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An Abundance of Boys: Addressing the Factors that Cause Gender Disproportionality in Special Education

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AN ABUNDANCE OF BOYS: ADDRESSING THE FACTORS THAT CAUSE GENDER DISPROPORTIONALITY IN SPECIAL EDUCATION

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APPROVED

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Abstract

The gender distribution in special education is skewed heavily toward boys, who outnumber girls at an overall rate of 2 to 1. The decision to place a student in special education programming has severe implications, whether it be positive or negative. In order to better understand why this ratio exists, it is necessary to determine the reasons behind the disproportion. Some of the main causative factors for gender disproportion in special education fall under the umbrella of genetics, physiology, and school structure. It appears that boys are overrepresented in special education, conversely it appears that girls are underrepresented, both of which are excruciatingly difficult to measure. Though the reasons for it are complex, both boys and girls stand to benefit from reducing gender disproportion. Boys may benefit most from reducing overrepresentation, while girls may benefit most from reducing underrepresentation. Because there are multiple reasons that factor into the disproportion, the solutions to address the issue are multiple as well. Through concerted effort in applying multiple solutions to address genetics, physiological differences, and school structure, it is possible for gender disproportion in special education to be reduced, thus benefiting all students.

Table of Contents

Key Terms

Attention Deficit Hyperactive Disorder (ADHD) - a medically diagnosed condition that is accompanied by persistent inattention, hyperactivity, and impulsivity.

Autism Spectrum Disorder (ASD)- a disability category in special education as well as a developmental disorder that varies in severity, and is commonly marked by difficulty with social interactions and communication, and repetitive patterns of behavior and thought.

Developmental Cognitive Disability (DCD) - a disability category in special education and a condition that causes significantly lower I.Q. than average, along with deficits in adaptive behavior.

Disproportion- any subgroup that is asymmetrically represented within the group.

Emotional Behavioral Disorder (EBD)- a disability category in special education where a student has been determined to have an emotional or behavioral disorder that adversely affects their education, and may or may not be accompanied with a specific emotional or behavioral medical diagnosis.

Gender- biological sex, male or female.

Individuals With Disabilities Education Act (IDEA) - a nation-wide law passed in the U.S. in 1975 that ensured a free and appropriate education to eligible children with disabilities.

Oppositional Defiance Disorder (ODD) - a medically diagnosed childhood disorder that is marked by defiant, hostile, and disobedient behavior directed toward adults and authority figures.

Other Health Impairment (OHI) - a disability category in special education that is marked by a diagnosed medical condition that has a significant and adverse effect on educational performance.

Overrepresentation- any subgroup that is unnecessarily represented within the group.

Response to Intervention (RTI) - a system or process used by educators to help struggling students to be successful, and is characterized by the use of educational interventions.

Underrepresentation- any subgroup that is not represented adequately within the group.

Speech and Language Impaired (SLI) - a category of disability in special education and condition where a person has difficulty with speech and language that adversely affects educational performance.

Specific Learning Disabilities (SLD) - a category of disability where a student is not able to achieve up to their ability in a specific skill, which is based on I.Q.

X-Linked Intellectual Disability (XLID) - any intellectual disability that is associated with X-linked recessive inheritance.

Special Education (SE) - a collective term that is used to refer to the individualized education that any student receives when qualifying under one of the recognized special education disability categories.

CHAPTER I: INTRODUCTION

History of Special Education

Today, special education is legislatively mandated as part of the educational curriculum in K-12 schools in the United States. This has not always been the case. Throughout history, the way in which people with disabilities are treated is based on societal norms and attitudes of contemporary times (Spaulding and Pratt, 2015). In the past, it was common for people with disabilities to be excluded from receiving an appropriate public education. Though attitudes toward people with disabilities began to change in a more positive direction around the turn of the 19th century, courts upheld legislation that gave school officials the right to exclude students with disabilities from attending school if they deemed that they might be disruptive to other students as recently as 1958 and 1969 (Yell, Rogers, and Rogers, 1998). By the late 1960s and 1970s parents and advocates for people with disabilities began to use the courts to force States to provide more equitable access to education for students with disabilities (Yell, Rogers, and Rogers, 1998). This led to the Rehabilitation Act of 1973, which gave people with disabilities freedom from exclusion that was based solely on their disability in any program or activity that received federal and financial assistance, and included both elementary and secondary schools (About IDEA, 2019). Then in November of 1975 Gerald Ford signed the Education for All Handicapped Children Act into law, which is now known as the Individuals with Disabilities Act (IDEA) (About IDEA, 2019). By signing this act into law, individuals with disabilities were granted educational opportunities that they did not have access to previously. It ensured that all students with a disability would receive a free and appropriate education (FAPE) in the least restrictive environment (LRE) (About IDEA, 2019). Today IDEA continues to ensure educational rights to students with disabilities. Since its inception, IDEA has expanded and

services students between the ages of 3 to 21. In 2017-2018, 7 million students were served under IDEA. Historically, the majority of students served under IDEA have been boys.

The Problem

It is totally clear that the proportion of boys in SE is not in line with their proportion in the general population. During the 2015-2016 school year 17% of male students in the United States received special education services under IDEA, likewise 9% of the female student population received special education services under IDEA from ages 6-21 ("Children and Youth With Disabilities," 2018). According to the U.S. Census Bureau the current U.S. population is nearly split between the sexes with 50.8% of the population being female, and remaining consistent across age groups (2018). These numbers would indicate that males receiving special education services outnumber females at a rate of 2 to 1. They are consistent with the 1992 Report to Congress on the implementation of IDEA that pointed out that 68.5% of students receiving special education are male, as reported by Wehmeyer and Schwartz (2001). This points to the consistency of disproportionality of boys in special education compared to girls, given that the ratio has remained relatively unchanged over the past 25 plus years. In total 6.7 million students were served in special education under IDEA during 2015-2016 ("Children and Youth With Disabilities," 2018), of these approximately 4.3 million were boys.

Boys are at greater risk of social stigmatization, segregation, lowered expectations, a weak curriculum, and constraint of post-school outcomes because they are more commonly admitted to SE programs (McIntyre and Tong, 2001). Conversely, females may be at risk of not getting SE services when they truly need them. This is why gender disproportionality in SE is an important issue to study and discuss. Identifying students as being in need of SE services may provide a great benefit to them. It allows many to have the support that they need to receive a

free and appropriate education. Likewise, being identified for SE services when unnecessary may be a disservice to the very students that educators are trying to provide more support for due to the previously listed risks. The decision to pursue SE services on behalf of a student, boy or girl, is one that must not be taken lightly. It is a life altering decision that may have life-long implications for the student being enrolled. Some of these implications, whether positive or negative, may include the quality of their social relationships, their preparedness for attending college, attaining and maintaining a career, receiving scholarships, and for their self-esteem. Being identified may help a student achieve much better lifelong outcomes if they need support, whereas if they do not truly need the support, being identified may have a negative impact on their life-long outcomes. Whether the decision made is to pursue SE services for a student, or not pursue those services, the importance and gravity of the decision needs to be known by all involved. It is important that those involved in the referral process make educated and well-informed decisions based on the needs of each individual student. The stakes are too high to not give the decision the due diligence that is needed.

Does being a boy by itself place a student at risk for placement in special education, or are there sociological correlates with maleness that create the risk? There is widespread concern that SE identification goes well beyond a student's medical, developmental, or cognitive functioning (Sullivan and Ball, 2013). Factors such as race, socioeconomic status, school attendance, gender, and teacher bias may play a role in SE identification. In their study, Sullivan and Ball examined how cultural and socioeconomic backgrounds were disproportionately represented in special education when multiple dimensions of difference (dimensions of sociodemographic and socioeconomic factors) are considered simultaneously. Gender was found

to be a top predictor for risk of SE identification. Specifically, a male of lower socioeconomic status was found to be at greatest for SE identification.

Are biological or developmental factors also at play? There are several ways in which this may be the case. Biologically, there are differences between males and females. For example, how genes are expressed in males and females are different. One of these being that males have one Y and one X chromosome, whereas females have two X chromosomes (Morgan, 1979). There are many X-linked syndromes and inheritances that cause developmental and cognitive deficits in humans. It is estimated that 5%-10% of intellectual disability is caused by X-linked inheritance in males (Lubs, Stevenson, and Schwartz, 2012). These chromosomal differences between the genders place males at greater risk for special education identification based on biological predispositions. Likewise, physiological differences may also play a factor, such as neurological and hormonal differences. Neurologically, males and females have structural and functional differences that can have a substantial effect on learning (Gurian and Stevens, 2004). Males and females not only have architectural differences in the brain, structures vary in their rate of maturation. Hormones, such as testosterone, oxytocin, and serotonin have a drastic effect on how people respond behaviorally to each other and their environment (Gurian and Stevens, 2004, Van Wingen, Mattern, Buitelaar, and Fernandez, 2010.) When considering factors of disproportionality and overrepresentation in SE, biological and developmental factors must be considered due the fact that males and females carry different disability risks because of biological and developmental factors; genetics, neurological differences, and hormonal differences.

Except for biological and developmental differences, is it possible that school itself—staffing, curriculum, planned activities, referring process, behavioral expectations—provide a

learning environment severely biased towards the education of young girls? When 89% of all elementary teachers are female (National Center for Education Statistics, 2018), could there be gender bias in the initial stages of the referral process for SE identification? Are male students and their female teachers struggling to find understanding due to differences in common gender-based communication styles? Perhaps the curriculum itself may be biased to suit female students, evidenced by a 2017 study that showed females receive more favorable grades compared to their male peers (Cornwell, Mustard, and Parys). Is the referral process inherently more likely to identify more boys for SE when nationally normed assessments designed to identify SE students do not take into account possible gender differences? Is pre-referral intervention data too dependent upon the referring teacher, and are pre-referral interventions done with fidelity? Is it probable that common behavioral expectations are enforced in a way that puts male students at a disadvantage, as McIntyre and Tong suggested in their assessment of classroom behavioral expectations (1998)? These are all questions that should be addressed when examining SE disproportion.

It is important that all of the possible causes of overrepresentation of males in SE be examined so that teachers can understand what is most important to address in the classroom and so that school districts can correct any cause related to school structure itself. It is likely that students with a biological or developmental reason for their disability need SE support. However, when taking into account factors of school structure, then school staff may be able to address the issue, potentially reducing gender disproportion and male overrepresentation in SE programs. School districts have the ability to address issues related to the school structures that are causing SE disproportion, as well as empowering families with knowledge to make well-informed decisions regarding future generations if a genetic condition is identified. Given the

serious nature of placing a student is SE and possible lifelong implications (positive or negative), school districts have a moral responsibility as educators to make sure that the process of SE identification is as unbiased as possible. In addition to addressing individual or curricular bias, there should also be an obligation to take into account patterns of differences in the sexes to create a more balanced SE referral process. As outlined in the 2017 study by Sullivan and Ball, there are many sociological correlates that may create risk for SE identification. It is in this realm that there is vast potential for taking corrective action that could provide better outcomes for students, with or without the label of "disabled".

Thesis Questions

Given the broad scope of boys being disproportionately referred to SE and the number of possible explanations for that, I have limited my thesis to 3 areas of investigation:

1. What are the major factors that have led to a disproportionate number of boys in special education in comparison to girls?
2. Are boys overrepresented in SE?
3. What can be done to reduce gender disproportion in SE?

