

PREDICTING FUTURE SPECIAL EDUCATION ELIGIBILITY FROM DEVELOPMENTAL
ASSESSMENT OF YOUNG CHILDREN (DAYC) SCORES

by

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Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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ABSTRACT

This quantitative non-experimental correlational study used logistic regression and archival data to examine the relationship between scores obtained by children at age three on the Developmental Assessment of Young Children (DAYC) rating scale and later special education eligibility status. The purpose of this study was to determine if DAYC scores can predict future special education eligibility as defined by the criteria of the State of Tennessee Department of Education and thereby provide a tactic for early identification and intervention. The 74 participants were students from a small, rural, high-poverty school district who were initially evaluated at age three using the DAYC and who were subsequently re-evaluated three years later. Students were originally rated by parents and teachers and later evaluated by licensed school psychologists using state-approved testing procedures and special education eligibility standards.

Keywords: special education eligibility, rating scale, evaluation, developmental delay

Dedication

This work is dedicated to my grandmother, Helen Margaret Canaday Whitehurst. She challenged me, inspired me, loved me, and taught me to never give up.

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List of Abbreviations

American Academy of Pediatrics (AAP)

Developmental Assessment of Young Children (DAYC)

Early Childhood Special Education (ECSE)

Education for All Handicapped Children Act (EAHCA)

Individual Educational Plan (IEP)

Individuals with Disabilities Act (IDEA)

Response to Intervention (RTI)

Tennessee Department of Education (TDOE)

CHAPTER ONE: INTRODUCTION

Background

Developmental rating scales are often used to determine eligibility for 3-year-old students in search of special education services provided by public school systems under individual state guidelines (Malone & Gallagher, 2009). Most school systems now recognize that early screening is an important element in the identification of students with developmental and learning problems (Glover & Albers, 2007, p. 118). Developmental rating scales assist in this screening by endeavoring to measure developmental skills across several domains including cognition, communication, social skills, physical development, and adaptive behavior. In Tennessee, students are eligible for special education services under the title of Developmentally Delayed if they obtain scores on a state approved instrument falling at least one and a half standard deviations below the mean in at least two developmental areas or if they obtain a score in one area that falls two standard deviations below the mean (Tennessee State Department of Education [TDOE], 2002). After three years, students placed in special education according to the results of these ratings are re-evaluated using standardized, state-approved instruments according to the nature of their supposed disability. Some students are dismissed from services at this time based upon the outcome of this second evaluation which may indicate that there was no actual disability present initially and that environmental conditions, rather than psychological or physiological impairments, were likely the basis of the preliminary eligibility (Daley & Carlson, 2009). Daley and Carson (2009) found many children identified for special education services no longer qualify for such services by the beginning of elementary school.

Past research has noted many flaws in the system of eligibility determination in the United States, but few studies have examined the causes and problems associated with

termination of service (Daley & Carson, 2009). Dismissal from special education has several short- and long-term consequences and affects all of those involved in the child's educational progress. The student is likely to have become accustomed to the accommodations and modifications specified in the Individual Educational Plan (IEP) and must adjust to instruction, curriculum, and settings designed for non-disabled peers (Carlson, 2000). Parents of declassified students are less likely to report satisfaction with their child's school and may be distressed to learn that their child will no longer receive services or angry to find that no disability is present after believing it to be so for the past three years (Holden-Pitt, 2005). Teachers and administrators must rethink placement for the student and work towards reducing the stress of reintegration (Carlson, 2000). Unfortunately, these children may be viewed as flawed in some way or unable to keep up with their peers in academic progress. Teachers are sometimes unwilling to incorporate these students into their classrooms and may avoid dealing with them if alternative placements are available (Ross-Hill, 2009).

The attitudes and beliefs that have been formed about the child by all of the involved parties over a three year period can be beneficial or detrimental to later academic success. When a child enters school, a related identity is generated that influences the way in which teachers, peers, parents, and administrators view the student and his or her behavior and performance (Christine, 2013; Finnan & Kombe, 2011; Rich & Schachter, 2012). Studies have found that limited expectations from parents and teachers for students with disabilities may limit the effectiveness of instruction. A child's identity is shaped by many things, but status as a special education student can be foremost among them in the school setting. Many educators feel that students placed in special education will retain this eligibility throughout their school career (Carlson & Parshall, 1996). This line of reasoning is sometimes contradictory to early

intervention theory which holds that outcomes for handicapped children can be changed through the use of targeted intervention (Jenkins et al., 2006). Learning, which takes place in developmentally appropriate settings, has been shown to encourage the development of language, social skills, and cognitive skills (Odom & Wolery, 2003).

The theoretical basis of early intervention stresses that programs which place emphasis on prevention of misidentification and comprehensive involvement in the learning process are integral to successful skill acquisition (Burton, Hains, Hanline, McLean, & McCormick, 1992). Research documenting whether special education programs are serving the right students and whether these students are provided with the most appropriate and effective service is lacking. Undoubtedly, some children are inappropriately placed and others are unidentified or fail to receive the services they require. Therefore, it is crucial to correctly diagnose students in need of services as early as possible, not only to provide for them instruction targeted to meet their individual needs, but also to ensure that they are not forced to suffer the academic and psychological consequences of misidentification. Further, more evidence on the impact of special education on achievement and student outcomes is needed in order to gage the usefulness of the money spent on these services. Better data are required to develop standardized appropriate assessments for students with disabilities across the various categories of impairment.

Problem Statement

Developmental rating scales are useful for comparing a child's growth across cognitive and physical domains and yield a developmental quotient which can be used to compare the individual with a norm group. Difficulties arise when this developmental quotient is misused and considered indicative of intelligence, an indicator of a specific learning disability, or a static

measure of the child's ability (Aylward, 2009). Predictive validity of testing instruments is often ignored because it necessitates longitudinal tracking, but "any effective screening instrument must be validated from this perspective" (Rafoth, 1997, p. 132). Additionally, young children are often uncooperative during evaluations, and ratings can be negatively influenced when they refuse to participate in the completion of a task. The use of a single composite measure is not ideal when predicting intelligence in children less than three years of age (Aylward, 2009). According to Dale et al. (2004), "there is a crucial need for long-term, prospective outcome studies of children who have been identified as having special needs in early childhood" (p. 240). The regular assessment of student development is critical to the implementation of programs which will lead to positive social, emotional, and cognitive outcomes (Schweinhart, 2013).

Partridge (1994) suggested that developmental rating scales are not beneficial in the identification of specific learning disabilities and only helpful in the determination of developmental delay. Therefore, children with learning disabilities can easily be overlooked in screenings using these measures because they are not sensitive to more mild cognitive impairments. Testing students using instruments that evaluate active cognitive processing are more helpful in determining future learning disabilities (Partridge, 1994). Many variables, such as pre-birth conditions, genetic abnormalities, environmental settings, and attention and behavior issues, can interfere with the rate of typical development and cause children to seem disabled at a young age when their fundamental cognitive ability is within the average range (Gartland & Strosnider, 2007). Therefore, basing initial special education eligibility and assuming disability status upon the results of a single rating scale is problematic. Despite problems associated with early cognitive and academic evaluation, there is no question that instruction is driven by assessment and that teachers are increasingly pressured to focus instruction based on deficits in

assessed skills using standardized tests (Casbergue, 2011). The problem is there has been little research exploring the interconnections between emotion, cognition, adaptation, development and academic achievement (Leerkes, Paradise, O'Brien, Calkins, & Lange, 2008). Additionally, few studies have sought to predict school related behavioral and emotional problems in children regardless of the fact that these areas are often a source of referral for special education services and are frequently reported by teachers as impacting academic performance (Pianta & McCoy, 1997).

