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ADDRESSING CHALLENGING BEHAVIORS  
OF STUDENTS WITH DOWN SYNDROME

A MASTER'S THESIS  
SUBMITTED TO THE FACULTY  
OF BETHEL UNIVERSITY

BY  
LAURA M. OLSTAD

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF  
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ADDRESSING CHALLENGING BEHAVIORS  
OF STUDENTS WITH DOWN SYNDROME

Laura M. Olstad

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APPROVED

Advisor's Name: Susan Larson

Program Director: Katie Bonawitz, Ed. D.

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## **Abstract**

This literature review focuses on finding research-supported techniques regarding interventions for children with Down syndrome who display challenging behaviors that interfere with academic and social aspects of their lives. The goal of this review is to discover currently available research focused on behaviors of children, students and young adults with Down syndrome and the interventions used to reduce challenging behaviors to help them be successful. This literature review focused on discovering interventions that address behaviors that are most prevalent in those with Down syndrome. Many questions are answered in this literature review about the factors that support behavior changes in students with Down syndrome. These include questions regarding Functional Behavior Analysis (FBA), which behavioral functions are most prevalent in children and adults with Down syndrome along with the long-term effects and the effectiveness of an FBA to identify the factors that address the challenging behaviors of students. This information will help special education teachers and caregivers understand the importance of addressing and teaching skills that help reduce or eliminate undesirable behaviors in children and young adults with Down syndrome.

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## CHAPTER I: INTRODUCTION

### History of Down syndrome

According to the National Down Syndrome Society, “Down syndrome occurs when an individual has a full or partial extra copy of chromosome 21. Typically, the nucleus of each cell contains 23 pairs of chromosomes, half of which are inherited from each parent.” (National Down Syndrome Society, 2018). In the United States, approximately one in every 700 babies is born with Down syndrome making it the most common chromosomal condition (Centers for Disease Control and Prevention, 2018). Due to the addition of extra genetic material, development is affected and typical physical traits include low muscle tone, small stature, and an upward slant to the eyes. Individuals with Down syndrome will have varying results of long-term developmental delays, intellectual disabilities, and other medical abnormalities such as heart and gastrointestinal disorders (Down Syndrome, 2018).

Education and living situations for those diagnosed with Down syndrome look very different today than during the first half of the twentieth century in the United States. Soon after birth, most children were placed in institutions as families were advised by the medical community that they would not be able to raise them due to their high needs. Parents were told that their child was less than human. “The children were locked away and put in deplorable conditions as to not be seen by the rest of society. Due to these inhuman conditions the National Association for Down Syndrome was formed in 1960 to help reverse the stereotype of those diagnosed with Down syndrome,” (History of NADS, 2016).

On November 29th, 1975 President Gerald Ford signed the Education for All Handicapped Children Act (Public Law 94-142); this federal law ensured a free, public education

for all children with disabilities, including those with Down syndrome. Millions of children with disabilities were able to attend public schools as the country committed to giving them opportunities to develop their underlying talents, share their gifts, and help contribute to their individual communities (History of NADS, 2018). Over the last 40 years, education has become more inclusive and the future for those with disabilities, including Down syndrome, has become more hopeful. This includes the immense progress towards protecting the rights of individuals with Down syndrome, helping meet the needs of each individual, and improving educational results from infants to youths with disabilities (History of NADS, 2018).

In the general education classroom, students with disabilities have been provided equal access to participation with their peers in the general curriculum due to policies and practices. “In 2010 nearly 60 percent of students with disabilities spent time in general education classrooms 80 percent or more of the school day. Early intervention services are now provided to nearly 350,000 families of infants and toddlers with disabilities, and over 6.6 million children and youths receive special education and related services designed to meet individual educational needs” (History of NADS, 2018). The Individuals with Disabilities Education Act (IDEA) was celebrated in 2010 as the 35th anniversary of the passage of Public Law 94-142.

### **Behavior Intervention Overview**

Typically, behavioral interventions are designed and implemented in school settings with input from teachers, parents, support staff, and a behavior intervention specialists. A behavior intervention typically includes a series of steps for teachers to follow that reduce or eliminate specific problem behaviors that interfere with learning. Identified problem behaviors may include disrupting the class, showing aggression toward the teacher or other children, acting



under responsive or withdrawn, refusing to complete work, and/or using inappropriate or harassing language. It is commonly understood that ‘All behavior is communication.’ Although knowing what the exact function a particular behavior serves, often uncovering the meaning behind it by examining the information collected through the assessments and asking strategic questions is beneficial (Tucker, 2014).

The first step for implementing a behavior intervention is to develop a Functional Behavior Assessment (FBA), which provides a hypothesis about the problem behaviors. The FBA process describes an individual student’s disruptive behaviors, considers the reasoning behind the behaviors and offers interventions for the teachers and staff to teach new behaviors that replace undesirable behaviors. Although not all behaviors merit an FBA process, the FBA is only available for students with an individualized education program (IEP) (Behavior Assessment and Intervention Plans, 2018).

After the student’s team collects all of the data for the FBA, discussions will take place and a hypothesis will be formed about the possible deficits and causes for the behavior. The team may then decide to develop a behavior intervention plan (BIP). The BIP targets from one to three specific undesirable behaviors and includes interventions that are linked to the functions of the behavior. A BIP may include replacement behaviors or prevention strategies along and provides a plan for responding to old behaviors that are currently being extinguished while promoting the new behaviors (Behavior Assessment and Intervention Plans, 2018). A BIP should be monitored and adjusted, as needed according to the student.

## **Personal Connection to Down syndrome Students and Behaviors**

I grew up with a cousin, the same age and gender as me, who has Down syndrome. I was fortunate enough to spend an immense amount of time with her, growing and learning even though she had many challenging behaviors. I remember getting my hair pulled, being bitten, hit and yelled at when she was upset. At the time I thought nothing of it, but now, as I work with high school students who have Down Syndrome and I deal with these challenging behaviors. I wonder if the behaviors could be minimized as the students grow into young adults. Students with Down syndrome who are currently in my class display many negative behaviors including attention problems, noncompliance, and compulsions. My high school students have long-established inappropriate behaviors. I wonder what earlier interventions adults have implemented to address these behaviors and how my colleagues and I can intervene to support teenage students to develop more appropriate behaviors.

My experiences growing up and teaching in the classroom have piqued my interest in learning the “why” behind the behaviors in students with Down syndrome. I want to discover what I can do as an educator to decrease negative behaviors and increase positive behaviors. I am interested in understanding what interventions can best help students with Down syndrome and learn which behavioral functions tend to be most prevalent for unwanted behaviors. My ideal goal is to help students develop functional skills in order to participate appropriately in the “real world.” Overall, challenging behavior not only precludes individuals with Down syndrome from learning opportunities within their environment, but also prevents them from accessing more typical educational and community environments as they approach school age and beyond (Buckley, Bird, Sacks, & Archer, 2002).

## **Overview and Thesis Questions**

This literature review considered currently available research focusing on behaviors of children, students and young adults with Down syndrome and the interventions used to reduce challenging behaviors to help them be successful. This literature review focused on finding new techniques to teach the correct skills and focus on the behaviors that are most prevalent in those with Down syndrome.

This literature review explored the following questions: What are factors that support behavior changes in students with DS within an FBA and behavioral intervention? What different aspects of behaviors and interventions for both the children with Down syndrome and their families does the research literature support? What functions of behaviors are most prevalent with children and adults with Down syndrome and what are the long-term effects? Lastly, how effective is an FBA in identifying the factors that address the challenging behaviors of students with Down syndrome? This information will help special education teachers and caregivers understand the importance of teaching and addressing skills that help reduce or eliminate undesirable in children and young adults with Down syndrome.

**Abbreviations**

BIP - Behavior Intervention Plan

DA - Developmental Age

DS - Down syndrome

EF - Executive Function

FBA - Functional Behavior Assessment

ID - Intellectual Disability

IEP - Individualized Education Program

NADS - National Down Syndrome Society

PA - Phonological Awareness

SIB - Self-Injurious Behavior

## **Definition of Terms**

*Adaptive Behavior* - Behavior that enables a person to get along in his or her environment with greatest success and least conflict with others.

*Analogue Functional Analysis* - Conducted by systematically manipulating predefined environmental events, usually in a controlled environment.

*Applied Behavior Analysis* - Interventions addressing socially significant age-appropriate behaviors with immediate importance to the individual using precise measurement of those behaviors in need of improvement.

*Behavior Intervention Plan* - A plan that is based on the results of a functional behavioral assessment and, at a minimum, includes a description of the problem behavior, global and specific hypotheses as to why the problem behavior occurs and intervention strategies that include positive behavioral supports and services to address the behavior.

*Behavioral Phenotype* - The characteristic cognitive, personality, behavioral, and psychiatric pattern that typifies a disorder.

*Challenging Behavior* - Self-injury or injury of others, causes damage to the physical environment, interferes with the acquisition of new skills, and/or socially isolates the learner.

*Down syndrome* - A genetic chromosome 21 disorder causing developmental and intellectual delays. Also called trisomy 21.

*Executive Function* - A set of mental skills that help you get things done. These skills are controlled in the frontal lobe of the brain.

*Functional Behavior Assessment* - The relationship between events in a person's environment and the occurrence of challenging behavior is determined in an effort to identify factors maintaining that behavior.

*Individualized Education Program* - A document that is developed for each public school child who needs special education. The IEP is created through a team effort, reviewed periodically.

*Intellectual Disability* - Significant limitations both in intellectual functioning (reasoning, learning, problem solving) and in adaptive behavior, which covers a range of everyday and practical skills.

*Phonological Awareness* - An individual's awareness of the phonological structure, or sound structure, of words.

*Positive Behavior Support* - A behavior management system used to understand what maintains

an individual's challenging behavior.

*Repetitive Behavior* - An umbrella term used to describe behaviors characterized by frequency, repetition, inappropriateness, and invariance including stereotyped and self-injurious behavior.

*Trial-Based Functional Analysis* - Used to identify problem behavior function in schools.

