences with coping with dyslexia in educational and everyday settings. While many studies exist that describe experiences with either early or late diagnosis with dyslexia, I have been unable to locate a source comparing the two experiences. Making this diagnosis more difficult is the fact that dyslexia is often hard to define. This study aims to tell the stories of students with dyslexia so that others can better understand this disability.

BENEFITS:

I may not benefit directly from this research. However, it may provide me with an outlet for releasing frustrations or give me a sense of empowerment by discussing my dyslexia experiences and helping others better understand this disorder.

PROCEDURES:

If I volunteer to take part in this study, I will be asked to be interviewed in person or via phone about my dyslexia. I will review the attached interview questions in order to be prepared to discuss the topics provided during this study. I understand that the interview will be open-ended allowing me to describe any experiences I feel may be helpful for this study. My responses will be typed by the researcher during the interview. The study will take approximately an hour, but may take longer depending on the depth and breadth of the responses I provide.

DISCOMFORTS OR STRESSES:

The discomforts or stresses that may be faced during this research are: the disclosure of confidential information (common) and/or emotional stress (rare). Since the interview will be personal in nature, I will be free to decide if I want to answer a question or discuss a proposed topic or not. If at any time during the interview I feel uncomfortable or appear to be upset I will be given the option to end the interview, change the topic, or continue the discussion. I will not be penalized in any way if I choose not to answer a question or to end the interview and not complete the study.

RISKS:

No risks are expected.

CONFIDENTIAL, ANONYMOUS, OR PUBLIC:

Any information obtained in connection with this study that can be identified with me will remain confidential unless required by law. At no time will any information about me be given to anyone outside the research study. The documents recording my interview responses will be deleted when the research is finished. The results of the study will be published as part of the requirements of the researcher's Masters in Education program with Cedarville University and may be presented at professional meetings, but my name and any identifying information will not be revealed.

FURTHER QUESTIONS:

The researcher will answer any further questions about the research, now or during the course of the project, and can be reached by telephone at: 724-954-7574.

FINAL AGREEMENT & CONSENT FORM COPY:

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

CONSENT:

Please sign both copies, keep one and return one to the researcher.

Name of Researcher: _____ Date: _____

Signature: _____

Telephone: _____ Email: _____

Name of Participant: _____ Date: _____

Signature: _____

Additional questions or problems regarding your rights as a research participant should be addressed to Dr. Dennis Sullivan, Chair, Institutional Review Board, Cedarville University, Cedarville, OH 45314; Telephone (937)766-7573. Email Address: IRB@cedarville.edu

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