Purpose Statement

The purpose of this quantitative non-experimental correlational study is to determine which, if any, DAYC subscale scores (predictor variables) are useful in predicting future special education eligibility, as defined by the State of Tennessee Department of Education, upon subsequent re-evaluation (criterion variable). The predictor variables in this study are the five subscales of the Developmental Assessment of Young Children (DAYC) rating scale: cognitive skills, communication skills, social-emotional skills, adaptive skills, and motor skills. The cognitive skills subscale measures age-appropriate concept development. The communication skills subscale measures receptive and expressive language skills as well as verbal and nonverbal abilities. The social-emotional skills subtest measures social competence and awareness within relationships. The adaptive skills subscale measures the degree to which a child can function independently and self-help skills. The motor skills subtest assesses both fine and gross motor skills (Voress & Maddox, 1998).

The criterion variable for this study is special education eligibility as described by the State of Tennessee Department of Education. Tennessee recognizes sixteen major categories of disability with further sub-categories falling under each of these. Each category is defined by

specific characteristics which must be evaluated and documented by licensed professionals (TDOE, 2002).

Significance of the Study

Identifying children at-risk for learning problems has been viewed as an important but under-recognized need in the field of child mental health (Satz & Fletcher, 1988). The current study provides insight into the prediction of special education eligibility from rating scales used in preschool settings which assess cognition, communication, social-emotional skills, adaptive skills, and motor skills, specifically the DAYC. The ability to predict this status is important to educators because it allows curriculum and instruction to be better tailored to meet the needs of the individual student. This assists children in remaining within equivalent educational settings alongside their same-age peers and to graduate from high school with their age-appropriate cohort.

Research Questions

The initial research question is as follows:

RQ1: How accurately can eligibility for special education services be predicted from a linear combination of Developmental Assessment of Young Children (DAYC) scores for 3-year-old students?

Null Hypothesis

The null hypothesis for this study is:

H₀1: There will be no statistically significant relationship between the criterion variable (eligibility for special education services) and the linear combination of predictor variables (Cognitive domain, Communication domain, Social-Emotional domain, Motor domain, and Adaptive domain) for 3-year-old students.

Definitions

1. *Adaptive Behavior Domain* – This domain measures independent functioning in the environment such as feeding and dressing (Voress & Maddox, 1998).
2. *Binary logistic regression* - A statistical method for analyzing data in which there are one or more independent variables that determine an outcome (Howell, 2011).
3. *Cognitive Domain* – This domain measures conceptual skills such as memory, planning, making good decisions, and discrimination between stimuli (Voress & Maddox, 1998).
4. *Communication Domain* – This domain measures skills used in sharing ideas and information with others in verbal and nonverbal settings (Voress & Maddox, 1998).
5. *Developmental Assessment of Young Children (DAYC)* – A developmental rating scale used to aid in the determination of eligibility for preschool children (Voress & Maddox, 1998).
6. *Developmental delay* – A condition that represents one or more statistically significant interruptions in the process of development (Voress & Maddox, 1998) .
7. *Early Intervention Theory* – A concise group of beliefs which emphasizes the importance of early recognition and remediation of factors which may have a negative impact upon the social, emotional, and intellectual competence of young children (Odom & Wolery, 2003).
8. *Eligibility* – This term refers to the possibility that a student will be able to receive special education services under the terms of an Individual Educational Plan (IEP) due to a disabling condition which interferes with educational progress (TDOE, 2002).

9. *Physical Development Domain* – This domain measures gross and fine motor development (Voress & Maddox, 1998).
10. *Response to Intervention (RTI)* - The process of providing research-based instruction and interventions through a three-tiered approach, monitoring progress frequently to make decisions about changes in instruction, and applying student response data to educational decisions (Ferri, 2011).
11. *Social-Emotional Domain* – This domain measures social competence enabling children to participate in meaningful interactions with peers and adults (Voress & Maddox, 1998).
12. *Standardized tests* – These evaluations are usually normed using a broad range of participants with a representative group and used to provide consistent information across populations of children (Casbergue, 2011).

CHAPTER TWO: LITERATURE REVIEW

This chapter presents a review of recent literature and historical material, as well as state and federal legislation, related to early identification, early intervention, and special education eligibility. The story of early intervention within special education is complicated and lengthy. It includes several landmark court cases and many subsequent changes in education law. The theory of Early Childhood Special Education (ECSE), as proposed by Odom and Wolery (2003), offered principles that seek to unify the field and provide an underlying foundation for the practices and beliefs that represent common denominators in this particular and unique part of education policy.

Predicting academic success has long been a goal in the field of education and perhaps even more so in special education. All special educators are familiar with writing goals and objectives for individual students, which can only be done through the use of predictive analysis. IEPs are required for every individual special education student and provide a specific plan which seeks to not only document the student's current academic achievement level but also to provide a strategy by which the student can make progress towards unambiguous long-term goals. In order to create these plans, some form of assessment is necessary to appraise current skills in each area for which goals are required. Eligibility for special education services is an evolving process with no clear culmination in sight, and preschool eligibility requirements continue to change on a state by state level as federal guidelines are implemented with a variety of interpretations.

Special education, as it relates to preschool services, is outlined here with a brief mention of response to intervention (RTI) programs and how they are influencing preschool services. RTI is a relatively new player on the field of education and has made numerous inroads into both

assessment and instruction. Finally, the subject of developmental screening is covered with special attention to each of the four areas that are most commonly evaluated by medical and educational professionals which include cognitive ability, communication skills, social-emotional skills, physical or motor (both gross and fine) skills, and adaptive skills.

Early Intervention

The primary assumption of early intervention is that it can change outcomes for students who have handicaps by biological or environmental conditions which interfere with educational progress (Jenkins et al., 2006). According to Dunst (2000), early intervention is “the provision of support and resources to families of young children from members of informal and formal social support networks that both directly and indirectly influence child, parent, and family functioning” (p. 97). The field has been heavily influenced by theories of behaviorism, constructivist theory, developmental psychodynamic theory, and ecological theory (Odom & Wolery, 2003). Components from each of these theoretical perspectives have been combined to form a unified theory of early intervention consisting of evidence-based practices and a common research base (Odom & Wolery, 2003). The philosophical and theoretical basis of early education places emphases on “the principles of integration, prevention, comprehensiveness, and family-centeredness” highlighting the importance of programs combining these factors (Burton et al., 1992, p. 54).

Early intervention theory is composed of several tenets of belief. The first of these is that families and homes comprise the principal nurturing environment for children with disabilities and that these children benefit from participating in the community as part of a family with non-disabled peers (Odom & Wolery, 2003). Special educators often attempt to extend the time that students spend in these skill-rich settings by allowing their students to participate with non-

disabled peers within the school environment as much as possible. Another essential component of early intervention theory is the establishment of positive relationships between caregivers, families, and professionals working with young children. Ideally, all of these parties of the child's growth experience are able and willing to work together towards the goal of providing positive and inspiring situations in which the young child can learn and grow with steady progress. Peer groups are also emphasized, and social competence is an acknowledged part of the development of such relationships. Indeed, social interaction is one of the key components of successful growth and development as it influences many other areas including adaptive behavior, communication skills, and academic achievement (Odom & Wolery, 2003).

In addition to the establishment of beneficial relationships, early intervention theory holds that children learn through observing and acting upon their environment. Therefore, teachers must promote active engagement in the classroom, and parents must learn to take advantage of natural learning opportunities in the home such as teaching math and reading skills through everyday household activities (Odom & Wolery, 2003). Furthermore, adults are essential to the learning process and should act as mediators to promote the acquisition of knowledge through planning, the establishment of goals, and systematic practice. Early intervention theory embraces a number of techniques to facilitate learning including modeling, incidental teaching, peer assisted learning, and reinforcement-based strategies, all of which can be accomplished in both home and classroom (Odom & Wolery, 2003). It is theorized that early intervention environments work by shaping experiences into forms that are better internalized by the delayed child, appealing to various forms of learning to optimize chances that the individual will approximate a normal chronological schedule of development (Levy, 2011).