## **CHAPTER II: LITERATURE REVIEW**

### **Overview of Research Process**

Academic peer-reviewed articles were selected for this literature review. The articles were retrieved from different databases such as EBSCOhost, ERIC, and Academic Search Premier. Statistical information and the history of Down syndrome were collected from informational reports. Other research information was gathered from previously published theses related to this particular topic. Keywords used to search the professional literature included behaviors of children with Down syndrome, FBA and students with Down syndrome, early interventions in education, Down syndrome behaviors, and FBA effectiveness Down syndrome. Information was compared to develop connections between studies, and patterns emerged among several of the research studies. Recurrent themes of the social, emotional, and academic benefits of early behavior interventions with young children with Down syndrome were prevalent in the research studies.

One recurring theme identified through the research studies included factors that support behavior change in students with Down syndrome related to an FBA. Studies conducted by Coe, Matson, Russell, Slifer, Capone, Baglio, and Stallings, 1999; Feeley & Jones, 2006; Cole and Levinson, 2002; Feeley and Jones, 2002, identified how behavior problems affect how students with Down syndrome deal with life events, repetitive behaviors of children with Down syndrome, how applied behavior analysis can be beneficial and the effect choice making has on behaviors. An abundance of research focused on the different aspects of behaviors and interventions for children and families of those with Down syndrome (Cless, Goff, and Durtschi, 2017; Lemons, et al. 2017; Lemons et al, 2015). Other research considered on the functions of challenging behaviors and how behavioral assessment (Tomaszewski, Fidler, Talapatra, & Riley,

2018; Makary et al. 2014; Dieleman et al. 2018). The final theme that emerged in the research showed the effectiveness of the Functional Behavior Assessment (FBA) as a tool to identify factors that maintain the challenging behaviors of students with Down syndrome (Rodriguez, Thompson, and Baynham, 2010; Rispoli, Davis, Goodwyn, & Camargo, 2012; Scheithauer, O'Connor, and Toby, 2015). It became evident through reading numerous studies on the behaviors of students with Down syndrome that many interventions and functional analysis can be implemented to address challenging behaviors. These benefits are examined and discussed more thoroughly throughout the remainder of this chapter.

### **Factors Supporting Behaviors of Children with Down syndrome**

Coe, Matson, Russell, Slifer, Capone, Baglio, and Stallings (1999) examined how a major developmental disorder, such as Down syndrome, placed children at risk for exhibiting behavior problems and how behaviors related to situational adversity. This study sought to compare behaviors of students with Down syndrome to those without who matched similar age, sex, and socioeconomic status based on their mothers' and teachers' ratings. The study focused on behaviors such as attention deficit, noncompliance, thought disorder, and social withdrawal. Life events were also considered relative to the association with behavior problems at home and at school. Although this study was completed in 1999, this was the first study of its kind to research behavior problems of those with Down syndrome and how life events impacted their mental health.

The study included the behavioral ratings from mothers and teachers of 88 children between the ages of six and 15 who attended regular elementary or secondary school classes. Forty four of the children had Down syndrome and 44 children did not. The mothers of the



children with Down syndrome were recruited from Down syndrome and mental retardation advocacy group, schools and ambulatory clinics. The mothers in the control group were recruited from pediatric practices and ambulatory clinics via social media. The mothers that were chosen to take part in the control group were matched with a mother of a child with Down syndrome based on their child's sex, chronological age and socioeconomic status (Coe et al. 1999).

The mothers participated in an interview and completed a background questionnaire specifically developed for the study along with the Vineland Adaptive Behavior Scales: Survey Form (VABS-SF), the Revised Behavior Problem Checklist (RBPC), and the Coddington Life Events Schedule (CLES). With guardian consent, the child's primary teacher also completed a copy of the RBPC (Coe et al., 1999).

The researchers concluded that students with Down syndrome demonstrated a greater number of behaviors in the areas of conduct disorder, attention problems, psychotic behavior, and social withdrawal/miscellaneous-based on reports completed by their mothers and teachers. Based on mother reports, "14 children with Down syndrome (31.8%) had severe behavior problems, compared to six students without Down syndrome (13.6%). Based on teacher reports, 20 children with Down syndrome (58.8%) had severe behavior problems, compared to seven students without Down syndrome (19.4%)". Overall, data from mothers of children with Down syndrome identified approximately one in three children with significant behavior problems, exceeding those without Down syndrome by close to a three to one margin. The teachers of these students reported an even larger percentage of children with Down syndrome who displayed significant behavior problems. The teachers' greatest concerns included conduct disorder, social withdrawal, attention problems, and psychotic behaviors (i.e. repetitive speech and major preoccupation of thoughts) (Coe et al. 1999).

This study concluded that children with Down syndrome demonstrated a higher rate of behaviors both at home and in school compared with typical children. Although the children with Down syndrome may experience fewer overall life events, their developmental level may impact how they are influenced by these events. These children may be more influenced by short-term consequences and rewards versus events happening at home. For example, “conduct in the class may be more influenced by quality of academic instruction (e.g., reinforcement rate, task difficulty) than recent family changes,” (Coe et al. 1999). These are all factors to consider when supporting behaviors of students with Down syndrome. The FBA provides insight as to how best develop an intervention plan that meets students’ highest needs.

Neil and Jones (2016), examined the repetitive behaviors of children with Down syndrome including unusual routines, rituals, and stereotypy along with the interventions for these behaviors. The study expanded previous behavior functional analysis conditions based on the procedures of Iwata et al. (1982/1994) that demonstrated how to decrease repetitive behavior for those learners with Down syndrome. Children with Down syndrome show greater frequencies of repetitive behavior compared to typically developing individuals, but fewer than those with other intellectual disabilities (Stores et al. 1998). “For children with Down syndrome, early repetitive behavior predicts maladaptive behavior later in development. As chronological and mental age increase in individuals with Down syndrome, routinized and compulsive behaviors are correlated with problem behaviors,” (Neil and Jones, 2016).

This study included three children with Down syndrome who engaged in repetitive behaviors. These participants were recruited from a local parent group and met the following criteria: participants had a diagnosis of Down syndrome, parents identified concerns with repetitive behavior, and parents endorsed one or more forms of repetitive behavior on the

Repetitive Behavior Scale - Revised (RBS-R) which rated 43 topographies of repetitive behavior on a 4-point Likert-type scale. Harper a six-year-old male, Margaret a five-year-old female, and Jackie an 11-year-old female met the study criteria. Sessions for Harper and Margaret were conducted in a therapy room at the university and for Jackie sessions were conducted in the living room of her home. All observers collected data and the children's adaptive functioning was assessed using the Vineland-II Parent/Caregiver Rating Form. The Vineland-II allows for descriptive information to be addressed about the adaptive functioning of the child, along with the RBS-R, which measures collateral changes that associate with the effects of a particular intervention (Neil and Jones, 2016).

Following the observations, the researchers functional analysis conditions and presented once per day in random order. These conditions included an attention, a demand and a control condition. During the attention condition, researchers responded when the child engaged in repetitive behavior with social reprimands (e.g., saying, "Don't do that.") and statements of concerns (e.g. saying, "What's wrong?"). During the demand condition researchers had the child assemble an inset puzzle. If the child engaged in repetitive behaviors researchers removed the instructional materials, turned away from the child, which allowed for 10 seconds of escape from the task. Finally, during the control condition, the child had access to preferred activities. The researchers provided brief statements related to the activity where the child was engaged. (e.g., saying, "You're playing the guitar,") for 30 seconds and then followed with requests for attention (Neil and Jones, 2016).

Each child had varying baseline results due to the differentiation of the conditions the researchers considered. Next, the researchers developed individualized interventions for each of the children. For Harper, the interventions showed an immediate decrease in the number of

intervals where the repetitive behavior occurred which was seen during the one, two, and three month follow-up meetings. Jackie's repetitive behaviors did not occur during the intervention following the functional analysis. It was also reported by Jackie's mother that behaviors didn't occur outside of the probes. For Margaret, similar levels of the repetitive behavior occurred, opposite of the original hypothesis. The researchers concluded that the behavior was maintained by automatic reinforcement (Neil and Jones, 2016).

The results of this study showed the use of functional analysis assessment on repetitive behaviors in children with Down syndrome. Regardless of the particular type of repetitive behavior, all three children in the study demonstrated behavioral functions similar with other functional assessments of repetitive behaviors including avoidance and social behaviors. "Individuals with Down syndrome have also been described as showing a pattern of problem behavior to obtain attention or escape from task demands," (Feeley and Jones, 2006). This would typically be associated with overly social behavior that engages other individuals and obtains social attention or avoidance behaviors that may interfere with task completion. This study added to the expanding literature regarding the use of behavior analytic strategies to address problem behaviors of children with Down syndrome. If repetitive behaviors in the children decreased, students may benefit with a greater number of learning opportunities and reduced social stigmatization. All who work with individuals with Down syndrome should know that decreasing repetitive behaviors will help increase the quality of life (Neil, Jones, 2016).

Feeley and Jones (2006) analyzed the functions of challenging behaviors of children with Down syndrome and how they could be addressed through the use of applied behavior assessments and interventions. Children with Down syndrome are at an increased risk for engaging in challenging behavior that may be part of a behavioral phenotype characteristic of

Down syndrome. The presence of the extra chromosome associated with Down syndrome affects the likelihood of having challenging behaviors and can have long-term effects that interfere with learning at a functional level throughout life. It has been a stereotype that children with Down syndrome are “stubborn” and can be difficult to deal with both at home and school when they are displaying these challenging behaviors (Feeley and Jones, 2006).

“Challenging behavior not only precludes individuals with Down syndrome from learning opportunities within their environment, but also prevents them from accessing more typical educational and community environments as they approach preschool and school age. When placement in a general education or community setting does occur, challenging behavior is likely to be the cause of removal from these settings,” (Buckley, Bird, Sacks & Archer, 2002, 65). Luckily, applied behavior methods have proven effective with different populations and disabilities and can be utilized to address all of the unique characteristics of those challenging behaviors shown by children with Down syndrome. Feeley and Jones (2006) focused on the use of *Positive behavior Support* to address skill repertoires and students living environments to increase quality of life and decrease impacting problem behaviors (Carr et al., 1999).