CHAPTER II: LITERATURE REVIEW

Overview of the Research Process

The primary method of research discovery on this topic included conducting internet searches through the search engines on the Bethel Libraries website and Google. Searches on the Bethel Libraries website were primarily used to find academic peer-reviewed journal articles through searching key terms related to the topic. Articles from many databases were made available through the Bethel Libraries website such as JSTOR, CINAHL, ATLA Religion, EBSCO MegaFile, etc. Google Scholar was used to find peer-reviewed journal articles as well through the same methods. Many statistical data points involving student demographics of SE were found through a general Google search. Lastly, several print resources such as manuals and books were attained through the use of a public library and training resources from ISD 318 school district.

Genetic Factors

The phenotypic expression of sex is determined largely by just two of the 46 chromosomes that make up the normal human genome. These are the X and Y chromosomes. In females, the 23rd pair of chromosomes is a homologous pair, carrying genetic duplicity similar to the other pairs (Sex Chromosome, 2019). These are the X chromosomes, and humans with two of these are developmentally female. Males are different in that they have only one X chromosome inherited from their mother that is paired with a Y chromosome. Females do not have a Y chromosome. Most of the genes on the Y chromosome are responsible for male characteristics, therefore if a human has an X and Y chromosome, they are developmentally male (Sex Chromosome, 2019).

More importantly, males have a single copy of the genes on the X chromosome. These genes do not occur on the Y chromosome. What genes on the X chromosome code for is purely expressed in males. It is not purely expressed in females, because they have two X chromosomes. Within the nucleus of each cell in the female body, one X chromosome is designated as active, while the other is inactive (Ahn and Lee, 2008). If a genetic mutation exists on the X chromosome, then the same mutation in a female will not express itself as severely compared to males. This is because one X chromosome has a mutation while the other one likely does not. Within the cells of females, the X chromosome with a mutation on it has the potential to be silenced, while males do not have this luxury. Any gene mutation on the X chromosome—whether devastating or beneficial—is expressed in males. A large proportion of the genes on the X chromosome determine intellectual capacity and social behavior (Lub, Stevenson, and Scwartz, 2012). These are the very attributes that set humans apart from other organisms, and the very attributes that can result in referral for special education. Because the X chromosome is mostly responsible for the genes associated with intellectual capacity and social behavior, it is fully expected that the variance of X-linked gene expression is broader for males and that more males will fall into the tail of the distribution considered abnormal and cause for referral for special education.

The National Center for Education Statistics provides summary data for SE referral in 13 commonly used categories. For the 2017-2018 school year, boys were disproportionally referred in every category (Table x). Referral for SE services for autistic behavior is clearly a primary reason that we see more boys than girls in SE. Disabilities with ratios greater than the ratio for all categories have mostly to do with the way boys behave. Specific learning disabilities are the most common reason for SE referral by far, but the bias towards boys is less evident than

referrals for behavior, though some studies suggest that boys referred to SE for a specific learning disability commonly are reported to have behavioral problems as well. Behavior problems, however, may not be severe enough to evaluate for an emotional or behavioral diagnosis. In addition, there may be developmental lag in skills necessary for language arts and communication in boys, which in part may explain the disproportion in the SLD and SLI categories. The least commonly used referral categories are obvious physical disabilities, and in those cases the rate of male referral is not much greater than it is for females. However, there isn't a referral category in Table x for which there isn't a known or suspected X-linked gene that places boys at greater risk.

Table x. Male and female SE referrals and the ratio of male to female referral for the 2017-2018 school year (National Center for Education Statistics)

Disability	**Male**	**Female**	**Ratio**
Autism	523114	101440	5.16
Emotional disturbance	249536	94582	2.64
Other health impairment	694472	282491	2.46
Developmental delay	112585	47802	2.36
Speech or language impairment	680913	339795	2.00
Traumatic brain injury	16094	9426	1.71
Multiple disabilities	76506	47818	1.60
Specific Learning disability	1386220	911961	1.52
Intellectual disability	238985	172817	1.38
Orthopedic impairment	20000	14745	1.36
Visual impairment	13368	10973	1.22

Deaf-blindness	709	590	1.20
Hearing impairment	34945	30508	1.15
All	**4047447**	**2064948**	**1.96**

Autism is the primary contributor to gender disproportion in SE referrals, and researchers agree that there is a strong genetic component to the disease. Five boys with autistic behavior are referred for every girl displaying similar symptoms. The incidence of children diagnosed with autism spectrum disorder (ASD) is about 1 in 59, which makes it one of the more common reasons for SE referral (Marco and Skuse, 2006). Within the general population of children with ASD, there are 4 boys for every girl (Marco and Skuse, 2006). The similarity of male bias regarding SE referral and diagnosis of autism in the general population begs for a simple, single-gene, X-linked explanation. Raymond investigated the 24 genes on the X-chromosome known to cause mental impairment and she found only 2 seemingly linked to autism (2006). Mutations in the NLGN3 and NGLN4 genes were primary candidates (Raymond 2006). These genes code for the protein, neuroligin, which is essential in the formation of normal synapses between neurons (Raymond, 2006). Marco and Skuse (2006) also noted the high likelihood of an X-linked explanation. These authors investigated several X-related genetic disorders that cause behavior that could be informative: fragile-X syndrome, mutations that affect neurologins, and creatinine transport deficiency. In all cases, the relationship with autism was complicated and likely not common enough to explain the preponderance of boys being diagnosed with autism. The authors concluded with two important points. First, low I.Q. is clearly correlated with a diagnosis of autism, and any genetic cause of cognitive impairment can result in a diagnosis of autism, and secondly, autism is a broadly defined phenotype and lots of genes could be involved, of which only some may be X-linked (Marco and Skuse).

Emotional behavioral disorder (EBD) is an important contributor to gender disproportion in SE referrals, and the same may be said of other health impairment (OHI) as well. Researchers agree that there is a both a genetic and environmental component to the disabilities. Two to three young boys are referred for every girl displaying EBD or OHI symptoms (Table x). However, by adulthood both the sexual bias and incidence of EBD disabilities declines. There is substantially less difference between males and females in the adult population, and few adults continue to show the symptoms of EBD and OHI disability that they displayed in childhood (Centers for Disease and Control, 2019). Attention Deficit Hyperactivity Disorder (ADHD) and Oppositional Defiant Disorder (ODD) are the most common EBD diagnoses leading to SE referral. The former of the two being especially relevant to the category of OHI. This is because ADHD is the most represented diagnosis for students that fall into the OHI category of disability (National Association of Special Education Teachers, 2019). In any case, the incidence rates of these diagnoses are astounding. According to the Centers for Disease Control and Prevention (CDC), 6.4 million people between the ages of 4 and 17—11 percent of the population—in the United States were diagnosed with ADHD as of 2011 (2019). It is also estimated that 6-9% of preschool children have a diagnosis of ODD (Ogundele, 2018). Seidman (2005) reports that in the U.S. 12-13% of students display at least moderate symptoms of EBD due largely to these two disorders. OHI on the other hand, makes up 14% of the total SE population, which is largely represented by students diagnosed with ADHD (National Association of Special Education Teachers, 2019, National Center for Education Statistics, 2019). The incidence rates over the last two decades have been steeply rising, and this strongly suggests that the diagnostic process is changing. It is critical that the SE referral process follow the most recent science of EBD disability (Xurvein, 2015). This is true for OHI disability as well.

Attention deficit hyperactivity disorder (ADHD) in children is 3 times more common in boys than in girls (Barkley, 2006). The disorder can present as inattentiveness, hyperactivity and lack of focus, or some combination of both. These subtypes are important because sexual bias is different among them. Girls are more likely than boys to display the inattentive subtype of ADHD (Biederman et al. 2002). Given the overall diagnostic bias towards boys, it is clear that they are overwhelmingly diagnosed with ADHD because they simply can't sit still and focus, furthermore, they may or may not also have difficulties with attention.

Researchers agree that ADHD is highly heritable (Larsson et al 2002). Heritability is estimated at 0.88 suggesting that ADHD is predominantly a genetic condition, but environment plays some role (0.12) (Larsson et al 2002). Just over 20 genes seem to be promising candidates linked to ADHD, however these genes are all autosomal (Collingwood, 2018). Furthermore, these genes are estimated to be heritable from either parent at a rate of 30-40% (Franke, et. all 2011). Ultimately, there is no x-linked expression to explain why diagnosis bias would be in favor of boys—but it is. Clearly there is much to learn about the genetic causes of ADHD.

Oppositional defiance disorder (ODD) is twice as common in boys compared to girls (Ogundele, 2018). It presents with openly hostile, negative, defiant, non-compliant, and irritable behaviors (Ogundele, 2018). ODD is believed to be a heritable condition. Comorbidity with ADHD is common, and shares genetic overlap with ADHD (Ghosh, Ray, and Basu, 2017). It is difficult to isolate with certainty which genes are responsible for the expression of the disorder. The GABRA2 gene is a possible candidate that is associated with the externalization of behavior, namely the dopaminergic and serotonergic systems (Ghosh, Ray, and Basu, 2017). At this time, there are 86 known genes that are causative factors of behaviors consistent with ODD (Ghosh, Ray, and Basu, 2017). Like ADHD, suspected genes involved are autosomal, thus there is no x-

linked expression for ODD to explain why diagnosis bias would be in favor of boys—but it is. There is much to learn about genetic causes for ODD.

In summary, EBD and OHI is a collection of disabilities affecting a significant percentage of school children. The heritable aspect of EBD and OHI (OHI due largely to ADHD) suggests genetic linkage, but early research suggests that it is complicated and not obviously X-linked, and therefore boy biased. Boys are referred 2-3 times more often than girls for both EBD and OHI, which is also approximately the same rate at which boys are diagnosed with either ADHD or ODD. That incidence and sex-bias declines with age indicates that in many cases boys can "outgrow it," but some boys don't. At a young age, how does a teacher know that a boy with an EBD or OHI (with an ADHD) diagnosis will need SE services throughout his school years or if they just need a little early help maturing? If you can "outgrow it," is it a disability? The teacher's evaluation process is further complicated in that the diagnostic criteria for ADHD and ODD are in flux. Hopefully, a genetic understanding of ADHD and ODD in adults will provide for an early genetic diagnosis for children that will most likely need SE services.

The genetics and understanding of autism and EBD disorders is plagued by broad inclusion and subjective diagnostic criteria. Although most research shows strong heritability and possible genetic explanation of these disorders, it is clear that environmental factors are at least partially in play. This is in stark contrast to cognitive disorders associated with genes on the X-chromosome. In this case, there are solid biological reasons to expect greater expression in boys compared to girls. In 2006, Raymond summarized the research to date of 24 genes implicated in intellectual dysfunction. She concluded that researchers suspect another 30-50 genes on the X-chromosome would be discovered as influencing mental capacity (Raymond 2006). Just a few years later Lubs, Stevenson, and Schwartz presented a 40-year review of X-linked intellectual

disability (XLID). At that time mutations in 102 genes of the X-chromosome were tied to half of the 160 known syndromes causing XLID (Lubs, Stevenson, and Schwarz, 2012).

Genetic research about XLID and autosomal genes that contribute to emotional, behavioral, and cognitive function is in a state of rapid change and discovery. It is unrealistic to expect teachers to stay up to date on all genetic findings, yet they are among the most likely people to suspect a gene-caused disability in a young student. Teachers should be at least aware of some of the physical expressions of genetic disability and know when to get expert help during the referral process. Teachers should know that for every 10 boys in their SE community, one of them would benefit from genetic testing. Early detection and clinical confirmation can bring clarity to a student's evaluation, and give teachers the chance to develop a reasonable curriculum and provide the family with options regarding family planning.

