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The Lived Experience of Parents of Children with Irlen Syndrome: A Biopsychosocial Perspective of the Effects of Tinted Lenses and Colored Overlays

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Abstract

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by

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Reading illiteracy is a continuing problem in society. Irlen purported many individuals struggle with reading due to a perceptual processing problem called Irlen Syndrome (IS). Existing research supports the use of colored overlays and tinted lenses to alleviate reading difficulties but has focused primarily on the biological benefits of improved reading while neglecting the IS child's psychological and social well-being. Viewed from a biopsychosocial perspective, the purpose of this qualitative phenomenological study was to explore the lived experiences of parents of children with IS who used colored overlays or tinted lenses. Engel's biopsychosocial theory acted as a guide for the interpretation of themes that emerged from the data analysis. Data were collected using a nonprobability purposeful sample strategy. This study's sample consisted of 11 parents with IS children who used colored overlays or tinted lenses for 4 months or longer. Parent interview transcripts were analyzed using hand coding and NVivo computer software. It was found that parents of IS children reported improvements in their child's overall reading, writing, homework completion, self-confidence, sociability, emotional regulation, and physical well-being when using colored overlays and tinted lenses. Findings revealed that many parents struggled with school personnel's ability to understand and accept IS as a diagnosis and provide their child with consistent adaptive device accommodations. The results of this study may lead to positive social change by giving practitioners and educators a greater understanding of IS and its biological, psychological, and social processes.

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Dedication

I would like to dedicate this dissertation in loving memory of my parents, James D. Merritt and Gladys Blackmon-Merritt, and good friend Pattijo Payne, who always believed in me. Also, I must give the highest exhalation to God for helping me to push through life obstacles to achieve my educational goals.

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Chapter 1: Introduction to the Study

Introduction

According to the United States Department of Education (2013), 32 million people in the United States were "functionally" illiterate. Fourteen percent of those who could not read were from the adult population, and 19% were high school graduates. Similarly, the National Center for Education Statistics (2013) revealed that 65% of U.S. fourth graders read below grade level, with 35% reading at grade level or above. Research showed a strong link between reading illiteracy or poor reading proficiency and risk for dropping out of school, criminality, difficulty acquiring employment, and social and economic instability (Adams, 1994; Hall & Moats, 1999; Moats, 2001; U.S. Department of Education, 2013). Therefore, learning to read is a necessity in society.

According to Irlen (2005), individuals who continue to struggle from reading despite intervention may be experiencing a visual disturbance or visual processing problem called Irlen syndrome (IS). Symptoms associated with the condition include visual distortions or blurring of printed texts to eyestrain, headache, and fatigue (Chouinard et al., 2012; Crabtree, 2011; Loew et al., 2014).

Colored overlays and tinted lenses are used to help individuals with reading difficulties like IS, a perceptual processing disorder that affects reading proficiency (Henderson et al., 2013). Allen et al. (2012) found that reading difficulties could be alleviated using colored overlays because the color can minimize visual distortion and stress when reading. Unfortunately, most research on colored overlays to help reading problems focused on improved reading's biological benefits. However, this phenomenological qualitative study explored whether or not the biological, psychological, and social processes that are in play when using colored overlays or tinted lenses enhance the lives of children diagnosed with IS, as perceived by their parents.

The first chapter provides background information as to the importance and rationale for this study. Chapter 2 includes a literature review on current research related to colored overlays and tinted lenses with children diagnosed with IS. This literature review includes a brief history of IS syndrome, followed by a literature review regarding the use of colored overlays, moving from a biological perspective towards a biopsychosocial theoretical framework.

Chapter 3 describes the phenomenological qualitative study method that I used to address the research questions and the population sample and data collection and data analysis. Chapter 4 is a review of my analysis and interpretation of the study results. Lastly, in Chapter 5, I provide an understanding of the data analyzed, limitations of the study, and implications and recommendations for future research due to this study's preliminary findings.

Background

Literature suggested that there is a strong link between reading, education, and workforce success (see Aud, et al., 2013). Those individuals who developed proficiency in reading fluency were more likely to acquire employment, social, and economic stability (Aud et al., 2013). In contrast, individuals less proficient in reading may be at greater risk for dropping out of school, unemployment, social instability, financial insecurity, and criminal activity (Adams, 1994; Hall & Moats, 1999). Therefore, the price of illiteracy is very high. Learning to read is a critical element in one's success.

Researchers purported that those who continue to struggle with reading despite interventions may experience a visual processing condition called IS (Chouinard et al., 2012; Irlen, 2005; Monger et al., 2015). According to Chouinard et al. (2012) and Irlen (2005), IS is characterized by visual distortions and somatic reactions, causing visual stress during reading activities. For example, individuals with this visual disturbance may experience the following: pattern glare, sensitivities to colors and contrast, lack of sustained attention, poor span recognition, and poor print resolution. Furthermore, individuals with IS tended to have reading difficulties with text appearing to move off the page, blur, or flicker. In addition to this, the individual may skip lines while reading, lose their place, and develop a slow reading rate and poor comprehension (Wilkins, 2002). Other symptoms associated with this condition may include eye strain, lack of sustained attention, frequent breaks in reading, inattention or restlessness, poor spelling, and writing, as well as avoidance behaviors associated with reading tasks (Crabtree, 2011; Irlen, 2005; Taub et al., 2009). Researchers also reported strong correlations between IS and migraines, autism, dyslexia, attention deficit disorder, and other learning problems (Crabtree, 2011; Evans & Stevenson, 2008; Kriss & Evans, 2005; Kruk et al., 2008; Singleton & Trotter, 2005).

Irlen (2005) suggested that as many as 46% of people diagnosed with learning disabilities suffer from the condition. It was a key factor interfering with reading improvement, but not the cause of reading difficulties. In the general population, 12–14% may struggle with IS, affecting the amount of time one spends reading (Irlen, 2005). Colored filters or overlays and tinted lenses were the methods used to alleviate or reduce the visual stress or distortions associated with the condition (Evans & Joseph, 2002; Irlen, 2005; Taub et al., 2009). Irlen indicated that when colored overlays and tinted lenses were able to control visual distortions, individuals became more engaged in the task of reading, and interventions that addressed language-based deficits may be more effective.

Previous research on the use of colored overlays to alleviate reading difficulties had primarily focused on the biological benefits of improved reading (see Denton & Meindl, 2015; Henderson et al., 2013; Park et al., 2012; Ritchie et al., 2011). However, research showed that children's psychological and social well-being could also be affected by IS (Boyle & Jindal-Snape, 2012; Stack-Cutler et al., 2015). For example, children who had difficulties in reading could also experience problems in interpersonal relationships, self-esteem, motivation, and resilience (Boyle & Jindal-Snape, 2012; Reid et al., 2016; Stack-Cutler et al., 2015).

According to Boyle and Jindal-Snape (2012), the psychological and social experiences of children with learning difficulties such as IS are often ignored. Therefore, this phenomenological qualitative study went beyond a biological perspective when looking at colored overlays and tinted/colored lenses among children with IS. Instead, Engel’s (1977) biopsychosocial theoretical framework, which emphasized the interconnectedness or interrelationship of the biological, social, and psychological aspects of a person’s well-being, was used when exploring how colored overlays and tinted lens can enhance or not enhance the lives of children who have IS through the lived experiences of their parents.

A greater understanding may be achieved by conducting such research regarding the specific biological, social, and psychological effects of colored overlays on children as perceived by their parents. The study results may support professional practice in health and clinical psychology by providing empirical evidence in the use of colored overlays or tinted lenses as a strategy that can enhance the wellbeing of children who have IS. Similarly, educators can use a more effective teaching strategy if the results identified the specific mechanisms and aspects involved in using colored overlays or tinted lenses that contributed to the improvement of children with IS. Furthermore, the results were instrumental in positive social change through the expanded use of colored overlays and tinted lenses as a strategy that could help enhance the biological, psychological and social functioning of children with IS.

Problem Statement

Colored overlays and tinted lenses were used to help individuals with reading difficulties such as IS, a perceptual processing disorder that affects reading proficiency (Henderson et al., 2013). Reading problems could be alleviated using colored overlays because the color can minimize visual distortion and stress when reading. (Allen et al., 2012). Previous research on the use of colored overlays to alleviate reading difficulties has been primarily focused on the biological benefits of improved reading (see Denton & Meindl, 2015; Henderson et al., 2013; Park et al., 2012; Ritchie et al., 2011). However, research has shown that children's psychological and social well-being can also be affected by IS (see Boyle & Jindal-Snape, 2012; Stack-Cutler et al., 2015). For example, children who have reading difficulties can also experience problems in interpersonal relationships, self-esteem, motivation, and resilience (Boyle & Jindal-Snape, 2012; Stack-Cutler et al., 2015).

According to Boyle and Jindal-Snape (2012), research has often ignored children's psychological and social experiences with learning difficulties such as IS. The gap in the literature was that the use of colored overlays and tinted/colored lens among children with IS was primarily examined from a biological perspective, even though reading difficulties can also lead to problems in both the social and psychological aspects of a person's functioning (see Stack-Cutler et al., 2016). Still unknown was how colored overlays and tinted lenses can enhance or not enhance the lives of children who have IS from biological, social, and psychological perspectives.

Purpose of the Study

The purpose of this qualitative phenomenological study was to explore from a biopsychosocial perspective the lived experience of parents of children with IS who used tinted lenses and colored overlays, which was not done before. The phenomenon that was the focus of the study was the perceived effect of colored overlays on the biological, social, and psychological wellbeing of children with IS based on the observations of their parents.

Research Question

The research question for the study was as follows:

What is the lived experience of parenting a child with IS who used colored overlays or tinted lenses as a way to treat IS?

Theoretical Framework for the Study

The conceptual framework was grounded and informed by Engel's (1977) biopsychosocial theory, which emphasized the interconnections between physical and mental health. Engel recognized that improvements in a person's functioning were based on the individual and collective effects of biological, social, and psychological components. The interactions of these three components can explain the cause, outcome, and treatment of a disease or disorder (Engel, 1977). Using the biopsychosocial framework to inform the exploration of the lived experience of parents of children with IS, I used Engel's theory to focus on how colored overlays or tinted lenses affect the biological, psychological, and social wellbeing of individuals.

Nature of the Study

The purpose of this qualitative phenomenological study was to explore the lived experience of 11 parents of children with IS who used tinted lenses and colored overlays for at least 4 months or more. The phenomenon that was the focus of the study was the perceived effect of colored overlays or tinted lenses on the biological, social, and psychological wellbeing of children with IS based on the observations of their parents through semistructured interviews.

I used a convenience sampling strategy when recruiting 11 parents with children diagnosed with IS as volunteers for this study. I recruited participants from a pool of clients diagnosed with the syndrome by an Irlen diagnostician. The diagnostician worked in private practice and self-reported that their clients used color filters for 4 months or longer. I used informed consent forms to ensure that all participants understood the study's primary purpose, the scope and nature of their involvement, the measures used to ensure confidentiality and protect their identities and personal information, and the process for withdrawal upon request. I informed participants that they could withdraw from the study at any time, and their data would be excluded from the study. With the help of computer-assisted qualitative data analysis called NVivo, I used the coding of interview data to explore themes of similarities and differences among the participants; thus, it allowed me to be more explicit and reflective about the analysis of the interview data (see Bryman, 2016).

Definitions

The definitions or terminology associated with this study were as follows:

Colored Overlays: Various transparency colored or hued plastic sheets that were placed overprinted text to alleviate visual distortion or visual stress when reading. These overlays were unique to the individual and less expensive than tinted lenses (Chouinard et al., 2012).

IS: This syndrome is also known as Irlen Syndrome or Scotopic Sensitivity Syndrome (SSS), coined by Irlen (2005). This syndrome involves excess sensitivity of an individual's visual system to specific frequencies within the white light spectrum that causes the brain to distort visual information (Irlen, 2005).

Tinted Lens: Prescribed precision lenses used to alleviate visual distortions or visual stress when reading, looking at the computer, or viewing whiteboards (Chouinard et al., 2012).

Assumptions

One of the study's aspects believed to be true was that participants willingly and openly engaged in semistructured interviews without any financial rewards or incentives. Once subjects agreed to participate in the study, I also assumed that they would remain for the duration, despite what might be happening currently in their lives. If the above assumptions were not correct, then participant attrition could occur, which would significantly impact this study. Also, if parents of children with IS did not openly and truthfully share their observations of the use of colored overlays and tinted lens with their children, then I could not learn how these colored filters enhance the lives of children with IS from a biological, social, and psychological perspective. Lastly, since I maintained participant confidentiality, I assumed that none of the participants would be knowledgeable of each other or have an opportunity to conference with each other, thus potentially biasing or contaminating the results of the study data.

Scope and Delimitations

The geographical location of the Irlen Diagnostic Center was in the City of Kingston, New York, which was the county seat of Ulster County. According to the United States Census in July 2015, the population was 23,436 people, with 18.6% of the people in poverty. Statistics on the population's ethnicity indicated that 73.2% were White, 14.6% were Black and African American alone, .5% were American Indian/Alaskan alone, 1.8% were Asian alone, and 1.8% were another ethnicity. The median income was $40,757, with 84.5% of the population possessing an educational level of high school graduate or higher (Aud, et al., 2013).

According to the Irlen diagnostician, most of her clients were worked with middle-class families who came to the clinic as intact families or single-mother families. Many came to the clinic from various geographical locations within a 90-mile radius. The client population was said to vary by gender and age (ranging from school-age to adulthood).

For this study, I collected gender, ethnicity, socioeconomic status, educational level, and marital status data to generate a sample profile. Collecting the above information for analysis provided further insight into how colored filters enhance or not enhance the biological, social, and psychological well-being of children who have IS from their parents' perspective.

Because I explored parents' perceptions about using colored filters for their children diagnosed with IS, it was considered subjective, limiting generalizability and replicability. In addition to this, the use of convenience sampling techniques and the failure to control extraneous variables further limited its generalizability to the population. Even though these issues may be inherent in the study, there is value in conducting such qualitative research. It could pave the way for preliminary evidence that would further research that may be quantitative or qualitative.

Limitations

This study was qualitative and based on interpretative data I obtained through parents' subjective views on how colored filters enhanced, or not, their children diagnosed with IS. I was concerned about how and what the participants thought about the various biopsychosocial processes that influence the outcomes of using colored filters with IS children, not the causality. This approach was based on each participant's account, which was unique to the participant. Therefore, the generalizability and replicability of the data were limited. Furthermore, the use of convenience sampling techniques and the failure to control extraneous variables further limited its generalizability. Although phenomenological qualitative research did not lend itself to generalizability and reproducibility, the systematic way in which I conducted the participant interviews, coded the data for analysis through NVivo, and interpreted the data reduced the chances of researcher bias and ensured reliability and validity of data.

Significance of the Study

The study's original contribution was that the results provided insights about the lived experience of parents of children with IS and the effects of colored overlays from biological, social, and psychological perspectives. This research area had not been examined in the past. Given that most studies on the use of colored overlays focused on the biological functioning of children in terms of improvements in reading (see Denton & Meindl, 2015; Henderson et al., 2013; Park et al., 2012; Ritchie et al., 2011), the results of the study provide a more in-depth insight into the biopsychosocial implications of colored overlays and the preliminary findings may spur further quantitative research. By exploring parents of children with IS's lived experience, a greater understanding about the specific effects from biological, social, and psychological perspectives.

The study results can support professional practice in health and clinical psychology by providing empirical evidence about using colored overlays or tinted lenses as a strategy that can enhance the well-being of children who have IS. Educators can use a more effective teaching instruction strategy to identify the specific mechanisms and aspects involved in using colored overlays or tinted lenses to improve children with IS. The results can be instrumental for positive social change through the expanded use of colored overlays and tinted lenses as a strategy that can help enhance the biological, psychological, and social functioning of children with IS.

Summary and Transition

Many people in the United States have not mastered reading fluently. Research indicates that a lack of mastery in reading is linked to dropping out of high school, criminality, and social and economic strife (Adams, 1994; Hall & Moats, 1999). Many children that had difficulties reading even with intervention may be experiencing IS, a visual disturbance affecting how printed text is perceived (Irlen, 2005). Colored filters are used to alleviate the visual distortions or distress associated with the condition. Research related to the use of colored filters to reduce reading difficulties primarily focused on the biological benefits of improved reading (see Denton & Meindl, 2015; Henderson et al., 2013; Park et al., 2012; Ritchie et al., 2011). However, these researchers overlooked children's psychological and social experiences with learning difficulties like IS (see Boyle & Jindal-Snape, 2012; Reid et al., 2016; Stack-Cutler et al., 2015).

In this qualitative study, I explored how colored filters enhanced or did not enhance the lives of IS syndrome children through their parents' perspectives, thus providing insight into the various biopsychosocial processes involved in using colored filters and empirical evidence for future research. In the next chapter, I provided a current literature review on the history of IS and its potential effect on children diagnosed with the condition. Also, I explored the use of colored filters as a strategy for children with IS from a biopsychosocial framework.

Chapter 2: Literature Review

Introduction

The problem I addressed in this study was about the 32 million people in the United States who are functionally illiterate (Aud et al., 2013). Of these 32 million individuals, 14% were adults who could not read, while 19% were high school graduates who could not read (U.S. Department of Education, 2013). Lack of reading literacy is a significant problem, as it is associated with deviant behaviors such as dropping out of school, criminal activities, and struggles with gaining and maintaining employment (Kucer, 2014). As learning to read is necessary for anyone wishing to participate in society, many advances have been made in the science of understanding why many individuals struggle with this basic learning need (Cornoldi & Oakhill, 2013). This review of literature pertains to a specific area of advanced study: IS (see Heine et al., 2016).

According to Heine et al. (2016), "in a world of inclusive education and assistive technologies, it is more important than ever to ensure every member of the class is given the opportunity of a sound education." (p. 2). I aimed to further the scientific understanding of tinted lenses or colored overlays for children with IS. However, there were significant limitations in the literature about this syndrome, which impacted previously published research. The gaps in literature also related to parents of children with IS, the participant sample for my study. This literature gap limits understanding of parents’ lived experience raising children with IS and limits how parents new to the IS diagnosis can be introduced to these visual aids.

Research on the use of colored overlays or tinted lenses amongst children with IS who had reading difficulties is primarily focused on the biological benefits of improved reading, disregarding the psychological and social processes associated with it (see Denton & Meindl, 2015; Henderson et al., 2013; Park et al., 2012; Ritchie et al., 2011). Therefore, in this literature review I explored the perceptions of parents of children diagnosed with IS as to whether biological, psychological, and social processes enhanced or did not enhance their children's lives regarding reading. By exploring parents of children with IS’s lived experience, I achieved a greater understanding about their specific effects from biological, social, and psychological perspectives. The study results could support professional practice in health and clinical psychology by providing empirical evidence in using colored overlays or tinted lenses as a strategy that can enhance the well-being of children who have IS.

The remainder of this chapter takes the following structure: (a) the literature search strategy, which I developed for further expansion on this research topic; (b) the theoretical foundation used in this study; and (c), the review of relevant literature. The review of the literature was broken into multiple sections, including (a) a further discussion of the background of the problem related to the theoretical framework of Engel’s biopsychosocial theoretical movement, (b) IS, (c) the benefits of colored filters and overlays for children with IS, (d) the arguments against the use of these tools, (d) the psychological and social impacts for both parents and children with learning disabilities, (e) a discussion of literature pertaining to the lived experience of parents with children with disabilities, and (f) a discussion of the social issues related to low reading comprehension in order to the gap in recently published literature. The chapter culminates with a summary of the conclusions drawn from this review of relevant literature.