Instruction received in developmentally advanced settings, such as inclusion classrooms, is another tenant of early intervention. Such environments have been shown to facilitate language acquisition, social skills, and cognitive development because they provide exposure to advanced skills that would not otherwise be available on a regular basis to the disabled student (Odom & Wolery, 2003). Because early intervention is necessarily individualized to the learner, the establishment of appropriate goals and the design of strategies designed to meet these goals is essential, thereby making individualized assessment indispensable to ensuring the adequacy of instruction. This necessity fits well with the implementation of the RTI model, which stresses the importance of individual goals and the tracking of academic growth through the use of continuous progress monitoring (Neisworth & Bagnato, 2004). Initial assessments can be useful in providing the probable learning path of students with recognition that these predictions are responsive to instruction and environmental factors, and thereby highlighting the importance of sound teaching strategies and inclusive classrooms that are conducive to experiential learning (Strand, Cerna, & Skucy, 2007).

Transition planning is integral to early intervention theory and exists to encourage a continuity of experiences across services and agencies which are necessary to ensure the continuous and seamless flow of learning that is important to early development (Sainato & Morrison, 2001). Transition necessitates assessment, so that current levels of performance and skills necessary for the new setting may be evaluated and taught, respectively (Odom & Wolery, 2003). Learning and transition take place within the child's environment, but factors outside of this immediate setting may also influence development. These ecological factors may occur at the microsystem level, encompassing the child's immediate surroundings, the mesosystem level, which represents the interactions within and between microsystems; the exosystem level, which

includes outside influences such as the parents' workplace; and the macrosystem level, representing societal and cultural influences, all of which must work together to facilitate optimal growth for the child (Odom & Wolery, 2003). Early intervention can result in both long and short term benefits for scholastic and community settings such as higher high school graduation rates, lower rates of criminal arrests in juveniles, and fewer grade retentions in elementary and middle school (Poon, LaRosa, & Pai, 2010).

Predicting Academic Success

Research showed that there are numerous influences among the many environments to which a child is exposed that interact to play a role in academic success, and it showed that education is an interpersonal as well as an intellectual undertaking (Scales, Benson, Roehlkepartain, Sesma, & Dulmen, 2006). Also, when multiple developmental factors are addressed and strengthened from a perspective which attempts to ensure that as many factors as possible are examined, positive outcomes become more likely, thus emphasizing the importance of a holistic approach. For these reasons, assessing the needs of preschool students across several domains and identifying deficiencies and strengths within each of those spheres becomes central to encouraging educational progress.

Because education is cumulative in nature, cognitive and psychosocial factors that are apparent in preschool are directly linked with achievement not only in the elementary years but also into high school and beyond (Bossaert, Doumen, Buyse, & Verschueren, 2011). Social factors in particular have often been the focus of research and learning models due to the fact that they are viewed as integral to all areas of human development, especially communication. Vygotsky's well-known theory of development emphasized that learning takes place through

interaction with peers and adults, while Bandura's observational learning theory stresses the acquisition of knowledge through imitation (Sung & Chang, 2010).

The importance of good social skills cannot be overstated because these behaviors and abilities contribute significantly to achievement goals by reducing the incidence of behavior problems and improving the quality and frequency of interactive learning. The student that is able to interact well with peers tends to use these skills more often and thereby benefit to a greater degree from the continual process of accommodating and assimilating information that is inherent in the practice (Del Prette, Del Prette, De Oliverira, Gresham, & Vance, 2012). The concept that social awareness is acquired through social interaction builds upon Vygotsky's theory and postulates a transactional view of development, highlighting the need for frequent and meaningful dealings between parents, educators, peers, and students (Fenning, Baker, & Juvonen, 2011).

Further research suggested that children who demonstrate the inability to maintain healthy interpersonal relationships are at-risk for various negative outcomes including "school failure and dropout, alcohol and substance abuse, delinquency, social rejection, and violent and destructive behavior patterns" (Del Prette et al., 2012, p. 617). These students present significant challenges to educators, parents, peers, and communities for several reasons. Social skills are difficult to learn and practice with ease as an adult if the basis for them has not been laid successfully during the developmentally appropriate windows. Assessing social and adaptive skills early in the process can help to strengthen the bridge between the learning environment and academic success (Fenning et al., 2011).

Intelligence and personality have been strongly linked to achievement in many studies over a long period of time, and predictive tests using these two factors are often employed not

only for the purpose of identifying areas of strength and deficit but also to assist in the process of curriculum planning so that teaching strategies can be linked to specific weaknesses and improving outcomes (Laidra, Pullmann, & Allik, 2007). Individual differences in both fluid and crystalized intelligence are recognized as influential predictors of school achievement, and reasoning ability affects all aspects of high-level learning in addition to influencing the approaches employed by educators when considering instructional methods (Stock, Desoete, & Roeyers, 2009). Despite strong associations, cognitive ability does not, as a stand-alone factor, account for all of the variability in student success, and addressing cognitive deficits in isolation will not always significantly improve academic success (Levpuscek, Zupanic, & Socan, 2012).

Other interpersonal constructs, such as self-regulation, decision making skills, motivation, persistence behavior, which are indirectly linked to intelligence, have also been shown to influence grades and long-term achievement (Casillas, Robbins, Allen, & Kuo, 2012). Motivation is important and applicable to all types of learning, but it is an essential component of elementary instruction in particular (Robinson, 1996). Achievement motivation, which is fundamental to giftedness, has three components including expectancy, value, and affect. All of these components are necessary for optimal achievement because the components are not independent, but must interact in an interdependent way (Rea, 2000). Children who find cognitive tasks enjoyable, and therefore motivating, will tend to immerse themselves in learning from an early age, thereby enhancing their exposure to such stimulation as well as their intellectual development (Gottfried & Gottfried, 2004).

The Evolution of Eligibility

Governmental interest in persons with disabilities is a relatively recent occurrence that began in early human history with voluntary or forced homebound care or institutionalization; it

moved very slowly over a relatively lengthy period of time to current practice which encourages almost total societal inclusion in educational and workplace settings (Gallagher, 2000). In the mid-1800s, some states were given federal grants to establish asylums for the deaf and dumb and for the education of blind students. Prior to the 1970s, children with special needs, whether physical, mental, or emotional, were commonly excluded from public schools, or the services provided to them were minimal and based upon the discretion, facilities, and staff of the local educational agency (Malone & Gallagher, 2009).

No federal laws specifically protected the rights of Americans with disabilities until Section 504 of the Rehabilitation Act of 1973, which created and extended civil rights to persons with disabilities and stated that excluding or segregating these individuals constituted discrimination and could be addressed through the filing of personal lawsuits against individuals or organizations (Aron, 2012). Prior to 1973, most state laws still allowed school districts to refuse enrollment to any student who was deemed uneducable according to local officials, and those who were admitted most often were placed in general education settings with no special services or were placed in special programs, often in separate or secluded areas away from other students, being provided with services that were inadequate or inappropriate.

Public Law 94-142 was enacted by the United States Congress in 1975, became effective in 1978, and prescribed education for all students, but it was successfully implemented only after a series of court challenges. This law also specified that students with handicaps be placed in the “least restrictive environment” or the setting which least restricts the opportunity for disabled students to interact with their non-disabled peers (Gallagher, 2000). Since the drafting and implementation of these early court decisions, the importance of special education implementation in public schools has been augmented consistently by the U.S. Department of

Education's involvement through research, funding, supervision, and curriculum development (Odom & Wolery, 2003).