Physiological Factors

There are physiological differences between the sexes. Some of these differences go well beyond physical appearance. Notably, two major differences that go beyond physical appearance are neurological and hormonal differences in males and females. These differences have an effect on how males and females learn. They also have an effect on male and female behavior, meaning they react differently to their environment. These differences potentially put males at more risk in certain disability categories compared to females. Neurological and hormonal factors appear to play a role in gender disproportion in special education.

Males and females learn differently due to brain architecture, which may put males at greater risk for special education identification. According to images taken by MRI, males and females have both structural and functional differences in the brain that have a substantial effect on learning (Gurian and Stevens, 2004). Because of the differences in brain architecture, males

are more likely to be behind in speech and language, reading and writing, and their ability to process emotions. For example, females use more cortical areas (the outer layer of the cerebrum) for verbal and emotive functioning, while males use more cortical areas of the brain for spatial and mechanical functioning (Gurian and Stevens, 2004). Females also often have more detailed memory storage and better listening skills due to differences in brain structure (Gurian and Stevens, 2004). Because the prefrontal cortex is more active in females, and will develop at an earlier age, they are less likely to engage in impulsive decision-making (Gurian and Steven, 2004). If male students are more likely to not be as adept in verbal and emotive functioning, this may increase their risk for special education identification due to deficits in speech and language and ability to regulate their emotions. It is potentially a significant reason for why males are disproportionately identified as having special education needs in the areas of speech and language, language arts (especially reading and writing), and for emotional or behavioral problems.

Males tend to process emotions differently than females, particularly they will think rather than immediately share when confronted by a teacher. Canli, Desmond, Zhao, and Gabriella observed functional MRI scans to note differences between the sexes regarding how they remember emotionally charged events (2002). They found that emotional events are more memorable than neutral ones for both sexes, and that females tend to have a better memory regarding emotional events compared to males (Canli et al., 2002). In addition, they found that females remember emotional autobiographical events more quickly than males, they have more brain regions that activate during an emotional event, and females have different neural networks that engage during emotional experiences and memory encoding (Canli, et al., 2002). Because of the way females encode emotional events into their memory, they are typically better able to

recall emotional events with greater speed and accuracy compared to males. In a school setting, students are typically encouraged to share their feelings after an emotional event. Often times when emotional events occur at school it is because of negative behaviors that may have occurred. When confronted by a teacher or a school staff member, the quickest way a student can deescalate a situation is by sharing their feelings as well as the facts of what happened. A school staff member is more likely to move on from an incident without further disciplinary action when a student is able to tell them what happened and how they feel about it. Because females have a superior memory regarding emotional events, it is more likely that they will be able to share their feelings and the facts of an emotional event in the moment. Males on the other hand may need more time to recall the event as well as think about how they may feel about it. This is time that is often not granted, thus they are more likely to have further disciplinary action steps taken against them, such as a formal behavioral referral. Behavioral referrals often play a direct role in the process of special education referral, specifically when evaluating a student for emotional and behavioral disabilities.

Hormonal differences between the sexes may place males at greater risk for special education identification. Males and females commonly have differences in levels of serotonin, oxytocin, and testosterone. Males not only have less serotonin, they also have less oxytocin which is the primary human bonding chemical, which puts them at greater risk to be impulsive and less likely to form as strong of a bond with others as females (Gurian, 2004). Adding to the male proclivity toward impulsiveness may be the role testosterone plays in behavior. Testosterone influences the human brain, which has an effect on behavior that is mediated by different brain regions within the brain's emotional circuitry (Van Wingen, Mattern, Buitelaar, and Fernandez, 2010) In their study, the authors examined the effects that exogenous

testosterone had on the interaction between the amygdala and other regions of the brain. It was found that testosterone reduces the functional coupling of the amygdala with the orbitofrontal cortex (Van Wingen et al., 2010). Furthermore, interhemispheric coupling was lower in males compared to females (Van Wingen et al., 2010). This is significant because the amygdala is associated with the fight or flight response in humans, while the orbitofrontal cortex is associated with the higher cognitive process of making decisions. Because males have higher levels of testosterone, they have less functional coupling between the amygdala and the orbitofrontal cortex, meaning there is less meaningful communication occurring between these two regions of the brain when the fight or flight response signal is given. This likely affects males in that they are more likely to make impulsive decisions, take greater risks, or be more aggressive in response to the fight or flight signal coming from the amygdala. Males are more likely to simply react to this signal rather than using a higher thought process to make a well-informed decision. This is relevant in a school setting because impulsivity, risk-taking, and aggression are all factors that could trigger a referral to special education, specifically for having an emotional or behavioral problem. Due to the lack of serotonin and oxytocin, and a higher level of testosterone, it would appear males are at greater risk of special education referral and identification because of hormonal differences between the sexes.

While there is much yet to be learned regarding neurological and hormonal differences between males and females, it would appear that these differences are a factor in gender disproportion in special education. The mentioned differences, if accurate, may put males at risk for special education referral and identification in Specific Learning Disabilities (SLD) (reading and writing), Emotional/Behavioral Disabilities (EBD), and Speech and Language Impaired (S/L) categories of disability.

School Structure

Gender Imbalance in teachers

The gender distribution of teachers in public education is heavily one-sided, which creates a higher risk for SE referral and identification in boys compared to girls. During the 2015/2016 school year about 23% of all public school teachers were male and 77% were female (National Center for Education Statistics, 2018). At the secondary level 36% of teachers were male while coming in at only 11% at the elementary level (National Center for Education Statistics, 2018). This means that 89% of all elementary teachers are female. This is especially relevant because of the growing emphasis on early identification of struggling learners. Many students will be identified as in need of SE services in elementary, where female teachers outnumber male teachers by 89%. Because of the gender distribution of teachers, boys are potentially at a much higher risk for SE identification due to gender miscommunication between boys and their female teachers and female proclivity to refer to SE.

The student-teacher relationship is an integral component in teaching (Koomen and Spilt, 2012), and when barriers exist in the student-teacher relationship, especially between female teachers and their male students, boys are at-risk for SE referral. In their study, Koomen and Spilt used a teacher-student relationship scale in a sample, which included 649 teachers and 1493 students, to measure the quality of relationships that teachers had with their students based on teacher gender (2012). It was found in this study that male and female teachers alike had more conflictual relationships with boys than girls; however female teachers reported that they had less close relationship with boys in the classroom (2012). This is possibly the case because barriers to this relationship commonly include female teachers misinterpreting male patterns of

communication and behavior. McIntyre and Tong suggested that this may be a reason for male overrepresentation in SE programs, especially in the EBD category of disability (1998). Boys and girls tend to have patterns of communication and behavior that is different from the other. Boys tend to be more oppositional in nature and view life as a competition to gain status, whereas girls tend to seek harmony and the preservation of relationships (McIntyre and Tong, 1998). Boys also commonly create bonds through opposition and competition with each other, are more likely to demonstrate physical aggression, and have a more aggressive and oppositional communicative style (McIntyre and Tong, 1998). It is important that teachers be able to recognize these differences in individual students so they are better equipped for harnessing them in a way that is conducive to learning for everyone. It is entirely possible for a teachers to misinterpret minor physical and verbal altercations as a serious problem when in actuality those demonstrating the behavior may be simply involved in friendly banter and the forming of friendship bonds. Likewise, they may also misinterpret a boys' communicative style as oppositional and disrespectful when in fact it may mean that they are engaged in the discussion and challenging as a means to learning. When teachers understand these patterns they will have better discernment of when oppositional or aggressive tendencies of boys cross the line from what could be considered a traditional behavioral or communicative pattern to a sign of possible disability. Whatever the etiology of the behavior, whether biological or environmental, traditional male patterns of behavior are commonly viewed as inappropriate by female teachers, which places them at greater risk for misidentification as being emotionally and or behaviorally disordered (EBD) (McIntyre and Tong, 1998).

Female teachers are more likely to refer students for SE evaluation than to deal with some of the problems with boys. Gender bias among those referring to SE is a major cause in the

unequal gender distribution in disabilities programs (Anderson, 1997). The most common referring agent has been found to be the general education teacher (Anderson, 1997). McIntire, whose hypothesis was that teacher gender was a major contributor in the decision to refer or not refer, completed a field study analyzing whether male or female teachers were more likely to refer students for SE (1998). Collecting data measurements from 92 teachers (25 males and 67 females) regarding student behavior and SE referral, it was found that female teachers were more likely to refer students for SE services than male teachers. In all, 60 students were referred, 88% of which were boys (McIntyre, 1998). A behavior checklist was used to determine whether or not students considered for SE demonstrated a low degree of problem behaviors or a high degree of problem behaviors. Overall, 12/25 or 48% of male teachers referred students for SE evaluation, while 48/67 or 72% of female teachers referred students to SE for evaluation (McIntyre, 1998). When students were reported to have high levels of problem behaviors, female teachers were more likely to refer than male teachers, conversely when students were found to demonstrate a low level of problem behaviors, zero referrals to SE were made (McIntyre, 1998). Out of 60 students that were referred to SE, 26 were identified as having a learning disability while 3 were identified as having an emotional disability (McIntyre, 1998). Interestingly, students with reported high levels of problem behaviors were the only students in the study to be referred for SE. The expectation would be that most of the students that qualified for SE services would have done so under the category of EBD. This would suggest that student behavior played a larger role in SE referral than intelligence and performance, thus the concern is that male teachers may not refer students with high problem behaviors that have a disability (a false negative), while female teachers may refer students with high levels of problem behaviors who do not have a disability (a false positive). Given the high proportion of boys referred to SE in this

study (88%), it would suggest that teacher gender constitutes as a major factor in gender disproportion in SE, specifically female teachers referring boys to SE rather than dealing with some of the problem behaviors associated with boys. Complicating the matter all the more, the majority of students in this study qualifying for SLD, which should have nothing to do with behavior-yet it did.

Referral and Evaluation Procedure

Early identification and referral processes for SE are too dependent upon the primary, classroom teacher. A study conducted in Iowa examining who typically refers students to special education showed that 74% of all students referred were done so by a regular education teacher, and of these students, 73% were found to be eligible for special education services (Kavale and Reese, 1992). While interdisciplinary teams participate in the process from pre-referral interventions to SE placement, they are often reliant upon data collected and reported by the primary teacher. This may be true whether the suspected disability is emotional, behavioral, or cognitive. Identification of a suspected disability and pre-referral intervention data is a vital component in the decision to refer or not to refer. This process can be prone to subjectivity at times, especially when deciding whether to refer for emotional or behavioral reasons. For example, the way in which discipline is implemented in schools is often reliant upon a teacher's value system, tolerance level, or philosophical orientation (Panko-Stilmock, 1996). Classroom disciplinary actions may be subjectively assigned by the teacher and then treated as real data during the identification, pre-referral, and referral process. Complicating the issue further, is the need for pre-referral interventions to be done with fidelity. It can be difficult for the primary teacher to manage a classroom and to conduct pre-referral interventions consistently and accurately. While there has been effort put forth across the U.S. to put systems in place to create

and sustain intervention fidelity, such as the Response to Intervention model (RTI), which takes a multi-tiered approach to intervention, there are concerns from some schools and districts because they are not seeing the improvement in student achievement or behavior outcomes they expected (O'Connor and Freeman, 2012). This is likely due to the fact that implementation of the very system designed to address this issue is not always implemented with fidelity to begin with. A study in Wisconsin has shown this to be true. Using a fidelity rubric, 70 schools were rated to determine whether they were adequately implementing the RTI model. They found that just 53% of schools in the study were implementing the system adequately (Ruffini, S. J., Lindsay, J., McInerney, M., Waite, W., & Miskell, 2016). When schools are struggling to adequately implement systems to create intervention fidelity, it is suggestive that pre-referral interventions are likely not being done with fidelity either. Meanwhile boys continue to be referred to SE programs at a much higher rate than girls, thus the SE gender disproportion continues.