Literature Search Strategy

I accomplished a literature review by employing various sources, found through a strategic search of the Walden University Library System, World Wide Web data, inter-library loan books and articles from a local community college, and specific databases such as Google Scholar. I investigated online educational and psychological databases such as Education Resource Information Center (ERIC), PsycINFO, PsychArticles, the Thoreau database, Google Search, and ProQuest to review dissertations within and outside of Walden University. Search terms used to conduct the literature review included, but were not limited to, *history or origins*, *biopsychosocial theory or model*, *Irlen syndrome*, *Meares-Irlen colored overlays*, *reading comprehension*, and *reading fluency*. In addition to this, other search terms used were *self-efficacy*, *poverty*, *self-esteem*, *behavior disorders*, *gender*, *depression*, *student motivation*, *student attitude*, and *reading disabilities*.

Theoretical Foundation

I chose Engel’s biopsychosocial theoretical movement as the theoretical foundation for this paper. My goal with this section was to justify the use of the theory in relation to IS through a brief overview of the background of the theory and subsequent movement, as well as studies that have also used the theory to advance the understanding of a specific field of mental and physical health. For example, researchers have used Engel’s model to study nursing (Renjith et al., 2016), chronic fatigue syndrome (Geraghty & Esmail, 2016), adjustment to arthritis (Sumner & Nicassio, 2016), and anxiety and depression (Dooley & Kunik, 2017).

These studies all stem from the last 2 years of scientific research, which suggested that Engel’s biopsychosocial model was still a paradigm within its field. This feeling was mirrored by van de Wiel and Paarlberg (2017), who argued that the biopsychosocial model played a significant role in patients' illness and health; in their study, these patients were explicitly gynecological. The biopsychosocial model was standard in western medicine, which I further discuss in subsequent sections. Still, van de Wiel and Paarlberg (2017) argued the use of the biopsychosocial model due to the depth of perspective gained from implementing it in research. They stated:

> The BPS [biopsychosocial model is a way of thinking that helps to understand complex health problems and complaints without ignoring the influence and importance of biomedical, personal, and social factors… The advantage of working with the BPS [biopsychosocial model] is that you not only find out how

> things work - the depth perspective - but also gain an understanding of the meaning of a certain complaint or symptom, why a certain phenomenon exists. (van de Wiel & Paarlberg, 2017; p. iv)

This depth perspective of the biopsychosocial model is possible because of how it looks at the interplay between biology, psychology, and socio-environmental factors that enable greater understanding. It is important to look at multiple factors when attempting to understand how specific health conditions affect an individual. Because of the comprehensive nature of this model, it would seem to lend itself well within various settings such as the educational and healthcare systems, since educators and clinicians often look at many variables to better understand their student or client.

Despite Engel's attempts to make the biopsychosocial model more applicable, its use in education, clinical care, and research remained minimal (Smith et al., 2013). Smith et al. (2013) argued that this was because issues surrounding the replication of research were difficult, as the biopsychosocial model depended heavily on qualitative data collection methods that were largely left up to the participant's openness and the chosen direction of the researcher. Other issues with the model's wide-scale application were also evident from the rising cost of health care and the surrounding climate of patient-centered care that focused on the illness, not the desired patient-physician contact needed to further implement the model to modern care (Lane, 2014).

Despite these practical issues, Engel's model continued to be used throughout the research. Since its first publication in 1977, the biopsychosocial model has been applied to psychiatry and psychosomatic medicine and medicine in general (Henningsen, 2015). It has been used in these two medical fields due to the desirability of the model's non-reductionist approach. The emotional and subjective aspects of an illness or disease and the social elements allowed for a comprehensive approach to care (Henningsen, 2015). For these reasons, I chose this model for this study of the lived experiences of parents of children with low reading comprehension levels.

Another significant benefit of using Engel's model was its previous incarnations for measuring health-related quality of life in children (Drotar, 2014). Furthermore, by establishing this measure, researchers such as Evarist et al. (2016) assessed psychosocial family transformation approaches that allowed medical practitioners to address patient and patient families' cultural needs and establish clear pathways for aid from social workers and therapists. This approach was called the mind, body, and spirit of health care (Greydanus et al., 2015). Because of these factors and explanations of the study, I chose Engel's Biopsychosocial Theory for this study. Further analysis and explanation of the theory can be found in the following section.

Review of Relevant Literature

In this section I review the recently published literature on the topic of IS and the problems associated with low reading comprehension levels, including the impact on parents. I chose these areas for further development and discussion as they are most significantly related to the problem at large. However, I also noted the importance of furthering understanding the theoretical foundation for this study. Therefore, the initial sections of this review of relevant literature are about this field.

Brief History of Western Medicine

Before Engel (2013) conceptualized the biopsychosocial model of science and medicine, there was a cultural indoctrination of Western scientific medicine and psychiatry that fell under the umbrella of a biomedical model of sickness and disease (Drotar, 2014). This model worked under the premise that illness and disease within a patient were produced by physio-chemical or genetic predispositions (Krieger, 2014). All diseases were explained or reduced to genetic factors (Kendler, 2015). Those patient ailments that were not clearly defined by biological factors were made to either fit the scientific method, to be excluded from the disease model, or to be classified as a mental illness that was not in the realm of scientific medicine, but psychiatry (Bynum & Porter, 2013; Engel, 1977; Frankel et al., 2013).

This biomedical model was highly influenced by Christian Orthodox beliefs and the basic principles of mind-body dualism that scientists such as Galileo, Newton, and Descartes adhered to (Engel, 1977). For instance, the Christian view was that scientific exploration of the human body should not include the soul, mind, and behaviors (Bynum & Porter, 2013). These variables were reserved for the church or religion to address, not science. Similarly, Engel believed that entities to be investigated through science could be reduced to a biological causal chain of events that would explain the entire illness progression in a human (Scull, 2015). According to Engel (1977), with the mind-body issue firmly established under the guidelines of the church, "classical science readily fostered the notion of the body as a machine, of disease as the consequence of the breakdown of the machine, and doctor's tasks as repair of the machine" (Engel, 1977, p. 382). Thus, the scientific approach to disease became more of a focus on biological processes (somatic) instead of psychological and social processes up until the beginning of the 20th century, even though many physicians, such as Weiss, Romano, and Reichman, began to consider emotions as necessary in the development of disease (Frankel et al., 2013).

Biopsychosocial Model and Conceptual Frameworks

Engel (1977) indicated that scientists or physicians should not only beware of the biological factors that create and affect the outcome of the disease but also obtain an understanding of the illness from the patient's point of view, as well as other relevant environmental influences before planning the course of treatment (Guillemin & Barnard, 2015). Engel urged physicians to be most concerned with fully understanding the patient's view of the sickness or illness, as well as the various systems upon systems that influenced one another to create patient distress or disease, that aid in the progression of the disease, and that influenced the treatment plan and prognosis (Frankel et al., 2013; Singh, 2002). For example, the physician's relationship with the patient was based on his indoctrinated training throughout the years (Guillemin & Barnard, 2015). It gauged the physician's interactions with the patient and treatment plan (Jobin, 2016). In turn, the patient's belief systems, acquired through previous experiences with their physician, family systems, and expectations, also impact their response to the physician and treatment plan (Jobin, 2016).

Engel’s biopsychosocial approach was thought to humanize the practice of medical research through introspection and dialogue with the patient (2013). What was formerly an interrogative “yes” and “no” questioning of the patient was now an encompassing self-analysis and perception by the patient coupled with the physician's expertise (Frankel et al., 2013; Suls & Rothman, 2004). This comprehensive approach was considered to provide more accurate data to the physician for the most effective treatment plan. Engel’s approach had underpinnings of a systems theory and social cognitive approaches (Frank et al., 2003; Sarga et al., 2014).

Irlen Syndrome

Irlen (2005) purported that individuals who continue to struggle with reading despite interventions may experience a visual processing condition called IS. This syndrome, also known as SSS, was a condition involving excess sensitivity of an individual’s visual system to specific frequencies within the white light spectrum that caused the brain to distort information (Crabtree, 2011; Heine et al., 2016; Irlen, 2005). In other words, some individuals’ visual pathways or brain systems react to wavelengths of light inappropriately or in a distorted way, which caused the doubling/blurring of images (Loew et al., 2014). Therefore, individuals suffering from this condition might experience pattern glare, sensitivity to colors and contrast, lack of sustained attention, poor span of recognition, and poor print resolution (Loew et al., 2014). This visual-processing problem was said to run in families (Robinson & Foreman, 2004).

Furthermore, individuals with IS tend to have reading difficulties with text appearing to move off the page, blur, jump off the page, or flicker (Williams, 2014). In addition to this, the individual might skip lines while reading, lose their place, and develop a slow reading rate and poor comprehension (Wilkins, 2002). Other symptoms associated with this condition might include eye strain, lack of sustained attention, frequent breaks in reading, inattention or restlessness, poor spelling and writing, and avoidance behaviors associated with reading tasks (Crabtree, 2011; Irlen, 2005; Kusano et al., 2015; Taub et al., 2009). Also, researchers reported strong correlations between IS and migraines, autism, dyslexia, attention deficit disorder, and other learning problems (Crabtree, 2011; Evans & Stevenson, 2008; Kriss & Evans, 2005; Kruk et al., 2008; Kusano et al., 2015; Singleton & Trotter, 2005).

Irlen (2005) suggested that as many as 46% of people diagnosed with learning disabilities suffered from IS. It was a key factor interfering with reading improvement, but not the cause of reading difficulties. In the general population, 12–14% might struggle with IS, affecting the amount of time one spends reading (Irlen, 2005). Colored filters or overlays and tinted lenses are methods used to alleviate or reduce the visual stress or distortions associated with the condition (Evans & Joseph, 2002; Irlen, 2005; Loew et al., 2013; Taub et al., 2009). Irlen indicated that when visual distortions could be controlled, individuals would become more available to engage in the task of reading, and interventions that address language-based deficits might be more effective.

History of Irlen Syndrome or Scotopic Sensitivity Syndrome

In the 1920s, Samuel Orton, a neurologist, investigated the causes and treatment of children with significant reading difficulties and discovered that several students reversed letters or transposed word order when reading text (Sinatra, 2016). Orton called this phenomenon “Strephosymbolia” meaning the “twisting of symbols, which was caused by an individual’s difficulty to appropriately develop the cerebral organization necessary to pair visual words with spoken forms of the words (Scammacca et al., 2016). He noted this phenomenon as some type of distortion when reading printed text and not a visual impairment (Bogdashina, 2016; Orton, 1925).

In the 1980s, a New Zealand teacher, Olive Meares, wrote the first detailed description of the syndrome (Barbu & Bulmaga, 2016). Meares asked several children about the print they were reading and discovered that when reading black and white text on white backgrounds, many children reported the words moved or wobbled or revealed spaces between words, which took away from the black print and made reading difficult (Westwood, 2017). These children preferred smaller reading print than larger because the white did not appear to glare as much (Westwood, 2017). Based on this, Meares believed that some of these children experienced visual or spatial distortions while reading text due to the brightness contrast of black-on-white print, contributing to their reading problems (Portwood, 2013; Westwood, 2017). She proposed colored paper or colored overlays to reduce or eliminate these visual distortions (Meares, 1980).

Also in the 1980s, Helen Irlen, a school psychologist from California, wrote a paper describing symptoms similar to Meares, which she eventually called Scotopic Sensitivity Syndrome (SSS) (Soares & Gontijo, 2016). From 1981–1983, Irlen interviewed and videotaped approximately 1,500 adults with reading problems. Irlen noted that a subgroup of the study participants had some necessary reading skills for success, such as good phonetics, decoding, and sight vocabulary, but continued to have reading difficulties (Galuschka et al., 2014). Group members indicated that the words moved together, flowed like a river/stream up and down the page, or words became black lines (Chang et al., 2014). As the subjects continued to read, their comprehension of the words decreased or became impossible.

One of Irlen's students provided Irlen with a red overlay she had used as part of her visual therapy training (Heine et al., 2016). Another student put this overlay on the reading passage and reported the words no longer appeared blurred or distorted (Heine et al., 2016). This was the impetus for Irlen trying various overlays with students and discovering that different colored overlays decreased each student's visual distortions and improved their reading ease (Heine et al., 2016). Irlen then took several years to develop diagnostic techniques and devised her own set of colored overlays and tinted lenses called Irlen Filters (Harries et al., 2015).

In addition to this, she established the Irlen Institute for Perceptual and Learning Difficulties in California to offer treatment for those experiencing SSS (Harries et al., 2015). Today, there are Irlen Institutes across the world (Irlen, 2005). Since both Meares and Irlen were instrumental in describing symptoms associated with the visual-perceptual condition, many researchers use the following terms to identify it: Meares-Irlen Syndrome (MIS), Irlen Syndrome (IS), or Scotopic Sensitivity Syndrome (SSS) (Edelson, 1999). However, for this dissertation, I use IS to identify the syndrome.

Description of Irlen Method

The Irlen method is a nonintrusive assessment method using colored overlays and filters to improve the brain's ability to process visual information. The method involves identifying the problem using a questionnaire and the Irlen Perceptual Rating Scale (IRPS). Once a person is diagnosed with IS, the certified Irlen diagnostician clinician works with the individual to determine the specific color overlay or tinted lenses that work best for him or her. Colored overlays are "sheets of translucent or transparent colored plastic that could be placed over a page of a book to color the text beneath without interfering with its clarity" (Edelson, 1999, para 19). The assessment process and choosing of colored overlays and tinted lenses are only completed by a certified Irlen diagnostician. After the diagnosis, the individual is taught how to use the Irlen method. (Irlen, 2005). Many researchers have supported the use of the Irlen method, as it is a form of visual stress that must not be confused with dyslexia (Wilkins et al., 2016). However, colored overlays have been used in aiding students with dyslexia (Denton & Meindl, 2015). I continue this discussion in the following section.

Research on the Use of Colored Filters and Colored Overlays

Controversy surrounds IS because no clear etiology can be found. As a result, not all professional organizations recognize the condition. For example, The American Academy of Ophthalmology ([AAO], 2014) and the American Association of Pediatrics ([AAP], 2009) acknowledged colored overlays or tinted lenses had been used as one of the treatment modalities for dyslexia or reading disabilities because some researchers hypothesized that the cause of learning disabilities such as dyslexia were due to a visual perceptual deficit called IS (Irlen, 2005; Evans & Joseph,2002; Hollis & Allen, 2006; Wilkins, 2002). However, both associations indicated studies that supported the use of colored or tinted lenses were not empirically based. These studies were flawed with inconsistent results, methodologies, and statistics; therefore, no clear conclusion could be drawn about dyslexia or other learning disabilities resulting from IS. At best, overlays and tinted lenses were viewed as relief for some readers who experienced eye discomfort. Likewise, Scheiman (2004) acknowledged that there was little scientific evidence to support overlays and tinted lenses as an effective treatment for dyslexia.

Similarly, Evans and Drasdo (1991) reviewed studies that purported the efficacy of tinted lenses or colored filters in reducing IS. The researchers reported that most of Irlen’s studies on the symptoms of IS and the effective use of colored filters tended to be based on participant interviews/questionnaires, as well as anecdotal information. This type of research data did not adhere to the standards of empirically based scientific conditions. Evans and Drasdo (1991) reported that most of Irlen's studies in the 1980s and 1990s did not consider the placebo effect and had no control groups or statistical analyses. Likewise, the AAP (2009) reported no scientific evidence for the use of colored lenses or filters. The AAP (2009) suggested that the method used to select these lenses was variable, and test-retest consistency is poor.

Furthermore, other researchers (Blaskey et al., 1990; Evans, et al., 1996; Howard-Jones, 2014) strongly suggested that the underlying symptoms of IS might be due to a binocular, refractive error, accommodative, or an ocular motor dysfunction among individuals identified with the condition and who sought help with the use of colored lenses (Howard-Jones, 2014). These researchers noted that when individuals were appropriately treated (i.e., visual therapy and vision lenses) for these visual anomalies, they no longer seemed to exhibit IS (Howard-Jones, 2014). Therefore, these individuals no longer needed colored overlays or tinted lenses. In contrast, there is a growing body of empirically based research using controlled placebo trials that suggested color therapy was effective to address the condition and improve reading rate/fluency (Bouldoukian et al., 2002; Evans & Joseph, 2002; Taub, et al., 2009; Wilkins, 2002).

For example, Evans et al. (1996), using optometric and visual-perceptual symptoms of children (i.e., visual strain and headaches), investigated the correlation between colored filters in reducing those symptoms associated with IS. They determined that colored filters helped to reduce the symptomatology. Furthermore, brain imaging studies seemed to support the linkage between the brain imbalance and visual information distortions that created the symptoms associated with the condition (H. Irlen, personal communication, August 17, 2012; Irlen, 1998; Irvine & Irvine, 1997; Lewine et al., 1997).

Because IS is considered a controversial condition, research on colored overlays to alleviate the syndrome is mixed. The following section of this paper offers an overview of colored overlays and tinted lenses' benefits and limitations in alleviating symptoms associated with IS.

Studies on the Benefits of Colored Filters or Overlays

Studies have shown the use of colored overlays or filters as an intervention for aiding in reading disorders or other learning disabilities is effective in improving reading fluency and comprehension in those individuals with IS (Evans & Joseph, 2002; Gutschke et al., 2017; Meares, 1980; Wilkins, 2002). For instance, Hollis and Allen (2006) randomly selected 58 adults to participate in a study exploring two methods for assessing subjects for colored overlays to determine which approach was most practical. Initially, each participant was given a “yes” or “no” questionnaire that depicted some of IS's symptoms. Subjects that score four or more out of a possible 20 points were noted to be sensitive to pattern glare (Hollis & Allen, 2006). The Wilkins Pattern Glare test was also administered to participants, which is a series of visual-perceptual tasks wherein individuals are asked if the pattern seems blurred, shadowy, or as bending lines (Hollis & Allen, 2006). A score of four or more on the interference grids suggests sensitivity to pattern glare. The researchers then administered the Wilkins Rate of Reading test (WRRT) and asked participants to select their color preference overlay (Hollis & Allen, 2006). Those individuals that had no color preference and scored a three or less on both of the above assessment measures (overlays and WRRT) were identified as “normal,” or the control group (Hollis & Allen, 2006).

Hollis and Allen (2006) identified participants with low scores and with a color preference as “borderline.” In contrast, those participants who scored high on both measures and preferred color had Meares-Irlen sensitivity (Hollis & Allen, 2006). When the researchers checked both the mean reading speed and the speed changes when reading with and without the overlay, the findings supported that those identified as Meares-Irlen sensitive demonstrated a significant reading speed advantage using a colored overlay (Hollis & Allen, 2006). In addition, the researchers noted that the Wilkins Pattern Glare test was a better predictor of pattern glare than the questionnaire (Hollis & Allen, 2006). In other words, the findings of the study suggested that the use of colored overlays in reading was beneficial for improving the reading speed/fluency.