Feeley and Jones (2006) utilized a file component process to address behaviors in those with Down syndrome that included the functional assessment, interview, direct observation, functional analysis and intervention. The functional assessment process helped determine what needs and concerns should be addressed for the particular student. The first step was to conduct an interview that identified the behavior of concern (Kern, Choutka, & Sokol, 2002). This was with the teacher, family or case manager and helps find related environmental/medical facts along with when/where/with whom the behavior was more or less prevalent. The next step, included direct observation of the student including documentation of what happened before or

after the challenging behavior was present. An antecedent-behavior-consequence (ABC) analysis was used to help gather information during the observation. The information was analyzed to find patterns of antecedents and consequences. Sometimes a challenging behavior could be addressed through an interview and observation, but a more systematic approach might have been required to confirm a particular function (Feeley and Jones, 2002).

Several researchers (e.g., Brooks, Todd, Tofflemoyer & Horner, 2003; Hetzroni & Roth, 2003) have shown that children with Down syndrome would highly benefit from learning particular skills that could replace a challenging behavior. “One type of skill building strategy, functional communication training, involves identifying and teaching a more appropriate communicative response serving the same function as the challenging behavior,” (Carr et al., 1994). This type of intervention includes a reinforcement system that addresses behaviors to help decrease the child’s particular challenging behavior. Positive behavior support interventions, like functional communication training, should be used to address certain challenging behaviors for children with Down syndrome. Teachers who become familiar with interventions and assessments addressing challenging behaviors will likely implement these strategies with all students, particularly those with Down syndrome (Feeley and Jones, 2006).

Feeley and Jones (2006) analyzed five studies implemented with children with Down syndrome, followed by additional suggestions for interventions based upon literature, clinical experience and research. These studies included behavioral interventions that addressed challenging behavior in children with Down syndrome. Six participants were examined through the different studies including five boys and one girl. Although the variables differed in the studies, they all addressed the behaviors of children with Down syndrome. The studies focused on the typical behaviors displayed including noncompliance, kicking, hitting, throwing materials,

and tantrums. Interventions included: choice versus no-choice, embedded within behavioral prompts, instruction of communicative replacement and extinction, along with noncontingent attention, versus no attention (Feeley and Jones, 2002).

Feeley and Jones analyzed five different studies related to the challenging behaviors in students with Down syndrome. The results varied, but proved that interventions and using antecedent-based strategies was critical. Cole & Levinson (2002) found that challenging behavior decreased from a range of 14.3% to 81.8% in the no choice condition, to 8.3% in the choice condition, with an increase in independent task performance. The study focused on choice versus no choice embedded within verbal prompts delivered during routine instruction. Davis, Brady, Williams & Hamilton (1992), found that compliance increased from an average of 6.7% during the baseline trial to 100% following the intervention. Researchers used high-probability requests followed by verbal, or gestural praise like a thumbs up. The third study (Hall, Neuharth-Pritchett & Belfiore, 1997) focused on aggressive/destructive behavior which decreased from 11% to 2% while using the communicative replacement technique. McComas, Thompson & Johnson (2003) found differing results as one student's behaviors decreased with the interventions and the other student's behavior stayed the same. Finally, Repp & Karsh, 1994 found that challenging behaviors decreased from 41% to 4% during interventions using extinction, differential reinforcement of alternative behaviors and increased opportunities to engage in social interactions.

The authors concluded that those who used interventions and were familiar with the behavior assessment technique, along with intervention strategies, were more likely to have the tools necessary to address behaviors in those children with Down syndrome. These challenging behaviors have hindered students from learning opportunities, along with denying them

opportunities to participate with their typically developing peers. The students instead received special placements in schools and other life events. The functional assessment process, along with interventions that relate to sound behavioral analytic principles, seem to be a good pair for the prevention of challenging behaviors in those individuals with Down syndrome. This is particularly relevant in the early stages of life when challenging behaviors first emerge and are obvious to family members and teachers.

Cole and Levinson (2002), focused their research on challenging behaviors of children with severe developmental disabilities, including those with Down syndrome. These children showed typical behaviors displayed by those with Down syndrome including being uncooperative and aggressive. The study explained how research suggested that allowing choice hyphonetic-making may have a large impact on children's behaviors. "Behavior improvements that have been associated with increased opportunities for choice included increase task engagement, increased spontaneous speech, and decreased problem behaviors," (Cole and Levenson, 2002). By allowing children with Down syndrome, who display inappropriate behaviors, an opportunity to choose a task, reward, or materials, helps reduce behaviors and improve overall academic performance. To show the maximum impact of the choice on the behaviors of the students in this study, the choice opportunities needed to extend beyond the simple choice of task or reward and included multiple *choice* opportunities within the child's daily routine. Cole and Levinson expanded on previous research by embedding choice opportunities during daily instruction. They evaluated the impact of the most challenging behaviors being displayed.

This study included two boys with Down syndrome who displayed severe developmental and behavioral disabilities. The boys were students at a university-affiliated laboratory school for



those with emotional/behavioral disorders. Teacher interviews and informal observations were used to select the two students. The researchers wanted to identify those who showed a high rate of challenging behaviors during their instructional activities. The boys chosen were in the same life skills class and showed high rates of uncooperative and aggressive behaviors. Each student was assigned a paraprofessional to work with them on a one-on-one basis. The first student, Keith, age eight, was verbal, but still had a hard time with his speech intelligibility. He displayed a high number of challenging behaviors while in school including aggression, tantrums, and noncompliance (e.g. screaming, whining and crying, putting his head down, leaving his assigned area, refusing to walk, destroying property). The other student, Wally, age seven, was non-verbal and used simple signs and gestures to communicate. His challenging behaviors included aggression, and noncompliance (e.g. throwing items within reach, hitting staff and objects, ripping up papers and other materials, turning off light switches, dropping to the floor.) The behaviors of both students interfered with their participation and instructional time at school (Cole and Levinson, 2002).

Before the study, the paraprofessionals who worked one-to-one with the students were observed in order to make sure they were using verbal directives and not offering choices during instructional routines while at school. The instructional routines that were targeted for each of the students included high numbers of challenging behaviors during typical routines along with a routine that involved an activity consistent with vocational or daily living skills related to the students' goals from their IEP. There were three student behaviors that served as dependent measures including the individual challenging behaviors displayed by Keith and Wally, number of task analysis steps completed prior to the behavior and finally the percentage of independently initiated task analysis steps during a daily instruction routine.

The study was completed by graduate and undergraduate psychology students who were unaware the purpose of this particular study. They underwent training that included a short overview of the coding system and one week of practice during daily instruction routine. During the actual data collection time frame the psychology students recorded the occurrence or nonoccurrence of the particular dependent variables measured during each step of the task analysis. The data collector recorded verbal prompts used by the paraprofessionals during each step of the task analysis. Responses were noted as directive or choice, as a measure of procedural integrity. "During all choice conditions, only sessions were included in which at least 80% of prompts were choice questions. The average percentage of choice questions for Keith's attendance routine during the first and second choice conditions was 94.5% and 90%, respectively. For Wally, the percentages of choice questions were 91.8% and 86.5%, respectively," (Cole and Levinson, 2002, 31-32).

Study results revealed that students demonstrated lower percentages of challenging behaviors during the no-choice condition. Trends were also stable or improving during choice conditions where the trends deteriorated when the students were observed for the no-choice phases. "During the initial no-choice condition, Keith completed an average of three steps prior to the onset of challenging behavior. Data indicated an initial high of four-with a drop to one of the final session of this phase. During the initial no-choice condition, data indicated that Wally typically engaged in challenging behavior immediately," (Cole and Levinson, 2002, 36).

This study showed positive overall impact of embedded individualized choice opportunities and interventions within the daily instructional routines of those students who have Down syndrome and displayed challenging behaviors. Instructional routines where individualized choice questions were included dramatically decreased Wally and Keith's

behaviors. This data is consistent with previous research that demonstrated the positive effects of choice on problem behavior (Dunlap et al. 1994). It was shown that asking a choice question to the students versus using directive statements reduced serious challenging behaviors. This study was added to the choice-making literature because it demonstrated a strategy to implement choices within the student's daily routine. Previously, researchers had limited the options for choice making to a selected task or a reinforcer before the task. This study exposed a student to multiple choice options throughout a school day. Although the study showed positive results, there were limitations that included only having two participants, brief experimental sessions, and confusion about why the results during the second no-choice condition were less clear for Wally than they were for Keith.

Allowing for choices in daily routines may have a positive impact on the behavior of even those students with the most severe behaviors. Typically these students go through a large number of interventions that have been deemed unsuccessful while at school. Including choices during the instructional routine may provide for opportunities to encourage more appropriate behaviors while the student participates in instruction. Providing choice questions is a simple, nonintrusive strategy compared with other interventions. "Embedding choice questions in instructional routines may be a useful tool in the continuing search for simple positive, nonintrusive, yet effective curricular interventions for children who engage in serious problem behavior," (Cole and Levinson, 2002, 36).

Research suggested several factors that supported behavioral changes in students with Down syndrome. The four articles supported early intervention to focus on challenging behaviors, including attention deficit, noncompliance, thought disorder, repetitive behaviors and social withdrawal. These behaviors were targeted by using functional assessment, interviews,

direct observations, functional analysis, embedded individualized choice activities and interventions to determine which needs and concerns should be addressed for each particular student. If behavior strategies that address problem behaviors are used early, it may allow the students with Down syndrome a larger number of learning opportunities, lower social stigmatization, resulting in increased in life event possibilities (Cole and Levenson, 2002; Neil and Jones, 2016; Coe et al. 1999; Feeley and Jones, 2002).

### **Research Literature**

Cless, Goff, and Durtschi, (2017) sought to better understand the particular needs and challenges of parents who deal with stress and coping with a family member who has special needs. This study analyzed whether hope mediated the association between mother's various coping behaviors and mother's relationship quality. "Hope was defined as a generalized positive state that comes from a personal sense of agency," (Cless, Goff, and Durtschi, 2017, 307). It is common that families who have a member with Down syndrome may face challenges, including developmental, medical, educational, social and financial issues. To help understand the needs of children and the challenges they may bring, previous researchers have studied the stress and coping of families with a child who has special needs. Few have been shown to experience higher levels of parenting stress than fathers. Mothers feel more responsible for dealing with the challenges and fulfilling the needs of the child. The overall purpose of this study was to understand the relationship among coping, hope, and relationship quality in a large sample of mothers of children who have Down syndrome (Cless et al. 2018).