In 1972, the case of *Mills v. the Board of Education of the District of Columbia* set the precedent for the requirement of formal evaluation to determine the child's needs before a determination of services can be made, and it set the stage for the passage of Section 504 of the Rehabilitation act of 1973 as well as the Education for All Handicapped Children Act (EAHCA) which would eventually become the Individuals with Disabilities Education Act (Gallagher, 2000). The Individuals with Disabilities Education Act (IDEA) provides funds to states so that they may provide specialized early intervention services to all children who meet eligibility standards by displaying cognitive, behavioral, or physical deficits as well as providing a due process option for parents who feel that they or their children have been denied rights provided to them by law (Morgan, Farkas, Hillemeier, & Maczuga, 2012). Federal law, as described in the IDEA, says that states must offer services to children with disabilities beginning at age three without expense to the parents. Consequently, students suspected of having a disability are routinely screened upon their entrance to school by a trained evaluator, and if problems are suspected, these children are referred to a school psychologist or other licensed professional for developmental evaluation (Malone & Gallagher, 2009). IDEA also requires states to identify and evaluate all children from birth to age 21 who appear to be in need of early intervention services or special education services, regardless of the severity of their disability, through the process known as Child Find (Aron & Loprest, 2012). The evaluation component of Child Find includes evaluation of cognitive skills, receptive and expressive language, perceptual and motor skills, behavioral and emotional functioning, as well as family and demographic information for all children residing within a particular state regardless of whether they attend private or public

school (Pianta & McCoy, 1997). Children receiving special education services under these laws must not only be present with an identifiable and specific disability, they must also demonstrate the need for special education as a result of their impairment (Aron & Loprest, 2012). The implementation of these changes has been slow but effective. Before IDEA's passage in 1975, only one in five children with disabilities attended public school. By 2005, "more than 6.7 million children (13.8 percent of all students nationally) were receiving special education services through the law" (Aron, 2012, p. 100).

Special Education in Preschool

Students who qualify for special education status at age three often come from less than ideal environmental circumstances which contribute to, rather than assist with, overcoming their handicapping condition. Contributing to the problem are factors such as poverty, socio-economic distress, public health issues, lack of community outreach, and funding complications (Burton et al., 1992). According to Aaron & Loprest (2012), the acute importance of early identification and remediation of childhood disabilities is now widely established. By intervening early in a child's development, health and educational course can often be redirected so that children can grow into independent and successful adults thereby reducing the need for more serious and costly services, such as incarceration and welfare, later in life. Early intervention services may include screening, assessment, referral, therapy, instruction, and treatment provided within the school setting or other environment as appropriate (Aron & Loprest, 2012). Preschool, as an intervention for children with disabilities, "attempts to facilitate cognitive and social development by providing a responsive, stimulating, and organized environment in the form of curricula and teacher-child interactions" (Jenkins et al., 2006, p. 739). Preschool as a therapeutic setting has been shown to assist students with various

disabilities, especially those associated with cognition and its related components. Additionally, evidence demonstrated that high-quality early intervention can provide long-term cost savings across various public programs such as education, health, and criminal justice (Aron & Loprest, 2012).

Jenkins et al. (2006) found that cognitive and language abilities were significantly related to age 19 achievement. Short-term effects of preschool intervention upon cognitive growth are well recognized and generally ranged from one-fifth to one-third of a standard deviation increase across the measure in use (Finn, 2009). Fine motor and cognitive skills have been highlighted by some studies to be linked with difficulties of achievement, and other studies have identified measures of IQ and perceptual-motor skills to be predictive of short-term successful outcomes (Pianta & McCoy, 1997).

In contrast to studies examining the short-term benefits of early intervention, it should be noted that despite some positive findings, research documenting the long-range academic effects of such programs is to some extent limited. Longitudinal studies of early special education intervention programs are more difficult to find than shorter term studies in the field of early childhood literature (Jenkins et al., 2006). This disparity may be due in part to a lack of congruence between educational assessment studies, emphasizing academic and cognitive factors, and developmental research which typically stresses the importance of social and behavioral skills (Pianta & McCoy, 1997).

Despite this deficiency of longitudinal research, it is important to recognize that “in today’s pre-K policy context, what matters most is a program’s effectiveness in imparting essential school-readiness skills to its young participants, principally in the cognitive domain” (Finn, 2009, p. 4). Providing school-readiness skills to those with delays or disabilities has been shown

to improve their educational and societal opportunities because the successful impartation of such instruction can often mitigate the effects of physiological or environmental obstacles (Morgan et al., 2012). Even with the potential for invalid assessment and mistaken identification, developmental screenings and other types of early evaluations enjoy popularity in the field, and their use is likely to increase along with national educational goals which pressure states to increase achievement in elementary school. Much of this use can be attributed to the need to monitor progress and promptly identify any gaps in development or achievement (Pianta & McCoy, 1997). Additionally, the implementation of RTI programs, though they often minimize the importance of innate cognitive factors in achievement, has increased the demand for screening tools identifying children at-risk for developing learning disabilities, particularly because early intervention reading programs for kindergarten and first grade students have proven effective in addressing early reading and math acquisition skills (Seethaler & Fuchs, 2010).

Developmental Screening

In general, developmental screening refers to the practice of evaluating large groups of children in order to find those who are at-risk for the later development of significant physiological and cognitive problems (Rydz, Shevell, Majnemer, & Oskoui, 2005). Screening children from birth through early childhood for developmental concerns has a very lengthy and wide-ranging history. One of the earliest screening tools was a method of judging the health and potential of a newborn child used by Spartan Greeks and similar to the Apgar test in use today. If infants failed, their lives were ended (Macy, 2012). Thankfully, the focus of screeners has changed over time to one of identification and remediation rather than simple elimination from

the gene pool. Such screening is now the preliminary process, in both medical and educational settings, for identifying areas of concern in early development (Jennings & Hanline, 2013).

Developmental screeners have been an integral and meaningful part of education systems since the implementation of IDEA and child-find systems. Physicians, parents, teachers, and others involved in childhood health and education need reliable instruments that consistently identify any abnormality that varies significantly from the norm of human development. Screeners are also increasingly relied upon in pediatric settings and as such, are under increasing scrutiny for their ability to provide precise measurement of developmental qualities and compare those capacities among populations (Elbaum, Gattamorta, & Penfield, 2010). In 2001, the American Academy of Pediatrics (AAP) recommended that well-child screenings include standardized developmental assessments, and in 2006 the AAP issued a comprehensive developmental screening algorithm designed to clarify the frequency and timing of evaluations (Radecki, Sand-Loud, O'Connor, Sharp, & Olson, 2011). In spite of these recommendations, it is estimated that only about one-third of individuals are identified by medical professionals prior to school entrance, and 71% of pediatricians admitted to using clinical judgment rather than standardized screening tools when developmental delay was suspected, causing many children to miss the benefits that earlier intervention had to offer (Poon et al., 2010).

Traditionally, significant delay has been recognized as a deficit of 25% compared to same-age peers, or a discrepancy of 1.5 or more standard deviations below the mean of the assessment instrument (Poon et al., 2010). Because of the high likelihood that premature infants and those with other obvious handicapping conditions at the time of birth will suffer from developmental delays, early diagnosis and identification is critical in order to enhance long-term outcomes (Guerra et al., 2014). Preterm birth is among the most common denominators among

developmentally delayed toddlers and has been shown to influence perceptual, motor, communication, attention, processing speed, and memory abilities (Levy, 2011). Despite these factors, research has not documented a clear and uniform relationship between perinatal difficulties and long-term consequences among premature children (Ergaz & Ornoy, 2011).

Timely recognition of delay is important for many reasons, but identification and diagnosis should be contemplated with the knowledge that developmental trajectories are widely divergent among age groups and populations. Thus, there exists substantial variation in what can be differentiated as abnormal during routine screening (Shevell, 2010). Additionally, the idea of delay itself implied that catching up is a possibility, when in fact a life-long deficiency may be likely in many cases (Levy, Ornoy, & Nevo, 2011). Other types of delay such as developmental dissociations, in which the child's growth varies greatly across domains, and developmental regression, in which the child seems to lose previously attained skills, must also be considered when evaluating young children for both medical and educational purposes (Poon et al., 2010).