In addition to the referral process, the assessment process may be problematic as well. The same assessment process during evaluation for SE is used for both boys and girls, and could or should be gender specific. This is usually true whether evaluation is being conducted based on cognitive or behavioral concerns. The Woodcock Johnson IV is one of the most commonly used tools to determine if a student has a learning disability. It is a nationally-normed battery of tests based on a large sample of the U.S. population (McGrew, LaForte, and Schrank, 2014). This assessment tool is used to determine if there is a severe discrepancy between a student's intelligence and achievement, and is normed on a population sample that includes both boys and girls. While girls hold a very slight IQ advantage between the ages of 5 to 15, the differences are nearly negligible (Lynn, Kanazawa, 2011). It is important that these tests measure the discrepancy between I.Q. and achievement, or potential (IQ) and performance (achievement).

While I.Q. may be nearly identical between boys and girls, there may be other factors that should be taken into account in determining severe discrepancy, or whether a student is learning disabled. One of these factors should be gender. If boys and girls have structural and functional differences in the brain that have an effect on how they learn as Gurian and Stevens suggested (2004), then these differences should be accounted for in the assessment process. These structural and functional differences could have an impact in overall achievement when compared to I.Q. in boys and girls. For example, boys tend to have higher scores in math, while girls tend to score higher than boys in language (Golsteyn and Schils, 2014). Furthermore, regarding achievement, girls take greater advantage of their I.Q. (Golsteyn and Schils, 2014). Regardless of I.Q., if trends suggest that achievement will be higher in certain skills vital to the curriculum based on gender, it would make sense to provide nationally-normed assessments like the Woodcock Johnson IV that are gender specific. Likewise, behavioral assessments such as the Behavior Assessment System for Children-3 (BASC III) are often used during evaluation for SE. This assessment also uses national norms to rate problems that children may have with emotions or behavior. It is a major assessment piece that is often used to determine an emotional or behavioral disability exists. The BASC III manual states that they do have separate gender-normed forms, however general, combined gender forms are preferred most of the time (Reynolds and Kamphaus, 2015). It would be reasonable to suggest that if trends of behavior and emotion are different between boys and girls based on structural and functional brain differences, or hormonal differences, then what constitutes as a disability should potentially be different as well. If boys typically are found to underperform in language, or are not able to take advantage of their I.Q. for academic achievement in the same way that girls do, they will in turn be at greater risk for SE identification when taking a nationally-normed test that is not gender specific.

If boys are naturally more aggressive and oppositional (McIntyre and Tong, 1998), then they will be at greater risk for SE identification than girls if behavioral assessments used do not take different gender-based behavioral norms into account.

Curriculum Bias

Curriculum becomes gender biased when non-cognitive factors are taken into consideration as it pertains to grading. Curriculum can be described as the skill or knowledge that a student is expected to learn, including learning standards and outcomes ("Curriculum," 2015). When non-cognitive factors such as social skills, behavior, and overall agreeableness to the learning process are included in a teacher's final assessment for grading students, they effectively become a part of the curriculum. Teachers are likely to grade boys more harshly than girls due to non-cognitive factors, thus increasing boys' risk of SE identification. Cornwell, Mustard, and Van Parys sought to analyze gender differences in academic achievement of elementary students by examining test scores, teacher assessments, and connecting the two (2013). They demonstrated that girls are much more agreeable to the learning process compared to boys, and that these non-cognitive skills are a major factor in teacher assessment. Boys scored 15% lower than girls on non-cognitive skills related to the learning process such as sitting for long periods, demonstrating knowledge in the classroom, and putting forth effort on assignments and homework, and scored lower with each higher grade level (Cornwell, Mustard, and Van Parys, 2013). Girls receive higher grades than boys in nearly every category, however student grades are not commensurate with test scores. Boys score at least as well on math tests, and significantly outperform girls on science tests, yet this is not reflected in teacher grading (Cornwell, Mustard, and Van Parys, 2013). Girls do score higher than boys on reading tests, yet receive even higher grades than boys than what is commensurate with what the scores would

indicate (Cornwell, Mustard, and Van Parys, 2013). Their data suggested that girls have a more mature attitude toward learning compared to boys, so they are rewarded by receiving higher grades than warranted by their test scores (Cornwell, Mustard, and Van Parys, 2013). This is relevant to SE because student grades are commonly a significant piece of evidence that is used in the SE referral process. If boys are receiving grades that are considerably lower than girls, then they will be at greater risk for SE identification. This is especially true because female teachers are more likely to refer to SE to begin with compared to male teachers, and it is because of the same non-cognitive factors that play a role in teacher grading. This also may have more impact than on the grades themselves as evidence for SE referral. When students are not successful, they are more likely to demonstrate behaviors that may have an impact on SE identification, such as withdrawal, frustration, aggression, or developing an oppositional attitude toward school in general.

Behavioral Expectations

The way in which common classroom behavioral expectations are implemented put males at risk for SE identification. McIntyre and Tong identify three main categories of behavioral expectations that are ritualistic in our schools, which are comply and cooperate, be polite and use your manners, and get along with others (McIntyre and Tong, 1998). These common expectations are essential components to providing an environment that is conducive to learning. The way in which these behavioral expectations are often implemented make it more difficult for boys to meet the expectation. Rules are often enforced too rigorously and work against behavioral patterns that boys typically bring to school (McIntyre and Tong). Boys also tend to receive greater consequences compared to girls for the same behaviors, and identical problem behaviors are more likely to lead to grade retention in boys than in girls (Owens, 2016).

This is consistent with the finding that teachers are more likely to believe that boys are harder to control than girls, and that they are more likely to engage in dangerous behavior (Skiba et. al., 2014). Owen concluded that the school environment is not set up for the success of boys (2016). This is because boys are given more severe consequences for problem behaviors than girls, and that teachers tend to believe that boys will be more difficult than girls to manage in the classroom. This results in boys being more at risk for being suspended, retained, or referred to administration for behavioral reasons. Data regarding these factors is often used during the assessment process as proof of behavioral or emotional problems. Because boys are linked to these consequences due to behavioral problems, they will be disproportionately represented in SE programs, especially in the disability category of EBD. In addition to referral for EBD, they may also be at risk for disability identification in other areas, such as SLD. This was observed in a study when out of the 29 students that qualified for SE in the study, 26 were identified as having a learning disability while concurrently demonstrating high levels of problem behaviors (McIntyre, 1998). No students were referred in this study that did not receive a high rating of behavioral problems. While it is possible for students to have a behavioral problem and a learning disability at the same time, it is likely that student behavior such as non-compliance, rudeness, or not getting along well with others has an effect on referral to SE, even when the suspected disability is not behavioral in nature.

Factors In Concert

Many things contribute to gender disproportion in SE. Contributing factors need to be looked at in concert. Major contributors are due to genetic, physiological, or school structure factors. Disproportionality in SE is a complex and multiply determined issue (Sulivan and Ball, 2013). Sullivan and Ball explained that researchers have conducted many studies, that have

yielded inconsistent results, that look at variables related to disability risk, including enrollment, student-body makeup, per-pupil expenditures, student-teacher ratios, teacher credentials, discipline patterns, teacher demographics, academic performance, dropout rates, socio-economic status, race, free and reduced lunch status, household income, school policy, linguistic status, and educational attainment of adults (2013). Furthermore, they concluded in their study that predictive variables regarding SE identification varied across disability categories (Sullivan and Ball, 2013). The most common predictors of SE identification were found to be free and reduced lunch status and gender (Sullivan and Ball, 2013). The reasons why may be different depending on variables on an individual level. There is also uncertainty as to how all of these variables relate specifically to gender. If socioeconomic status is a strong indicator of disability risk, then how does that specifically affect boys compared to girls? There has yet to be a comprehensive study that takes all potential factors into account, likely because of the complex nature of the subject along with the feasibility of taking on such a task. To view the issue as anything less than complex would be an oversimplification of the problem. What is certain is that boys, regardless of race, continue to be disproportionately represented in SE programs and has been true for quite some time. Genetics, physiology, and school structure all seem to play a prominent role in the reasons behind these disproportionate trends.

Boys Are Overrepresented In Special Education

Overrepresentation of any groupings of students occurs when students are placed in SE when they do not require SE services. Disproportion in a binary group simply means that a subgroup is asymmetrically represented within the group. Gender disproportion can potentially occur in SE without overrepresentation. When holding to these particular definitions of overrepresentation and disproportion, there are two main ways in which gender disproportion is

to be expected in SE. Both of which, would result in a greater amount of boys receiving SE services compared to girls.

Boys are statistically expected to be disproportionately represented in greater numbers in SE due to genetic inheritance. As discussed earlier, 5%-10% of intellectual disability is caused by, X-linked genetic inheritance in males (Lubs, Stevenson, and Schwartz, 2012). Boys are more severely affected by X-linked genetic disorders than girls ("What are the different ways," 2019). Because boys are more severely affected by X-linked genetic disorders, then it is expected that more of them will qualify for SE services compared to girls. A certain amount of disproportion is to be expected because of this. It is unlikely however that this accounts for the disparity in its entirety, due to the fact that it still only accounts for 5%-10% of intellectual disability, which the majority of these individuals qualifying in only one disability category (DCD). Adding to the disproportionate numbers in SE is female underrepresentation. Girls that would otherwise qualify for SE services may not be getting the help they need. Evidence of this is seen in that girls placed in SE have significantly lower IQs than their male counterparts (Vogel, 1990). Emotional and behavioral problems in girls are also not as evident because they are commonly more internalized, leading to lack of confidence or depression, whereas boys' behavior tends to be more externalized (Wehmeyer and Schwartz, 2001). Girls still may have emotional and behavioral problems, but because they are expressed in a less external manner and are less likely to be noticed, and therefore not as likely to be referred to SE, adding to the disproportionate numbers. Though a case can be made for female underrepresentation, it is still difficult to prove definitively because evidence for underrepresentation is based on comparison with boys in SE, who are potentially overrepresented.

Are boys overrepresented in SE? This is a difficult question to answer. If girls' underrepresentation and genetic factors can account for the disproportionate numbers entirely, then boys are not overrepresented. Genetic factors, such as X-linked inheritances do not seem to be able to fully account for the numbers. While it is likely true that girls are underrepresented in SE, it is not currently known to what extent this is true. There just is not much data on those that are not referred to SE. It can be inferred that it is probable due to girls in SE having significantly lower I.Q. scores than boys, and because their emotional and behavioral issues are often more internalized compared to boys who typically express emotional and behavioral problems more externally. Perhaps the biggest indicator of male overrepresentation in SE can be seen in average I.Q. scores. Boys and girls do not have significantly different average I.Q. scores (Lynn and Kanazawa, 2011). The differences are negligible, yet boys outnumber girls 1.52 to 1 for specific learning disability (SLD) (Digest of Education Statistics, 2018).

If there is little difference between boys and girls with objective testing, is male overrepresentation due to subjective referral? Even when looking specifically at the disability category of SLD, behavioral factors seem to be incorporated into the criteria for SE qualification. Even though they are still meeting criteria under that disability category, the reason for referral is still often in part for behavioral reasons. This is evidenced by the McIntyre study that showed 26 out of 29 SE qualifying students doing so under the SLD category, all of which had reports of high levels of problem behaviors (1998). If teachers are referring students to SE in order to evaluate for SLD in part because of behavioral problems, then the SE referral and evaluation process is even more subjective. This is due in large part because behavioral problems are by their very nature prone to subjectivity. Everyone has different tolerance levels, beliefs, and philosophies regarding classroom behavior. If they are being reported as having high levels of

behavioral problems, then who is to say that their behavior is not getting in the way of their learning? If a student is being referred for behavioral reasons then they should have had a behavioral intervention. If they are being referred for SLD when they have a behavioral problem, then that means that they received academic interventions, which may not have been what they really needed.