Although Hollis and Allen’s (2006) study had a relatively small sample size, the researchers controlled for vision problems. A participant self-report questionnaire ruled out any subjects diagnosed with dyslexia or reading problems. Therefore, the researchers attempted to obtain an accurate assessment of the sensitivity of the two instruments in identifying pattern glare and the improvement of reading speed with and without colored overlays without potentially co-existing disorders (Monger et al., 2015). However, it must be noted that with self-reporting comes a degree of bias and unreliability in the identification of symptom assessment data collected (Rosenberger et al., 2017). In addition to this, the small sample size resulted in the questioning of the transferability or generalizability of the findings to other settings (Bacchetti, 2013).

Other questions arose in recent literature and predominantly pertained to how colored overlays exert their effects, as authors such as Uccula et al. (2014) have found. Uccula et al. (2014) studied the role of colors in reading written texts. They claimed that colored overlays applied above written texts positively influenced reading fluency and speed. Uccula et al. argued that these effects are particularly evident for those affected by IS. Finding that 12–14% of the general population and 46 % of the dyslexic population might suffer from IS, Uccula et al. (2014) conducted a critical review of relevant literature about IS to create a fuller, more concise understanding of the syndrome.

After reviewing the published literature, Uccula et al. (2014) discovered that the actual exertion process associated with the use of colored overlays had not yet been fully understood. They also argued that many researchers found overlays controversial, which I further discuss in the following section of this chapter. Uccula et al.’s conclusion was that colored overlays were the best means of supporting individuals through process of learning to reading.

Similarly, Bouldoukian et al. (2002) supported using assigned colored overlays in improving reading rate. Using a randomized control trial, the researchers investigated the effects of prescribed colored overlays and an ultraviolet control filter on reading rate in

33 participants, 29 children and four adults, who attended the Institute of Optometry due to suspected learning difficulties or diagnosed dyslexia (Bouldoukian et al., 2002). The researchers used the WRRT, which consists of reading passages made up of 15 repeated words in different orders as part of the participants' reading rate assessment (Bouldoukian et al., 2002). Furthermore, to be included in the study, the participants had to meet the following criteria: (a) attended the institute, (b) optometric vision problems had been corrected; (c) continued to complain about visual distortions or IS symptoms while reading; and (d) reported a reduction in symptoms with colored overlay (Bouldoukian et al., 2002).

Bouldoukian et al. (2002) administered two interventions to participants: colored overlays and control filters. Each subject selected the color preference and the researchers used an ultraviolet blocking filter as a control (Bouldoukian et al., 2002). Each participant read the four parallel reading passage versions of the WRRT (Bouldoukian et al., 2002). However, the subjects read two versions of the WRRT with the colored overlays and the other two without the colored overlays (Bouldoukian et al., 2002). The researchers used an ABBA design to control for practice effect. Half of the participants read first from the Wilkin passages with the control filter and the other half with the overlay in their preferred color (Bouldoukian et al., 2002). After each participant read the passages four times, the researchers asked for their filter preference (Bouldoukian et al., 2002). The study revealed a marked improvement in reading rate among those participants who used the colored overlays on their second attempt at reading the passages than in the second attempt with the control filter (Bouldoukian et al., 2002).

The ABBA design allowed the researchers to control the practice or carry-over effect that may be characteristic of a close-in-time repeated reading task. Furthermore, the potential visual problem that might contribute to the study outcome was eliminated due to the rigorous screening of participants for visual problems and treating them. This method reduced the opportunity for other researchers to suggest that the reading rate improvement noted was flawed. In contrast, the small sample size and the setting in which the study took place might not lend itself to other settings.

Several researchers have studied various populations based on their condition and associated IS symptoms. Ludlow et al. (2008) conducted two studies in which they: (a) investigated whether 18 boys with Autism would improve reading task performance at higher levels or rates than those not on the spectrum (controls) when using self-directed colored overlays; and (b) investigated whether children with Autism, who were matched with children with mild learning disabilities would improve in reading rate when allowed to select their oven colored overlays. The first study's results revealed an increase in reading speed when using overlays in those individuals with Autism rather than in the controls (Ludlow et al., 2008). The second study's results showed that when participants were asked to select an overlay based on how clear they could perceive the text and not on their preference overlay, improvements in reading rate occurred (Ludlow et al., 2008).

Kriss and Evans (2005) reviewed several studies that purported IS's prevalence in the dyslexic population and realized that this research had not been systematically investigated. Therefore, the researchers investigated this phenomenon using 64 school-aged children (32 with dyslexia and 32 control students without dyslexia) hand-picked by their teachers (Kriss & Evans, 2005). The researchers gave participants Wilkin's Intuitive Overlaps and the WRRT to assess their reading rate (Kriss & Evans, 2005). Researchers only used the WRRT on students who preferred a particular color of overlay and had their reading rate assessed with and without the overlay (Kriss & Evans, 2005). Students in both groups read faster with overlays than without them (Kriss & Evans, 2005).

However, the dyslexic group read much faster with the specified overlays than without them (Kriss & Evans, 2005). According to the researchers, their study supported the prevalence of IS symptoms in the dyslexic population, and possibly more so than in the general population (Kriss & Evans, 2005). Unfortunately, the researchers might have been premature in stating that IS might be more prevalent in the dyslexic population than in the general population based on such a small sample size (Kriss & Evans, 2005).

Similarly, Singleton and Trotter (2005) investigated the relationship between IS and dyslexia. Participants included 20 university students (Singleton & Trotter, 2005). Ten participants had dyslexia diagnoses (Singleton & Trotter, 2005). Researchers selected the other students based on low visual stress scores on the Visual Processing Problems Inventory (VPPI) (Singleton & Trotter, 2005). Other assessment measures used to investigate student improvement in reading speed included the use of Colorimeter, VPPI, WRRT, and the Wide Range Achievement Test-III (WRAT-III) (Singleton & Trotter, 2005).

The researchers first assessed participants with the Colorimeter to determine the most comfortable color for reading and found an optimal color for all the subjects. All subjects took the WRRT in the Colorimeter, with and without their optimal color (Singleton & Trotter, 2005). Study outcomes indicated that students who were dyslexic and who reported a high degree of visual stress on the VPPI improved their reading rate when using their optimal color compared to those who did not have dyslexia (Singleton & Trotter, 2005).

Evans and Allen (2014) conducted a study similar to Singleton and Trotter almost 10 years later. They also found that colored filters reduced symptoms of dyslexia in individuals with visual stress. First, Evans and Allen (2014) argued that previous researchers in the field had failed to consider one of the primary explanations for the endorsement of colored filters by dyslexia charities. These charities were in close contact with individuals who found that colored filters reduce their visual stress. This finding was significant, as Evans and Allen (2014) highlighted a social trend, rather than a scientific one, in that one-third of individuals with dyslexia also had visual stress issues. These individuals frequently turn to charities for help with their disability. Therefore, these charities must have found that the use of colored overlays was beneficial, as they continued to promote such practices (Evans & Allen, 2014).

Evans and Allen’s (2014) study was critical as it highlighted the broader social aspects of the arguments for and against colored overlays in treating individuals with visual stress. Evans and Allen also singled out previous researchers who used strategic reviews of literature as the basis of data gathering, as Evans and Allen (2014) claimed that these studies frequently fell against the use of visual overlays. This bias was not substantiated, as Evans and Allen (2014) also conducted a review of the literature and found a wealth of data, dating to before 2013, that supported the use of visual overlays. However, Evans and Allen stated,

> We accept that the diagnosis of visual stress is challenging and that more research is needed…it would seem a sensible precaution for children with reading difficulties to be asked if words appear to blur or move, and if reading causes a headache. For such cases…guidelines advocate ruling out conventional visual factors and screening with colored overlays. If a child finds an overlay helpful for a sustain period and an improvement is noted by their teachers or parents…they can be tested…to see whether colored lenses would help further.” (p. 1)

The above statements suggested that the use of visual overlays was a unique area of study, wherein what might help one individual might not aid another (Evans & Allen, 2014). Researchers such as Imaizumi et al. (2016) argued that this was expected, as colored overlays can improve reading comfort for individuals both with and without IS. In general, the studies I have discussed supported improved reading performance in various populations (i.e., adults, children, learning disabled, migraine sufferers, and people with dyslexia) due to overlays. In the supporting research, several studies addressed the visual stress, pattern glare, and perceptual distortion associated with IS and the benefits of colored overlays or filters to address the condition (Crabtree, 2011; Evans & Joseph, 2002; Evans & Stevenson, 2008; Kruk et al., 2008; Nichols et., al, 2008; Singleton & Totter, 2005). Each study included data from participant self-reports, which might render study findings vulnerable to participant and researcher bias issues. However, researchers also used objective reading measures in these studies and questionnaires to achieve some degree of reliability and validity. Of interest was that no supportive research sought to explain IS, which might be considered by antagonists to be a missing component in understanding IS and its symptoms.

Studies Not Supporting the Benefits of Colored Overlays

Introduced in the previous section was the idea that colored overlays and the study of their use were biased in their actions against their legitimacy (Evans & Allen, 2014). Some authors claimed that although there were many anecdotal claims and studies indicating that colored lenses and overlays improved reading performance, they did not provide enough evidence for support or endorsement by the medical community (Griffiths et al., 2016). Griffiths et al. (2016) argued this after a systematic review of the literature on the effects of colored overlays on reading performance. The basis for this argument stems from more than 35 years of research on various elements of IS that did not result in the International Classification of Disease or the Diagnostic and Statistical Manual of Mental Disorders recognizing visual stress as an actual disorder (Griffiths et al., 2016). In this section will I further this discussion through a review of previously published data.

Ritchie et al. (2011) investigated the short-term or immediate effects of colored overlays in 61 school-aged children diagnosed with reading difficulties by an Irlen diagnostician due to symptoms associated with IS. The researchers used Irlen colored overlays, the Mini-Mental State Examination (MMSE), and the WRRT to assess overlay color preference for reading text, general intellectual functioning, and reading speed/acuity (Ritchie et al., 2011). In addition to this, researchers used the Gray Oral Reading test (GORT) to measure overall reading ability, including reading fluency, reading comprehension, and oral reading (Ritchie et al., 2011). Based on the Irlen diagnostician's assessment, participants were placed in two groups—those diagnosed with IS and identified as poor readers and those not classified with IS or poor readers (Ritchie et al., 2011). Study outcomes revealed that neither group differed in cognitive functioning nor reading proficiency (Ritchie et al., 2011).

In terms of reading rate, the WRRT was used as subjects were tested within the two groups with colorless overlays, non-prescribed overlays, and prescribed overlays (Ritchie et al., 2011). The study results indicated that colored overlays, whether prescribed or not, did not improve reading rate than colorless overlays (Ritchie et al., 2011). These findings were not consistent with Irlen's premise that IS had an immediate reading effect on persons diagnosed with IS and who might experience poor reading (Irlen, 2005). Although Ritchie et al. (2011) argued that IS might not exist as a condition and that overlays were not beneficial in improving reading rate, their study was plagued by a small sample size, which made one question its generalizability. In addition to this, researcher bias regarding the idea of IS appeared to be apparent before the study, which raised the question of the validity and reliability of the findings.

Likewise, Taub et al. (2009) investigated the effects of colored overlays on reading eye movements in 60 adult optometric students. The researchers administered an eye exam to participants and excluded subjects with eye conditions such as strabismus, amblyopia, and ocular disease (Taub et al., 2009). The Visagraph II was used to measure eye movement and included fixations made per 100 words, regression eye movements, and reading speed (Taub et al., 2009). Reading speed also included duration of fixation and total reading time, reading comprehension rate, directional attack, and recognition span (Taub et al., 2009). Also, researchers used colored overlays along with a clear overlay as the baseline control. In addition to this, Taub et al. used a symptom questionnaire to determine which participants went into the symptomatic and asymptomatic groups.

The research methodology consisted of an ANOVA analysis (Taub et al., 2009). Each subject was connected to the Visagraph and given 10 passages to read and 10 colored overlays over two sessions as a dry run (Taub et al., 2009). The passages and overlay sequences were then randomized within and between sessions (Taub et al., 2009). However, the same passage and overlay were not used together between sessions (Taub et al., 2009). Study findings revealed that colored overlays used with the two groups for the two test sessions did not affect any of the variables the Visagraph measured (Taub et al., 2009).

Symptomatic participants scored poorer than the asymptomatic participants on the above testing variables (Taub et al., 2009). In addition to this, the symptomatic group appeared to experience more vision problems or optometric disorders than the asymptomatic group (Taub et al., 2009). This information suggests that there may be a correlation between vision problems and symptoms that many proponents of Irlen's theory view as signs of IS (Bouldoukian et al., 2002; Evans & Joseph, 2002; Evans et al., 1996; Hollis & Allen, 2006; Irlen, 2005).

Perhaps vision problems account for an individual's perceived visual distortions of text and poor reading ability. Vision correction might be more effective than the use of colored overlays. Unfortunately, most of the studies that support the concept of IS symptomatology and the use of colored overlays did not test for optometric problems but relied on participant's self-report of no eye problems (Bouldoukian et al., 2002; Evans & Joseph, 2002; Evans et al., 1996; Hollis & Allen, 2006; Irlen, 2005).

Finally, Northway (2003) assessed the effectiveness of colored overlays in improving reading performance or scanning. She studied 64 children who attended an eye clinic over 6 months (Northway, 2003). Northway (2003) gave each participant a comprehensive vision evaluation before the study and used the Reading Rate Test (RRT) to measure the reading rate and the Developmental Eye Movement test (DEM) to measure horizontal scanning. In addition to this, colored overlays were used, and participants were asked to read passages from the RRT (Northway, 2003).

The researcher asked participants whether they were experiencing any symptoms such as headaches, eyestrain, and reading text jumping off the page to determine if IS may be present (Northway, 2003). Participants were able to pick out their preferred color overlay (Northway, 2003). Study findings showed that participants' reading rate did not necessarily improve with colored overlay use. Still, individuals with vision problems did appear to gravitate to specific colors of overlays and find them useful (Northway, 2003). Scanning abilities appeared to improve in participants who used overlays when tested with the DEM.

In conclusion, although there are arguments for and against the use of colored overlays, there are also findings that suggested that colored filters have helped certain individuals, which cannot be ignored (Kim et al., 2015). This broader study aimed to fill the gap in research about the use of colored overlays and their impacts on both the individual sufferer and their loved ones. This issue had not been addressed in previously published literature about visual stress and the use of colored lenses and overlays. However, as the following section depicts, visual stress during youth is a learning disability, and the data about psychological and social impacts for children with learning disabilities is rife. Therefore, these data were used in a broad sense to understand the lived experience of both the child and the parents of children with other learning disabilities, as this might provide further assessment for those with low reading comprehension.

Psychological and Social Impacts for Children with Learning Disabilities

A wealth of diagnosable disabilities currently hinders the U. S. youth (Marschark & Clark, 2014). These disabilities range on a scale from mild, where sufferers could live a relatively normal life, to severe, where patients depend on a lifetime of support from the medical community, as well as their immediate social community (Marschark & Clark, 2014). Though reading comprehension was low on the scale of severity, in that most individuals with low reading comprehension and no other discernible intellectual or physical disability could go onto lead relatively normal lives, which I discuss elsewhere in this dissertation, there are still significant psychological and social impacts for children with learning disabilities (Carr, 2015).

Due to the significant lack of qualitative data on the psychological and social impacts for children with IS, in this section I assessed literature about all forms of learning disabilities. This literature sheds light on the lived experience, which is crucial in today's changing social environments (Holmes & O'Loughlin, 2014). Social identity has traditionally been established through face-to-face interactions, but social networking sites now provide additional mediums (Holmes & O'Loughlin, 2014). Through these mediums, social identities could be developed and explored, but issues arise when individuals with learning disabilities use these sites, and miscommunications might be made (Holmes & O'Loughlin, 2014). Cortiella and Horowitz (2014) describe this issue, and others like it, as emerging issues unique to the 21st century.

These issues have given way to the Americans with Disabilities Act (ADA) (Cortiella & Horowitz, 2014). The ADA protects people with disabilities from discrimination in schools, workplaces, and various other social environments. Since learning is considered an activity, those individuals with learning disabilities are also protected by the ADA (Cortiella & Horowitz, 2014). Unfortunately, with the lack of specific diagnosis, individuals suffering from IS might not be wholly covered by the ADA, leading to a major social issue associated with the disorder. Swanson et al. (2013) argued that regardless of the ADA, children with learning disabilities continue to face a wealth of social and psychological issues. As disorders such as IS are somewhat unobservable to the layperson, individuals with reading and writing disorders may be unfairly punished by teachers and parents alike (Swanson et al., 2013). Herein lies another reason why the present study may be of significant benefit to those currently living with IS and living with individuals that have IS.

Some of these issues are psychological and social, such as bullying, physical aggression leading to psychological problems, and peer victimization, which was both a lived experience and a psychologically damaging practice (Espelage, et al., 2015; Rose et al., 2015). Though efforts have been made in social-emotional learning skills, bullying and disproportionate punishment of children with learning disorders are still significantly present in the U. S. school system (Espelage et al., 2015). Espelage et al. (2015) studied this phenomenon by investigating demographic variables, sense of belonging, and social supports as a predictor for bullying behaviors for students with specific learning disabilities and students without disabilities.

Espelage et al. (2015) acknowledged that these student groups were characteristically different, but the study's results suggested that bullying involvement was invariant. What should be noted for this study was that one of the core predictors of bullying was individuals with a low-grade point average, such as those individuals who might suffer from IS (Espelage et al., 2015). In the study, individuals with learning disabilities were significantly more likely to be bullied than they were to be bullies (Espelage et al., 2015). Bullying was both a social and psychological impact of learning disabilities. In the following section, I focus on the social implications of learning disabilities by examining issues such as a child's inability to appropriately interact with others.

Social

Most of the social issues surrounding learning disabilities relate to the ability of individuals with disabilities to assimilate into a normal conversation (Seligman & Darling, 2017). This may relate to how children with disorders, such as dyslexia and other disorders similar to IS, understand jokes and sarcasm (Seligman & Darling, 2017). Children with learning disorders were also less likely to find the right words when discussing a topic, they were passionate about or needed to respond to (Ceci, 2013). Other social challenges included communication with friends and family members. Many children with learning disabilities may shy away from social events due to a lack of understanding of social cues and body language, as well as other elements of modern life such as texting, as abbreviations might be an area where a child with learning disabilities needs additional help (Ceci, 2013).

Other issues also arose from miscommunication, wherein disorders such as IS and dyslexia have a long-term impact on a child's ability to properly understand and interpret words that a child might be recalling things verbally inaccurately. Still, the children are visually correct, leading to confusion in conversation (Merrell & Gimpel, 2014). This social miscuing could also develop into hostility, as children with learning disorders are limited in their ability to explain a particular event or emotion and might misconstrue a series of events or how a series of events impacted them (Merrell & Gimpel, 2014). This could lead to victimization (Klomek et al., 2016).

Klomek et al. (2016) conducted one of the first studies on the association between victimization by bullying and attachment to both parents and teachers amongst students with reported learning disorders. Klomek et al. (2016) had a total of 1,691 seventh- and eighth-grade students across six junior high schools’ complete questionnaires about learning disorders, victimization, and attachment to mother, father, and teacher. The researchers applied a regression analysis to estimate the probability of victimization through the various variables. They found that only students who reported learning disorders were at greater risk of frequent victimization (Klomek et al., 2016). These data were found in comparison to individuals without learning disorders (Klomek et al., 2016).