Today's educational policies are focused on improvement through research-driven instruction for all children as well as classroom practices verified through empirical research. These demands are fraught with difficulty for the field of special education for many reasons, but one in particular is due to the variability inherent in the population and the many contexts of the instructional environment (Odom et al., 2005). Despite these difficulties, special educators have long accepted and made use of frequent data collection in the attempt to measure the effects of intervention plans on individual student goals and thus ensure the appropriateness of instruction (McConnell, 2000). Screening instruments provide an important contribution to the evidence-based evaluation and instruction of young children with disabilities and help provide alignment

of preschool curricula with transitional plans to kindergarten by identifying areas of need (Macy, 2012).

Although developmental screening has a storied past and is familiar to most special educators, there have been few longitudinal studies documenting outcomes for children who receive preschool special education services due to being identified as a result of the implementation of screening instruments. The effectiveness of these programs is often assumed due to robust empirical support for the results of intervention with non-special education students (Sullivan & Field, 2013). It is important to remember that, “whilst the central focus of developmental follow-up lies in the accurate assessment of outcome, the ultimate goal is the elucidation of early predictors of later disability” (Johnson & Marlow, 2006, p. 180).

Comprehensive developmental potential is multifaceted and the result of a myriad of genetic and environmental factors that are sometimes difficult to pinpoint (Sachdeva et al., 2010). Though research demonstrated that significant long-term deficits are probable in the majority of delayed children, the extent of such deficits and the precise nature of the handicaps are generally unknown in the young child (Levy, 2011). Therefore, although identification and attempts at remediation are desirable in most, if not all cases, attempting to predict future need with a high degree of accuracy can be counterproductive. Professionals can and should make an effort to listen to parents’ concerns regarding the development of their child, record and maintain a detailed developmental history, use standardized instruments to make accurate observations of the child, and work to identify and negate risk factors in the environment (Poon et al., 2010).

In general, the domains of development identified in most screening instruments can be categorized into four broad areas, each of which may be assumed to include various skills, activities, abilities, and behaviors. The four areas include cognitive or adaptive development,

language or communication development, personal or social development, and motor development (Rydz et al., 2005). These four areas or domains overlay the contemporary models of biology that emphasize a three-fold interaction between age, genetic, and environmental factors which unite to form a developmental trajectory that is particularly relevant to the concept of developmental delay (Levy, 2011). Unfortunately, a diagnosis of a neurodevelopmental disability in most of these areas, with the attendant needs for medical services, rehabilitation, therapy, and other supportive environments including education, presents a significant and costly challenge on individual, family, and societal levels (Shevell, 2010). As noted in other fields of research, early identification and treatment generally reduces the cost of treatment and improves quality of life for children and families when compared to after-the-fact diagnoses later in the course of development (Poon et al., 2010). Addressing these needs early in the process of potential remediation is important from the perspective of age, not only from the standpoint of better results, but also from the possibility that sensitive periods of development may be missed, causing the temporary or permanent loss of critical skills. Despite the best efforts of physicians, educators, therapists and other professionals, the majority of children with developmental delay continue to demonstrate deficits into late childhood and adulthood (Levy, 2011).

Cognitive development, sometimes considered in combination with adaptive development, measures the child's ability to work through problem situations and solve them through the use of insight, experience, learned and innate skills, and instruction. It involves verbal and nonverbal reasoning abilities and the ability to retain information and apply it at a later time (Rydz et al., 2005). Many factors contribute to cognitive ability and some, such as nutritional elements, medical issues, and social interplay, are malleable to some degree through the use of intervention strategies (Sachdeva et al., 2010). Cognitive abilities are particularly

vulnerable to the effects of oxygen deprivation during birth due to the potential for asphyxia and hypoxic-ischemic encephalopathy that can occur during problematical deliveries and which can lead to extensive and lasting damage with long-term neurodevelopmental deficits and associated behavioral and motor complications (Ergaz & Ornoy, 2011).

Mental capabilities are powerful forecasters of success in school with crystallized intelligence. These include the use of one's skills and experience to solve problems and possessing a slightly greater influence than fluid intelligence, which involves the ability to think logically and solve problems in unfamiliar situations (Stock et al., 2009). Although it is often presumed that young children with developmental delays are cognitively impaired or will eventually be identified as such, this has not been reliably documented, and a large portion of such children in fact possess average or better intelligence, suggesting the concept of two separate subsets of delayed individuals (Riou, Ghosh, Francoeur, & Shevell, 2009).

Unfortunately, most screening measures have no ability to differentiate between these two groups, so students demonstrating poor cognitive skills due to environmental influence are often grouped with peers who demonstrate true and lasting cognitive impairments. An additional factor to consider is the idea that cognitive ability in isolation, although playing an important role, is not always predictive of individual differences in school success (Levpusek et al., 2102). These findings indicated that educators and clinicians should be cautious when applying labels to very young children and when communicating to parents predictions regarding eventual outcomes based on early abilities (Gillespie-Lynch et al., 2011).

Assessment of children with handicapping conditions is a necessary component of special education, and the measurement of intelligence and its related components is integral to these evaluations. Success in academic settings is correlated with several factors of cognitive ability

such as working memory and processing speed along with conative factors such as motivation, interest level, ability to focus, and other personality traits (Gottfredson & Saklofske, 2009). According to Jensen (2011), measures of effort are related to cognitive abilities such as working memory, especially in young children. If these factors can be accurately measured and are normally distributed in the population, then future abilities and behaviors can be predicted and influenced through deliberate intervention in the classroom. When considering current practice in the measurement of aptitudes, whether cognitive or performance in nature, standardized tests are the principle method of analysis and classification of developmental abilities (Radecki et al., 2011).

Intelligence has been formally studied for about 100 years, during which time several primary theories have emerged. Galton proposed that the ability to discriminate and act upon various sensations is the primary factor in determining levels of intellectual ability, and this theory was expanded upon by Cattell, who proposed ten psychological components including “tactile discrimination, thresholds for pain, weight discrimination, and reaction times to auditory stimuli” (Takahashi, 2013, p. 608). Spearman’s two-factor model of intelligence gained popularity early in the 20th century and was followed by Horn and Cattell, who postulated crystallized and fluid intelligences that paralleled the verbal and performance scales of the Wechsler tests. Several other prominent theories have also emerged including those of Binet, Carroll, McGrew and Flanagan, and Gardner (Jensen, 2011).

Along with these theoretical perspectives has come the realization that cognition is best understood within the context of particular environments, necessitating the recognition of developmental factors which are culturally and contextually specific (Keller, 2011). Intelligence can be viewed as one of the common denominators to giftedness, along with other factors such

as aptitudes, talents, and environmental influences. It cannot, however, stand-alone as a certain indicator of ability (Sternberg & Davidson, 2005). Among these external factors, educational opportunity ranked with others such as nutrition, clean air, and public health (Morgan et al., 2012). Because learning in school involves these developmental elements as well as those inherent in the individual, using cognitive ability to predict academic achievement can best be accomplished when measured with tests that are conceptual rather than exacting in nature (Gottfredson & Saklofske, 2009). The DAYC cognitive subtest fits this description and consists of items that are developmentally responsive applying to competency in daily situations requiring the child to act independently as well as within social contexts (Voress & Maddox, 1998).

Language and communication skills include both receptive and expressive abilities as well as the use of nonverbal symbols representing facets of communication exemplified in printed materials and body usage (Rydz et al., 2005). The critical factor when identifying developmental language impairments in early childhood is “a recognizable impairment in language skills that is disproportionate when compared to achievement in the other nonlanguage developmental domains” (Shevell, 2010, p. 122). Language disabilities can be independent of other handicapping conditions as well as related to environmental and cultural settings. They are sometimes problematic when other delays do not exist and are then recognized as specific language disorders (Rydz et al., 2005). However, for some children, difficulties with talking and linguistic acquisition are the initial signs of a tenacious language impairment that can be related to or comorbid with other conditions including behavioral or cognitive issues, and longitudinal studies have confirmed this by demonstrating that deficits in other domains usually become apparent in children with developmental language impairment (Shevell, 2010).