"Previous researchers have found that mothers of children with special needs may exhibit both positive and negative coping strategies, such as problem solving, accepting responsibility, positive reappraisal of events, escape/avoidance, and denial," (Glidden et al., 2006; Woodman &

Hauser-Cram, 201, 308). This study by Cless, Goff, and Durtschi focused on the different types of coping including internal efforts to manage stress, seeking support from outside sources and turning to religion or spirituality for guidance. Mothers of children with Down syndrome have expressed the significance of accepting their child's diagnosis, having a positive attitude, and taking advantage of spiritual support while coping (Nelson, Goff et al., 2013). Along with coping skills, hope has been linked to help reduce levels of depression and anxiety. "Hope is a positive motivational state that is based on an interactively derived sense of successful agency and pathways," (Cless, Goff, and Durtschi, 2017, 309). The connection between relationship quality and hope has not been specifically assessed in mothers of children with Down syndrome. The researchers noted that more knowledge was needed regarding how hope could contribute to relationship outcomes because it is a significant factor in the relationship between mothers and children (Cless, Goff, and Durtschi, 2017). Minimal research was found related to the specific factors and processes that link the relationship quality of these relationships. "Parents' relationship quality has been linked to favorable family outcomes, such as lower parenting stress, fewer depressive symptoms, and increased parenting efficacy in mothers," (Gerstein et al., 2009, 309).

This study included participants recruited from local Down syndrome groups associated with the National Down Syndrome Congress, Down Syndrome Guild of Greater Kansas City, Band of Angels, and the Council for Exceptional Children. The organizations distributed information about the study through local membership affiliates. The information survey completed by potential participants included quantitative and qualitative questions. Overall, there were participants from 38 states along with some from one other country. Of the 644 surveyed, 351 participants were selected from the following criteria: must be female, in a romantic

relationship and have a child with Down syndrome. Of the 351 participants, 90.3% were White, and 78% were in their first marriage. The average annual income was \$70,000 or higher and 39.6% were employed full-time. The mothers average age was 41.66 and the average age of the children with Down syndrome averaged 7.67 years (Cless, Goff and Durtschi, 2017).

The scale used in this study measured coping strategies and included the Family Crisis Oriented Personal Evaluation Scales (F-COPES), which asked the participants to retrospectively rate their use of coping strategies at the time of their child's diagnosis. Three different types of coping strategies included religious coping, internal coping, and seeking external support. To assess hope, the researchers used the Herth Hope Index, which is a 12-item likert scale where participants rated their agreement with statements from one (strongly disagree) to four (strongly agree). Finally, to measure relationship quality two factors were used including the Revised Dyadic Adjustment Scale (RDAS), and the Couples Satisfaction Index (CSI). Both were used to understand the overall relationship quality of the mothers in the study.

“The current results indicated that both religious coping and internal coping were significantly associated with a higher level of mothers' relationship quality, and this association was mediated by hope. Support-seeking coping was not found to have a significant direct or indirect effect to relationship quality,” (Cless, Goff and Durtschi, 2017, 314). This study added to the already published literature regarding Down syndrome and provided additional interventions for mothers of children with Down syndrome, therapists, and communities. It was implied by the study that coping was not the only factor determining relationship quality but that hope was also a significant factor. The results of this study provided additional support to studies that suggested positive reappraisal was associated with lower levels of parenting stress in parents of children with Down syndrome. It also helped expand the research that fosters hope in moms

of children with Down syndrome. This information not only helps with stress, but also has increased positive outcomes for intimate relationships. “In this study, behaviors such as believing in one’s own power to solve problems, drawing on family strengths to face difficulties in life, and redefining family problems in positive ways were considered internal coping efforts,” (Cless, Goff, and Durtschi, 2017).

This research literature supported that interventions that help families, particularly mothers of children with Down syndrome, with higher levels of coping mechanisms, the sense of hope for their children and their relationship quality with their significant others. Interventions provided by therapists, social groups and religion all provided support to help mothers identify the beliefs and values they found most important. Therapists helped mothers explore the families’ belief systems and practices, such as religious and spiritual practices, that were useful as coping strategies. “Identifying and responding to the beliefs and values that are important to mothers of children with Down syndrome is a crucial step of the helping relationship between families and service providers,” (Cless, Goff, and Durtschi, 2017).

Lemons, King, Davidson, Puranik, Otaiba, Fulmer, Mrachko, Partanen and Fidler, (2017) looked to develop interventions for children with Down syndrome regarding behavioral phenotypes and early reading. “The purpose of this study was to evaluate the feasibility and potential efficacy of an early reading intervention targeting phonological awareness and phonic skills that had been developed in alignment with the behavioral phenotype of Down syndrome,” (Lemons, et al. 2017, 176-177). This study focused on children with Down syndrome for three reasons: Down syndrome is the most common genetic syndrome associated with intellectual disabilities; the behavioral phenotype of Down syndrome is relatively well established; more reading intervention research has been conducted involving individuals with Down than any

other genetic syndrome. The targeted research question in this study considered a relationship between how a behavioral phenotype was delivered during a reading intervention and the mastery of a targeted skill for a child with Down syndrome.

This study included seven white children with Down syndrome, two girls and five boys ranging from six to eight years old. The children were screened for vision and hearing, used English as their primary language, provided two correct letter sounds, and demonstrated mastery of reading skills to be eligible for the study. The instructors included four special education teachers with five to 35 years of experience and three paraprofessionals with three to nine years of experience. The interventions were delivered in the child's special education classroom in a public elementary school located in Pittsburgh, Pennsylvania. The children were recruited through a flyer given to local Down syndrome parent support organizations and school districts. The parents then contacted the coordinators who obtained approval from the school and set up screenings (Lemons, et al. 2017).

The interventions included 20 to 40 minutes sessions completed four times per week for five months. During the interventions the students participated in original activities along with activities adapted from *Road to the Code* and *Road to Reading* (Blachman, Ball, Black, & Tangel, 2000; Blachman & Tangel, 2008). Eight intervention lessons included teaching highly imageable decodable key words along with the sound of the initial consonant letters in each key word. The researchers, "hypothesized that teaching the words as whole words paired with pictures would increase the likelihood that children would learn the words and that the learning could serve as a foundation on which to build additional skills," (Lemons, et. al. 2017, 178). During the remaining lessons, the researchers choose to use key and partner words while teaching phonological awareness and phonics skills. When developing the interventions, the



researchers focused on scaffolding to help reduce the complexity of directions. They limited the initial instruction to three picture-supported words. The researchers choose to focus on the characteristics of demonstrated behavioral phenotypes, such as short-term memory loss.

The children in the study participated in an average of 45.1 sessions over a 16-week period. “A consistent functional relation was established for three students (Anne, Craig, Miguel). Two students (Lilli, Robert) demonstrated gains, although a functional relation was not established due to positive baseline trends. Finally, two students, Alex and Jack, demonstrated delayed response to intervention and we were unable to replicate an effect across a sufficient number of lessons,” (Lemons, et al. 2017, 184). The findings of this study were consistent with outcomes of previous research studies focused on interventions of students with Down syndrome, where a large number of students demonstrated learning of content directly taught to them (Burgoyne et al., 2012; Lemons et al., 2012). The students who struggled with the intervention, such as Alex and Jack, may have benefited from additional individualization of behavior management plans due to low engagement. The subjects had difficulty managing behavior and maintaining engagement during both of their sessions. Overall, study results supported the likelihood and potential value of the reading intervention in regard to behavioral phenotypes (Lemons et al. 2017).

The researchers continued to determine how genes and the cognitive functions of children with Down syndrome impact academics and behaviors. Even though the researchers were looking for the limitations of academics and behaviors, they continued to show high expectations for academic performance of individuals with Down syndrome and other disorders. “The researchers believe that research aimed at understanding the behavioral phenotype of individuals with Down syndrome and evaluating the effect of tailoring reading interventions based on the

phenotype may increase the effectiveness of academic interventions for a wider range of individuals than was previously thought possible,” (Lemons et al. 2017, 185).

Lemons, King, Davidson, Puranik, Fulmer, Mrachko, Partanen, Al Otaiba, and Fidler, (2015), studied whether using an commercially available phonological awareness program increased phonological awareness, letter sound and word recognition for a child with Down syndrome based on their behavioral phenotypes. The researchers used the *Road to the Code* (RTC; Blachman, Ball, Black, & Tangel, 2000), an effective phonological awareness program that demonstrated improved skills in developing children at-risk of falling behind. This research study was completed when no other studies used a popular program such as the *Road to the Code*. Typically, programs like these are difficult for special education teachers to use due to the minimal structured. The researchers followed studies by Fidler and colleagues (Fidler, 2005, 2006; Fidler, Most, & Philofsky, 2009) who proposed that there might be better outcomes for children with Down syndrome if the interventions related to phonological awareness considered their typical behavioral phenotypes. These behaviors included cognition, speech, language, adaptive behavior, social-emotional function and motor functioning. If adaptations were provided for these characteristics, student outcomes may be improved. “The overall research question guiding this work was “Is the introduction of an adapted PA intervention associated with an improvement in word reading, letter-sound knowledge, and PA skills?” This first explicit attempt explored the promise of adapting an academic intervention for children with DS based on phenotypic characteristics,” (Lemons et al. 2015, 273).

This study included five students with Down syndrome; four female and one male, all between the ages of six to eight. They were recruited from local school districts and organizations in western Pennsylvania. All were native English speakers, able to see and hear

well, communicated mainly through speech, attended 20 minutes of instructions with minimal behavioral breaks and showed mastery of 10 letter sounds. These students were typically programed in the general education classroom. Three students received life skill support and two received learning support. The interventionists included two special education teachers and one student enrolled in a special education doctoral program. All three had previously worked with students with disabilities and received training regarding specific data collection. The interventions were completed in a quiet one-on-one setting at each student's school.

The researchers measured naming of letter sounds, phonemic awareness (first sounds), and predetermined targeted words to determine how to measure the learning of the content provided. They choose a scope-and-sequence method over a 15-week period that included three daily lesson components. Adaptations were made for the baseline intervention according to guidelines from Fidler (2005) which focused on aspects of the Down syndrome behavioral phenotype. The main adaptation helped the child learn the letter sounds by teaching a target word that started with the particular target letter. The researchers adapted lesson plans to focus on behavioral phenotypes in the following ways: increased intensity, decreased working memory, integrated practice of targeted skills, increased task persistence, offered increased levels of support by using most-to-least system, used verbal language with increased visual support, and finally provided positive reinforcement (Lemons et al. 2015).