This study was significant as it highlights that students who self-report learning disabilities were more likely than others to be victimized by bullies (Klomek et al., 2016). Children with special education needs were more likely to experience victimization at school (Fink et al., 2015). However, they were also more likely to engage in bullying behaviors (Fink et al., 2015). To study this, Fink et al. (2015) developed the Bullying Behavior and Experience Scale, a self-reported measure of victimization and bullying behavior for children with special educational needs such as those individuals with IS exhibit.

Using a sample of 348 children with a mean age of 10 years, Fink et al. (2015) compared the incidence of victimization and bullying in children with special education needs to their peers, with controls for behavioral and emotional difficulties. Overall, the scale showed favorable psychometric properties using multi-group confirmatory factor analysis and differential item functioning (Fink et al., 2015). Individuals with special educational needs were more likely to be victims of bullying or report bullying events. Still, they were just as likely to experience and report bullying and victimization as children with specific behavioral and emotional disorders (Fink et al., 2015).

One reason for these increased incidences of victimization, according to Turunen et al. (2017), was that classmates quickly notice them. In the case of students with reading difficulties, Turunen et al. (2017) argued that affected students were often burdened with emotional, behavioral, and interpersonal problems at school. Whether or not reading difficulties increase bullying involvement risks has not been studied in recently published literature. Therefore, it was the focal point of Turunen et al.'s (2017) recent study. To investigate this, Turunen et al. (2017) tested the association of self-reported reading difficulties with peer-reported involvement in bullying in a nationally representative sample of 17,188 students in grades 3–8. These students came from 1045 classrooms in 147 schools (Turunen et al., 2017). The results suggested that even the most basic reading difficulties placed students at risk for victimization rather than becoming bullies themselves (Turunen et al., 2017). However, the overall conclusions found that over a third of students with reading difficulties were involved in bullying either as victims, bullies, or bully/victims, compared with only a fifth of students without self-reported cases of reading difficulties (Turunen et al., 2017).

Based on the studies I reviewed in this section, particular social issues are more significantly affiliated with low reading comprehension levels, such as bullying (Turunen et al., 2017). Smith et al. (2015) claimed that this should not be the case, as students with low reading literacy were frequently and repeatedly found to be more likely to be both bullied and engage in deviant social behaviors. Yet this trend has not changed over the last 50 years of published literature. Though certain interventions exist, more data are needed to understand and stop these negative trends (Smith et al., 2015). In the next section, I explore the psychological issues for children with reading deficiencies.

Psychological

Other significant issues associated with low achievement levels were more psychological in their manifestation (Baumeister, 2013). Bishop (2014) argued that these issues were present as a result of the fact that reading comprehension was not a unitary skill. Instead, reading comprehension requires an understanding of spoken language, and the ability to classify and interpret incoming speech patterns from another person. It is expected that an individual's existing mental lexicon would allow for their interpretation of the social context. When children cannot fully comprehend these social interactions, they might experience low self-esteem, self-efficacy, and other negative psychological experiences (Bishop, 2014).

Some studies showed that low reading comprehension during early childhood could also manifest as other learning disabilities in adolescence, such as callous and unemotional traits (Frick et al., 2014). Contrary to this, some children with low reading comprehension levels also exhibited psychological impacts on inattention and hyperactivity (Cain & Bignell, 2014). Children with diagnosed attention deficit hyperactivity disorder (ADHD) frequently had reading problems (Cain & Bignell, 2014).

Cain and Bignell (2014) conducted two studies to examine how reading comprehension skills were related to inattention and hyperactivity. The study samples included separate groups of 7- to 11-year-olds in each study (Cain & Bignell, 2014). The methodological approach for both studies used teacher ratings of inattention and hyperactivity to identify three groups at risk of ADHD (Cain & Bignell, 2014). These included poor attention, high hyperactivity, poor attention, hyperactivity, and also same-age controls (Cain & Bignell, 2014). Cain and Bignell explored how inattention and hyperactivity predicted reading in the first study, whereas in the second study they compared reading comprehension between the control and sample groups.

The results showed that poor attention was related to poor reading comprehension, although the relationship was partially mediated by word reading skills (Cain & Bignell, 2014). Overall, this study suggested that reading comprehension problems in children with attention difficulties were related to poor word reading and could subsequently develop into ADHD if not mitigated (Cain & Bignell, 2014). One primary limitations of Cain and Bignell's study was that they did not assess whether low reading comprehension led to an increased likelihood of hyperactivity through lack of understanding of verbal direction nor if the children were less likely to know how to read due to hyperactivity and subsequent distractions.

Many studies examined find common links between behavioral issues and poor reading comprehension (Miller et al., 2014). Miller et al. studied the potential linkage between behaviors and reading comprehension. They examined the extent to which teacher ratings of behavior attention could predict responsiveness to word reading instruction for first and third grade reading comprehension performance. The participant sample was large, including 110 first-grade students who had previously been at risk for low reading comprehension and other difficulties (Miller et al., 2014).

Miller et al.'s (2014) participants received 20 weeks of intensive reading interventions combined with classroom reading instruction. Through a path analysis, Miller et al. found that teacher ratings of student attention significantly predicted students' word reading growth in the first grade, even after controlling for other relevant predictors such as phonological awareness, non-word reading, sight word efficiency, vocabulary, listening comprehension, hyperactivity, nonverbal reasoning, and short-term memory. The researchers also found that attention levels demonstrated a significant indirect effect on third grade reading comprehension via word reading but not via listening (Miller et al., 2014).

Overall, this study's results suggested that student attention was a significant predictor of at-risk readers' responsiveness to reading instruction (Miller et al., 2014). However, it might be that students with low levels of attention also had significant difficulty reading and would benefit from scientific interventions such as colored overlays and other tools available to aid in the development of reading comprehension (Pressley & Allington, 2014). Kintsch and Vipond (2014) argued that the relationship between psychology and education was not as well developed as the link between physics and engineering. There were limitations when ascertaining whether low reading abilities was the fault of behavioral disorders, or if behavioral disorders were a result of low reading. Another limitation was whether the low reading comprehension stemmed from the lack of discipline or a whole other set of syndromes, such as IS.

Either way, low reading comprehension can be considered a learning disability (Kintsch & Vipond, 2014). Young children did not necessarily understand the magnitude of such a learning disability due to their lack of other awareness of normality (Kintsch & Vipond, 2014). Parents were often left bearing the burden of a disability until the child was old enough to fully comprehend their limitations (Kintsch & Vipond, 2014). In the following section, I explore parents' lived experiences with learning disabilities, how previous researchers have studied this phenomenon, and what those studies uncovered.

Lived Experiences of Parents with Children with Learning Disabilities

Living with a child with a long-term learning disability could result in many challenges that go far beyond normal parenting (Smith et al., 2015). Conducting qualitative research about families' lived experiences could be a delicate art form to neither offend nor leave a study lacking in certain areas due to sensitive conversation topics (Cridland et al., 2015). Cridland et al. urged researchers to pay particular attention to semistructured interviews and other qualitative data collection methods. The researchers indicated that preparation, participant recruitment, obtaining informed and voluntary consent/assent, and conducting effective interviews were the first major steps toward a successful study. From there, Cridland et al. supported the process wherein participants are involved in data analysis, which could help develop a better understanding of the data.

Researching lived experiences was not a straight-forward means of understanding the elements of the human condition and negative and positive life changes (Van Manen, 2016). The notion underlying this approach was that interpretive phenomenological research and theorizing cannot be separated from written textual practice. Therefore, there are limitations to the abstract nature of the discovery versus the practical needs of educational inquiry that demand to be turned into text (Van Manen, 2016). This is why researchers study the lived experiences of drastic areas of life, and researchers have conducted studies about parental lived experiences of extreme scenarios involving their children (Van Manen, 2016).

Ward (2015) studied parents' lived experience with children living in psychiatric units. The basis of this study was that adolescents were members of a particular life cycle stage that went hand-in-hand with many significant psychosocial changes and that when this stage of life was combined with serious mental health difficulties, the effects could have significant repercussions on the individual and their family (Ward, 2015). Ward studied both these individuals and the science of adolescent mental health disorders while working as a social worker in a psychiatric unit for more than 8 years. Ward argued that findings showed how trends occur within these families and how complex adolescent mental health disorders can be for the individual parent.

Ward's (2015) study was significant because it highlighted how studying the lived experience could humanize qualitative scientific research. This happens through finding trends in participant groups that could aid and help others in the future, and also how each experience could be somewhat unique to the individual. Therefore, this must be understood by researchers attempting to complete research into lived experiences. Soufi et al. (2017) had similar findings in their study of the lived experience of parents having a child with a stroke. One limitation they noted was the lack of participants, as most qualitative studies use only a small sample (Soufi et al., 2017).

Despite only 14 participants in the study, Soufi et al. (2017) identified trends in these parents' lived experiences. Trends included the brutality of diagnosis, lack of information regarding disease condition, feelings of abandonment after discharge from hospital, focus on functional recovery, late awareness of cognitive disorders, and need for psychological support and family adaptation (Soufi et al., 2017). Though the results of Soufi et al.'s (2017) study did not directly relate to the current study's broader elements, the fact that such specific themes were uncovered through studying the lived experience was significant. Throughout the qualitative discussion, the development of themes was not a new area of human science but instead created a dialogue for future study mirrored by other researchers (Titlestad & Pooley, 2014).

Recently published literature on parents of children with learning disabilities was sparse. Most recent studies pertained to the individual with a disability (Mullins & Preyde, 2013) or parents of children with specific and extreme learning disabilities that hindered their entire lifestyle, such as autism spectrum disorder (Corcoran et al., 2015). Therefore, the data I obtained in the current study may fill a gap in research practice literature. This would be one of the only studies of lived experience when studying reading comprehension and IS. My hope is this study's results could help mitigate many of the adverse outcomes associated with low reading comprehension. I discuss these issues in the following section.

Social Issues Related to Low Reading Comprehension

Students with low reading comprehension could also be victims of low self-efficacy, as I previously discussed in this chapter (see Vaughn et al., 2013). Low self-efficacy during childhood was linked to anti-social and deviant behavior during adolescence (Hart et al., 2014). According to Wang and Fredricks (2014), low reading comprehension levels were significantly linked to a lack of school engagement and could be used to predict school dropout levels. Therefore, teachers, parents, and educational leaders must ensure that every child has access to the right tools to develop their reading comprehension. This could be one means of reducing the likelihood of anti-social and deviant behaviors and dropout potential (Lewison et al., 2014).

Learned (2016) argued that youth readers had to navigate complex school contexts involving both different classes, teachers, and texts, and various institutional processes such as reading assessment and tracking reading literacy. However, little research has explored how or why young adolescents' literacy skills varied throughout these contexts (Learned, 2016). Therefore, Learned studied eight ninth-grade students for a year. The students were identified as struggling readers across content classes before the study's commencement (Learned, 2016).

Analysis of over 425 hours of observations, 64 interviews, assessments, and school records showed that participant interactions with interrelated institutional contexts for reading intervention and school discipline tended to position students as deficient readers and deviant youths regardless of engaged and skillful reading (Learned, 2016). This study suggested that reading literacy, when poor during childhood, could leave a child labeled negatively into adolescence. For example, children with high reading comprehension levels in third grade were significantly more likely to graduate from high school (Pears et al., 2016).

In general, school readiness was found to decrease children's likelihood of consuming drugs and alcohol during their adolescence (Pears et al., 2016). Through ameliorating the potential for students to go on with low reading proficiencies, students were far less likely to engage in deviant behaviors (Learned, 2016). This would also allow many students to graduate from high school (Pears et al., 2016) and go on to the working world with ease (Vogt & Shearer, 2016). Students with average and above average reading literacy levels were significantly more likely to attend a four-year college, graduate from college, and be average or top earners in their field (Street, 2014).

Some authors argued it was up to both parents and teachers to control a negative situation and develop interventions to aid in children's reading proficiencies (Sim et al., 2014). This was not only due to the higher levels of anxiety and depression observed in children with low reading proficiency levels (Mammarella et al., 2016) but also because developing childhood reading levels had the potential to improve the economy of the United States by introducing future generations with average and above average reading skills (Daly et al., 2015). This section concluded the review of relevant literature. The following section provides a summary of the findings.

Summary

To conclude, I uncovered several themes relevant to the current study through this literature review. I deemed Engel's biopsychosocial model of science and medicine appropriate for this study by combining the study of lived experience and medically based intervention of colored overlays (Drotar, 2014; Engel, 1977; Kendler, 2015; Krieger, 2014). In this study, I combined the biological process of medicine (the inability of children to concentrate their vision correctly) with the psychological (the lived experiences of parents of children with IS) and therefore the sociocultural (how low reading literacy impacts on society at large).

From there, I depicted a fuller understanding of IS. This was where the medical areas of the study were important, as IS is a condition involving excess sensitivity of visual systems to particular frequencies of the white light spectrum (Crabtree, 2011; Heine et al., 2016; Irlen, 2005). In layman's terms, IS involves broken-down pathways from the optic nerves to the brain, wherein particular filters do not allow for full comprehension of images and words (Loew et al., 2014). This results in the doubling or blurring of images and could result in a perceived low attention span or learning disability in children with IS or medical condition (Loew et al., 2014; Robinson & Foreman, 2004).

Text flickering might also present as blurring, and in some cases the print may appear to jump off the page (Williams, 2014). This phenomenon could lead to eye strain, a drop in attention span due to the necessity for frequent breaks in reading, and slow reading rates, and many children also presented with avoidance behaviors (Wilkins, 2002; Williams, 2014). As many researchers found links between IS and other disorders, such as dyslexia, migraines, autism, ADHD, and other learning disabilities, the present study is more important than ever, as it might be that these students are unfairly labeled, and their parents may be put through extreme levels of stress due to false information (Crabtree, 2011; Evans & Stevenson, 2008; Kriss & Evans, 2005; Kruk et al., 2008; Kusano et al., 2015; Singleton & Trotter, 2005).

One of the easiest means of diagnosing IS, in a practical sense, is to use colored filters or overlays on texts to make it easier for the child reader (Gutschke et al., 2017). This is more beneficial than questionnaires, even when administered in adults (Hollis & Allen, 2006). Despite this and the wealth of other data uncovered throughout this chapter, many researchers still argue against the benefits of colored overlays, claiming them to be only beneficial for specific individuals (Griffiths et al., 2016). However, there were particular discrepancies in the reporting of such studies, which is why, in the present study, I evaluated parents' lived experience using colored overlays with their children.

This was where the psychological and sociocultural elements met in the current study. In the sections of the literature review dedicated to this, I examined studies on the human impact of raising a child with a learning disability and its impacts. One significant finding of this section was that, due to the lack of specific observation of IS as a disability, children with IS were not covered by the ADA and the protections this allowed (Cortiella & Horowitz, 2014). Therefore, children with IS were at a significant disadvantage as their disability was not legally viewed as a disability in the United States. Consequently, any form of discrimination in school, the workplace, or any other social environment was not prosecutable under the ADA (Swanson et al., 2013). This was a sociocultural issue that could lead to psychological problems.

Children with disabilities were far more likely to be involved in bullying behavior, either as victims or perpetrators (Klomek et al., 2016). In addition to this, many students could be unfairly mislabeled as having ADHD and other disabilities, which could lead to low self-esteem and low self-efficacy (Cain & Bignell, 2014). By understanding the lived experience of parents going through the process of IS with their child, it might be that the psychological elements can be mitigated in future cases (Ward, 2015). This was just one of the many limitations highlighted within this review of the literature. This summary concludes Chapter 2. In Chapter 3, I discuss the methodological approach that I applied in this study.

Chapter 3: Research Method

Introduction

Colored overlays and tinted lenses were used to help individuals with reading difficulties such as IS, a perceptual processing disorder that affects reading proficiency (Henderson et al., 2013). Reading difficulties could be alleviated using colored overlays because the color could minimize visual distortion and stress when reading (Allen et al., 2012). Previous research on the use of colored overlays to alleviate reading difficulties was primarily focused on the biological benefits of improved reading (see Denton & Meindl, 2015; Henderson et al., 2013; Park et al., 2012). However, research showed that children's psychological and social well-being, such as interpersonal relationships, self-esteem, motivation, and resilience, could also be affected because of the IS (Boyle & Jindal-Snape, 2012; Stack-Cutler et al., 2015).

In reviewing the literature on the use of colored lenses or colored overlays with children with IS, it was apparent that much was known about the biological aspects associated with the disorder, but very little was known about the psychological and social factors related to the condition. Therefore, the purpose of this qualitative phenomenological study was to explore the lived experiences of parents of children with IS who used colored overlays or tinted lenses for at least 4 months and more from a biopsychosocial perspective. In this chapter I provide information about the particular research design and rationale behind its use, a description of the study participants and sampling size, procedures for recruitment and data collection, data analysis, and potential advantages and disadvantages to the particular design.

Research Design and Rationale

A qualitative research design using a phenomenological approach was the method I used to look at the biological, social, and psychological phenomenon associated with the perceptions of parents who had IS children that used colored overlays or tinted lenses for reading. I chose a strict phenomenological design to extract the essence of the lived experiences of parents, thus allowing an in-depth examination of the phenomenon of parenting a child with IS who used colored overlays or tinted lenses for reading. Also, I used this approach was because there was very little knowledge regarding the above complex phenomenon, and there continues to be much controversy surrounding IS.

This research design best fit this study because I was specifically interested in exploring the complex experience of parenting a child with IS who used tinted lenses or colored overlays in everyday life. To this aim, my study followed this phenomenon from the parent's perspective, which allowed a comprehensive understanding of the child's changes in terms of ability to read and the social and psychological aspects of the child's daily life. By using this approach and an in-depth interview process, I gained better insight about how study participants perceived or gave meaning to their life events and having a child with IS, and this helped me understand why parents behaved in the manner they did base on their perceptions (see Krathwohl, 1998; Somekh & Lewin, 2005). Although this approach did not lead to data generalizability as in quantitative research, through collecting and analyzing participants’ life stories, qualitative research may generate new theories or insights about particular phenomenon in a more in-depth manner. In the present study, this may be the individual and commonly shared concrete examples of the phenomenon associated with parent’s perceptions of overlay and tinted lens with there IS children (see Krathwohl, 1998).

Role of the Researcher

My role as researcher in qualitative research was to gain insight into the participants' thoughts and feelings. I accomplished this by initially establishing and maintaining rapport with the study participants before and throughout the interview process. Rapport can be established with a simple smile or greeting, actively listening to participants, or asking questions to seek further understanding or clarity (Maykut & Morehouse, 2002). Researcher-participant rapport allowed study participants to feel more comfortable in sharing their life stories. Hallberg (2008) reminded researchers that rapport was essential in qualitative research, more so than the interview process, because the initial relationship between researcher and participant allowed for the building of trust and mutual respect. In turn, the study participants’ trust in the researcher would hopefully yield richer data.

An integral part of qualitative research was the interview process, which was not an easy undertaking for me. It required the participant to talk freely about their experiences with IS and colored filters while I listened nonjudgmentally. I became the student, seeking participants’ expertise or knowledge about their lived experiences with

IS and colored filters. Sometimes, the lived experiences of the study participants were fresh in their minds. In contrast, sometimes when asking study participants to tell their stories resulted in them reliving past experiences that they found too difficult to discuss.