Subjective referral is a major issue causing overrepresentation of boys in SE, especially when referring to SE for behavioral or emotional problems (McIntyre and Tong, 2001). Boys outnumber girls 2.64 to 1 under the EBD category of disability (Digest of Education Statistics, 2018). McIntyre and Tong suggested the cross-gender misunderstandings of behavior and communication is a driving factor for overrepresentation (2001). Female teachers do not always understand male patterns of behavior and communication, interpreting their behaviors as more severe than they really are. If this is a cause for overrepresentation of boys in EBD programs, then overrepresentation is exasperated by the fact that female teachers outnumber male teachers at every level in K-12 education, and by the fact that they are more likely to refer students to SE for behavioral reasons compared to male teachers (McIntyre, 1998). Even more disturbing, is the fact that grades are often used as evidence of a disability across nearly all disability categories. This is a major issue because boys do not receive grades that are commensurate with their test scores. Cornwell, Mustard, and Van Parys accumulated data that showed that girls have a more mature attitude toward learning compared to boys and are rewarded by receiving higher grades than warranted by their test scores, whereas boys continually receive lower grades than warranted based on their test scores (2013). This demonstrates another example of how subjective interpretation of behavior affects boys, putting them at greater risk for SE identification and overrepresentation.

The lack of fidelity in pre-referral interventions also puts boys at-risk for overrepresentation. Boys are referred to SE more often than girls. There is evidence that pre-referral interventions are not always done with fidelity. It was shown in one study that out of 70 schools, just 53% were implementing an intervention programming (RTI) adequately (Lindsay, MicInerney, Miskel, Ruffini, and Waite, 2016). If interventions are not done with complete fidelity, then we do not know to what extent they would have been successful. It is possible that boys are at least partially overrepresented in SE programming because pre-referral interventions were not implemented and executed properly. These are boys that qualify for SE upon referral and evaluation, but had the interventions been conducted with fidelity, they may have made enough progress in the suspected area of disability so that SE referral would not have been necessary.

If subjective referral causes male overrepresentation in SE, then what about the evaluation process and disability criteria? Is the very criteria set for disability determination subjective? Though criteria qualifying for SE may be consistent, it potentially puts boys at-risk for SE identification. Boys and girls have to meet the same criteria to qualify for SE, though boys and girls have physiological differences that affect how they learn (Gurian and Stevens, 2014). When evaluating for learning disabilities, or disabilities related to behavior, common assessments used are normed on the general population of children, both boys and girls. If criteria for SE qualification were tailored to the differences common in boys and girls, would it be different based on gender? If it was shown that norms were different based on gender, then there is potential that what is now considered to be a disability for some may not be a disability when gender norms are taken into account. This could be one more possible reason for male overrepresentation.

Are boys overrepresented in SE? Given the available research to this point, it is difficult to say that this is true by definitive measures. A certain amount of subjective interpretation is needed in order to answer this question. Based on the available research and knowledge, it is logical to infer that boys are in fact overrepresented in SE. The same can also be said of female underrepresentation. It is logical to infer that girls are underrepresented in SE. This at times is framed as an "either or" issue. Either boys are overrepresented or girls are underrepresented. To frame it in this manner, however, is likely a mistake. One being true does not necessarily mean that the other is not true. What is known definitively is that boys outnumber girls at about a 2 to 1 ratio in SE. Whether the reasons for disproportion are due to male overrepresentation or female underrepresentation, or more realistically a combination of both, all students stand to benefit from actions taken to address the disproportion. This is true for the boy student in SE that may not need SE services, or the girl who is in need of SE services but goes unnoticed.

Reducing Gender Disproportion in Special Education

There is a myriad of factors that lead to gender disproportion in SE; therefore, there is no single solution. It is difficult to confirm the degree to which boys are overrepresented in SE, just as it is difficult to confirm the degree to which girls are underrepresented in SE. The reasons for disproportion are many, and commonly fall under the umbrella of either genetic, physiological, or school structure factors. Though it is complex, there are steps that may be taken to improve disproportion. It is worth exploring and discussing these possibilities as it could lead to better outcomes for the many students that are being referred to, or are already placed in SE programming. By addressing disproportion in SE rather than overrepresentation, both boys and girls stand to benefit. Future generations may benefit from addressing genetic factors, boys

would benefit by addressing issues that cause overrepresentation, and girls would benefit from addressing underrepresentation. In addressing these factors, the 2 to 1 ratio could be reduced.

Genetic Risk

Achieving reproductive confidence through genetic testing may be one avenue in which gender disproportion may be addressed. Research has shown that some disproportion should be expected due to genetic factors. There are over 150 known syndromes related to the X chromosome that may cause intellectual disability (Lubs, Stevenson, and Schwartz, 2012). Boys specifically are at greater risk of having intellectual or cognitive disabilities because of X-linked genetic inheritances. While it has been known for quite some time that boys are at greater risk for intellectual disability due to genetic factors, there is a growing number of genetic tests that are becoming available to families who have a history of intellectual disability. If a specific gene mutation is found, it may be possible to prevent recurrence of a specific syndrome or genetic cause for intellectual disability through carrier testing, donor eggs, prenatal diagnosis, and preimplantation genetic testing (Lubs, Stevenson, and Schwartz, 2012). This would be beneficial for families because it may be able to allow them to make better and more well-informed decisions when considering future generations. They would have the opportunity to consider genetic risks concerning possible disability outcomes in their children when deciding whether or not they want to have children of their own. In the future they may even be able to take advantage of new technologies that could ensure certain mutations are not passed on through genetics. Genetic testing could be beneficial for families who have children either being evaluated for or are already placed in SE.

Relationships

Relationships play a vital role in boys' learning, and can reduce SE referral numbers when cultivated properly. Specifically, positive teacher relationships are the primary factor that should come first when trying to make an effort to improve the learning and engagement of boys in the classroom (Reichert and Hawley, 2013). In their international study, Reichert and Hawley set out to find characteristics of effective instruction and found patterns that they claim were effective for the learning and engagement of boys, regardless of student intelligence, socioeconomic status, or religion (2009). Teacher characteristics that were shown to improve the outcomes of all students, but especially for boys included a willingness to improvise to meet student needs, showing mastery of their subject, requiring quality work, being responsive to student interest and talent, sharing common interest or characteristic with a student, accommodating a measure of opposition, and a willingness to show vulnerability (Reichert and Hawley, 2009). These teacher characteristics were found to be central to the success of boys in the classroom in this study, which included 18 schools and 6 countries. A key component to these teachers' success with their students hinged on their ability to form an agreeable alliance with the boys in their class where they were able to work together for a common purpose, and when a teacher had these characteristics they were more successful with the boys in their classrooms compared to other teachers that did not demonstrate these same characteristics. As it relates to gender disproportion and male overrepresentation in SE, teachers can mitigate factors related to their relational approach that may put boys at risk for SE identification. Factors such as hormonal differences, which may have a hand in the more aggressive nature of boys, and factors related to the behavioral and communicative patterns of boys.

Teacher Training

Training teachers regarding differences in how boys and girls learn is necessary, understanding common strengths and weaknesses. Boys and girls have structural and functional differences in the brain that affects how they learn (Gurian and Stevens, 2004). Teachers should be trained in these differences in order to better meet the needs of all students in their classroom. In broad terms, because of these differences, boys tend to be stronger in skills related to spatial and mechanical functioning, whereas girls tend to have stronger skills in social, emotional, and language functioning (Gurian and Stevens, 2004). This is why boys tend to hold a slight edge in math and science while girls tend to be better off socially, as well as in language arts. While there is no one size fits all approach as related to gender, these common differences should be taken into account. If the instructional approach of a teacher skews too much one way or the other, you may be effectively putting most of the students of a particular gender at risk of underperformance. If schools learn to take these differences seriously, and subsequently train their teachers accordingly in this realm, then they will be better equipped to help boys achieve a greater degree of appropriate social and emotional skills. Conversely, they can also help girls achieve greater heights in areas often associated with underperformance, such as math and science. If there is an overall improvement in the social and emotional well-being of boys, then they will be less likely to be identified as having a disability. This would help to account for physiological factors causing disproportion because it takes into consideration the structural and functional differences of the brain that cause the differences in how both boys and girls tend to learn.

In addition to learning differences in how boys and girls commonly learn, training regarding common language and behavioral patterns of boys and girls may also be helpful in

addressing disproportion. While enforcing rules for safety is important, common male behavioral patterns that are non-threatening are often thought of as inappropriate in a school setting (McIntyre and Tong, 1998). These behavioral patterns may be viewed as a more serious issue than they really are, behaviors such as roughhousing, active movement, or questioning teacher instruction. Approaches can be implemented in schools to make the learning process more palatable for boys (McIntyre and Tong, 1998). If teachers are better able to understand traditional language and behavioral patterns of boys then they will be better at identifying the difference between a behavioral disability and what is simply typical boy behavior. When teachers are trained in these differences then they will be able to reduce the risk of SE identification in boys, because then they will have the opportunity to adjust their instructional approach to better suit the needs of boys. They will, therefore, be less likely to refer boys for SE evaluation, because they will be able to better identify the difference between disability and common behavioral patterns of boys. Anderson indicated that practitioners need to understand that gender affects decisions made in the classroom, and as research becomes available it is necessary to identify factors influencing classroom decision-making regarding services, create programs to better prepare teachers, and create better methods for addressing the needs of all students in the classroom, both male and female (Anderson,1997).

Curriculum

Assessing student knowledge based on merit rather than non-cognitive factors would likely reduce gender disproportion in SE. Boys are often not graded commensurately with their test scores (Cornwell, Mustard, and Van Parys, 2013). They consistently receive significantly lower grades than girls, even though test scores show that they are much closer to girls in abilities. Grades have a stronger correlation to social behavior when compared to test scores,

especially for younger aged students (Devries, Rauthman, and Gephardt, 2010). This means that social skills and overall behavior is effectively being brought in as part of the curriculum. A significant part of the referral and evaluation process for SE involves assessing student grades. Grades are usually taken as evidence of a learning or behavioral problem. They are used to demonstrate that a certain behavioral problem is having an impact on their academic achievement. While a student may demonstrate a behavioral problem, this should not be taken into account when assessing academic skills they may or may not have. If a teacher is to assess behavioral and social skills it should be done so in that same realm rather than leaking into the curriculum of other school subjects. Boys that are potentially at-risk for SE identification would benefit from a more equitable assessment process, one that assesses based on the skills and standards directly related to the subject or topic being assessed. Because it is the boys' grades that are suffering, they would be less likely to identified and placed in SE.

Referral and Evaluation Procedure

The implementation and follow through of pre-referral interventions should be done with fidelity. One model, such as the RTI model that is being embraced by many districts is not always being implemented with fidelity. This is a model that has been designed to catch students early when they begin to struggle, so they can close the gap between a struggling student and their peers. In one study they found that just 53% of schools were implementing the system adequately (Ruffini, 2016). Research has shown that interventions in education have rarely been implemented as designed, and are often adapted in ways they were never intended for (Lendrum and Humphrey, 2012). As a part of the referral process, students must be given the opportunity to respond to educational interventions before they are referred for SE evaluation. If these interventions are not implemented correctly, then their success rate will not only be low, but it

will also make the intervention invalid. It is important to give students every opportunity to respond positively to interventions; therefore, it is important that the intervention be done with fidelity before referral to SE. If a teacher is able to implement an intervention the way it was designed to be implemented, and done so with fidelity, then fewer students will be placed in SE because they will have likely responded to the intervention more positively. This is significant to reducing gender disproportion in SE because boys make up the larger proportion of students being referred. This will help all students to have a better chance at closing a behavioral or academic gap between themselves and their peers, however it stands to benefit boys more greatly as boys consistently outnumber girls in the intervention process.