The results of the study showed a functional relation between treatment and the learning of target words. All five students showed higher posttest scores, though they made modest gains. These findings illustrated a functional relationship between the adapted intervention and improvement on phonological awareness and targeted words. "Results contribute to the more focused body of work involving children with DS by demonstrating children with DS can benefit

from PA intervention,” (Lemons et al, 2015, 283). The teachers in the study also reported how the positive outcomes of the interventions could be incorporated into the students’ current teaching regimes. Three of the five teachers reported that even though they thought the intervention would be beneficial for their students with Down syndrome and other intellectual disabilities, the practicality of implementing this one-on-one would not be possible based on the current support at their schools.

This study demonstrated that the interventions regarding phonemic awareness were effective when behavioral phenotypes of children with Down syndrome were addressed. The study limitations included limited direct teaching, brief periods of mandatory instructional time that reduced the intervention time for some of the students, and feasibility of future use for teachers. The authors felt that the findings supported how phenotypic characteristics could be used to adapt interventions for those with Down syndrome. It is important for these types of interventions to be implemented early in a child's education. Not all children who may be diagnosed with Down syndrome need adaptations based on their behavioral phenotypes, but proactively addressing issues would be beneficial for future learning. The researchers stated, “This approach could increase our ability to provide more effective interventions to children with Intellectual Disabilities, and it may increase our understanding of learning challenges in the general population,” (Lemons et al, 2015).

The research literature supported the different aspects of behaviors and interventions for children with Down syndrome and their families. The three articles supported families and their coping and hope mechanisms, the behavioral phenotypes in regard to phonemic awareness, and showed how supporting children with Down syndrome early on promoted greater academic achievements throughout schooling. The research has shown that these interventions may not

only benefit for students with Down syndrome, but also students with other intellectual disabilities (Cless, Goff, and Durtschi, 2017; Lemons, et al. 2017; Lemons et al, 2015)

### **Functions of Challenging Behaviors**

Tomaszewski, Fidler, Talapatra, and Riley (2018), explained why individuals with Down syndrome exhibited issues related to the different aspects of executive function (EF) and adaptive behavior throughout their lives. Currently limited information exists regarding how EF difficulties relate to employment outcomes in adulthood. The deficiency of information is due to improved quality of life factors for people with Down syndrome, due to the increased life expectancy from 12 years during the 1950s to an average of 60 years in the 2000s (Bittles & Glasson, 2004). In this study, the researchers evaluated how adaptive behavior and EF profiles of individuals with Down syndrome during early adulthood are associated with the areas of functioning and employment status (Tomaszewski, Fidler, Talapatra, & Riley, 2018, p. 41).

This study focused on adaptive behavior and the executive function individuals with Down syndrome. “Adaptive behavior refers to the conceptual, practical and social skills performed by individuals in their everyday lives. Conceptual skills include communication, numeracy, academic skills and self-directions, while social skills include social responsibility, self-esteem, interpersonal skills and social problem solving. Practical skills include daily living skills, safety, health care, routines and occupational skills” (Schalock *et al.* 2010). Woolf et al. (2010) reported that adaptive behavior makes up 45% of employer decision making when considering whether or not to hire an adult with an intellectual disability. Along with adaptive functioning this study focused on executive function, meaning “the cognitive processes involved

in goal-directed behavior. These processes included working memory, cognitive flexibility, inhibitory control and planning,” (Tomaszewski, Fidler, Talapatra, & Riley, 2018, p. 43).

This study included 31 adults with Down syndrome who ranged in age from 18 to 43 along with their parents or caregivers. The participants were primarily Caucasian and had an IQ range from 40 to 68. They were enrolled in an adult education course geared towards individuals with Down syndrome at the University of Denver. Participants were recruited through a community organization, The Global Down Syndrome Foundation, which helped those with Down syndrome through research, education, medical care and advocacy. The parents or caregivers completed a phone-interview assessment of adaptive behavior, a demographic questionnaire and an informant-report assessment of executive function for baseline assessment data. An information questionnaire included the medical and employment status of the individual with Down Syndrome.

The Stanford-Binet, Fifth Edition, assessed the participants’ cognitive abilities and included the non-verbal and verbal domains. The study also used the Vineland Adaptive Behavior Scales, Second Edition, completed by the parents and caregivers, which assessed communication, daily living skills and socialization. Finally, they were given the Behavior Rating Inventory of Executive Function-Adult version (BRIEF-A), which included the behavioral regulation index, metacognition index and general executive composite index (Tomaszewski, Fidler, Talapatra, & Riley, 2018, p. 45-46).

The researchers reported that adults with Down syndrome showed challenges in the communication and daily living skills and strengths in socialization skills, when data considered adaptive behaviors. The caregivers and parents reported that their young adult demonstrated challenges in executive functions in the shifting attention, working memory, plan/organization

and task monitor domains. They showed relative strengths in the areas of inhibit, emotional control, self-monitor, initiate and organization of materials. Working memory seems to be mostly associated with the employment status of young adults with DS, as those who have a better working memory were more likely to be employed versus those with working memory challenges (Tomaszewski, Fidler, Talapatra, & Riley, 2018, p. 49).

The adaptive behavior profile in this study indicated challenges with expressive language skills, showing relative strengths in both receptive language and coping skills. This study also noted an additional struggle in the sub-domain of daily living skills with regard to community via the VABS-II. Although these findings contradicted to previous reports, it may have been due to the types of scores that were included. Regardless, this study added to previous literature relative to the adaptive behavior profiles of adults with Down syndrome and the interventions put in place that were associated with this population group (Tomaszewski, Fidler, Talapatra, & Riley, 2018).

Researchers also observed executive functioning profiles and found results similar to previous research findings showing that young adults with Down Syndrome demonstrated challenges in working memory, planning and organization, and task monitoring (Garon et al. 2008; Miyake et al 2000; Pennington & Ozonoff 1996). Tomaszewski et al. found similar results in which study participants' strengths were found in the areas of emotional control and organization of materials. Working memory, planning and organization, and task monitoring were all reported as areas of strength during this study compared to previous studies (Bevins et al. 2014; Daunhauer et al. 2014a; de Sola et al. 2015; Heyman & Heyman & Hauser-Cram 2015). Possible differences may have been due to the reference group or parent bias when completing the BREIF-A. The caregivers and parents may have reported solely on how the

young adults with DS behaved in their home and community rather than how they compared to their same age peers (Tomaszewski, Fidler, Talapatra, & Riley, 2018, p. 48-49).

The study concluded that those with more difficulty with working memory were less likely to be employed versus those with less difficulty. This is extremely important information for teachers working with young adults with Down syndrome in post-secondary programs. Goals should focus on skills to improve executive functioning, such as working memory, to promote successful transitions after formal education and training has been completed (Pulina et al. 2015). It is becoming more common that adults with Down syndrome are competitively employed. Currently adults with DS work in sheltered employment, attend day programs, or may be enrolled in training programs. Competitive employment may be possible for some, but many parents and caregivers reported a lack of programs if they were not available through their school district or county (Kumin & Schoenbrodt, 2016). Vocational education programs are extremely important in teaching job skills. When students have successfully completed training, future employers are able to make accommodations so workers can complete the job tasks in manageable fashion. The results of the study indicated that it is imperative for vocational classes to target EF skills early in the education program to allow students more success as they reach the adult age (Tomaszewski, Fidler, Talapatra, & Riley, 2018, p. 48-50).

Makary, Testa, Tonge, Einfeld, Mohr & Gray (2015) examined the range and severity of adaptive and behavior problems among adults with Down syndrome. They reported how additional support with social and conceptual abilities was beneficial as behaviors of a person with Down syndrome over time are not stable but change as the individual ages and develops. There is a large amount of research related to adaptive behaviors of individuals with Down syndrome including social, practical and conceptual skills that allows them to function in



everyday living (AAIDD 2010). Typically, these studies focused on determining trajectories that show how children will function as they gain and adapt (Harrison 1987; Keith et al. 1987).

Seeing as the life expectancy for those with Down syndrome has increased from 12 to 60 years (Bittles et al. 2007), understanding behaviors through adulthood is becoming more important.

Makary et al. (2015) focused their study around two main goals: one was to determine whether age was associated with changes in adaptive behavior in healthy aging adults with Down syndrome. Secondly, if there was an association, could it be determined whether changes were due to age-related differences in the range or selective of the selected adaptive behaviors (Makary et al. 2015).

The researchers conducted a longitudinal study of 20 participants and a cross-sectional study with 33 participants all with Down syndrome between ages 16 and 56. The longitudinal study included 11 males and nine females, and the cross-sectional study included 21 males and 12 females. The longitudinal study used participants from a previous Monash University, Centre of Developmental Psychiatry and Psychology study where behavioral information was collected from 119 individuals in 2006 to 2008. Of the 119 individuals, 20 responded to the current study and were eligible to complete the second data point, conducted from 2010 to 2012. The individuals from the cross-sectional study included 33 individuals with Down syndrome with only one data point collected from 2010-2012. Participants were recruited from the Down Syndrome Association at the Monash University in Victoria and South Australia. The parents and caregivers in both studies provided their child's current psychiatric diagnoses. Individuals with Down syndrome who were diagnosed or suspected of dementia were not eligible for the study (Makary et al. 2015).

Measurements included in the study were: Peabody Picture Vocabulary Test Fourth Edition (PPVT-4), Developmental Behavior Checklist-Adult (DBC-A), Adaptive Behavior Dementia Questionnaire (ABDQ), and the Adaptive behavior Assessment System-II Adult (ABAS-II). The PPVT-4 is a measure of receptive vocabulary where the subject points to a named picture. It was used by previous researchers in studies of those with Down syndrome (Dunn & Dunn, 2007). The DBC-A provides a measure of emotional and behavioral disturbances experienced by adults with intellectual disabilities. ABDQ is a screening tool designed to detect changes in daily functioning associated with dementia in those with Down syndrome. Finally, the ABAS-II is a questionnaire completed by the parent or caregiver that measures adaptive behavior skills. For both the longitudinal and cross-sectional study the participants, along with their families, were asked to participate with statements and consent forms via the mail. The parent/caregiver with the most/consistent contact with the participant was asked to complete the DBC-A, the ABDQ and the ABAS-II. The information obtained from the two different studies was statistically analyzed with random effects regression which provided the points of data (Makary et al. 2015).