I demonstrated a balance of therapeutic skills learned in the interview process, such as active listening without judgment, genuine respect, and empathy, while maintaining objectivity. This required a balancing act since I had to maintain clear professional boundaries within the study while fostering a sense of trust and understanding with the participants. I had to be mindful that using therapeutic skills in the study might foster a sense of comfort with participants, thus leading them to self-disclose issues beyond the study topic. For instance, participants might have thought of the researcher-participant relationship as more like a therapist-client relationship. Additionally, I had to be aware of the study participant’s role in order to avoid a therapist-client approach during the interview process. Therefore, to avoid any confusion in the study, I clearly vocalized the study's objectives and procedures to participants at the beginning and periodically throughout the interview process and adhere to them. Dickson-Swift et al. (2007) suggested that to avoid role confusion, the researcher should be careful of disclosing their information, make certain to discuss the study process with other researchers or university chairs, as well as be cognizant of how the researcher’s emotions can affect study participant responses.

As part of my research, I considered any potential ethical issues or challenges before conducting my research. Therefore, I was guided by the Walden University

Internal Review Board criteria and the American Psychological Association Code of Conduct Ethics (2017). This meant I followed a professional belief system of not placing any study participant in a harmful situation-physically or mentally and made certain that informed consent was gathered from each participant after they were provided with the objectives and procedures associated with the study. Study procedures included how I planned to ensure participant confidentiality, how I recorded and stored participants' stories, and participant's right at any time to not participate in the study.

Methodology

Population

My target population was parents of children diagnosed with IS who used colored overlays or tinted lenses for 4 months or longer. Little to no information existed about the general population of parents to children with IS, and there was no published work on the demographics, age, gender, or ethnicity of this population. However, according to the private Irlen diagnostician who assisted with the initial recruitment, the demographics were widespread. Clients who came to this diagnostician's office tended to be from a medium-sized city in the Northeast (C. Kessler, personal communication, August 21, 2017). Due to the Irlen diagnostician's limited clientele that met my study criteria, the IRB granted me approval to use an online social media support group of parents of children with IS. The social media group included individuals within the US and internationally.

Sampling and Sampling Procedures

I used a convenience sample of participants due to time constraints and ease of availability of the target population. This sampling method was consistent with the phenomenological approach. It was important to ensure that the participants were targeted based on their experience with the phenomenon of interest and the study's specific criteria. To ensure that the parents had sufficient experience with their children’s use of the overlays or lenses, I sampled parents whose children had used overlays or lenses for at least 4 months or longer. I recruited these participants from a pool of clients diagnosed with IS by an Irlen diagnostician who worked in private practice and self-reported that her clients used colored filters for 4 months or longer. Also, I recruited participants through an IS parent social media support group. A total of 20 participants was the desired sample for my study. Although the sample size was 20 participants, saturation was met at 11 participants, so I concluded the data collection.

Instrumentation

Using Engle’s (1977) biopsychosocial theory as a guide and an extensive review of literature on IS, I developed six semistructured, open-ended questions that allowed me to explore the lived experiences of parents of children with IS who used overlays or tinted lenses (see Evans & Allen, 2014; Irlen, 2005; Monger, et al., 2017; Wilkins, 2002). Additionally, my committee reviewed the interview questions and provided me with feedback as to whether the questions were directly related to the research criteria. I used their feedback to revise my questions and added probing questions that might elicit more information or clarity from participants that was related to my study (see Appendix B). Furthermore, study participants' stories were collected using an audio-tape and handwritten notes to ensure accuracy and integrity of their lived experiences.

Procedures for Recruitment, Participation, and Data Collection

Initially, I asked the private clinician to look through her files and select clients who used colored filters for at least 4 months. Once the private clinician had obtained a pool of potential participants that had met the above criteria, I asked her to reach out to her clients via email, telephone, or office posting with my invitational flyer to see if they might be in participating (see Appendix A). The invitational flyer included my contact information, such as private email and phone number, so that interested individuals could contact me to clarify my study further. For those interested in participating in the study, I sent a consent form to them by mail or email for their review before the interview process. I also sent participants the interview questions before the interview process (see Appendix B). The consent form had to be signed before the interview process could take place. I also obtained IRB approval to recruit through a social media support group of parents who had children with IS due to the private clinician's limited clientele. Recruitment on social media was similar to the Irlen clinician's clientele recruitment. For example, I shared my invitational flyer on the social media site, which allowed interested persons to contact me via telephone and email for further information. Then a consent form was emailed to participants, along with the interview questions. The consent form had to be electronically signed before the interview process took place. Specifically, the consent letter informed parents that I was focusing my dissertation on what parents might have encountered before and since their child's diagnosis of IS. I also informed parents that by participating in the study, it would help me and others better understand the disorder and understand what they and their children might deal with in society. The information provided in the informed consent removed the possibility for individuals who met the criteria, but were not interested in the study to be revealed without their express interest. Interested participants had to reach out to me to be a part of the sample.

To better understand participants' lived experiences with their child's IS, I interviewed participants through a series of brief questions meant to guide them toward explaining their raw experiences only. I did not guide them to discuss any particular topic or subject. However, I did assist them to stay on topic if they discussed content unrelated to their experiences with their child's use of colored overlays or tinted lenses. Using this interviewing method, I allowed participants to naturally discuss their feelings or perceptions in dealing with IS with their child as they explained their lived experiences. These interviews took place through Zoom and telephone conferencing at the participant's convenience and mutually agreed upon times. Individuals that participated in the study lived in the United States and internationally. The interview process took approximately 1 to 2 hours. In some cases, data collection spanned over 2 days because I forgot to ask four participants the sixth interview question. All four participants were willing to continue with the interview process, thus the data collection was not effected in anyway. All interview discussions were audiotaped to make certain that I did not miss any data participants provided. I maintained these data confidentially and securely in a safe place used these data only for this study. Upon completion and approval of my dissertation, I will retain the data for 5 years. At the end of the 5 years, I will offer the transcripts to the study participants upon request or dispose of them by shredding.

In the informed consent letter, these participants received notification that their participation in this study was invaluable. Their data could provide insight to schools and practitioners about the disorder. If participants had any further questions or wanted to know the dissertation information's outcomes, I provided them with a contact number for further inquiry on the consent form. At any time, if participants did not wish to remain in the study, I informed them that they could leave without any repercussion. If at any time the sample size went below 20 participants, I resumed sampling and used the original procedures, but ultimately ended with a final sample of 11 participants.

Data Analysis

I analyzed data using NVivo 12, a qualitative research computer software program devised by QSR International Incorporated. Although I used the software to assist in the organization and management of data, I had the responsibility to interpret all interview data to ensure personal life story information integrity. During the transcribed information review, analysis consisted of looking closely at participants' comments and words for meanings, shared themes, and relevant data. This allowed me to become familiar with the participant data and form initial interpretations or thoughts about the data (see Braun & Clarke, 2006).

Following Braun and Clarke's (2006) coding suggestions, I reviewed the meaning held within each response and organized the data to highlight various areas of potential interest after transcribing the interview data. I then began to identify initial codes or broad connections between participants' relevant responses. This meant that I described the obvious features and meanings associated with the content of the data to understand the underlying features or meanings associated with the content data. I used computer software to code by tagging and naming various texts with an identifying code. In this stage of analysis, my goal was to assign a code to as many chunks of meaning as possible based on the participant data, such as those of particular interest to me or those that might emerge from the coding process (Braun & Clarke, 2006).

After I had initially coded all the data and placed them in order, I looked carefully at the identified information from the initial coding of the data. Specifically, I grouped the initial themes or patterns that emerged from the coding process and used these groups to identify the connections or interconnections between themes (Braun & Clarke, 2006). Braun and Clarke (2006) called the initial searching of themes from the data to be the third phase of thematic analysis. They indicated that the third stage should end with "a collection of candidate themes, and sub-themes, and all extracts of data that have been coded in relation to them" (Braun & Clarke, 2006, p. 20). The fourth stage of analysis was the review and refinement of individual participant themes that emerged through the coding analysis process. The fourth stage required me to look at individual participant themes in relation to all the other participant interview data and look at any additional themes that might have been overlooked or missed in the initial coding process and reworking the coding system (Braun & Clarke, 2006).

The fifth stage of analysis further required me to define and refine themes and interconnected themes inherent in the interview data. The goal at this stage was to determine the true meaning that each theme and interconnected theme represented. However, to ensure that I gained insight into the participants' lived experiences through the themes and interconnected themes that emerged, I had to check or verify the established themes against the actual verbatim interview data collected by each participant, ensuring internal consistency of themes. According to Braun and Clarke (2006), that was important so that the researcher had a clear understanding or definition of what their themes were at this point, or else further refinement was needed.

The last stage of this analysis was my drafting of the themes that emerged from the study of parents' lived experiences with children with IS. I wrote these themes based on data provided by the study participants in a clear, connected manner for the readers to obtain the essence of the biological, social, and psychological experience of IS children's parents by providing verbatim examples or aspects of encounters experienced by parents of IS children. Writing in this way preserved the participants’ voices while explaining their overarching experiences.

Issues of Trustworthiness

Internal Validity

Unlike quantitative researchers, who may be concerned about the broader aspects of a study and making sure that the data are replicable and generalizable to the population as a whole, I strived to understand and explain the in-depth processes of phenomenon such as the lived experiences of parents of children diagnosed with IS that used colored filters. Although the findings might not be generalizable to the population as a whole or replicable as in quantitative research, the in-depth shared experiences of participants I acquired through the interview and transcription processes were usually representative of this specific participant group (parents of IS children), familiar to other IS parents who might share similar experiences, and were instrumental in broadening my knowledge base.

As a qualitative researcher I did not use the same standardized means to establish the reliability and validity of data as quantitative researchers, but I did use specific procedures such as credibility, transferability, consistency, and confirmability. The use of these procedures ensured that my research was representative of the study's population (Shenton, 2004; Thomas & Magilvy, 2011).

Credibility

I obtained credibility by looking at the participant's transcript data and reviewing the similarities between and amongst the study participants' information. According to Thomas and Magilvy (2011), credibility is achieved when the researcher obtains an accurate view of the study participant's experiences that could be quickly understood by another parent living with a child with IS. Researchers (Shenton, 2004; Thomas & Magilvy, 2011) indicated that there are various ways researchers can check for credibility within their study. The first way is by asking the study participants to provide feedback on the accuracy of their transcriptions and particular interpretations or themes that the researcher obtains based on the transcribed interview data. Second, a researcher can request a peer review of the study by someone experienced in qualitative analysis to provide a new perspective or challenge existing assumptions. Third, during the interview process, developing specific questions might help a researcher determine whether the participant was telling the truth or not. Finally, the last strategy is by providing a clear, concise description of the phenomenon studying. I used the above strategies throughout my study.

Transferability

Transferability in qualitative research is similar to external validity in quantitative analysis, in which I determined if the research findings were transferable to another population or group. Although the transferability of study findings in qualitative research could be difficult to ascertain, one strategy to attempt to achieve it was that I obtained as much information as possible about their particular populations. I obtained as much detailed descriptive demographics for other researchers to be able to use some of the similar data to gain further insight about a specific or similar population (Shenton, 2004; Thomas & Magilvy, 2011).

Dependability

In addressing reliability, I used strategies or techniques that would allow other researchers to follow my research. I indicated the specific steps and procedures that I used when I selected my population, collected the data, analyzed the data, and discussed the interpretation of the data and research findings. In addition to this, I used specific strategies to assess data credibility and transferability. According to researchers (Shenton, 2004; Thomas & Magilvy, 2011), the above dependability processes allow other researchers to determine if proper researcher procedures were followed in a study (Shenton, 2004; Thomas & Magilvy, 2011).

Confirmability

According to Thomas and Magilvy (2011), establishing confirmability occurs after credibility, transferability, and dependability are determined. Like objectivity in quantitative research, confirmability in qualitative research requires a researcher to be aware of how their own biases or personal feelings might play a role in the study. Therefore, it was most important for me to allow participants' stories to unfold during the interview process without interference other than seeking clarification of participants' comments, and without the expression of personal feelings. My approach to the interview process allowed study participants fostered a trusting relationship and reduced my potential own bias.

Ethical Procedures

Before conducting the research study, I formally sent to the Institutional Review Board (IRB) the ethical procedures I planned to use with the participants and the IRB application. Once I received IRB approval, I began recruiting participants. As noted earlier, I recruited participants from a private practitioner in the Northeast United States. I asked the private clinician to look through her files and select clients who used colored filters for 4 months or longer. Once the private clinician obtained a pool of potential participants that met these criteria, I asked the private clinician to reach out to her clients via email or mail and provide potential participants with my invitational flyer, consent form, private email, and phone number for further clarification of the research topic of the study. Specifically, the consent letter informed parents that I, as a Walden University student, was completing my dissertation on what parents might have encountered before and since their child's diagnosis of IS to understand the disorder and what children and parents might deal with in society. This allowed participants to remain unidentified unless they chose to reach out to me with their contact information and interest in participating.

Within the informed consent letter, I also let participants know that their participation in this study was invaluable and could provide insight to schools and practitioners about the disorder. If participants had any further questions or wanted to know the study findings, I provided them with a contact number. I informed participants that if at any time they did not wish to remain in the study, they could leave without repercussion. Also, I informed participants that upon completion and approval of my dissertation, I would retain their data for 5 years. At the end of the 5 years, I will provide the transcripts to participants at their request or disposed of them by shredding.

Summary

In summary, I selected a qualitative method and phenomenological design to obtain a more in-depth understanding of the biological, psychological, and social processes or phenomena resulting from the lived experiences of parenting a child diagnosed with IS and used tinted lenses or colored overlays. My methodological approach was intended to enhance or enrich my knowledge base and assist practitioners in being more sensitive to the needs of this particular population or group. I used a convenience sample from a private practitioner in a medium-sized city in the Northeast composed of various demographics. Also, I used proper ethical procedures that ensured appropriate recruitment, confidentiality, data collection, and study representation through the use of multiple techniques (i.e., credibility, transferability, dependability, and conformability). In the following chapter, I report the findings of the current research study.

Chapter 4: Results

Introduction

IS, a visual processing problem, causes individuals to struggle with reading by creating symptoms like visual distortions and blurring the printed text. It leads to eye strain, headaches, and fatigue (Chouinard et al., 2012; Crabtree, 2011; Loew et al., 2014). Reading difficulties associated with IS could be mitigated through color overlays, which minimize visual distortions (Allen et al., 2012). While researchers focused on the biological benefits of using overlays and tinted lenses, it was unknown how using colored overlays and tinted lenses influenced the lives of children who had IS from biological, social, and psychological perspectives. Therefore, the purpose of this qualitative phenomenological study was for me to explore the lived experiences of parents to children with IS who used tinted lenses and colored overlays, which had not been done before, through a biopsychosocial perspective. My research question for the study was "What is the lived experience of parenting a child with IS who used colored overlays or tinted lenses as a way to treat IS?"

In this chapter, I present the results of this qualitative phenomenological study. The chapter opens with a presentation of my research setting and a discussion of the participants' demographics. I describe how I applied the data analysis process outlined in Chapter 3 to the data I collected, and I present how I established data trustworthiness. Also, I present the findings from the study before providing a chapter summary.

Setting

It was vital for me to establish a setting that allowed participants the opportunity to talk freely with me in a safe, confidential environment. I allowed participants to choose where their interviews were conducted, including the office of the private Irlen diagnostician, face-to-face via Skype or Zoom, or over the telephone. Originally, I planned to interview 20 participants for my study, but I achieved data saturation before the 11th participant; therefore, data collection concluded. Participant 1 decided to meet face-to-face for the interview, and I interviewed Participant 6 via Zoom meeting. I completed the other nine interviews over the phone. Each interview was engaging and allowed for open-ended dialogue about the research question. There were no distractions during any of the interview sessions because participants chose times conducive to their schedules.

Demographics

Participants provided demographic information that assisted me in understanding the results of this research study. The 11 participants' demographics and characteristics included their age, gender, ethnicity, education level, income level, and whether they resided within or outside the United States. Although I did not initially request any further demographic information from participants, I noted that several participants reported their child to have multiple comorbidities besides IS. Also, several participants revealed that others in their family, or participants themselves, were diagnosed with IS. I referenced study participants as Participant 1, Participant 2, and so forth to maintain confidentiality. I also referenced two participants as Participant 3 and 3b, because I initially assigned them with the same research numbers due to a miscount. The 11 participants in the study all identified themselves as White American women. However, Participant 8 considered herself to be a White British woman. Participant 7 indicated that she identified as White and acknowledged a history that included Pacific Islander; she noted that she wanted to be recognized as White for this study. The ages of participants varied. Three participants identified themselves as 50–60 years old. Seven participants were between the ages of 40–49 years old. One study participant identified herself as between 29–39 years of age. All participants possessed, at minimum, a bachelor's degree from a technical college. In addition to this, all participants' income was higher than $50,000, though one participant estimated her monthly income not in U.S. dollars but Qatari riyals. The participant reported numerous fringe benefits built into her cost of living that were free of charges, unlike wages in the United States. Table 1 provides a summary of the participant's demographics.

Table 1

Participant Demographics

Identifier	Gender	Age Range	Ethnicity	Education	Income	Country
1	F	50-60	W	M	$75,000+	USA
2	F	50-60	W	M	$75,000+	USA
3	F	29-39	W	B	$75,000+	USA
3b	F	40-49	W	M	$75,000+	USA
4	F	40-49	W	B	$75,000+	USA
5	F	50-60	W	D	$75,000+	UK
6	F	40-49	W	B	$75,000+	USA
7	F	40-49	W	B	Prefer not	USA
8	F	40-49	WB	T/C	$10,000-24,999	UK
9	F	40-49	W	M	$75,000+	USA
10	F	40-49	W	M	$50,000-74.000	Qatar

Six of the 11 participants provided information about their daughters with IS. Five participants described their lived experiences with sons who had IS. In addition to this, six participants noted their own IS diagnosis or reported multiple children in the family had IS. Furthermore, seven of the 11 participants independently said that their child had coexisting diagnoses such as speech impairments, ADHD, anxiety disorder, dyslexia, or physical impairment. Table 2 presents additional family information of participants, including whether children had additional diagnoses to IS and if others in the family had a diagnosis of IS.

Table 2

Descriptive Information for Additional Family Information

Identifier	Child's Gender	Additional Diagnoses	Parents or siblings with IS
1	F	Yes	No
2	F	Yes	Yes
3	M	Yes	No
3b	M	Yes	No
4	F	Yes	Yes
5	F	Yes	Yes
6	F	No	Yes
7	F	Yes	Yes
8	M	No	No
9	M	No	No
10	M	No	Yes

Data Collection

Once Walden's IRB approved my study on July 10, 2019, and I received a signed letter of cooperation from an IS private practitioner, I began data collection. An initial delay in receiving the signed letter of cooperation hindered the data collection process by several months. I provided the private practitioner with recruitment flyers and prepaid envelopes to mail to clients who met the inclusion criteria. The private practitioner sent the recruitment flyer to her clients over several months. The private practitioner's recruitment yielded three potential participants, only one who signed the consent form to participate in an interview. When initial recruitment procedures did not produce the desired sample of 20 participants, I requested a change to the recruitment process through Walden's IRB. I asked the IRB to recruit participants outside of the initial recruitment area and through IS social media support groups. My IRB amendment was approved, and I began recruiting IS parents through social media channels, which led to my sample size of 11 participants that was achieved through saturation.