Using someone other than the primary teacher to carry out a pre-referral intervention should be considered. The referral process is often too dependent on the primary teacher and may lead to gender disproportion in SE. In one study, 74% of all referrals to SE were done so by the primary teacher (Kavale and Reese, 1992). And boys are being referred to SE at a much higher rate than girls as evidenced by a 2 to 1 ratio being placed in SE. Decisions to refer are often prone to subjectivity, especially as it relates to behavior, because everyone has different tolerance levels and instructional philosophies. In bringing in a different point of view, whatever the educational problem may be, the suspected problem could either be confirmed or challenged. This could go a long way in ensuring that a learning problem does or does not exist in a student because it will have been observed by someone with a different point of view.

Gender specific assessments should be used during the evaluation process for SE. Girls are better able to take advantage of their I.Q. as it relates to achievement (Golsteyn and Schils, 2014). Girls are also stronger in social and emotional functioning (Gurian and Stevens, 2004). If this is true, then normed assessments that are used in the evaluation process should be gender

specific. Currently there are very few assessments used in the evaluation procedure that are tailored to gender. Two common assessments used are the WJIV for academic achievement, and the BASC III for behavioral patterns. Because the editions of these most commonly used are nationally normed on a sample that includes both boys and girls, boys are at greater risk for SE identification. If girls are typically better able to take advantage of their I.Q. for achievement, then they will likely score higher than a boy on the WJIV that has the same I.Q. Likewise, if girls are typically ahead of boys in social and emotional functioning, they will likely receive a score indicating fewer behavioral and emotional problems on the BASC III. This could put boys at greater risk for both SLD and EBD identification. If gender-based norms are used on assessments for meeting initial criteria, then it is likely that fewer boys would be placed in SE, because the standard for meeting criteria would be changed to something more in line with their typical male peers.

Single Gender Classrooms

Single-gender classrooms are a possible solution for reducing SE identification in boys. This idea is based on the assumption that a different educational format, such as single gender classrooms, could help boys' behavior and reduce the number of special education referrals for boys (Piechura-Couture, Heins, and Tichenor, 2013). It also stems from the rationale that there are biological differences between the genders, and that these differences are apparent in classroom behavior, which can be addressed through pedagogical practices (Piechura-Couture, et al., 2013).

Piechura-Courture, et al., (2013) sought to find out in their study whether single gender classrooms could be an appropriate way to address the problem of male overrepresentation in special education. In order to do this they looked at data collected by the Dept. of Education in

South Carolina, which was garnered through surveys sent to the 217 schools in the state that offered single gender classroom. The authors used this data to highlight two major areas of concern, which are classroom behaviors and academic performance. Overall, 2,200 students, 178 parents, and 181 teachers completed surveys from 41 elementary, middle, and high schools in the state (Piechura-Couture, et al., 2013). Surveys were designed for each respective group, asking to rate the extent they felt that behavior, participation, educational performance, etc. improved their success in the classroom. Interestingly the results were very positive across the board. Parents and students overall strongly agreed that students improved in the areas of behavior and academics at a rate of roughly 60%-70% across the indicators measured in their single gender classrooms, with parents strongly agreeing at a slightly higher rate than the students. Most noteworthy however is the fact that teachers strongly agreed that students improved at a rate of 70% for behavior, 80% for participation, and 80% for attitude, which were higher ratings than indicated by students and parents (Piechura-Couture, et al., 2013). In looking at academics, 84% of teachers in male classrooms reported that they strongly agreed that single gender classroom had improved in independence, which is the sign of an effective learner (Piechura-Couture et al., 2013). Data presented in this article indicates that teachers, students, and parents believed that single gender classrooms helped students to be more successful in behavior and academics. It would make logical sense that with these perceived improvements in behavior and academics, especially by teachers, would reduce overrepresentation of males in special education. This is especially true given the fact that behavior and lack of academic achievement are strong indicators as to whether or not students will be referred to special education to begin with. This solution has the potential to reduce risk caused by many factors that lead to disproportion and male overrepresentation in SE. Instructional practices are likely to instantly improve because

there would not be a need to teach to the learning styles of both boys and girls. Typical behavioral and language patterns of boys would not be compared to their female counterparts. Behavioral expectations would be based on boys' behavior that is commonly observed and not compared with girls. And if the improvements as described in the study concerning academic and behavioral outcomes are true, then there would be less suspicion of disability in these areas to start with. The findings of this study are suggestive that single-gender classrooms may go a long way in reducing gender male representation in SE.

Recruitment of Male Teachers

Considering the fact that female teachers are more likely to refer boy students to special education for behavioral reasons (McIntyre, 1988), and that general education teachers are the people most commonly making those referrals (Kavale and Reese, 1992), one method of addressing the overrepresentation of males in special education would be to find ways to increase the number of males teachers. This is especially relevant because it is estimated that the number of male teachers in the United States is at 24%, and when looking at preschool and kindergarten that number shrinks to 2.2% (Johnson, 2010). This could potentially add a piece to the puzzle of addressing male overrepresentation in special education, especially if the female teacher to male student relationship is naturally strained due to differences in communication styles and behavioral patterns (McIntyre and Tong, 1998). In placing more males in teaching roles, it is most likely that the number of boys being referred to SE for behavioral problems would be lessened. While initiatives to recruit more male teachers have been around since 1957, men are still vastly outnumbered in the teaching profession (Goesling and Rice, 2005). For this to be a viable solution, there would need to be a proven strategy implemented for attracting more men to the teaching profession, which at this point has not been discovered.

Physical Activity

Including short bouts of physical activity in the classroom wherever possible, may be part of the solution because it helps boys to demonstrate more on-task behavior. A major factor that allows a student to be successful in the classroom is their ability to stay on-task. When a student is able to pay attention to what the teacher is instructing them to do, and to carry it out, that student is likely to be viewed as not having a behavioral problem. While there are other concerning problems regarding behavior, this is a major one that certainly plays a role in many special education referrals. One method of improving on-task behaviors in the classroom is by implementing short bouts of physical activity for students to participate in. Maher, in his study, sought to determine the effectiveness of short bouts of physical activity in the classroom by measuring on-task behavior in elementary students immediately following a physical activity break (2011). In this study, the effectiveness of recess breaks and classroom-based physical activity were measured. Trained observers were used to measure on-task behaviors following physical activity, either through recess breaks or classroom-based physical activity. The results of this study showed that students with extra recess showed some improvement in on-task behavior in the classroom, however students that participated in classroom-based physical activities with an academic component showed an improvement of +8.3% in on-task behavior compared to the control group who did not participate in extra physical activities (Maher, 2011). Maher concludes that because of the positive effects that physical activity has on attention-to-task behaviors in elementary students, that teachers should incorporate more physical activity into the daily schedule in the form of recess and classroom-based physical activities (2011). This solution may help students to better manage and regulate their behavior in the classroom.

Specifically, physical activity appears to help students' to show on-task behavior for longer periods of time. Given the fact that many students go on to the special education referral process in part because of their inability to stay on-task in the classroom, and some of the assessment tools used in the evaluation process specifically measure on-task behavior, implementing strategies for increasing on-task behavior in the classroom could reduce the number of students being identified for SE. This could benefit boys specifically because they more often demonstrate off-task behaviors compared to girls. If boys were able to be perceived as being on-task more often, then they will be less likely to be referred for SE evaluation.

Underrepresentation of Girls

Addressing issues related to girls' underrepresentation in SE programming would help to reduce disproportion. When looking specifically at learning disabled students, Susan Vogel found a discrepancy between gender, IQ, and special education placement. She noted based on her review of a sampling of special education students in LD programs, that female students were significantly lower in intelligence, were more severely impaired, and had a greater aptitude-achievement discrepancy compared to males who were placed in LD programs (Vogel, 1990). This discrepancy seems to be a problem with students identified emotionally or behaviorally disordered as well. In one review of the literature regarding the emotionally or behaviorally disordered, Callahan mentions that an implication of his research is that being male places a child at an increased risk as being identified as emotionally or behaviorally disordered and placed into a special education program, while being female is likely a risk for under-identification (Callahan, 1994). This could be due to the fact that male students appear to have more negative teacher-student interactions compared to female students. A tendency for boys is to have more externalized problem behaviors such as physical aggression, challenging authority,

and name-calling, while girls are more likely to have problem behaviors such as depression and withdrawal (Callahan, 1994). Female students end up underrepresented in EBD programs because their problem behaviors are often less disruptive to the class than the behavior of the male counterparts. A female student may be in need of services for special education, but because she is less likely to be disruptive to the class compared to male students, they go unnoticed. Underrepresentation of females in special education programs is one factor that contributes to the overall disproportionate numbers regarding gender and special education (Wehmeyer, M. L., & Schwartz, M. 2001).

CHAPTER III: DISCUSSION AND CONCLUSION

Summary of Literature

It is clear that boys are disproportionately represented in SE. There is no literature that seeks to show that this is not true. Since the inception and implementation of IDEA, boys outnumber girls in SE. Boys are have outnumbered girls in SE at a rate of 2 to 1, and has been a consistent ratio over the course of many years. Data taken regarding gender and SE placement taken nearly 30 years ago and compared to current times has remained relatively unchanged in the overall ratio of boys in SE compared to girls. This is accepted as fact amongst those studying gender disproportion in SE. There have been shifts in specific disability categories, but there have not been major changes in the overall gender distribution.

The research shows that there are genetic reasons for gender disproportion in SE. This was observed in literature dating back as early as the 1970s. Boys are simply more at risk for disability, especially intellectual disability, because they lack a second X chromosome. Girls, even if they have an X-linked genetic inheritance that causes a deficit, are less likely to be identified and placed in SE as they are often able to compensate by having a second unaffected X chromosome. What the literature fails to produce is a compelling case that shows that this is the main reason as to why boys outnumber girls in SE. It is able to account for some of the gender disproportion in SE, but is a far cry from accounting fully for the 2 to 1 ratio that is so widely known and accepted in the field.

It appears that there are physiological reasons for the disproportion. The available literature commonly suggested that boys and girls have structural and functional differences in the brain, and because of these differences they tend to learn differently from each other. There are also hormonal differences between girls and boys, that affect how process and react to

information. Because of these differences, girls are less likely to have some of the characteristics that would lead to referral and placement in SE. While the literature showed consensus that physiological differences were present, there was not always agreement in how the differences presented. There is agreement however that brain structure and hormones have an effect on how people process and react to external stimulation. How people process and react to information is directly linked to the decision to refer or not refer students to SE.

School structure has a significant impact on the distribution of boys and girls in SE. The available research showed overwhelmingly that this is true. There was variance in some of the literature regarding how school structure did or did not affect boys and girls, and their respective relationship to SE. It showed through many studies that boys are at a greater risk of SE identification due to school structure, likewise it showed how girls were underrepresented in SE. Literature at times framed this as one being more true than the other. After further examination, it appears that both are in fact true. Framing it as an either or situation was a mistake that was observed on multiple occasions throughout the research process. What was abundantly clear in the literature was that components of school structure such as teacher gender, classroom management, discipline, relational approach, curriculum, methods of grading, etc., all are factors that impact gender disproportion in SE.