Population-based studies have shown significant relationships between early expressive delay and later emotional problems in adolescents, especially boys (Henrichs et al., 2013). Language abilities and intelligence scores have also been shown to predict adaptive behavior skills both separately and independently, with language abilities possessing the stronger correlation (Gillespie-Lynch et al., 2011). Furthermore, expressive vocabulary scores have been found to be predictive of global cognitive functioning, possibly due to the increased ability of these students to interact with peers and adults, thus providing a basis for intervention and eventual prognosis (Riou et al., 2009). Early language delay is often characterized not only by poor mechanical and speech skills but also by deficits in short-term memory, thereby affecting other developmental areas and contributing to an overall state of below average functioning and confirming that the capacity to communicate effectively is central to all areas of human ability (Levy, 2011). When language impairments are not secondary to other handicapping conditions, the rate at which children catch-up with their peers varies considerably, and some continue to display weaknesses well into late childhood (Levy et al., 2011). As demonstrated by numerous studies, difficulties with communication can be a precursor to problems in a wide range of other areas such as behavior and social skills (Hattier, Matson, Sipes, & Turygin, 2011).

Personal or social skills describe the ability to interact with others and maintain satisfactory relationships with peers and adults. Self-help skills, encompassing the activities of daily living, such as toileting, eating, and dressing, are sometimes included in this domain or according to other studies, within the domain of adaptive behavior (Rydz et al., 2005). Research established that children that experience difficulty building and maintaining satisfactory relationships have difficulties in educational, psychosocial, and vocational capacities and are at-risk for school failure and dropout, drug abuse, delinquency, and maladaptive behavior patterns

(Del Prette et al., 2012). Social skills levels are more highly correlated among students that have disabilities with lower IQ scores than with higher functioning students. Additionally, language skills in combination with attention skills have been shown to predict adult social functioning (Gillespie-Lynch et al., 2011). In the past, cognitive parameters were thought to be strongly associated with impairments in social functioning, but evidence suggested that social difficulties can be persistent when relative developmental levels are controlled in the equation meaning that a child can display an inability to get along with others, interact with peers, or understand social cues, without displaying cognitive deficits (Fenning et al., 2011). Peer associations are beneficial to students at all levels and in many ways. They provide a sense of relatedness and belonging which is often motivational, and collaboration made possible through effective peer relationships can assist children in learning problem-solving skills that enable long-term academic success (Del Prette et al., 2012). Longitudinal studies demonstrated that high school students displaying better social skills and those that are involved in extracurricular activities go on to earn higher salaries and achieve at higher levels after 10 years (Casillas et al., 2012).

Attention Deficit Hyperactivity Disorder (AHD) is a frequent comorbid condition with neurodevelopmental disabilities, and often becomes more evident when the child enters school and begins to have difficulty maintaining focus in the classroom and interacting with peers and adults (Levy et al., 2011). Other social skills related problems, particularly behavior issues, are more frequently diagnosed in children with developmental disorders and may indicate the presence of delay in other domains. For example, temper tantrums may be a result of difficulty communicating with peers and adults, or they may be due to intolerance for noise or physical stimulation (Poon et al., 2010). Openness to new experiences is related to social steadiness and the desire to seek new educational learning opportunities, thereby contributing to success in

academic settings (Laidra et al., 2007). A good way to think of social skills is to characterize them as learning enablers that contribute to the process of learning by facilitating and enhancing interactions with others and reducing behavior problems that might otherwise interfere with the learning process (Del Prette et al., 2012).

Motor development includes both gross and fine skills and involves tasks ranging from the ability to climb stairs using alternate feet to stringing beads and fastening buttons (Rydz et al., 2005). School-related tasks in this domain often focus on facility with a pencil or keyboard, independent eating and toileting, and physical education competence stressing skills that are required in the classroom setting. Research studies, which date to the 1930s and beyond, acknowledged relationships between motor-impairments in very young children and later social-emotional problems, including anxiety and depression (Piek, Barrett, Smith, Rigoli, & Gasson, 2010). Early fine motor skills, such as the ability to write legibly and manipulate small objects with ease are correlated with eventual cognitive abilities and accurately predicted both verbal and performance IQ scores in some studies (Riou et al., 2009). Cerebral palsy, caused by damage to the motor control centers of the brain during development, is the most common cause of significant physical disabilities in developmentally delayed children and may include concurrent intellectual and communication deficits (Hattier et al., 2011).

The Future of Preschool Evaluation

Eligibility for special education services at all levels has always been and continues to be a topic of importance for educators, parents, and students. School psychologists have historically been referred to as the “gatekeepers” of special education and as such are the persons to whom other professionals in the field of education turn when making important decisions about students who are potentially developmentally delayed (Fagan & Wise, 2000). Despite the

overarching procedures and regulations outlined in IDEA, school psychologists and other specialists are bound by the guidelines for evaluation that vary from state to state. These guidelines include the choice of instruments used in evaluations and are usually based on the recommendation of the psychologist. Additionally, the results of testing are typically open to some degree of interpretation. Complicating matters further, states are turning to response to intervention (RTI) as a viable alternative to traditional assessment models, even in preschool (Greenwood et al., 2011).

Due to many factors which are often dependent upon difficult to control societal and cultural influences, large numbers of children enter school having had very limited experience with literacy from home and community settings. By so doing they increase the odds that they will struggle to achieve in all skill areas but especially in language, reading, and social-emotional domains. Although RTI was not initially intended to identify disorders other than learning disability or recommended for pre-kindergarten students, the method is beginning to be frequently applied in preschool for the purpose of identifying children with delays (Bayat, Mindes, & Covitt, 2010). These types of applications are associated with the belief that many learning disabilities and behavior problems can be prevented or negated through the use of early intercession, which challenges, to some degree, theories proposing that biology and genetics are the root cause of most learning issues (West, 2011). Advocates for RTI hold that early delays can be prevented from becoming disabilities through instruction tailored to meet individual deficits, and in this fashion at least they concur with theories of early intervention (Greenwood et al., 2012).

Proponents of RTI suggested that it can prevent children who are experiencing academic problems, but have not yet been diagnosed with a disability, from requiring special education

services by helping teachers to differentiate and tailor the level and intensity of their instruction in order to meet the needs of each student (Lindeman, 2013). However, the approach has not been widely accepted yet for preschool children, and there is little research to support the benefits of its implementation at this level (Greenwood et al., 2012). Criticism of current methods used to identify children suggested that they represent a “wait to fail” approach that prevents early intervention due to the requirement that students must demonstrate a gap between achievement and perceived ability which is often absent in very young children (Restori, Gresham, & Cook, 2008). Further, the discrepancy model is grounded in cognitive science and learning theory, stressing the conviction that thought and behavior are the result of information processing and not the result of simple collaboration with peers and the environment (Miller, 2011). Cognitive theorists argued that the ability and aptitude for learning stems from genetically inherited traits that are stimulated, but not created, through interaction with environmental impetuses, thus placing the cause for disability within the child rather than as a part of the instructional setting (Ferri, 2011).

There is considerable discussion among evaluation specialists concerning whether RTI can be appropriately applied as a stand-alone instrument for determining special education eligibility and developmental delay. Some professionals argued that such labels are not necessary for the acquisition of special services and that any student who fails to achieve following quality and targeted intervention must be disabled (McKenzie, 2009). Others suggested that the use of RTI as a diagnostic instrument may over-identify rather than lessen the number of children receiving special education services (Ferri, 2011). The National Association for the Education of Young Children (NAEYC) views explicit teaching of particular skills as not developmentally appropriate for preschool children, thereby contradicting the use of RTI in such

settings (Greenwood et al., 2011). Accordingly, if RTI is to become a successful part of early childhood intervention and service, it must be adjusted so that its approaches are grounded in developmentally appropriate practice (Lindeman, 2013).