The results of the study stated, “It was estimated that for an age difference of 10 years, the MIS for the ABAS-II Adult Global Adaptive, Conceptual and Social composites would decrease by 0.08, 0.09, and 0.08, respectively (generally moderate effect size; e.g. 0.008 coefficient is a moderate effect size 0.24). These decreases in MIS were consistently associated with significantly lower proportion of items positively check with ageing and not age-related changes in the intensity of adaptive abilities,” (Makary et al. 2014, 696). This was due to checking fewer items on the measure of adaptive behavior (ABAS-II Adults). Additionally, there was no association between the intensity and age when items were endorsed. These findings

suggested that age decreased in adaptive behaviors contributed to a decrease in the number of behaviors performed and not a change in the strength at which the behaviors were performed (Makary et al. 2014).

This study supported previous findings that showed age-related declines were related to changes in the adaptive behavioral range versus the intensity of the adaptive ability of the individual with Down syndrome (Taffe et al, 2008). Overall, this study reported that practical skills stayed the same with ageing, but social and conceptual skills declined. “Assistance for adaptive behavior skills, particularly social and conceptual, will be important to help maintain vocational and independent living success, which will likely aid autonomy, self-esteem and promote an active lifestyle into old age,” (Makary et al. 2014, 698). This study displayed functions of adaptive behaviors that were prevalent and indicated impact on the long-term if there was not early intervention.

Authors Dieleman, Pauw, Soenens, Hove and Prinzie (2018), researched how problem behaviors and psychosocial strengths, along with problem-strength interrelations, could be evaluated for youth with Down syndrome. This study chose a more inclusive view of behavioral phenotypes of children with Down syndrome. They chose to do this by examining the interrelations and evaluating the profiles of the subject’s strengths and problems. Even though previous research documented problem behaviors in the children with DS, minimal studies analyzed their psychosocial strengths (Dekker, Koot, van der Ende, & Verhulst, 2002; Dykens, 2007; Dykens & Kasari, 1997). Psychosocial strengths were defined as behaviors that create a sense of satisfaction, foster relationships and strengthen the ability cope with adversity, or generally promote development (Epstein & Sharma, 1998).

The purpose of the study was to acquire a more comprehensive view of the behavioral phenotype of youth with Down syndrome. The study had three different goals: describe the degree and nature of problem behaviors and psychosocial strengths; examine the interrelations between problem behaviors and psychosocial strengths; and evaluate naturally occurring profiles in Down syndrome by using a cluster analysis. By focusing on particular behavioral phenotypes and psychosocial strengths, the researchers tried to determine the long-term effects for those with Down syndrome (Dieleman et al. 2018).

The subjects included parents who were asked to participate via invitations sent to parent associations for Down syndrome in Belgium and the Netherlands, along with training centers, schools, and guidance services. The study requirements included that the child was diagnosed with Down syndrome and between four and 20 years old. The sample included 67 parents of children with Down syndrome. The children included 37 boys and 30 girls between the ages of 4 and 19. The mothers average age was 40.4 years and the fathers average age was 45.1. The parents filled out an online or paper questionnaire (Dieleman et al. 2018).

The researchers used the Vineland Screener 0-6 (Scholte, van Duijn, Dijkxhoorn, Noens, & van Berckelaer-Onnes, 2008) where parents rated the adaptive behaviors of children regarding communication, daily living skills, socialization, and motor skills. This allowed the researchers to estimate the child's developmental age (DA). The parents were also asked to complete the Child Behavior Checklist/4-18 (CBCL; Achenbach, 1991) by rating the child's emotional and behavior problems which included eight syndrome scales: Withdrawn/Depressed Behavior, Somatic Complaints, Anxious/Depressed Behavior, Social Problems, Thought Problems, Attention Problems, Delinquent Behavior, and Aggressive Behavior. Even though the CBCL was developed for typically developing children, studies previously showed that this was an

acceptable instrument to examine the problem behaviors in children with Down syndrome (Koskentausta, Iivanainen, & Almqvist, 2004). The parents also rated their child's psychosocial strengths on the Behavioral and Emotional Rating Scale (BERS-2, Epstein, 2004). By using this scale researchers determined positive emotions, behaviors, and life aspects of the children by measuring five types of psychosocial strengths. The strength scales included the Interpersonal Strength scale, Family Involvement scale, Intrapersonal Strength scale, School Functioning scale, and the Affective Strength scale. The scores were arranged into groups based on the typical norms of a small school population (including mainly typically developing children and a small percentage of children with disabilities; Epstein 2004).

“The results in this study indicate that attention, social, and thought problems were most prevalent, whereas family involvement and receiving/expressing affection were identified as strengths. A confirmatory factor analysis identified problems and strengths as distinct, yet related, variables,” (Dieleman, 2018, 222). This study also reported that strengths of children with Down syndrome improved as their DA increased. It showed that acquiring conceptual, practical and social skills further promoted psychosocial strengths. The parents reported that their child communicated emotions better and accepted affection when parents were involved. This aligned with previous studies that stated that social understanding/behavior along with empathy was a child with Down syndrome's best developed skill (Di Nuovo & Buono, 2011). The Confirmatory Factor Analysis (CFA) indicated that there were common behavioral problems and psychosocial strengths in children with Down syndrome. Problems and strengths included definite and important information regarding the behavioral display of a child with Down syndrome (Dieleman et al. 2018).

The research findings from this study can be implemented into interventions for children with Down syndrome, as they may be beneficial for the following reasons: determining the children who may be most at-risk for maladaptive development, finding strengths interventions and determining specific interventions to be used. “Children with low levels of strengths in addition to high levels of problems appear to be most at -risk and, hence, might need more intensive or longer support than other children with Down syndrome,” (Dieleman et al, 2018, 223). Choosing the appropriate interventions for these children it may off chance focus on problem behaviors, like aggression or internalizing problems. Although this study was one of the first to acquire profiles of problems and strengths in children with Down syndrome, there were a few limitations. These limitations included the small sample size, the instruments (CBCL and BERS-2), as they were developed for the general population and not individuals with ID, and the cross-sectional design of the study. To add to the continued research and to better understand the long-term correlations, a longitudinal signed was recommended to help determine the developmental pathways of those behavior problems along with the strengths of children and adults with Down syndrome (Dieleman et al. 2018).

The research literature supported the functions of behaviors and long-term effects that were most prevalent with children and adults with Down syndrome. The three articles focused on adaptive behaviors and the executive function in those with Down syndrome, how additional support with social and conceptual abilities may be beneficial as behaviors, and problem behaviors and psychosocial strengths that can be evaluated for youth with Down syndrome. By focusing on the various aspects of behaviors, including the social aspects and the meaning behind why these behaviors are happening, and by focusing on their psychosocial strengths, children with Down syndrome would continue to develop and thrive as they become older and

independent (Tomaszewski, Fidler, Talapatra, & Riley, 2018; Makary et al. 2014; Dieleman et al. 2018).

### **Effectiveness of the FBA**

Rodriguez, Thompson, and Baynham (2010) assessed the effects of attention and escape related to noncompliance in children with Down syndrome. Noncompliance with instructions was noted as one of the most common problems for which children are referred for behavioral treatment (Bernal, Klinnert, & Schultz, 1980; Miles & Wilder, 2009) and has been reported in between 8% and 54% of young children (Crowther, Bond, & Rolf, 1981). Noncompliance may be one factor that reduces social and academic growth. Preschool and kindergarten teachers rated compliance as one of the most critical school readiness skills (Hains, Folwer, Schwartz, Kottwitz, & Rosenkotter, 1989). Due to the possible negative effects that noncompliance in children, especially those with ID, it is essential to integrate methods to manage this problem behavior. “Because attention and escape appear to be the most common consequences for noncompliance among young children, it is particularly important to understand the role of these variables in the maintenance of noncompliance. Thus, the purpose of the current study was to describe a method for evaluating the relative contributions of escape and attention in the maintenance of noncompliance,” (Rodriguez et al. 2010, 144). By doing so, this study explained how developing a Functional Behavior Assessment (FBA) identified factors that contributed to problem behavior.

This study included three children, Sue, Lee and Ben who were enrolled in an early childhood program at a university. They were recommended to the study by their teachers due to noncompliance in the classroom. Sue was a typically-developing 2-year-old girl. Lee was a 4-

year-old boy who was also typically developing, and Ben was a 4-year-old boy who was diagnosed with Down syndrome. The study procedure included five-minute sessions composed of ten, 30-second trials for each child. The sessions were completed in a room at the university that included a one-way observation mirror with reading material, a small trash bin, and 40 pieces of white paper spread around the room. The researchers, trained in observation, collected data related to compliance and non-compliance. “Compliance was recorded when more than half of at least one piece of paper passed the opening of the trash bin within 5 seconds of the instruction. Noncompliance was recorded if the child failed to meet this requirement,” (Rodriguez et al. 2010, 144). A second observer also collected data with an agreement stating that data was included when both observers recorded the same response for one trial (mean agreement across children was 99%) (Rodriguez et al. 2010).

This study focused on the attention and escape conditions in regard to noncompliance and behaviors of children. The attention condition was developed to determine whether noncompliance was responsive to the types of attention that generally followed noncompliance during normal conditions (e.g. verbal and physical encouragement to complete the task). For this study if noncompliance was shown, the researcher displayed attention, but would not allow the child to escape from the task. If the child cooperated, they received a break from the task but no attention was given. This meant that the researcher only displayed attention when the child was noncompliant. The escape condition was created to determine whether noncompliance responded to escape from tasks. The escape condition was compared to the attention condition, but the circumstances for compliance and noncompliance were reversed. For the escape condition, the researcher displayed attention for compliance by giving praise and continuing the task through physical guidance. “The attention and escape conditions were alternated in a multielement



design. Furthermore, control was demonstrated through a contingency reversal strategy in which one test condition served as a control for the other,” (Rodriguez et al. 2010, 145).