Research has shown that there are steps that can be taken to reduce gender disproportion in SE. Many of the ideas to reduce disproportion as presented in this review were suggestive, or inferred based on the literature available. There were many studies concerned with how to improve student outcomes overall. For example, short bouts of physical activity appeared to improve student behavior regulation. If a student is better able to regulate their behavior, they are less likely to be referred to SE for that reason. It is logical to suggest that short bouts of physical

activity may reduce gender disproportion in SE, because the research shows the trend that boys have a more difficult time regulating their behavior in the classroom. If a student lacks academic, social, emotional, or behavioral success in the classroom then they will be at greater risk to be referred to and placed in SE. Therefore, many of the ideas presented in this review for reducing gender disproportion relied upon literature that demonstrated an improvement in these outcomes in boys. What was most clear in however, was that the student and teacher relationship is key to improving educational outcomes in boys. This was a common theme found in the literature. How a student and teacher relate to one another is a decisive factor in student success in the classroom. Research showed that girls tend to be more agreeable to the educational process in general, despite teacher instructional approach, therefore making the student and teacher relationship even more important in the educational outcomes of boys.

Limitations of Research

There is a copious amount of information regarding gender disproportion in SE. The number of journal articles, books, and sheer data seems to be almost limitless. Notwithstanding that there is such a wealth of information on the topic, serious limitations were observed. Genetics, for example, is clearly an important component in trying to better understand why the disproportion exists. Great progress has been made in this area of research, however there is much to the story yet to be discovered. There are still many diagnoses often associated with a SE identification that have yet to be genetically linked. There is also disagreement on whether or not certain diagnoses are linked to an individual's genetic makeup. Until research is able to definitively answer how, where, and if any given diagnosis is associated with a genetic cause, it will be incredibly difficult to determine how much of a factor genetics are in SE gender disproportion. Furthermore, research regarding disproportion in specific disability categories has

a propensity to be murky. This is due to the fact that disability categories often lack specificity by their very nature. For example, there may have been a study conducted that looked specifically at EBD students. If the authors did not delineate specific characteristics of the student sample, at times it was difficult to decipher if their conclusion about what they were studying was adequately representative of the EBD student population as a whole. This is because there are any number of reasons why a student may have been identified in that population. The same could be said of other disability categories as well, such as ASD, DCD, SLD, and SMI to name a few. Lastly, there was limited research on how some of the specific factors that may put a student at risk for SE identification affected students based on gender. A study showing that socioeconomic status as a strong predictor of SE risk may not go into detail about how socioeconomic status respectively effects boys and girls. Going further in this vein, information regarding the disability rate of adults of children with low socioeconomic status, who may have an SE identified child was not readily available from what was observed in the research process.

Implications for Future Research

The decision to refer or place a child in SE has significant consequences, either positive, negative, or anything in between the two. Therefore the topic of gender disproportion remains an important one to continue to discuss and study. Whether the reasons for disproportion are genetic, overrepresentation, or underrepresentation, the future lives of the students that teachers are tasked with educating are at stake. In order to improve the outcomes of all students, further research is needed. This is needed in order to determine how, where, and why disproportion occurs, and what can be done to reduce the disproportion, whether the reasons are due to genetic factors, overrepresentation, or underrepresentation. There are key areas where further research

may be especially beneficial. Further studies proving or disproving the link of medical conditions and mental health diagnoses to genetic causes could prove to be of great use. This is true whether it empowers families to make well-informed decisions about future generations, or in the development of future medical or educational interventions. Research that delineates differences in students in a given disability category is necessary. Too often disabled students are lumped into broad categories, which subsequently are often too broad to find the specific information that a study is seeking to find. More research is also needed regarding how common factors that put students at risk of SE identification impact them based on gender. It is possible that research in this realm may change the very definition of disability itself, taking into account differences within subgroups, such as gender. The implication for research ultimately is that more is needed across the entire scope of gender disproportion in SE until there can be widespread agreement about its causes. When that happens, then there can be more clarity in forming and implementing a plan that can address the issue on a much larger scale than ever before.

Reason for Topic Choice

My personal interest in gender disproportionality in special education stems from two major life experiences. These experiences include growing up in the same household as my cognitively impaired brother, and then as a special education (SE) teacher. Since the time I became a SE teacher in 2016, I've had a total of 26 students enrolled in special education. During that time I've had a total of 16 males compared to 9 females. In addition, nearly all of the new students during that time going through the pre-referral intervention process were also male. During one of our staff meetings when we were discussing pre-referral interventions, a colleague of mine posed the question, "What are we going to do about all these boys?" This caused me to contemplate why there were so many males compared to females in SE. My mind went back to

thinking about my own household, living with a brother who was enrolled in SE when he was a student. Knowing my brother's diagnosis of Fragile X Syndrome, I knew that males were at greater risk for being identified as needing SE. This is based on the fact that in most cases, males are more severely affected by X-linked genetic disorders than females ("What are the different ways," 2019). My brother was a prime example of this in action. I began to wonder if this could explain gender disproportionality in SE in its entirety, or if it was just one piece to a much more complicated issue. In thinking about my own students, I began to think about the types of disabilities they were identified with. Out of 26 students, only 1 could be definitively identified as having a disability due to X-linked genetic inheritance. This raised my suspicion that the issue of gender disproportion in SE could not be totally explained due to X-linked inheritance.

Professional Application

Having knowledge surrounding the issue of gender disproportion in SE has implications for professional application. Undoubtedly there is vast potential for professional application in the field of education. This issue however, has ripple effects that also extend to a broader context. In addition to the field of education, there are also applications that can be extended to the medical and mental health fields. Because schools often depend heavily on medical and mental health diagnoses during the referral and evaluation process, it is necessary to consider the professional applications in those fields as well.

School policies regarding how they refer, evaluate, discipline, and grade students are all relevant. When school districts understand common differences in how boys and girls learn and behave, then school policy can be adjusted to be more equitable. This may include addressing issues of male overrepresentation, female underrepresentation, or both. In addressing referral, evaluation, discipline, and grading policies, gender disproportion in SE may be reduced. This

would be of benefit for both boys and girls. It is needed for those who shape school policy to be aware of the issue. This includes school boards, superintendents, principals, and teachers alike. In coming together, these individuals can shape school policy in a way that improves the outcomes of all students, which is not only their duty, but something that should be their common goal.

In the classroom, the most glaring professional application is for the teacher to be aware of their own potential bias. They must be ever aware of how their instructional practices and behavioral management styles affect their students. More specifically, in regards to gender disproportion, they need to be aware of how their actions and bias affects both male overrepresentation and female underrepresentation in SE. Research suggests that teachers are a major contributor to disproportion, whether that is because they tend to grade boys more harshly, misunderstand common behavioral and communicative patterns in boys, have different behavioral expectations that are gender-based, or simply assume that a girl does not need the extra educational or emotional support because they happen to be more agreeable to the educational process. It is an absolute necessity that teachers reflect on potential biases, and in turn adjust their instructional and behavioral management approach accordingly.

Individuals that set disability criteria and create common assessment tools for SE evaluation are needed to do their part to address disproportion as well. Their goal should be to set criteria and form assessment tools that are free of bias, and normed in an equitable manner. Given what we know about the differences that are common between boys and girls, it makes logical sense that they would dig deeper to look at variances in norms based on gender, and if they have, apply it to assessment tools that are commonly used in SE evaluation. In doing so it

may be possible that the very way in which certain disabilities are defined could potentially be changed.

Lastly, those in the medical and mental health professions are not without responsibility in the contribution of gender disproportion. It is common for social issues to compel those in the medical and mental health fields to improve best practices. Gender disproportion in SE is a social issue. Schools often rely heavily upon the diagnoses of these professionals when considering the placement of a student in SE. When a student is placed in SE, the trajectory of their education can change significantly, and can have a lifelong impact on the child. Diagnostic methods, especially in the mental health field is commonly subjective. Medical doctors and mental health workers alike should continue to push for more objective diagnostic measures, such as genetic testing. When scientists are better able to link genetic causes to medical or mental health disorders, the more precise those in the medical and mental health fields will be in their diagnosis of an individual.

Conclusion

The population distribution in SE is disproportionately male. Boys appear to be overrepresented in SE, conversely girls appear to be underrepresented. There are many factors that have led to the disproportion. Because of the many factors, it is difficult to prove with accurate measure that boys are overrepresented in SE. It is also difficult to prove that girls are underrepresented in SE. Based on the available research, one can infer that both of these are true. There needs to be continued and comprehensive research to better understand the nature of the disproportion and why it is happening. How these factors relate and affect each other is complicated, and only time and research will shed more light on the issue. It is worthwhile to focus efforts on reducing gender disproportion in SE. In doing so, both boys and girls will

benefit. By targeting disproportion, the number of boys that are unnecessarily placed in SE could be reduced, while girls in need of SE services and not receiving it will get the support they need. Furthermore, genetic research stands to benefit all students, but especially boys due to X-linked genetic inheritance. The decision to refer and place any student in SE is not be taken lightly. The decision has ripple effects that can extend throughout a lifetime. These effects may be positive or negative depending on whether the decision is correct. It is best to make correct decisions. The trajectory of human lives is at stake. That matters.

References

About IDEA. (2019). Retrieved from https://sites.ed.gov/idea/about-idea/#IDEA-History

Ahn, J. & Lee, J. (2008) X chromosome: X inactivation. *Nature Education* 1(1):24 Retrieved from https://www.nature.com/scitable/topicpage/x-chromosome-x-inactivation-323/

Anderson, K. (1997). Gender bias and special education referrals. *Annals of Dyslexia, 47*, 151-162. Retrieved from https://link-springer-com.ezproxy.bethel.edu/content/pdf/10.1007%2Fs11881-997-0024-8.pdf

Barkley, R. (Ed.). (2006). *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment* (3rd ed.). New York, NY: Guilford Press.