When development follows a normal course, the interaction between genetic heritage, chronological age, and environmental stage is orderly and predetermined. When this progressive collaboration is disrupted, whether through nature or nurture, delays may occur which frequently result in permanent disabilities (Levy, 2011). Infants and toddlers are the most vulnerable to problems with psychosocial, cognitive, and motor development due to the vulnerability of the brain during development, genetic and biological risk factors, and environmental conditions (Sachdeva et al., 2010).

Distinguishing and treating delays through early intervention can be accomplished through the use of standardized screening measures and is most often beneficial to children, families, and society in many ways including cost effectiveness (Sachdeva et al., 2010). It is important to recognize that if markers for academic success or failure can be found and addressed, it would be possible to prevent at least to some degree, through remediation programs, children from falling behind in school from an early age (Stock et al., 2009). Traditional screening accomplishes this through the use of specialized instruments such as the DAYC and other age-appropriate tools that are designed to identify problem areas and provide a measurable degree of significance when compared to others of the same age. It is conceivable that specific areas of deficit in childhood can predict future problems within academic domains and with particular skills, making the predictive value of assessment important in terms of long-range goals and strategies for learning. RTI proposes to eliminate the need for much of the psychometric testing that is completed today. However, it is not clear whether application in the

preschool setting will be successful or appropriate or that in the long term, RTI will be useful as anything other than a method of instructional intervention (Guskey, 2010). Whatever the method, a predictive model for special education services would allow educators to better write IEPs for students and to anticipate possible difficulties with skills acquisition. It would also provide a framework for administrators when choosing curricula and making staffing decisions. With the continued impetus towards standardized assessment driving instructional decisions, teachers are encouraged to focus their energy on deficit areas. If the long-term potential for these deficits can be identified upon entry to preschool, perhaps instructional strategies can be targeted to better meet the needs of those who are likely at-risk for the necessity of long-term special education services.

CHAPTER THREE: METHODOLOGY

Design

A correlational predictive design using logistic regression was employed for this study in order to find significant correlations between future special education eligibility (criterion variable) and DAYC subscale scores (predictor variables), which cannot be manipulated for this research (Howell, 2011). Logistic regression was appropriate for this study because it is used to predict a dichotomous criterion variable from a combination of several independent variables (Gliner & Morgan, 2000). It was also the most versatile of the models appropriate for use with data having a dichotomous dependent variable (Pedhazur, 1997). Additionally, a correlational design allowed analysis of the relationships among several variables, in this case, specific DAYC scores and special education eligibility as well as the strength of such relationships (Gall, Gall, & Borg, 2007). A convenience sample was used due to the ready availability of data and because the researcher was familiar with the site and population (Gall et al., 2007). Students were selected who were initially evaluated upon entering preschool with the DAYC and later re-evaluated using procedures and instruments approved by the State of Tennessee Department of Education.

Research Question

The initial research question was as follows:

RQ1: How accurately can eligibility for special education services be predicted from a linear combination of Developmental Assessment of Young Children (DAYC) scores for 3-year-old students?

Null Hypothesis

The null hypothesis for this study was:

H₀₁: There will be no statistically significant relationship between the criterion variable (eligibility for special education services) and the linear combination of predictor variables (Cognitive domain, Communication domain, Social-Emotional domain, Motor domain, and Adaptive domain) for 3-year-old students.

Participants and Setting

The participants were students enrolled or previously enrolled in a rural public school district. These students were initially evaluated for special education eligibility using the Developmental Assessment of Young Children (DAYC) at age three and re-evaluated three years later using methods and instruments designated by the State of Tennessee Department of Education. A convenience sample of 74 student records which included all that were viable, chosen by the researcher because they met the previous qualifications and the quantity recommended for correlational research for a medium effect size with .7 statistical power at an alpha level of .05, was collected (Gall et al., 2007). Convenience sampling was chosen due to the inherently small size of the available sample and the likelihood that all obtainable scores would be necessary to form an adequate sample size. According to Gall et al. (2007), the use of inferential statistics from a convenience sample is acceptable provided the sample claims to characterize a particular population. Due to the demographic makeup of the area, the majority of the participants were African-American and from low-income families and are also likely to mirror the general population in the surrounding area. The sample size consisted of 47 males and 27 females, all of whom were within two months of their third birthday at the time of initial evaluation. Included in the sample were 50 students of African-American descent and 24 of Caucasian descent.

Instrumentation

The Developmental Assessment of Young Children (DAYC) is a rating scale used to identify children from birth to 11 years of age with possible delays in the areas of cognition, communication, social-emotional development, physical development, and adaptive behavior. Each of the five domains this test measures reflects an area mandated for assessment and intervention in the Individuals with Disabilities Education Improvement Act 2004. The authors identified four uses of the test including identification of children with developmental delays, determination of individual strengths and weaknesses, documentation of progress, and research (Voress & Maddox, 1998).

The DAYC was normed on a sample of 1,269 children from 27 states and one province of Canada. It was intended to represent gender, race, urban or rural residence, ethnicity, family income, and the educational attainment of parents. Coefficient alphas for each of the subtests met or exceeded .90 and composite coefficients met or exceeded .95 with reliability data demonstrating high internal consistency. Test-retest reliability, based on two samples, indicated correlations of .94 to .99 across subtests. The authors examined content, criterion-related, and construct validity finding substantial correlations between this measure and others designed to identify delayed children (Voress & Maddox, 1998).

Administration is completed by a trained examiner with a caregiver or parent and typically takes about one hour except in cases where additional direct assessment is needed. In such circumstances, the examiner may choose to complete the evaluation over a period of several days. The examiner may interview parents, teachers, or other caregivers in order to score items accurately. Additionally, the examiner may observe the child in several settings or test the child directly. Following administration, scoring is accomplished by hand, typically by the school

psychologist, using tables provided in the manual. Scores are reported in age equivalents, percentile ranks, standard scores, and an overall general developmental index. Standard scores, which were used for the purposes of this research, have a mean of 100 and a standard deviation of 15. These scores may range from <50 to >150 and are incorporated into an eligibility report which is subsequently shared with the parent.

Procedures

The intended research was presented to the superintendent of schools and permission to access printed and stored student records was requested (see Appendix A). Parental agreement was not required in order to complete this process. All paperwork was submitted to the Institutional Review Board (IRB) and upon approval (see Appendix B), the search for print records of students who were initially evaluated at three years of age with the DAYC and subsequently re-evaluated three years later began. Print records consisted of actual paper documents and copies of documents which are maintained indefinitely, per legal requirements, by the school system in a locked filing room located at the central office. A visual search through each of these individual records provided the evaluation history of each child, including DAYC scores and subsequent eligibility status. These individual records were examined, and the DAYC scores recorded on a data collection sheet anonymously then put into an Excel spreadsheet and entered into the Predictive Analytics SoftWare (PASW) database which was used to complete the analysis. See Appendix C for sample data collection sheet. The examination of documents and recording of scores was completed in rooms provided at the Central Office of the school system. All student records were replaced following examination, and the students were issued anonymous identification numbers for the purposes of the study. Student race, sex, and exact age were noted, but no other identifying information was recorded.

Data Analysis

According to Creswell (2008), quantitative methodology is suitable when research questions involve the significance of the relationship between variables and the examination of such a relationship with an unbiased technique. Logistic regression is used to avoid violating the assumption of linearity necessary to linear regression and is considered superior to other regression techniques because it accepts continuous and discrete predictors, is not affected by normality, and has been shown to produce accurate results (Peng, So, Stage, & St. John, 2002). This method is used to analyze the relationships between variables because of the dichotomous nature of the criterion variable and the subtests of the DAYC which are interval scores and will be predictor variables (Gall et al., 2007).