When participants scheduled their interview, I provided them an electronic informed consent form with information about the study, which they signed electronically. Before starting the interviews, I requested the participants' permission to audio-record the interview. I reviewed the consent form information with each participant, which included their right to stop the interview process at any point if they felt uncomfortable answering a question or with the interview process. I asked participants if they had the opportunity to review the six interview questions ahead of time. I asked the participants if they willingly agreed to be in the study to also obtain verbal consent. Interviews took from 26-48 minutes, depending on the details participants provided. At the end of every interview, I asked participants several demographic questions, which I also recorded as part of the interview. After every participant interview session ended, I provided participants with details about the study's next steps, such as the transcript process and the return of their individual transcript as a member check. As interviews continued, I realized that I had not asked four participants (Participants 3b, 4, 5, and 6) Interview Question 6. I contacted those participants and notified them of my error. All four participants were willing to schedule a follow-up meeting with me, via telephone, to complete Interview Question 6.

After conducting 11 interviews, I used Temi, a transcription company, to transcribe the audiotaped interviews. Once transcribed, I reviewed the transcripts for errors or mistakes in participant statements produced through the Temi service. I also used notes taken during the interviews to further verify transcripts accuracy. Once confirmed, I sent transcripts to the participants for feedback and transcription verification. Participants verified their transcripts electronically.

I reached saturation in my study when the same themes were recurring. Initially, I proposed interviewing 20 participants, but I reached redundancy where no new information emerged with the 11 participants. During the interview process participants told their unique stories, but all shared a commonality in how they experienced the phenomena. After I interviewed the 11 participants and analyzed data, themes and subthemes started to emerge, and no new information resulted from the additional interviews.

Data Analysis

I used thematic analysis, outlined by Braun and Clarke (2006), to analyze data in this qualitative phenomenological study. According to Braun and Clarke, thematic analysis is a six-step process of data reduction that allows researchers to explore themes, or patterns, in their data set. The qualitative computer-assisted data analysis program NVivo 12 facilitated the data analysis process. NVivo 12 is a program designed to assist researchers with easy categorization, storage, and retrieval of large quantities of textual data. After I transcribed the interviews and uploaded the transcripts to NVivo 12, the coding process began. NVivo is an active process and is similar to hand-coding because it is researcher-driven. First, I thoroughly immersed myself in the data for familiarity and to better understand participants' experiences and perspectives based on their interviews. This familiarization completed Step 1 of thematic analysis.

I began initial coding in NVivo by highlighting passages related to the research questions and saving those at a node, giving them a descriptive title or code. This was the second step of thematic analysis and was complete when I had coded all transcripts, which left me with a list of codes stored to nodes in NVivo 12. I also completed manual hand-coding of the data to find any additional codes to add to this list. Using the same approach to analyze in the NVivo 12 program, I used different colors to highlight keywords, phrases, or salient passages of text in the interviews, assigning a code to each color highlighted. This form of color-hand coding and organization of the data occurred in two cycles, which resulted in merged and reduced phrases, statements, and meanings until there were no repetitiveness or overlapping categories.

Using the hand-coding approach, I identified 34 codes. I sorted and examined these for relationships. In the third step of analysis, I placed topically or semantically related codes into five broader categories. I generated brief and descriptive titles for these larger categories that described the categories' contents, such as school experiences, sensitivity to light, physical sensations, community/peer/social interactions, and emotions. Major themes emerged from these categories: academic achievement and difficulties in school; confidence and improved social interaction; and physical, behavioral, and emotional regulation. Two subthemes emerged from the overarching theme on physical, behavioral, and emotional regulation. For example, participants noted that their children had decreased behaviors and a calmer brain and that the IS children had improved energy. In Step 4, I examined these possible candidate themes and subthemes. This step required me to check the codes within each candidate theme and the transcript extracts to which those codes were assigned. It also required me to ensure that the codes and passages supported the creation of that candidate theme and told a cohesive story about participants' experiences with children with IS who used overlays or tinted glasses. In Step 5, I created and defined titles for those themes. The thematic analysis' final step was to present, in written form, the completed results. The final thematic structure of the findings is shown in Table 3.

Table 3

Thematic Structure of Findings

Theme	Subtheme (if applicable)
1. Overcoming academic difficulties	1a. Overcoming academic difficulties 1b. Battling the school.
2. Improving confidence and sociality	
3. Regulating physical, behavioral, and emotional symptoms	3a. Decreasing behaviors and calming brain 3b. Increasing energy 3c. Physical improvements

Evidence of Trustworthiness

Credibility

I established credibility by reviewing all data for similarities between and amongst the study participants' information. As I noted in Chapter 3, Thomas and Magilvy (2011) indicated that credibility is achieved when a researcher obtains an accurate view of a participant's experiences. To establish the credibility of the data, I conducted a transcript verification with all participants. Upon completing the participant's transcript, I provided them with a copy to review for accuracy. If participants requested changes or additions, they informed me and I made those appropriate changes. Participants then sent me a response through a secure, private email indicating whether their comments in the interview were achieved. All 11 participants reported transcript accuracy after the revision was made to at least three participants' transcripts. Also, my chair and second committee member provided feedback to me once a quarter as I progressed through data collection and analysis processes. Lastly, there was consistency in providing participants with clear, concise information about the phenomenon studied. I offered further clarification if participants required.

Transferability

Transferability in qualitative research is like external validity in quantitative analysis, or when a researcher determines if the research findings are transferable to another population or group (Shenton, 2004; Thomas & Magilvy, 2011). The transferability of study findings in qualitative research can be challenging to ascertain (Shenton, 2004; Thomas & Magilvy, 2011). Still, researchers can establish transferability by collecting all possible data about their research populations, like demographic data, so other researchers could replicate the study to gain further insight about a similar population (Shenton, 2004; Thomas & Magilvy, 2011). I completed both hand-coding and coding in NVivo 12 to gain the most descriptive insight into the sample population. The findings associated with this data may help validate and comfort participating parents and provide valuable insight to similar populations, practitioners, and school personnel.

Dependability

I accomplished dependability by describing the specific steps and procedures I used to select their population, collect and analyze the data, and interpret the data and research findings (see Shenton, 2004; Thomas & Magilvy, 2011). I established dependability by obtaining detailed information from participants who shared similar experiences in this study. I also interviewed participants until responses became redundant. Member checking also provided me with an opportunity for participants' responses to remain consistent. In addition to member checking, I had a colleague ask me interview questions to ensure my interview questions were appropriate.

Confirmability

According to Thomas and Magilvy (2011), confirmability can be established after credibility, transferability, and dependability are determined. Like objectivity in quantitative research, confirmability in qualitative research requires researchers to know how their biases or personal feelings may play a role in the research (Thomas & Magilvy, 2011). I established confirmability by allowing participants to tell their stories based on the six specific interview questions I asked them. At times, I sought clarification or asked participants to explain themselves further or to give examples. I did not share my opinions or thoughts about what the participant said to me during the interview. I remained open and nonjudgmental to all responses. To ensure that participants knew that I was an attentive listener and further helped develop rapport, I occasionally summarized the information they shared with me. Then, I waited for the participants to confirm that I either understood or did not correctly understand their story.

Results

Data analysis yielded three themes: Theme 1: Overcoming academic difficulties; Theme 2: Improving confidence and sociality; and Theme 3: Regulating physical, behavioral, and emotional symptoms. Theme 1 contains two subthemes: Subtheme 1a. Overcoming academic difficulties and Subtheme 1b. Battling the school. Theme 3 contains three subthemes: Subtheme 3a. Decreasing behaviors and calming the brain, Subtheme 3b. Increasing energy, and Subtheme 3c. Physical Improvements. I present the results in this section by theme.

Theme 1: Overcoming Educational Difficulties

Parenting a child with IS before the child's use of overlays or tinted glasses as a treatment for IS was characterized by academic difficulties and challenges. Participants described their children as struggling with reading and writing before using overlays or tinted lenses. Participants also described their struggles with their children’s schools, including teachers and other school personnel, before using overlays or tinted glasses. Both sets of struggles, that is, the academic struggles and the battles with school personnel, improved with overlays or tinted glasses. Theme 1 captures the experience of what it was like for participants to parent children with IS before and after implementing overlays or tinted lenses. This theme contains two subthemes: overcoming academic difficulties and battling the school.

Subtheme 1a. Overcoming Academic Difficulties

Academic life prior to overlays or tinted lenses to treat IS was frustrating for participants. Participants noted that they, and their children's teachers, knew the children could read and comprehend what they read but still experienced challenges in the classroom. Participant 3b relayed how her son "was able to read," but "his reading scores were really, really low." Participant 3b said that while her child's reading comprehension was great, the scores on fluency were "always at the bottom tenth percentile of the class." The teachers could identify the problem because they knew, according to Participant 3b, that her child could read. When Participant 3b's child got to fifth grade, he relied on audiobooks for reading but took gifted courses because his reading comprehension was good.

Participant 4 explained that, before using tinted lenses, her daughter demonstrated no trouble with reading comprehension, which was similar to the experience of Participant 3b. Despite the ability to comprehend what she was reading, Participant 3b shared that "it was deciphering the word, or phonemic awareness, was where she had the breakdown." Participant 10 also noted that her son had difficulty reading, which led her to question if he could comprehend what he had read. In addition to difficulty reading, one participant noticed her son had trouble writing prior to using overlays and tinted glasses. Participant 8 learned that when her son was instructed to write on white, lined paper, he could not see the lines and would write "all over the place," according to Participant 8.

After implementing overlays and tinted glasses, participants reported broad academic improvements in their children with IS. Participants 1 and 8 described how their children demonstrated improved reading ability concomitant with overlay and tinted lenses implementation. Participant 1 described this improvement:

> [H]er comprehension, it was very labor-intensive if you think about it. It's time-consuming because you're reading each word, and then you have to go back and reread it multiple times, and that is not as necessary now. I don't know because I have not asked her how many times she has to go back and reread it. But

> definitely, we have seen an improvement…Yes, in both the comprehension as well as fluency…She's still a slow reader. She will always be a slow reader. It is much more laborious than for a non-IS individual. But as the workload has increased in high school, she stands a chance, and that's the way I would describe it. Whereas before the diagnosis, I don't know that she would have been able to keep up.

This passage from the interview with Participant 1 highlights how using tinted lenses has helped her daughter improve her reading fluency and comprehension skills. The passage also indicates that the use of tinted lenses is not a cure-all. Participant 1's experience of her daughter's use of tinted glasses is that her daughter's academic ability has improved demonstrably, which appears to give Participant 1 hope that, as her daughter's high school classes become more challenging, her daughter will be better prepared to meet those challenges.

Participant 7 also discussed her daughter's improved reading ability. Participant 7 noted that her daughter "reads so much smoother" than she did before her IS diagnosis. Participant 7 suggested that her daughter also understands what she reads better than before. "Before, it was like pulling teeth to get her to read anything," said Participant 7, but now her daughter reads for fun, which Participant 7 attributed to the IS diagnosis and use of tinted lenses.

Participants spoke positively about the improvements in their children's grades and academic ability while also acknowledging their children still had some academic challenges. Participant 2 said, "I have only positive feelings about [my daughter] using the tinted lenses." While tinted overlays helped her daughter, Participant 2 explained that the addition of tinted glasses made a real difference for her daughter. Now, Participant 2 said, "I certainly would not have a happy, straight-A student looking forward to her future." Participant 2 linked the use of these glasses to her daughter's improved grades and positive outlook toward school.

Participant 5 described how her daughter had "taken off again" now that she had an IS diagnosis and tinted glasses. Participant 5 was concerned before IS testing that her daughter had dyslexia, but diagnostic testing showed that her daughter did not have dyslexia. For Participant 5 and her daughter, life was noticeably improved now that her daughter had tinted lenses. Homework was no longer as much a challenge as prior to the IS diagnosis, and Participant 5 explained that her daughter "rarely brings homework back," meaning she could finish all of her work during the school day now. Her daughter was also no longer "as exhausted" when she returned home from school as she was before she used overlays and tinted lenses.

Like Participant 5, Participant 7 said that her daughter no longer had difficulty with her homework now that she used tinted lenses. Participant 7 was clear that homework was still challenging with the tinted glasses, but there was an improvement:

> Since she's gotten homework, as far as that goes at home, she was taking what should have taken only 40 minutes to do and it was taking her two and three hours every night to do. With her glasses, homework is a little bit different now, but it

> definitely brought it down a little bit, as far as time needed to spend on it once she did get her glasses.

Participant 7's daughter faced challenges in the classroom before her colored/tinted lenses, which led to additional tutoring each week. Before lenses, her daughter was getting behind in her classes, even with the tutor's help. Still, Participant 7 said that "now, she's right at or just barely below meeting the grade-level expectations since using the glasses." This statement indicated that Participant 7 attributed her daughter's improved academic ability to the use of tinted lenses and the assistance they provided. Through using the glasses, her daughter has gone from requiring a tutor and spending hours a week on homework only to be behind her class to be at grade level or only slightly below.

Participant 8 noticed an improvement in her son's exam scores and writing ability when he began wearing tinted lenses. One of the adaptive devices Participant 8's son used was a different colored paper to write on, which Participant 8 said made a significant difference in his writing ability, especially writing on the lines on the paper because he could see them. She said that his writing was still "untidy," but his skills were improving in that area. Participant 8 also reported that her son was now passing his exams, which Participant 10 also saw improvement in her son.

Subtheme 1b. Battling the School

When their children began using overlays or tinted lenses, participants described constant battles with their children’s schools, including teachers, and other personnel, over the accommodations. Participant 1's daughter had a 504 accommodation plan that did not include colored overlays or tinted lenses at first. After much discussion with the school and advocacy on behalf of her daughter, Participant 1 successfully added the overlays to the accommodation plan. Participant 1 described,

> So, last year, she had to take exams and was not allowed to wear them because they weren't approved on her 504…I asked that the colored overlays be included on her 504 because she needs to take an IB exam. The IB exam, I read all the requirements, and they allow colored lenses…The pushback that I got in the meeting was that it was considered alternative and "we're not sure." So, it was towards the end of the meeting, and they said, "We'll let the director decide on whether it should be included or not" …So, I wrote a very nice email attaching just as, you know, wanted to follow up to see if this would be included on the report…Lo and behold, it was put on the accommodation plan.

Participant 1 said that important to her argument against the school personnel was that "these are not glasses." This was critical because, according to the 504 accommodation plan, if a visual deficiency could be corrected with glasses, then colored glasses for IS would not be approved. Participant 1 had to effectively argue that her daughter's tinted lenses were not for visual deficiency but for IS, at which point they were allowed on her daughter's accommodation.

While Participant 1 had the experience of fighting to add tinted lenses to her daughter's 504, Participant 3 recalled the frustration she experienced when her son's school told her they did not believe in IS. This led the school to deny an accommodation plan, including tinted lenses or colored overlays. Participant 3 recalled that her son's school district had, in prior years, screened for IS but had stopped doing so before her son was diagnosed. Participant 3 said when she presented the letter from her son's IS diagnostician, the school personnel said, "We don't believe in Irlen." As a result, and coupled with the fact that Participant 3 said her son makes good grades, the district did not want to make accommodations for her son. However, some teachers could make accommodations for her son at their discretion, which provided some relief. Participant 8 also battled with a school district that did not believe in IS and did not "want to accept there was a problem," according to Participant 8. She recalled, "The school, they completely didn't care…They had no reason to make him leave the school, and they made life quite difficult. They wouldn't give him blue paper. They didn't let him use his overlays." As a result, Participant 8's son moved to wearing glasses for IS, which the school did seem to approve, leading to fewer battles between Participant 8 and the district.

Unlike Participant 3, whose son had teachers who made accommodations for him in the classroom, Participant 3a faced the teacher's non-compliance with her son's accommodations. This was also the case for Participant 7. In the case of Participant 3 and her son, one teacher kept forgetting to use the special paper that he needed to be able to read his homework and regularly sent him home with regular white paper. Participant 3 described this as "a lot of frustration" and went through several meetings, including with the head of the school district, to discuss the lack of compliance with her son's accommodations. Participant 7 had a similar problem with the colored paper. Her daughter's teacher would regularly forget that she needed her homework and handouts printed on the right color of paper, as specified in the accommodations, but the teacher did not always make this available.

Participants also said that their children with IS had some issues with teachers or school personnel who did not understand the IS tinted lenses, which was challenging for their children. Participant 4 remembered when her daughter's teacher's aide told her daughter to remove her sunglasses, which Participant 4 was able to remedy quickly. Participant 5 experienced a similar situation with a substitute teacher who complained about her daughter's use of sunglasses in the classroom, leading to her daughter no longer wanting to wear the glasses. Participants 6 and 9 had similar problems with substitute teachers, unaware of their children's accommodation plans. Participant 9 said that this was "probably the worst of it," which indicated that there might have been more significant challenges her son faced than being asked to remove his adaptive lenses.

Theme 2: Improving Confidence and Sociality

Participants described an apparent increase in their children's confidence with the use of overlays or tinted lenses. Children who wore tinted lenses or used colored overlays for reading and writing grew more confident with use. These children also improved their social interactions and relationships due to using overlays and tinted lenses, perhaps because of the confidence the adaptive devices provided.

Part of this confidence was simply confidence in wearing tinted lenses, which may set them apart from their peers or make them look visibly different from others. Participant 3b said that her son wears his glasses, though not all the time. During activities like school and scouts, Participant 3b's son wears his glasses, but at home, when he can watch television in the dark, her son often removes his glasses. Participant 7 acknowledged that she does have to remind her daughter to wear her glasses occasionally. Still, her daughter primarily has the confidence to wear her glasses because "she knows that it makes her feel better." Participant 8 said that her son wears his glasses from first thing in the morning until bedtime because, as she stated, "he's accepted them."

Participants 2 and 11 both described their children's lack of self-confidence before using colored overlays or tinted lenses. Participant 2 homeschooled her daughter and acknowledged some degree of competition between students, even in their homeschooling group. Her daughter was the only one in the group who could not read, and Participant 2 said her daughter "did not feel good about that." Participant 2 was unsure whether this anxiety her daughter experienced was related to IS. Still, the fact that she described her daughter's anxiety over not being able to read in the context of life before and after implementing overlays and tinted lenses is perhaps an indication that Participant 2 does believe a relationship exists.

Participant 10 described her son as lacking the confidence to show his intelligence prior to using colored overlays and tinted lenses. Participant 10 elaborated:

> [O]ne thing that I've seen from a mom/parent/teacher [perspective], so I'm going to wear all the hats at once, is that he no longer downplays his intelligence in conversations with his peers. So, he might've, in the past, prior to [wearing glasses], say, "Oh, I'm just not a good reader. I'm not very smart." He would downplay something like that, and now he doesn't do that anymore. This quote demonstrated Participant 10's experiences as a mother of a son who has IS and as a teacher. As a mom of a son with IS, and as a teacher herself, Participant 10 indicated she thought her son downplayed his intelligence, perhaps because he lacked self-confidence and did not want to draw attention to himself or the fact that he lives with IS.

Participants reported that their children with IS came out of their shells after using overlays and tinted lenses. Children who previously lacked confidence in themselves, like the children of Participants 8 and 11, have grown confident and are now more willing to participate in events and activities than before colored overlays or tinted lenses. Participant 2 said that her daughter is now playing tennis with a local team. Participant 2 indicated the significance of this is two-fold: first, her daughter lacked confidence before tinted glasses to join a sports team. Secondly, her daughter can now handle the light outside because of her tinted glasses.