The results stated that the participants showed levels of noncompliance that were consistently higher in the attention condition. This suggested the following: noncompliance was maintained by social attention, and attention was relatively more influential than escape in the maintenance of the children’s noncompliance. Lee demonstrated the largest discrepancy regarding noncompliance across the two conditions with an average of 73% for attention and 23% for escape condition intervals. Sue showed lower levels of noncompliance compared to Lee’s, 38% for attention and 10% for escape. Ben, the child with Down syndrome, displayed a larger degree of overlap with an average of 55% for attention and 36% for escape condition intervals (Rodriguez et al. 2010). “The degree of overlap evident in Ben’s data may be due to multiple treatment interference. If so, implementing these procedures within a reversal design may have produced more discriminated responding and allowed more conclusive statements regarding Ben’s data,” (Rodriguez et al. 2010, 145). The authors stated that a condition, such as escape or attention, would be hard to exhibit due to the fact that no response to noncompliance would initiate escape, and the prevention of escape was necessary for some interaction with the participant.

Overall, this study suggested that higher levels of noncompliance were shown concerning the attention condition from all the child participants in this study. This was true even though this assessment only tested the effects regarding attention to escape. This means that when the attention was given through continuous verbal and physical prompting, it contributed to noncompliance shown by the children. This study, along with the study completed by Wilder et al. (2007), illustrated that positive reinforcement would more likely add to the continuation of

noncompliance in children who are typically developing. This behavior that may seem to be an escape response. “However, because timeout would be ineffective if noncompliance was maintained by escape from instructions, treatments for noncompliance must be individualized based on the function of problem behavior,” (Rodriguez et al. 2010, 147). This study introduced one option for studying the effects of attention and escape regarding an individual’s non-compliance. A study like this may help form the beginnings for treatment recommendations and evaluations, such as developing an FBA for a child. The researchers stated additional research in this area would be beneficial for parent-training programs and preschool classrooms to help them be as effective as they can with children (both with ID and typically developing) who are noncompliant (Rodriguez et al. 2010).

Rispoli, Davis, Goodwyn, and Camargo (2012), compared the results of a trial-based functional analysis with an analogue functional analysis conducted in public school classrooms. More often than not, students with autism and other ID are placed in public school classrooms, but these students often display challenging behaviors that can significantly impact classroom activities in the areas of instruction, communication, and social interactions (Koegel, Matos-Freeden, Lang, & Koegel, 2011). Previous research proved that interventions to help with challenging behaviors were more successful when they were based on the results of a functional behavior assessment (FBA) (Carr, 1994; Mace, 1994; Mace, Lilli, & Pinter-Lalli, 1991). Both the trial-based functional analysis and the analogue functional analysis helped to determine the functions of the behavior found in the FBA. The functional analysis directs both behavior interventionists and teachers to determine the function of the challenging behavior and connects the problem behavior to a successful intervention (Rispoli, Davis, Goodwyn, & Camargo, 2012).

The analogue functional analysis is a well-researched method that determines the behavioral function. The information is gathered in a controlled setting to allow manipulation reinforcement to help determine the consequence of a particular challenging behavior (Iwata et al., 1994). “One recommendation from previous studies is that analogue functional analysis should be conducted in the setting in which the behavior naturally occurs and in which the intervention is to be applied,” (Hanley et al., 2003, 181). Although it would be beneficial to use analogue functional analysis, many challenging factors come about when doing so in a public school setting. The analogue functional analysis is time-consuming, includes resources for training, can cause ethical concerns because of learning effects that may arise due to dense schedules, and finally there could potentially obtain problematic inconclusive results (Rispoli, Davis, Goodwyn, & Camargo, 2012).

An alternative to an analogue functional analysis is a trial-based functional analysis. For this analysis, researchers conduct the study in the classroom where the child functions in a more natural setting which results in more valid conclusive results. The authors noted that no study has evaluated the use of trial-based functional analysis following inconclusive analogue functional analysis results (Rispoli, Davis, Goodwyn, & Camargo, 2012, 181).

To address the missing pieces of current literature, the researchers in this study compared the analogue functional analysis results to a trial-based functional analysis in a public classroom. This study included two students with ID and challenging behaviors. One of the students, Lauren a 5-year-old female with autism, was in a self-contained special education classroom. Her challenging behaviors included aggression towards adults demonstrated by screaming, pushing, kicking, and grabbing. The other student, Dennis a 15-year-old male with Down syndrome, was also in a self-contained classroom. His challenging behaviors included verbal outbursts (“No” or

“Stop it”). Lauren’s teacher with 15 years of experience, and Dennis’ paraprofessional with five years of experience implemented this study. The information for both students was collected from observation during one school day. The analogue functional analysis was completed in a partitioned spot of the classroom and the trial-based functional analysis was completed in the classrooms during different activities that were part of the typical classroom routine (Rispoli, Davis, Goodwyn, & Camargo, 2012).

The study procedure was divided into three phases. Phase one was a descriptive assessment where trained students collected data regarding antecedents and consequences for the students challenging behaviors using the Functional Assessment Observation Form (O’Neill et al., 1997). The two challenging behaviors that occurred the most often were selected as target behaviors for the functional analysis. Phase two included the analogue functional analysis that included four five-minute conditions: attention, tangible, escape, and play. Phase three was the trial-based functional analysis that included 20 discrete trials for each of the three conditions: attention, tangible, and escape (Rispoli, Davis, Goodwyn, & Camargo, 2012).

The results of the study stated that both Lauren and Dennis displayed low levels of challenging behaviors during the analogue functional analysis. “Lauren did not exhibit challenging behavior during the attention or play conditions and had very low levels of behavior in the escape and tangible conditions. Dennis did not exhibit challenging behavior during the play, escape, or tangible conditions. During the attention condition, Dennis engaged in challenging behavior during one session for an over average of 0.6% of 10-second intervals,” (Rispoli et al. 2012, 184). During the trial-based functional analysis, Lauren showed the highest levels of challenging behaviors during the escape test condition (40% of trials), followed by attention (35%), and then tangible (20%). An analysis of these results concluded that Lauren’s

challenging behaviors continued due to the negative reinforcement she received by escaping task demands and the positive reinforcement she received from seeking attention and her preferred tangibles. Dennis' results for the trial-based functional analysis included the highest levels of challenging behavior for the tangible test condition (35% of trials) and escape test condition (40%) versus the control condition (10%) and escape control condition (5%). One could infer from the results that Dennis' challenging behavior continued with both positive reinforcement in the form of tangibles, and negative reinforcement via escape from instructional demands (Rispoli, Davis, Goodwyn, & Camargo, 2012).

In conclusion, the study results indicated that the analogue functional analysis did not determine the function of the behavior, but the trial-based functional analysis detected the function of behavior for both participants. The analogue functional analysis also conflicted with data gathered from descriptive assessments (Rispoli et al. 2012). The results aligned with previous research that showed the benefits of trial-based functional analysis in children with developmental disabilities (Bloom et al., 2011). The trail-based functional analysis produced more relevant practices to address challenging behavior versus the analogue functional analysis. Even though researchers had less control of external variables regarding the assessment context, the study allowed for the observational assessment of problem behaviors in the child's natural setting. The authors concluded that a trial-based functional analysis was a more useful alternative to an analogue functional analysis when developing an FBA including interventions, for a child with a challenging behavior, in a public-school setting. The benefits included assessment during normal classroom routines, minimal training for staff and the students remained in the classroom (Rispoli et al. 2012).

Scheithauer, O'Connor, and Toby (2015), evaluated the possibility that when self-restraint and self-injurious behavior (SIB) co-occur, self-restraint might be maintained by negative reinforcement through the removal of SIB for an individual who exhibited hand-to-head SIB. Typically, individuals with ID who exhibit problem behaviors, such as SIB, pose concerns and are commonly referred for interventions. Unfortunately, an SIB includes self-restraint which can complicate the assessment process. Fisher and Iwata (1996) proposed four hypotheses about how SIB relates to self-restraint including: (1) SIB and self-restraint may be maintained by the same functional consequences, (2) they function independently, (3) SIB is maintained by access to self-restraint, which is tested by allowing access to self-restraint contingent on SIB, and (4) self-restraint is negatively reinforced by the removal of SIB. The study completed by Scheithauer, O'Connor, and Toby (2015) wanted to duplicate and extend SIB and self-restraint assessment procedures. Even though previous research manipulated self-restraint and their aversive effects of SIB, no other research has combined all behaviors for one individual (Fisher, Grace, and Murphy, 1996). This research would be beneficial in the development of an FBA to address challenging behaviors.

This study included a 12-year-old girl, Wendy, diagnosed with Down syndrome and a stereotypic movement disorder that included self-injury, disruptive behavior disorder, and ID. Wendy attended an outpatient clinic and received treatment for SIB (hand-to-head hitting). Her SIB caused permanent monocular vision loss along with recurrent facial injuries. Along with the SIB, Wendy had self-restraint tendencies that included sitting on her hands or placing her arms between folded legs or being wrapped in clothing (Scheithauer, O'Connor, & Toby, 2015). Wendy's caregivers reported that they encouraged self-restraint, but by doing so interfered with Wendy's adaptive skills.

The study sessions were administered in a padded therapy room where a data collector recorded the number of SIBs and the time Wendy used self-restraint from behind a one-way panel. The experimenter conducted three different functional analysis (FA) of Wendy's SIBs. The first FA was completed using the conditions outlined by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) along with a tangible condition with contingent access to a preferred item. For Wendy this was a telephone cord with mouthing toys attached. The second FA had the researcher block Wendy any time she tried to use self-restraint. For the final FA, Wendy wore splints to allow improved functional skills. An arm-splint analysis determined the number of stays in the splint that permitted Wendy to engage in SIB, but the splint slowed the velocity of the motion and decreased the force (Scheithauer, O'Connor, & Toby, 2015).