Biederman, J., Mick, E., Faraone, S. V., Braaten, E., Doyle, A., Spencer, T., . . . Johnson, M. A. (2002). Influence of gender on attention deficit hyperactivity disorder in children referred to a psychiatric clinic. *American Journal of Psychiatry, 159*(1), 36-42. doi:10.1176/appi.ajp.159.1.36

Callahan, K. (1994). Wherefore art thou, juliet? causes and implications of the male dominated sex ratio in programs for students with emotional and behavioral disorders. *Education and Treatment of Children, 17*(3), 228-243. Retrieved from https://web-a-ebscohostcom.ezproxy.bethel.edu/ehost/detail/detail?vid=0&sid=47f19713-691a-46d7-acea-a155c910b4f9%40sdc vsessmgr06&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#AN=9501131491&db=keh

Canli, T., Desmond, J. E., Zhao, Z., & Gabrieli, J. D. E. (2002). Sex differences in the neural basis of emotional memories. *Proceedings of the National Academy of Sciences of the United States of America, 99*(16), 10789-10794. doi:10.1073/pnas.162356599

Centers for Disease Control and Prevention. (2019). Data and Statistics About ADHD. Retrieved from https://www.cdc.gov/ncbddd/adhd/data.html

Centers for Disease Control and Prevention. (2019). Data and Statistics on Children's Mental Health. Retrieved from https://docs.google.com/document/d/1hWg_jB6TOijVZux5TajZXDQQGeFZNtZk1k2wBNUqyD0/edit

Children and Youth With Disabilities. (April, 2018). Retrieved from https://nces.ed.gov/programs/coe/indicator_cgg.asp

Collingwood, Jane. (2018, October, 8). The Genetics of ADHD. Retrieved from https://psychcentral.com/lib/the-genetics-of-adhd/

Cornwell, C., Mustard, D., & Van Parys, J. (2013). Noncognitive skills and the gender disparities in test scores and teacher assessments: Evidence from primary school. *The Journal of Human Resources, 48*(1), 236. Retrieved from https://web-a-ebscohost-com.ezproxy.bethel.edu/ehost/pdfviewer/pdfviewer?vid=0&sid=93a4027d-076b-4866-8dfb-186349f018ee%40sdc-v-sessmgr03

Curriculum. (2015, August 12). Retrieved from https://www.edglossary.org/curriculum

Devries, J. M., Rathmann, K., & Gebhardt, M. (2018). How does social behavior relate to both grades and achievement scores? *Frontiers in Psychology, 9*, 857. doi:10.3389/fpsyg.2018.00857

Digest of Education Statistics. (2018). Retrieved from https://nces.ed.gov/programs/digest/d18/tables/dt18_204.50.asp?current=yes

Franke, B., S, V. F., Asherson, P., Buitelaar, J., C, H. D. B., J, A. R., . . . Reif, A. (2011). The genetics of attention deficit/hyperactivity disorder in adults, a review. *Molecular Psychiatry, 17*(10), 960. doi:10.1038/mp.2011.138

Ghosh, A., Ray, A., & Basu, A. (2017). Oppositional defiant disorder: Current insight. *Psychology Research and Behavior Management, 10*, 353-367. doi:10.2147/PRBM.S120582

Golsteyn, B. H. H., & Schils, T. (2014). Gender gaps in primary school achievement: A decomposition into endowments and returns to IQ and non-cognitive factors. *Economics of Education Review, 41*, 176-187. doi:10.1016/j.econedurev.2014.04.001

Gurian, M., & Stevens, K. (2004). With boys and girls in mind. *Educational Leadership, 62*(3), 21. Retrieved from http://www.ascd.org/publications/educational-leadership/nov04/vol62/num03/With-Boys-and-Girls-in-Mind.aspx

Individual with Disabilities Act. (July 11, 2017). Sec. 300.8. Retrieved from https://sites.ed.gov/idea/regs/b/a/300.8

Johnson, S. (2010). STILL SO FEW MALE TEACHERS: Now what? *YC Young Children, 65*(3), 18-23. Retrieved from https://search-proquest-com.ezproxy.bethel.edu/docview/873822940?accountid=8593&rfr_id=info%3Axri%2Fsid%3Aprimo

Larsson, H., Chang, Z., D'Onofrio, B.,M., & Lichtenstein, P. (2014). The heritability of clinically diagnosed attention deficit hyperactivity disorder across the lifespan.*44*(10), 2223-2229. doi:10.1017/S0033291713002493

Lendrum, A., & Humphrey, N. (2012). The importance of studying the implementation of interventions in school settings. *Oxford Review of Education, 38*(5), 635-652. doi:10.1080/03054985.2012.734800

Lubs, H., Stevenson, R., & Schwartz, C. (2012). Fragile X and X-linked intellectual disability: Four decades of discovery.*American Journal of Human Genetics, 90*(4), 579. doi:10.1016/j.ajhg.2012.02.018

Kavale, K. A., & Reese, J. H. (1992). The character of learning disabilities: An iowa profile. *Learning Disability Quarterly, 15*(2), 74-94. doi:10.2307/1511010

Lynn, R., & Kanazawa, S. (2011). A longitudinal study of sex differences in intelligence at ages 7, 11 and 16 years. *Personality and Individual Differences, 51*(3), 321-324. doi:10.1016/j.paid.2011.02.028

Mahar, M. (2011). Impact of short bouts of physical activity on attention-to-task in elementary school children. *Preventive Medicine, 52*, S64. doi:10.1016/j.ypmed.2011.01.026

Marco, E. J., & Skuse, D. H. (2006). Autism-lessons from the X chromosome. *Social Cognitive and Affective Neuroscience, 1*(3), 183-193. doi:10.1093/scan/nsl028

McGrew, K. S., LaForte, E. M., & Schrank, F. A. (2014). Technical Manual. *Woodcock-Johnson IV*. Rolling Meadows, IL: Riverside.

McIntyre, L. (1988). Teacher gender: A predictor of special education referral? *Journal of Learning Disabilities, 21*, 382-383. Retrieved from https://journals-sagepub-com.ezproxy.bethel.edu/doi/pdf/10.1177/002221948802100612

McIntyre, T., & Tong, V. (1998). WHERE THE BOYS ARE: Do cross-gender misunderstandings of language use and behavior patterns contribute to the overrepresentation of males in programs for students with emotional and behavioral disorders? *Education and Treatment of Children, 21*(3), 321-32. Retrieved from https://web-b-ebscohost-com.ezproxy.bethel.edu/ehost/detail/detail?vid=0&sid=e26ddc3d-60e1-478f-8498-973ebf067ae0%40pdc-v-sessmgr03&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#AN=1529595&db=keh

Minnesota Department of Education. (November 30, 2018). Checklists. Retrieved from https://education.mn.gov/MDE/dse/sped/mon/prog/list/

National Center for Education Statistics. (2018). *Fast Facts.* Retrieved from https://nces.ed.gov/fastfacts/display.asp?id=28

National Association of Special Education Teachers. (2019). *Comprehensive Overview of Other Health Impairments*. Retrieved from https://www.naset.org/index.php?id=2278

O'Connor, E.,P., & Freeman, E. W. (2012). District-level considerations in supporting and sustaining RtI implementation. *Psychology in the Schools, 49*(3), 297. doi:10.1002/pits.21598

Ogundele, M. O. (2018). Behavioural and emotional disorders in childhood: A brief overview for paediatricians. *World Journal of Clinical Pediatrics, 7*(1), 9-26. doi:10.5409/wjcp.v7.i1.9

Owens, J. (2016). Early childhood behavior problems and the gender gap in educational attainment in the united states. *Sociology of Education, 89*(3), 236-258. doi:10.1177/0038040716650926

Panko-Stilmock, Joy Lynn, "Teacher gender and discipline referral rates for middle level boys and girls" (1996). *ETD collection for University of Nebraska - Lincoln*. AAI9715979. Retrieved from: https://digitalcommons.unl.edu/dissertations/AAI9715979

Piechura-Couture, K., Heins, E., & Tichenor, M. (2013). The boy factor: Can single-gender classes reduce the over-representation of boys in special education? *College Student Journal, 47*(2), 235-243. Retrieved from https://web-a-ebscohost-com.ezproxy.bethel.edu/ehost/detail/detail?vid=0&sid=9599cafc-6581-48d9-8771-890329248cf7%40sessionmgr4009&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#AN=88413455&db=keh

Raymond, F. L. (2006). *X linked mental retardation: A clinical guide* BMJ Publishing Group Ltd. doi:10.1136/jmg.2005.033043

Rice, C. J., & Goessling, D. P. (2005). Recruiting and retaining male special education teachers. *Remedial & Special Education, 26*(6), 347-356. doi:10.1177/07419325050260060501

Reichert, M., & Hawley, R. (2010). Reaching boys: An international study of effective teaching practices. *Phi Delta Kappan Magazine, 91*(4), 35-40. doi:10.1177/003172171009100408

Reichert, M., & Hawley, R. (2013). Relationships play primary role in boys' learning. *Phi Delta Kappan Magazine, 94*(8), 49-53. doi:10.1177/003172171309400812

Reynolds, C.R., Kamphaus, R.W. (2015). Behavior assessment for children: Third edition. (BASC-3). [Assessment Instrument]. Bloomington, MN: Pearson. Retrieved from https://images.pearsonclinical.com/images/assets/basc-3/basc3resources/About-the-BASC-3-Rating-Scales.pdf

Ruffini, S. J., Lindsay, J., McInerney, M., Waite, W., & Miskell, R. (2016). *Measuring the implementation fidelity of the Response to Intervention framework in Milwaukee Public Schools*(REL 2017–192). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Midwest. Retrieved from http://ies.ed.gov/ncee/edlabs

Seidman, A. (2005). The learning killer: Disruptive student behavior in the classroom. *Reading Improvement, 42*(1), 40. Retrieved from https://web-b-ebscohost-com.ezproxy.bethel.edu/ehost/pdfviewer/pdfviewer?vid=0&sid=13cf9fe3-60df-4d10-b57c-59138f719287%40pdc-v-sessmgr01

Sex chromosome. (2019). *Britannica Online Academic Edition,*Encyclopædia Britannica, Inc. Retrieved from https://clicsearch.bethel.edu/primo-explore/fulldisplay?docid=TN_britnica66991&context=PC&vid=BETHEL&lang=en_US&search_scope=bethel&adaptor=primo_central_multiple_fe&tab=default_tab&query=any,contains,23%20pair%20of%20chromosome%20in%20females&facet=rtype,exclude,newspaper_articles&facet=rtype,exclude,reviews&facet=rtype,exclude,dissertations&mode=Basic

Skiba, R. J., Chung, C., Trachok, M., Baker, T. L., Sheya, A., & Hughes, R. L. (2014). Parsing disciplinary disproportionality: Contributions of infraction, student, and school

characteristics to out-of-school suspension and expulsion.*American Educational Research Journal, 51*(4), 640-670. doi:10.3102/0002831214541670

Spaulding, L. S., & Pratt, S. M. (2015). Article 7: A review and analysis of the history of special education and disability advocacy in the united states.(essay). *American Educational History Journal, 42*(1-2), 91.

Spilt, J. L., Koomen, H. M. Y., & Jak, S. (2012). Are boys better off with male and girls with female teachers? A multilevel investigation of measurement invariance and gender match in teacher–student relationship quality. *Journal of School Psychology, 50*(3), 363-378. doi:10.1016/j.jsp.2011.12.002

Sullivan, A. L., & Bal, A. (2013). Disproportionality in special education: Effects of individual and school variables on disability risk. *Exceptional Children, 79*(4), 475-494. doi:10.1177/001440291307900406

Van Wingen, G., Mattern, C., Verkes, R. J., Buitelaar, J., & Fernández, G. (2010). Testosterone reduces amygdala–orbitofrontal cortex coupling. *Psychoneuroendocrinology*, *35*(1), 105–113. https://doi-org.ezproxy.bethel.edu/10.1016/j.psyneuen.2009.09.007

Vogel, S. A. (1990). Gender differences in intelligence, language, visual-motor abilities, and academic achievement in students with learning disabilities: A review of the literature. *Journal of Learning Disabilities, 23*(1), 44-52. doi:10.1177/002221949002300111

What are the different ways in which a genetic condition can be inherited. (2019, September 10). Retrieved from https://ghr.nlm.nih.gov/primer/inheritance/inheritancepatterns

Wehmeyer, M. L., & Schwartz, M. (2001). Disproportionate representation of males in special education services: Biology, behavior, or bias? *Education and Treatment of Children, 24*(1), 28-45. Retrieved from https://web-b-ebscohost-com.ezproxy.bethel.edu/ehost/detail/detail?vid=0&sid=feea4dff-b3f2-4cd7-88ef-1946122a90ef%40pdc-v-sessmgr01&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#AN=4686875&db=keh

Xurvein. (2015). Assessment Process of EBD Students: Professional Perspectives. Retrieved from https://sophia.stkate.edu/cgi/viewcontent.cgi?article=1549&context=msw_papers

Yell, M. L., Rogers, D., & Rogers, E. L. (1998). The legal history of special education: What a long, strange trip it's been.*Remedial and Special Education, 19*(4), 219-228. doi:10.1177/074193259801900405