Similarly, Participant 3 noticed her son gaining confidence and coming out of the shell he lived in before overlays and tinted lenses. Participant 3 described how her son attributed this confidence to the tinted lenses:

> He willingly came home after the first month of school and asked to run for student council, which surprised us. He got up in front of his class and made a speech. He says, "It's because of my glasses that I was able to do that." He said, "I felt comfortable talking to people." I never expected to see that change in his competence and his self-esteem. Never before would my kid have ever come home and asked to make a poster, run for student council, and get up in front of his class and make a speech. His teachers have noted some of that self-confidence as well.

This quote by Participant 3 demonstrates how her son has gained confidence and become more outgoing and extroverted as a result of wearing tinted lenses. This confidence was evidence not only to Participant 3 and her son but also to her son's teachers. Her son is aware that wearing tinted glasses to mitigate IS symptoms has provided this newfound self-confidence and assurance.

Participant 8, who lives abroad with her son, also noticed changes in her son's confidence. Prior to wearing tinted lenses, Participant 8's son was "really shy." She described him as a child who was hesitant to go out and make friends or participate in group activities. Now that her son has his glasses, his confidence has allowed him to participate in scouting events, like the World Scout Jamboree, which included her son traveling to the United States with a group for three weeks. Participant 8 described this as "crazy, in my opinion," because this behavior was not something she could have imagined for her son before he started wearing tinted glasses.

Parenting children with IS who used overlays and tinted lenses in their glasses meant parenting children confident in their academic ability. Before using colored overlays and tinted lenses, participants described their children with IS as lacking academic confidence. Participant 1 said that her daughter used to "avoid reading out loud." Now, with overlays and tinted glasses, children are more confident. "She’s taking a very hard workload, and the more confidence that she developed in her ability to achieve that, the more that I could back off,” described Participant 1 of her daughter, now that her daughter wears tinted glasses. For Participant 5, this academic confidence was about the present situation and looking into the future and going to college. Participant 5 said, “I think [my daughter] gained a little bit more confident that she could actually go to college,” which was significant in that this highlights a new way of viewing the future and what her daughter’s future could look like now that she has tinted lenses.

Children who had difficulty reading and writing were more confident in completing these tasks. Participant 8 said that her son did not enjoy reading before he started wearing his glasses, but now, according to Participant 8, her son will “pick up a book and read for hours if given half the chance.” Participant 8 described how her son used to avoid filling out paperwork and forms because they required him to write, but with his new confidence in his writing ability, Participant 8 said her son “just does it; he doesn’t really think about [filling out applications and forms],” which she attributed to his wearing tinted glasses. Participant 10 also noted that her son’s new confidence has translated into “perseverance and persistence,” which he did not have before. Participant

10 described her son as unlearning that reading was difficult, which he believed before wearing tinted glasses, and learning that with practice, her son can achieve what he wants. Participant 10's perspective as a teacher, not just a mom of a child with IS, sheds more light on this:

> I am an educator who is in the educational philosophy pocket of the world that says it's not about the test scores. It's about, like, your feeling towards being educated or feeling happy in an educational space. Those things were markedly different, which is nice.

This passage underscored how Participant 10 saw her son, both as her child and as a student. As a teacher and parent, Participant 10 now experienced her son as a child who had an improved attitude toward his learning environment and learning in general. Before wearing glasses, her son faced challenges related to learning, and Participant 10 noticed marked changes now that he wears tinted lenses.

Children with IS who use colored overlays and tinted lenses had improved sociality, which may be attributed to their improved confidence. Before using overlays and tinted lenses, participants characterized their children as lacking social skills or not being socially active and outgoing. "He had a hard time making eye contact with people; he wasn't very willing to be a participant in a class activity or get up in front of people and talk," Participant 3 said of her son with IS, who now wears tinted glasses. Participant 8 also described her son as someone who "never really had friends as such" prior to receiving his tinted lenses. After receiving tinted lenses, Participant 3 saw a change in how compassionate her son was toward others. Participant 3 elaborated:

> You know, it was interesting to see, but I feel like that he has become, I want to say, more compassionate. Let me say, before wearing the tinted lenses, before we knew what was going on, he seemed to be very focused on himself. Now, he seems to be more focused on the world around him and noticing little details. It's definitely more compassionate to what other people are feeling or going through. I see him, or I hear him make comments about things that he never would've noticed before.

The experience Participant 3 described in this quote showed some of the social transformations her son went through after receiving tinted lenses. According to Participant 3, this was noticeable in her son's interest in other people. Before, her son was very focused on himself, which she attributed to his untreated IS symptoms. With glasses, her son was now more detail-oriented and "focused on the world around him."

Participant 5 also described her experience with her daughter being more social since she began wearing tinted lenses. Participant 5's daughter had improved relationships with her teachers and a "good circle of friends," according to Participant 5. She described her daughter as "more pleasant to be around." Additionally, this participant described her daughter as being "high strung" before tinted lenses, which may have contributed to "some bullying" and poor relationships with others. However, Participant 5's daughter has had to learn social cues and skills now that she has tinted lenses because her IS symptoms were so severe prior to the glasses that she had difficulty reading social expressions. Participant 5 reported that her daughter took social classes to learn these skills, which she would not have been able to do as easily without her use of the glasses. “Life got a lot less stressful,” said Participant 5 of her daughter’s newfound social skills and relationships.

In Theme 2, there were two discrepant cases. Participant 1’s experience with her daughter prior to using overlays and tinted lenses was that her daughter was already a “social butterfly.” Participant 1 recalled that her daughter “compensated” for her IS symptoms in such a way that she was extremely outgoing and never had problems making friends. Participant 1 said,

> Socially, I call my daughter a social butterfly. Part of the reason, I think, that we did not realize that there was even an issue was she compensated for it extremely well. She’s high verbal and would do a lot of work in teams with her best friend. What she would do this was kind of in middle school because my daughter was diagnosed later in the 11th grade when we realized it. But in middle school, she and her best friend would work together frequently on homework assignments or project assignments. The friend would do the heavy reading out loud, and then my daughter would do other elements.

This quote demonstrates how, unlike other participants’ children, Participant 1’s daughter did not have social difficulties prior to her IS diagnosis. Her daughter’s strong social relationships may have been a direct result of her untreated IS symptoms, as she tried to compensate for these. As a result of this compensation, Participant 1's daughter's IS was undiagnosed and untreated until she was an older teenager.

Participant 2 presented another discrepant case in Theme 2. In contrast to other participants who either described their children as improving sociality or being very social prior to their IS diagnosis and treatment with overlays and tinted lenses, Participant 2's daughter continued to struggle with social anxiety. In part, this was mitigated by the fact that Participant 2 homeschooled her daughter, but her daughter's social difficulties in brick-and-mortar schools led to this homeschooling. "School did not go well," explained Participant 2, "So, there was social anxiety, there was feeling like she stood out, and that she was different. Therefore, the brick-and-mortar school was not a good fit." Participant 2 admitted, however, that "it's hard to exactly know where Irlen fits into [my daughter's social anxiety]."

Theme 3: Regulating Physical, Behavioral, and Emotional Symptoms

The third theme was based on participants' experiences of their children with IS who used colored overlays and tinted lenses. Through these adaptive devices, they were better able to regulate their physical, behavioral, and emotional symptoms of IS. There were three subthemes associated with this theme, decreasing negative behaviors and calming the brain, improving energy, and physical improvements.

Subtheme 3a. Decreasing Behaviors and Calming the Brain.

Participants experienced their children decreasing emotional and behavioral symptoms as a result of overlays and tinted glasses. Prior to their children using overlays and tinted lenses, life with IS was challenging for participants because their children often had trouble regulating their emotions and the behavioral responses to those emotions. With overlays and tinted glasses, this had changed for almost all participants. Participant 1 described life with her daughter before overlays and tinted lenses as a “constant battle,” likening their relationship to war. Participant 1’s daughter used “emotional pushback” when asked to do something before using tinted lenses. Now that her daughter has tinted glasses, Participant 1 said the family experienced less fighting, which is perhaps because, as Participant 1 said, “Emotionally, my daughter feels more equipped to handle a heavier workload.” When asked to do things like homework, even a heavy school workload, Participant 1’s daughter can better regulate her emotions about completing those tasks.

Several participants used the word *calm* to describe their children's changes after their children began using overlays or wearing tinted lenses. Participant 3 said that her son’s lenses “really help to kind of calm him.” Participant 3 elaborated:

> Previously, he had a lot of difficulty if he would get upset about something and kind of getting over it. He has difficulty letting it go or kind of getting past it. Now, if he gets upset about something, it’s a very minimal reaction. He kind of gets past it. I don’t know if that’s related to the glasses or lenses, but that’s just been within the last couple of months. So, when we started using the glasses, that was a change we saw, and that’s a big difference as well. In this passage, Participant 3 considered the relationship between her son’s tinted lenses and his

> improved behavioral and emotional regulation. At first, she appeared hesitant to connect her son’s ability to move past challenges directly to his use of tinted lenses but then works through this to link the two by stating, “when we started using the glasses, that was a change we saw.”

Participant 4 repeatedly used calm when she described her experience with her daughter, who wears tinted lenses. Though Participant 4 said that her daughter “wasn’t wild anyway” prior to glasses, “she is calmer.” Participant 4 admitted that “I hate to use the same descriptive word again, but she was just calmer,” indicating she could not find a better term to describe the experience of having a child with IS who wore tinted lenses. Her daughter was now more responsive and obedient when asked to do things, which was an improvement. Participant 5 characterized her daughter as having severe behavioral issues before her IS diagnosis and tinted lenses. Participant 5 explained,

> Okay, she had daily meltdowns. She would sit on the staircase and say, “I’m dumb. I cannot do any work. I can’t even go to college.” Starting in eighth grade, things really began to fall apart socially. Socially, it did not work out. Because she was always having fights around, and she was very aggressive to other students and rude. Also, started to see behavioral issues by not following teacher’s instructions, challenging them…She saw the behaviorist, and she didn’t follow the teachers…her best friend abandoned her, and she was not really able to make other friendships during that time.

This quote from Participant 5 highlighted her experiences parenting a child with IS prior to overlays or tinted glasses. Her child had such significant behaviors that she could not regulate that they sought treatment from a behaviorist. Now, with tinted lenses, Participant 5 said that life with her daughter was very different. “She’s mentally just a lot stronger kind of dealing with panic attacks,” Participant 5 said, “Her anxiety has gone down…So, it was just a calm experience at home, not this constant stress.”

Similar to Participant 5, Participant 6 described her daughter as “my emotional basket case” prior to tinted lenses. Participant 6 likened her daughter’s emotional outbursts to “an emotional roller coaster,” which was soon remedied after her daughter began wearing tinted glasses. “There was no longer the loss of control with her emotions,” said Participant 6. This participant said that her daughter’s “emotions made sense to what was happening,” and her daughter told her she felt “more in control of her emotions and brain” after wearing the tinted glasses. Participant 7’s daughter also had a hard time regulating her behaviors, which led her daughter to be removed from school several times in the year before receiving her tinted glasses. Now, with the tinted lenses, Participant 7’s daughter “seems more calm, more relaxed,” and her daughter no longer demonstrated the same behavioral challenges in the classroom.

Participant 9 said the change in her son’s emotions happened almost instantaneously when he began wearing tinted glasses. Before lenses, her son was “as far as the anxiety…always in that fight or flight mode.” She reported that her son’s anxiety diminished with the use of glasses: “Like, the second he put the glasses on, he said it was like a wave of relief just washed over him." Participant 9 experienced her son as less anxious now, which she directly connected to his wearing tinted lenses.

Participants reported that their children experienced nervous behaviors as a symptom of IS, which improved after using overlays and tinted glasses. Participant 2's daughter called these behaviors "Irlen attacks," and, for her daughter, the attacks included furiously rubbing her eyes and stuttering. "The stuttering went away," Participant 2 said of the change she noticed after her daughter began wearing tinted lenses. Participant 7 said that her daughter's nervous behaviors were characterized by coughing spells that led to her frequent removal from the classroom because they were so disruptive to the class. Participant 7 described her daughter receiving a diagnosis of eosinophilic esophagitis and medication. She noted that even the medicine for that disorder had no real impact on the cough. "They didn't have any effects on the cough until after she got her overlays…She does not cough anymore, which I know makes her feel better," said Participant 7.

Several participants described their children's brains as becoming calmer after using colored overlays and tinted lenses. Participant 2 said her daughter's brain "was in complete disarray," which made her daughter "kind of act drunk" before glasses, which she no longer experienced. Participant 4 said that her daughter's glasses "just calmed her little brain down." Before glasses, Participant 4's daughter had a very active brain that did not allow her to calm down, especially before bedtime. "It's time for bed now, instead of this highly active brain," Participant 4 said of the changes she had seen in her daughter's IS symptoms. Participant 10's son experienced a similar active brain to

Participant 4's daughter, which was also calmed by tinted lenses, but differently. Before wearing tinted lenses, and especially for reading, her son would fall asleep after starting to read because it took him so much "brainpower" to read without an adaptive device. Now, he no longer falls asleep reading because his brain is not on overload from trying to compensate for his IS symptoms while reading.

Subtheme 3b. Improving Energy

According to participants, children with IS who used overlays and tinted glasses to help their symptoms saw improvements in their energy levels. This was perhaps a consequence of the active brain that participants described in their children in Subtheme 3a. With a calmer brain came improvements to energy levels. Participant 1 said she failed to recognize a "kind of fatigue" in her daughter before tinted lenses but said her daughter use to require frequent breaks from activities, which is no longer the case now that she has tinted glasses. Participant 4 noticed a difference in her daughter's energy levels as a result of wearing lenses. While her daughter seemingly had energy before her glasses, this was rambunctious, restless energy rather than something focused, and the restlessness created problems for her daughter's sleep hygiene. Participant 4 shared:

> She sleeps more, and she sleeps better. She was very restless…She always wakes up and hollers for me, or she wakes up and says, "I need to go to the bathroom." She has never been a sound sleeper, but now her quality of sleep has been better. She still doesn't sleep through the night, but she's up maybe once a night versus before; she was up three and four times a night…But with her lenses, it allowed

> her to sleep for longer periods of time because she was able to go to bed. Also, with the extra sleep, it benefitted her in school and her behavior.

Several things are evident in this passage from Participant 4. First, Participant 4 linked her daughter's use of tinted lenses and her improved quality of sleep. This likely led her daughter to have more energy during the day than the rambunctious, active brain they experienced before. Second, Participant 4 made the connection between tinted lenses, improved sleep, and academic improvement. Because her daughter was now sleeping better, Participant 4's daughter had seen academic improvements. Third, Participant 4 connected tinted glasses, improved sleep, and reduced behaviors, meaning that something about receiving better quality sleep due to wearing the lenses had mitigated her daughter's behavioral problems that she once had.

Participants 6, 7, and 10 also reported improvements in their children's sleep quality and, thus, energy levels. Participant 5 said her daughter used to come home from school "exhausted," but now that she uses overlays at school, her daughter "wasn't always exhausted and tired." Similarly, Participant 6 said, "Now that I think about it, [my daughter] didn't have as much trouble sleeping. She slept better after she got her color overlays." Participant 6 said that now, her daughter was asleep within 20 minutes of bedtime, a significant improvement from before overlays. Participant 9 said her son was always tired before colored overlays and tinted lenses, but now, her son "had more energy…more energy to do things."

Subtheme 3c. Physical Improvements

Participants' children experienced noticeable physical improvements related to using tinted lenses or colored overlays to improve their IS symptoms. Four participants said their children experienced headaches related to IS before they had tinted lenses or overlays, the frequency of which improved after obtaining their adaptive devices. Participant 5 reported that her daughter's migraines "disappeared" with the use of overlays. Her daughter had frequent migraines prior to her IS diagnosis, and she has not had one in two years. Similarly, Participant 10 said her son "has not encountered a headache" since he started using adaptive devices for IS. Participant 9's son had also seen a decrease too in headache frequency. Participant 9 said,

> The headaches were horrible. He would come home from school and put blankets over his head and just cry for an hour because he was in so much pain. It was heartbreaking. Then, he's supposed to do homework. It was horrible. Now, he doesn't really experience any of that. So, it's amazingly different.

Other participants' children experienced different physical improvements related to light sensitivity, which was a symptom of their children's IS. Participant 2 said her daughter frequently read in dark rooms. Participant 2 explained,

> She liked to be in dark places. Even reading, she would read where it was dark. For instance, like in her bedroom with all the shades drawn and no lights on, etc. I had no understanding of why anybody would ever want to do that.

Now, with adaptive devices, Participant 2's daughter no longer felt she needed to be in a dark room. When Participant 2's daughter had her glasses on, she did not like to be in rooms with artificially dim light. Even when Participant 2's daughter had her glasses on, she continued to have some trouble with flashing lights.

Another symptom of IS that adaptive devices appeared to improve in participants' children was depth perception. Participant 3's son played hockey and baseball but could not see the ball in baseball because he lacked depth perception. Participant 3 said her son played ball better once he got his glasses. Participants 3a and 4 both said their children described the world as looking "flat" before their glasses. Participant 3a's son, prior to tinted lenses, said that the snow he saw outside the window fell flat. After he got his glasses, he looked out the window and told Participant 3a that the snow was "bumpy," meaning that he could now see the landscape with depth perception. Participant 4 described an experience when she and her daughter went to shoot laser targets:

> We went through this three times, and she did not hit one target because we were afraid her glasses were going to fall off because you're suspended in the air. Well, we put her glasses on. She came back and started hitting the targets where she could not do that before. That was huge. Because she was so frustrated that she could not hit these targets with lasers. However, [with] the glasses, she hit like five and six targets. It was great.

Similarly, Participant 6 assumed that her daughter was clumsy before her IS diagnosis. She said her daughter would walk into doorways and had trouble judging corners when walking around the house. Participant 6 said that once her daughter had filters, her depth perception changed, and her movement in the house improved. "Turning a corner in the house was no longer problematic." Participant 6's daughter was not the only child who had trouble with clumsiness due to lack of depth perception or for other reasons. This also happened to Participant 2's daughter, who use to walk into things in the house, a behavior that has reduced with adaptive devices. Participant 3a reported that her son "trips a lot and falls a lot" before he had tinted lenses.

Summary

In this chapter, I presented the findings from this study. Key results from this thematic analysis indicated that parents' experiences of their children with IS who use colored overlays or tinted lenses were characterized by overall improvements in their children's academic ability, behavioral and emotional regulation, energy levels, and physical symptoms. Prior to using overlays and tinted lenses, participants said their experiences with their children were challenging. Their children had academic difficulties that teachers did not understand, particularly in reading and writing, which seemingly did not make sense because the children with IS could comprehend what they were reading. After implementing overlays and tinted lenses, children improved their reading and writing ability, and participants reported improvements in their children's test scores and grades. Children also increased their confidence, which led them to better, more positive social relationships and interactions with others.

Findings also indicated that children could not control their emotions and behaviors before they started using overlays and tinted glasses. Some participants noticed an almost immediate improvement in their children's emotions and behaviors using lenses. Participants who described their children as emotional rollercoasters before tinted glasses noticed that their children were better able to handle challenges. Their children's emotional responses matched situations, rather than their children becoming overly emotional over something that was not a big deal. Children also slept better at night with overlays and lenses during the day, which led them to improved energy levels. In addition to this, many participants noticed almost an immediate improvement or reduction in their IS child's physical symptoms such as eye rubbing, stuttering, migraines, coughing, stomach issues, and light sensitivity. I also discussed the setting and demographics of this study in this chapter and how trustworthiness issues were maintained throughout the study. In the next chapter, I discuss the findings presented in this chapter in greater detail and in relation to the literature on the topic.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this qualitative phenomenological study was to explore the lived experiences of parents of children with IS who used tinted lenses or colored overlays to treat IS from a biopsychosocial perspective. Most research on this phenomenon has focused on the biological aspects of children with IS, thus neglecting the interconnected psychological and social experiences of children with IS. This chapter includes a summary of the study findings and interpretation of the results and a discussion of how the findings add to the knowledge base in the field of psychology. I also discuss study limitations and recommendations for future research and implications for positive social change.