The results of the first FA were undifferentiated with higher rates of SIB and self-restraint for all the different conditions. Self-restraint continued throughout the FA. This meant that self-restraint and SIB were not part of the same response class. The second FA results displayed a mean rate of self-injury of seven responses per minute which increased from the first FA that had a mean rate of 15 responses per minute when self-restraint was blocked. When sessions included social contingencies, Wendy displayed comparable or higher rates of SIB when reinforcement was a factor versus when reinforcement was restricted. These results indicated that when the sessions included social contingencies, Wendy continued to engage in SIB regardless of whether reinforcement was delivered. This suggested that the behavior Wendy displayed could have been unrelated to the social contingencies offered. The results of the final FA, which included the arm-splint analysis, showed that Wendy engaged in SIB only when she had empty sleeves or bare arms. She engaged in self-restraint during 9.8% of session time without splints and did not use self-restraint when she wore the splints, (Scheithauer, O'Connor,

and Toby, 2015, 910). Wendy displayed low rates of SIB and self-restraint during the final FA with splints. These final results indicated that in order to sufficiently reduce the force of Wendy's SIB, four stays were needed in the splint to reduce the level of self-restraint, typically needed by using avoidance or termination (Scheithauer, O'Connor, and Toby, 2015).

An FBA effectively identified the factors related to Wendy's SIB through the different FA's that were performed during this study. This study successfully added to prior research by including different methods to analyze the hypothesis that self-restraint was maintained by negative reinforcement for certain individuals (Smith et al. 1992; Fisher et al., 1996). Like Smith et al. (1992), these researchers saw higher rates of SIB when self-restraint was blocked. They also decreased the force of the SIB which almost eliminated self-restraint, solidifying the researcher's hypothesis that self-restraint was maintained by negative reinforcement. "After they implemented a treatment that included arm splints, caregivers indicated that SIB and self-restraint decreased and Wendy's interaction with her environment increased," (Scheithauer, O'Connor, and Toby, 2015, 910). In conclusion, the study stated that having several FAs allowed for a greater level of insight regarding the relationship between self-restraint and SIB, clarifying the cause of Wendy's SIB (Scheithauer, O'Connor, and Toby, 2015).

Research suggested ways an FBA effectively identified factors that reduce challenging behaviors in children with Down syndrome. The three articles supported early intervention and functional analysis by focusing on noncompliant behaviors, the type of functional analysis that should be used (e.g. trail-based, analogue), and types of problem behaviors like SIB. Due to the large number of students with ID who display challenging behaviors, it is imperative these behaviors are addressed correctly and efficiently (Rodriguez, Thompson, and Baynham, 2010; Rispoli, Davis, Goodwyn, & Camargo, 2012; Scheithauer, O'Connor, and Toby, 2015).



## CHAPTER III: DISCUSSION AND CONCLUSION

### Summary of Literature

This literature review is a small section of the relevant research that continues to grow in a field focused on behaviors of children, students and young adults with Down syndrome and the interventions used to reduce their challenging behaviors. The review demonstrates that a growing body of research targets methods for teaching the correct skills and interventions along with a focus on the most prevalent behaviors in those with Down syndrome. Promising options demonstrated the positive effects an FBA and behavior interventions had for a student with Down syndrome. The research provided insight into determining the specific behavior problems of children with Down syndrome including attention deficit, noncompliance, thought disorder, and social withdrawal (Coe et al. 1999). The literature review also revealed that repetitive behaviors including unusual routines, rituals, and stereotypy are common and how analogue functional analysis may help decrease these behaviors (Neil and Jones, 2015). The research illustrated that through the use of applied behavior analysis for assessment and intervention, successful results have been shown when functional assessment along with correct behavior analytic principles for prevention were used, particularly in young children when the patterns first emerge (Feeley and Jones, 2006). The studies also demonstrated that when using the activity choice method to address challenging behaviors, as opposed to giving verbal directives, behaviors decreased while learning increased (Cole and Levinson, 2002).

This literature review also explained how research literature supported the different aspects of behaviors and interventions for the children with Down syndrome and their families. The study completed by Cless, Goff, and Durtschi (2017), stated positively that hope was significantly associated with greater relationship quality in mothers and their children with Down

syndrome. Through the use of various coping behavior methods, the relationship quality increased through the use of therapists and religious practices. Another study demonstrated how developing an early reading intervention aligned with particular behavioral phenotypes. This was completed through a multiple-probe study that showed a functional relation between the intervention and mastery of taught content reducing behavior problems (Lemons et al. 2017). The research also provided insight into using a commercially available phonological awareness program that indicated a functional relationship between the adapted program and phonological awareness. This program aligned with characteristics associated with the behavioral phenotypes in children with Down syndrome, thus increasing the child's learning (Lemons et al. 2015).

The functions of behaviors most prevalent in children and adults with Down syndrome were illustrated through articles in this literature review. Tomaszewski, Fidler, Talapartra, and Riley (2018), demonstrated that specific aspects of the Down syndrome cognitive profile may have an important influence on employment status in young adults with Down syndrome. Their research showed distinct patterns of strengths and challenges in adaptive behavior and executive functions. The study by Makary et al. (2015) demonstrated the association between adaptive behavior and age in adults with Down syndrome by examining the range and severity of their adaptive behavior problems, with results showing increased age highly associated with lower adaptive behavior abilities. On the contrary, the behavior problems and psychosocial strengths in youth with Down syndrome was examined by Dieleman et al. (2018). Their results showed that attention, social and thought problems were most prevalent.

Finally, the literature displayed how an FBA was effective in identifying factors that addressed challenging behaviors in a student with Down syndrome. The study by Rodriguez, Thompson, and Baynham (2010), presented a method for assessing the relative effects of

attention and escape regarding noncompliance in children with Down syndrome. They determined that noncompliance was maintained by social attention and was a valuable method to develop function-based treatments. The study by Rispoli, Davis, Goodwyn, and Camargo (2012), considered the effectiveness of trial-based and analogue functional analysis. The results indicated that with available resources, the trial-based functional analysis produced clear behavior functions and should be used. Lastly, the literature described by Scheithauer, O'Connor and Toby (2015), displayed how an FBA was effective with an assessment of self-restraint using a functional analysis with a student who demonstrated self-injurious behavior. Information stated that multiple functional analysis provided insight into the functional properties of self-injurious behavior. This research provided a clearer understanding of how to use functional analysis results in clinical decision making.

### **Implications for Professional Application**

The topic of how to address behaviors in children, students and young adults with Down syndrome along with the interventions used to reduce challenging behaviors has been a popular topic around the country for years. Schools in the United States often grapple with determining the appropriate intervention to address challenging behaviors. This topic has been something my school and district discusses on a regular basis. Our district continually faces new challenges with students as they enter the district, advance to each grade and needs continue to change. The research from this literature review regarding behaviors of those with Down syndrome, dictates that we address the behaviors through the use of an FBA, providing a greater success rate.

Our district is fortunate enough to have behavior specialists assigned to the schools who take a huge role in developing FBAs and integrating them into the school day. It would be

beneficial to inform them, along with other special education teachers, about which particular functional analysis would work best. When working with a child with challenging behaviors, one must first determine which specific behavior to target. This could be done through the use of surveys from both teachers and parents using the Vineland Adaptive Behavior Scale, or the Revised Behavior Problem Checklist. Next an ABAB and multiple-probe design could be used by implementing reinforcement or choice options.

One important area that the Tomaszewski, Fidler, Talapatra and Riley (2018) study highlighted was the importance of focusing on executive function and adaptive behaviors across the lifespan of a person with Down syndrome. Because minimal information was documented on how these difficulties related to employment outcomes, it is critical to focus on these behaviors early, which the educators focus in the school setting. We have a very large vocational program in our district, and it is important to implement vocational skills during the school day to prepare students for future employment. This also includes targeting behaviors that may hinder potential employment such as impaired social skills.

The professional implications of this literature review show that overall, professionals need to continue to try different approaches to address challenging behaviors of children with Down syndrome. One approach will not work for everyone, so treating each student as an individual with different needs will help determine which approach will have the greatest impact. This does not make the job of the teacher easier, but it does provide teachers with a variety of options instead of, or in conjunction with, the widely used functional analysis.

In terms of implications for my teaching, I have found many different ideas and methods when addressing the challenging behaviors of my students. This information will improve my teaching and ensure that the interventions my students receive are research-based, well rounded

and accessible. The review also helped me to better understand the appropriate use of functional analysis interventions, and the benefits when used correctly.

### **Limitations of the Research**

The main limitation of this research was the small sample size of the majority of students; thus they did not provide definitive results. Some of the studies had less than five participants making it hard to conclude predictive evidence from this study. A very limited number of studies compared the behaviors of those with Down syndrome and others with Intellectual Disabilities. There was also a limited number of studies that compared FBA with other interventions in terms of effectiveness. Regarding the research focused on challenging behavior of adults with Down syndrome, it was difficult to find articles that yielded results when interventions were used later in life. Most of the articles published only demonstrated positive results. It seems unrealistic to believe when children with Down syndrome display such a wide range of behaviors and change course through their lives.

### **Implications for Future Research**

Recommendations for future research would include completing more research on other behavior intervention techniques that not only include children with Down syndrome, but children with other intellectual disabilities, such as Autism or Emotional Behavior Disorders. It would be beneficial for researchers to compare results of the interventions across different levels of intellectual disabilities so that teachers who work with all students become more well-rounded educators. More research is also needed that targets specific age groups and compares the same interventions and effectiveness with different age groups. It would be helpful for professionals to

be able to narrow their search when trying to decide what program to use with individual students in their classrooms. Research is needed that compares the different functional analysis with targeted behaviors, such as avoidance during direct instruction time.

It would also be interesting to find more research comparing behavior interventions targeting different subject areas, such as reading and math in order to compare treatment effectiveness within the different subjects. Overall, the topic of behaviors and interventions related to students with Down syndrome needs to be researched more thoroughly as many of the same studies I reviewed contained small sample sizes and limited scopes of research.

## **Conclusion**

This literature review gave me an opportunity to explore my own biases about interventions and behaviors of students with Down syndrome and examine in depth why an FBA is considered the gold standard in addressing a behaviors of students in the classroom. I have learned that the use of one single functional analysis technique may not always be the best method for minimizing a challenging behavior, and that there may be circumstances where it can be useful to use many techniques. This process demonstrated that there is not a gold standard for interventions in dealing with challenging behaviors of students with Down syndrome, but a variety of functional analysis techniques that should be considered the gold standard for individual students.

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