I used Engel's (1977) biopsychosocial theory, which emphasizes the interconnections between physical and mental health as involving biological, social, and psychological components, to inform my exploration of the lived experiences of parents of children with IS. Engel's biopsychosocial theory acted as a guide for interpretation when I explored the themes that resulted from the analysis. Data analysis involved thematic analysis, as outlined by Braun and Clarke (2006).

Interpretation of the Findings

My intent in this study was to explore the lived experiences of parents who had a child with IS who used colored overlays or tinted lenses for 4 months or longer to treat the syndrome. The findings were based on the interview data I collected from 11 parents.

Data collected also included demographic information on the participants. Three major themes emerged from data analysis: (a) Overcoming educational difficulties; (b) Improving confidence and sociality; and c) Regulating physical, behavioral, and emotional symptoms. Two subthemes supported Theme 1: Overcoming academic difficulties and Battling the school. Theme 3 contained three subthemes: Decreasing behaviors and calming the brain, Increasing energy, and Physical improvements.

Parents indicated that their children with IS struggled academically in homework completion, reading, and writing before the diagnosis of the syndrome. Many experienced reading issues in terms of decoding, reading fluency or rate of reading, and reading comprehension, all of which impacted their performance on standardized state assessments or required an approach to academics that was slow and labor-intensive. However, after using colored overlays or tinted lenses, participants reported that their children showed overall improvements in academics, with many noted improvements overall in reading (i.e., reading fluency and reading speed) and writing.

The above findings aligned with the works of several researchers on the association between individuals with IS and reading and general academic difficulties (see Irlen, 2005; Meares, 1980; Orton, 1925). Irlen (2005) argued that many individuals who continue to struggle with reading despite interventions might be experiencing a visual processing condition called IS. She noted that the visual systems of individuals with IS are often sensitive to specific frequencies within the white light spectrum, which cause the brain to distort information, and double or blur images. This distortion of information could cause individuals to develop visual stress, a key factor that interfered with the amount of time they spent reading.

Like Meares (1980), Irlen (2005) purported that using colored overlays or tinted lenses could alleviate or reduce these visual distortions associated with the condition. Irlen indicated that the use of colored filters would allow individuals to engage more willingly in reading and reading interventions to address language-based deficits more effectively. Similarly, other researchers supported Irlen's association between IS, visual stressors, and reading difficulties. For example, Williams (2014) indicated that individuals with IS tend to have reading difficulties with text appearing to move off the page, blur, jump off the page, or flicker. Likewise, Chang et al. (2014) noted that IS individuals might develop slow reading rates and poor reading comprehension due to visual distortions that result in the individual losing their place or skipping lines while reading. Other researchers also reported that many IS individuals tend to have poor writing and spelling, as well as reading fluency issues, and a myriad of behavioral and physical symptoms (Crabtree, 2011; Evans & Joseph, 2002; Evans & Stevenson, 2008; Irlen, 2005; Kusano et al., 2015; Loew et al., 2013; Taub et al., 2009). These researchers concurred with Irlen that colored overlays and tinted lenses are methods that could be used to alleviate this visual distortion or stress (Crabtree, 2011; Evans & Joseph, 2002; Evans & Stevenson, 2008; Irlen, 2005; Kusano et al., 2015; Loew et al., 2013; Taub et al., 2009).

Other researchers examined the use of participant-preferred colored overlays to aid in reading disorders or other learning disabilities such as dyslexia and autism. My findings supported those of previous researchers who reported that colored overlays or colored filters were shown to assist in the improvement of reading fluency, reading speed, and comprehension in individuals who experienced IS (see Bouldoukian et al., 2002; Evans & Joseph, 2002; Gutschke et al., 2017; Hollis & Allen, 2006; Kriss & Evans, 2005; Ludlow et al., 2008; Wilkins, 2002; Wilkins & Evans, 2002).

Another key finding of my study was that parents of IS children struggled with school personnel to understand IS, consider it a disability, and provide consistent accommodations to their children. In contrast, some parents of IS children received acknowledgment on some level that IS existed and were provided with accommodations. However, these accommodations, such as colored overlays or other adaptive devices, were not provided by teachers or school personnel in the educational system without a parental battle. Additionally, many IS children were called out in classes in front of their peers by school personnel (i.e., teachers, substitute teachers, and aides) and reprimanded for wearing dark-colored glasses, which further highlighted that many school staff did not understand IS and the need for colored/tinted lenses. The above actions by school personnel stigmatized children with IS. Therefore, my study supported Swanson et al. (2013) argument that disorders such as IS were largely unidentifiable by the layperson and may not get the same considerations as disabilities that were clearly specified and fall under the purview of the ADA. Therefore, children with IS may be considered an unprotected group subjected to unfair treatment by teachers or school personnel within the schools. Unfortunately, lacking specific diagnosis, individuals who suffer from IS may not be wholly covered by the ADA, which constitutes a major social issue associated with the disorder (Cortiella & Horowitz, 2014).

Improvements in confidence and social interactions were also key findings in my study. Participants reported their IS children’s confidence increased as the children began to use overlays and tinted lenses to reduce visual distress. Participants also reported positive academic changes in areas such as reading and writing. Additionally, children with IS no longer stood out as different amongst their peers and were better able to communicate and understand social cues. As their self-confidence developed, so did their willingness to interact with peers. Similarly, Bishop (2014) noted that children with hearing impairments might also miss or misinterpret social cues, which led to low self-esteem and diminished confidence.

Another finding of my study indicated that children could not control their emotions, behaviors, and physical responses before they started using overlays and tinted glasses. Some participants noticed an almost immediate improvement in their children’s emotions and behaviors using lenses. Participants who described their children as emotional rollercoasters before tinted glasses noticed that their children were better able to handle challenges. Their children's emotional responses matched situations, rather than their children becoming overly emotional over something that was not a big deal. Children also slept better at night when they used overlays and lenses during the day, which led them to improved energy levels. In addition to this, many participants noticed almost an immediate improvement or reduction in their IS child's physical symptoms such as eye rubbing, stuttering, migraines, coughing, stomach issues, and light sensitivity.

My findings supported Turunen et al.'s (2017) research on the connection between physical, behavioral, and emotional challenges and IS. Turunen et al. found that in the case of students with reading difficulties, affected students were often burdened with emotional, behavioral, and interpersonal challenges. However, my findings added a new perspective in that tinted lenses could help regulate physical, behavioral, and emotional symptoms in IS children, which might reduce the visual distress.

Limitations of the Study

I identified several study limitations. First, this study's scope was limited to 11 participants who had children with IS, who used colored overlays or tinted lenses for a during of 4 months or longer. The parents of IS children who volunteered for the study may have different experiences than those who did not participate. For example, socioeconomics, education, culture, gender, and ethnicity all could contribute to one's experiences or perceptions. In my study, all the parents of IS children were women, had a bachelor's degree or higher, and identified themselves as White. Perhaps a more diverse group of parent volunteers would yield a different set of experiences, such as men, other identified minorities, or persons of color. In addition, this study's findings may be more representative of this specific participant group (parents of IS children) and not generalizable to the population as a whole. However, my qualitative research aimed to gain in-depth insight and information on the shared experiences of participants. Furthermore, my qualitative study relied on me as the primary data collector for the interview and analysis of the data, which could result in possible researcher bias. However, I minimized the possibility or researcher bias by using strategies such as trustworthiness, integrity, and member checks of the data (see Shenton, 2004; Thomas & Magilvy, 2011).

Lastly, although my review of the literature suggested that children with IS or other learning disabilities might experience an increased incidence of victimization by bullies or demonstrate bullying behavior (Fink et al., 2015; Klomek et al., 2016; Turunen et al., 2017), most participants in my study did not report this experience. Only one participant reported this phenomenon in my study. Perhaps if my sample size had been larger, parents might have reported this phenomenon.

Recommendations

As I conducted interviews, parents provided further demographic information about themselves and their children. Information gleaned from participants revealed that seven out of 11 parent participants reported that their children had concurrent or co-existing diagnoses, such as speech impairments, ADHD, anxiety, dyslexia, reading difficulties, and other learning disabilities. Although a review of empirical literature revealed that there was a correlation between IS and conditions such as ADHD, dyslexia, autism, and anxiety, further mixed-methods research might provide more comprehensive insight into the factors or relationships between IS and specific disorders (Crabtree, 2011; Evans & Stevenson, 2008; Kriss & Evans, 2005).

In addition to the above-noted findings, six participants also shared without being prompted that they either had IS or other children in the family had the condition, which supported Irlen’s (2005) research that it was not unusual for multiple family members to have IS. This familial phenomenon should be explored further through qualitative and quantitative studies. For example, researchers might wish to explore the lived experiences of parents with IS, as well as their offspring through retrospective or prospective studies. Also, quantitative research might assess several factors or variables (i.e., genetic or environmental) that contribute to IS occurring within family members.

This qualitative phenomenological study explored parents' lived experiences with IS children who used colored overlays and tinted lenses through a biopsychosocial perspective. In my current study, the participants identified themselves as educated, White women. Perhaps a more diverse group of parent volunteers, including men or people of color, would have further enhanced this study by providing more insightful experiences.

Implications

My goal in this study was to use a biopsychosocial perspective to better understand and gain more in-depth insight into parents' lived experiences with children with IS who used colored overlays or tinted lenses. The preliminary findings of this study may contribute to the existing body of knowledge on IS and available treatments, spur further research once published in a peer-reviewed journal, and potentially be presented at an IS conference. Furthermore, this study's results may help educate and enlighten clinicians and educators about the condition and help provide additional support to parents with children with IS. Additionally, study findings indicated that tinted lenses could help children regulate physical, behavioral, and emotional symptoms. The results also may lead to positive social change by informing ways to enhance IS children’s reading and academic outcomes, leading to reduced stigmatism associated with IS and improved learning and learning opportunities.

Conclusion

Reading illiteracy continues to be a problem in our society today. Reading illiteracy has been associated with students being at-risk of dropping out of school, criminality, and social and economic instability. Therefore, learning to read is necessary for U.S. society (Adams, 1994; Hall & Moats, 1999; US Department of Education, 2013).

Irlen (2005) purported that many individuals struggle with reading due to a visual disturbance called IS, which impacts reading proficiency. The use of colored overlays and tinted lenses was seen as a tool to alleviate the condition, allowing individuals to read or engage more in reading interventions. Unfortunately, most research on the use of colored overlays and tinted lenses mainly focused on the biological dimensions of reading difficulties, ignoring associated psychological and social issues children may experience as a result of reading difficulties. However, the purpose of my phenomenological qualitative study was to explore the lived experiences of parents of children with IS who used tinted lenses or colored overlays to treat IS from a biopsychosocial perspective. I had a genuine interest to explore how the above phenomenon might enhance the lives of IS children who used colored overlays or tinted lenses, as perceived by their parents.

I used the biopsychosocial theory of Engel (1977), which emphasized the interconnections between physical and mental health. Engel's theory considered the role biology, social processes, and psychology play in physical and mental health. I used Engel's biopsychosocial approach to guide my interpretation and explore the themes generated through data analysis.

Overall, my study results showed the use of colored overlays or tinted lenses enhanced the IS child in terms of academics, self-confidence, sociability, and regulation of emotions, behaviors, and physical well-being. Specifically, participants reported improvements in their child's reading fluency and reading comprehension. Participants also reported improvements in their IS child's homework completion and writing. In addition to this, participants reported an improvement in their child's confidence levels and sociability, as colored overlays or tinted lenses reduced the visual distress that may have made their child struggle compared to their peers. These adaptive devices allowed the IS child to improve academics and feel like they no longer stood out amongst their peers. However, participants acknowledged continued school struggles with personnel to understand and consider IS to be a disability and provide consistent accommodations for the IS child.

Another important finding was that overlays and tinted lenses seemed to enhance calmness and energy levels. The adaptive devices also seemed to reduce light sensitivity associated with IS dysregulation. Furthermore, parents attributed the reduction or elimination of physical symptoms such as stomach aches, headaches, stuttering, and eye rubbing due to colored overlays or tinted lenses as an adaptive device.

In summation, by conducting my study and publishing it in a peer-reviewed journal, as well as presenting it at an IS conference, a greater understanding of specific biological, social, and psychological effects that colored overlays and tinted lenses had on IS children, as their parents perceived, might be achieved. The results of my study might support professional practice in health and clinical psychology by providing an understanding of the use of colored overlays and tinted lenses as a strategy to enhance the well-being of children with IS. Additionally, educators might be provided with an awareness of IS and the knowledge that colored overlays and tinted lenses can be used as a more effective teaching instruction strategy for improving overall reading and other academic areas. Furthermore, my study results could be instrumental in positive social change through the expanded use of colored overlays and tinted lenses in various settings to help enhance children's biological, psychological, and social functioning with IS.

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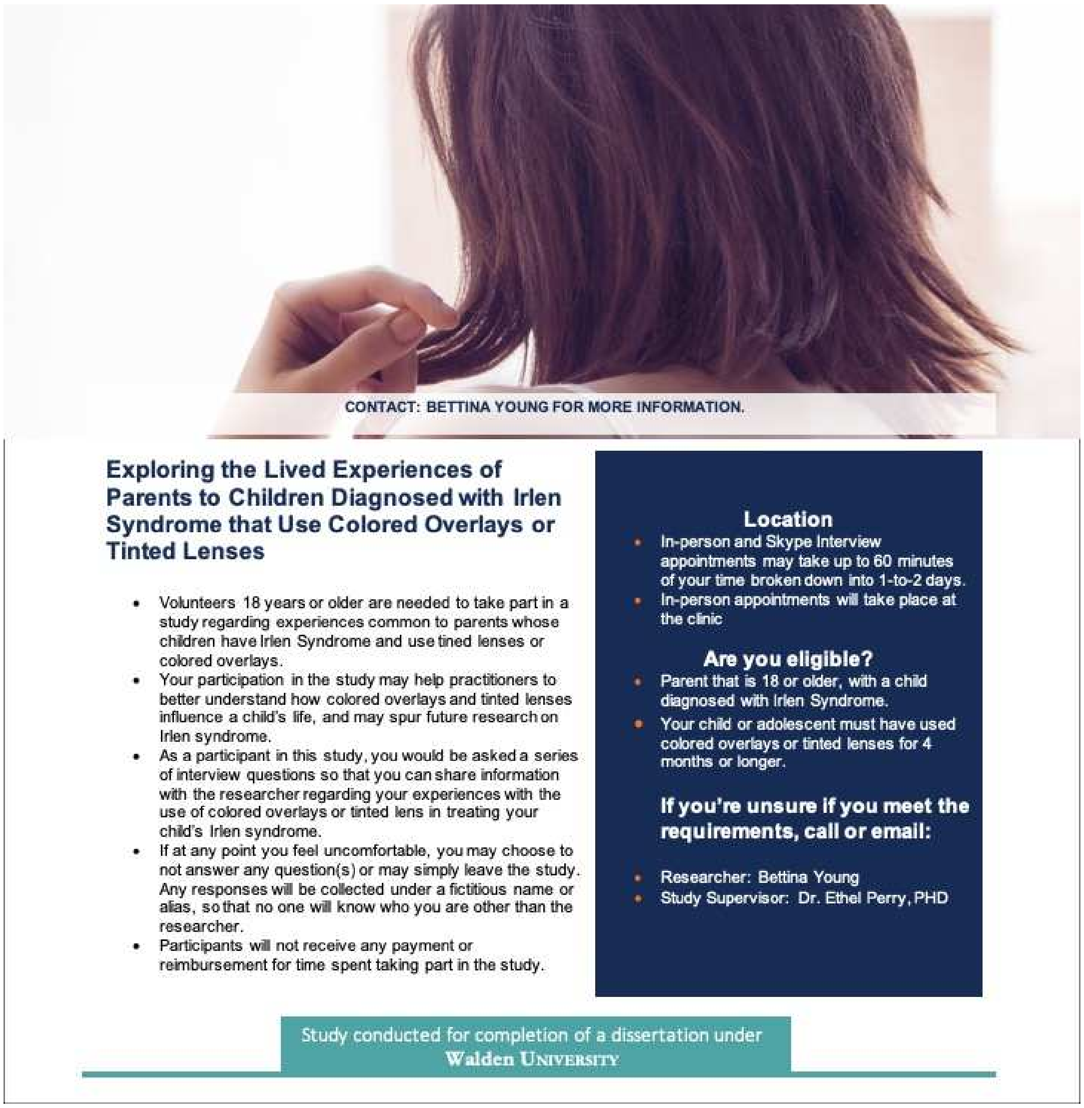
Appendix A: Recruitment Flyer



CONTACT: BETTINA YOUNG FOR MORE INFORMATION.

Exploring the Lived Experiences of Parents to Children Diagnosed with Irlen Syndrome that Use Colored Overlays or Tinted Lenses

- Volunteers 18 years or older are needed to take part in a study regarding experiences common to parents whose children have Irlen Syndrome and use tined lenses or colored overlays.
- Your participation in the study may help practitioners to better understand how colored overlays and tinted lenses influence a child's life, and may spur future research on Irlen syndrome.
- As a participant in this study, you would be asked a series of interview questions so that you can share information with the researcher regarding your experiences with the use of colored overlays or tinted lens in treating your child's Irlen syndrome.
- If at any point you feel uncomfortable, you may choose to not answer any question(s) or may simply leave the study. Any responses will be collected under a fictitious name or alias, so that no one will know who you are other than the researcher.
- Participants will not receive any payment or reimbursement for time spent taking part in the study.

Location

- In-person and Skype Interview appointments may take up to 60 minutes of your time broken down into 1-to-2 days.
- In-person appointments will take place at the clinic

Are you eligible?

- Parent that is 18 or older, with a child diagnosed with Irlen Syndrome.
- Your child or adolescent must have used colored overlays or tinted lenses for 4 months or longer.

If you're unsure if you meet the requirements, call or email:

- Researcher: Bettina Young
- Study Supervisor: Dr. Ethel Perry, PHD

Study conducted for completion of a dissertation under
Walden University

Appendix B: Interview

1RQ. In as much detail as possible, describe your life as you have experienced it before your child was diagnosed with IS?

2RQ. In as much detail as possible, describe your life as you have experienced it after your child was diagnosed with Irlen Syndrome?

3RQ. Specifically, what was your experience like within the home, school, community, and/or interactions with others?

4RQ. What kinds of things did you pick up on that might have indicated a physical or emotional sensation for your child when using the tinted lenses and/or colored overlays?

5 RQ. Did you notice any behavioral change(s) after your child started using tinted lenses and/or colored overlays? If so, how would you describe the change?

6 RQ. How would you best describe your feelings about your child's use of colored overlays and/or tinted lens? Were changes noticed in behaviors, feelings, social interaction, and symptoms?

<u>Probing Question</u>:

1. I noticed you brought up___. Can you tell me more about that?