The statistical assumptions required for logistic regression include independent observations, no outliers, accuracy in the measurement of independent variables, and independent variables that are not linear combinations of one another (Pedhazur, 1997). The appropriateness of the method can be evaluated through tests of individual parameter estimates within the model as well as tests of the overall model including a goodness-of-fit statistic (Peng et al., 2002). However, assessment of fit in logistic regression is not a simple matter, and there are limitations to using tests designed for linear regression. Hence, more attention should be given to overall regression diagnostics rather than relying on a single measure (Pedhazur, 1997). The alpha level was set at .05 for all analyses. Histograms, boxplots, and other measures of skewness and kurtosis were employed as required by the data. Sample size in logistic regression is controversial as well as variable but several authors recommend “a minimum ratio of 10 to 1 with a minimum sample size of 100 or 50 plus a variable number that is a function of the number of predictors” (Peng et al., 2002, p. 267). It is often suggested that sample size for logistic

regression be determined by the preferred effect size and power of the test of significance (Pedhazur, 1997). Multiple frequency distributions and histograms were conducted to ensure the data were accurately recorded and transferred to the data analysis software. The scores for each variable were examined to determine if any recorded score was outside the limits of the respective scale. Additionally, a normal curve was included with each histogram to identify the presence or absence of outliers. Values for skewness and kurtosis were also calculated.

CHAPTER FOUR: FINDINGS

Research Question

The initial research question was as follows:

RQ1: How accurately can eligibility for special education services be predicted from a linear combination of Developmental Assessment of Young Children (DAYC) scores for 3-year-old students?

Null Hypothesis

The null hypothesis for this study was:

H₀1: There will be no statistically significant relationship between the criterion variable (eligibility for special education services) and the linear combination of predictor variables (Cognitive domain, Communication domain, Social-Emotional domain, Motor domain, and Adaptive domain) for 3-year-old students.

Data Screening

This study used binary logistic regression to answer the central research question. Logistic regression is used to avoid violating the assumption of linearity necessary to linear regression and is considered superior to other regression techniques because it accepts continuous and discrete predictors, is not affected by normality, and has been shown to produce accurate results (Peng et al., 2002). Multiple frequency distributions and histograms were conducted to ensure the data were accurately recorded and transferred to the data analysis software. The scores for each variable were examined to determine if any recorded score was outside the limits of the respective scale. Additionally, a normal curve was included with each histogram to identify the presence or absence of outliers. Values for skewness and kurtosis were also calculated, and there were no missing variables for any of these.

Descriptive Statistics

The reader was given an overview of the relevant findings. Statistics such as mean, median, mode, frequency, and standard deviation were used. A total of 74 cases were included in the analysis. Descriptive statistics (see Table 1) revealed that participants had a mean Cognitive test score of 71.73 indicating that these students fell within the normal range of test scores for this measure. The Communication mean score was 67.86, the Social-Emotional mean score was 74.11, the Physical mean score 79.3, and the Adaptive mean score was 76.8, all of which also fall within the normal range of test scores for this instrument. Caution should be used when generalizing these results due to the small sample size which was representative of the community in which the study took place.

Table 1

Descriptive Statistics for Test Scores

	Min	Max	<i>M</i>	<i>SD</i>
Cognitive	50	96	71.73	10.142
Communication	50	93	67.86	11.692
Social-Emotional	50	98	74.11	11.079
Physical	53	107	79.3	12.876
Adaptive	53	107	76.8	11.816

Results

Null Hypothesis One

This study was designed to answer one central research question and its corresponding null hypothesis. The central null hypothesis postulated that there will be no statistically

significant relationship between the criterion variable (eligibility for special education services) and the linear combination of predictor variables (Cognitive domain, Communication domain, Social-Emotional domain, Motor domain, and Adaptive domain) for 3-year-old students.

The Predictive Analytics SoftWare (PASW) version 18.0 program (formerly SPSS) was used for data analysis purposes. Raw scores for each student were entered into an Excel spreadsheet and then transferred into PASW. The binary logistic statistic procedure was chosen for data analysis purposes because it is designed to address a dichotomous dependent variable, in this case, eligibility for special education services (yes/no).

A total of 74 cases were included in the analysis, and there were no missing variables for any of these. The binary logistic regression option was chosen, with eligibility status as dependent variable, and the five subtests of the DAYC (cognitive, communication, social-emotional, physical, and adaptive) as the five independent variables. Scores from these five variables were used in a linear combination with the natural log odds of being eligible for special education three years after initial testing. Due to the high multicollinearity of the independent variables, all independent variables were entered into the equation simultaneously. Results indicated the model was significantly different from zero [$X^2(5) = 18.651, p = .002$]. The R^2 produced by the Cox and Snell procedure was .223. Most researchers acknowledged the substantive limitations of the Cox and Snell procedure and although it revealed a large R^2 in this study, little weight should be attached to the statistic, especially for interpretation purposes (Hosmer & Lemeshow, 2000).

Percentage accuracy procedures were used to examine the relative accuracy of the equation in predicting eligibility. See Table 2 for frequency counts for all categories. Overall, 75.7% of the subjects were correctly classified using the mathematical model provided by the

logistic equation as seen in Table 3. Using a sensitivity analysis (true positives), 48 of the 74 subjects (65%) were correctly classified by the model. A specificity analysis revealed that 8 of the 74 subjects (11%) predicted to be not eligible were indeed not eligible three years later. Use of the positive predictive value indicated that 48 of the 60 subjects predicted to be eligible (80%) were indeed eligible three years later. Finally, the negative predictive value revealed that 8 of the 14 subjects (57%) predicted to be not eligible were indeed not eligible.

Table 2

Frequency Counts for Predicted and Observed Categories

Observed	Predicted	
	Eligible	Not Eligible
Eligible	50	96
Not Eligible	50	93

Table 3

Binary Logistic Regression Accuracy Procedures

Procedure	Percentage
Overall Percentage Accuracy	75.7
Sensitivity Analysis	65.0
Specificity Analysis	11.0
Positive Predictive Value	80.0
Negative Predictive Value	57.0

Results of the Binary Regression Analysis were examined, with particular emphasis on the B value of each independent variable. As seen in Table 4, the only independent variable where the B value attained significance was Cognitive [$B = .116, p = .026, Exp B = 1.123$]. This indicated that holding all other variables constant, for every increase by one unit in the cognitive subtest score, the odds of becoming not eligible for special education services increased by 1.123. Thus, the best predictor for eligibility is the cognitive domain. It is important to note that the independent variables were highly correlated (i.e., multicollinearity), and thus the relative value of the B weights should be interpreted with caution. For this reason, future analyses should isolate the Cognitive variable and identify its unique ability to predict future eligibility for special education services.

Table 4

Regression Analysis Results

	B	SE	Wald	Df	Sig	Exp B
Communication	.017	.035	.248	1	.619	1.017
Social-Emotional	.034	.045	.561	1	.454	1.035
Physical	-.027	.045	.373	1	.541	.973
Adaptive	.020	.041	.232	1	.630	1.020
Cognitive	.116	.052	4.927	1	.026	1.123

Binary logistic regression was used to examine the relative accuracy of the equation in predicting eligibility. According to Andrew, Pederson, and McEvoy (2011), linear regression provides a regression equation that can assist in prediction as well as a coefficient of determination which is useful in determining how well the predictor variable can predict the

criterion variable. Reviewing the data indicated that overall, 75.7% of the subjects were correctly categorized using the mathematical model provided by the logistic equation. Use of the positive predictive value indicated that 80% of the subjects predicted to be eligible were found to be eligible three years later. The negative predictive value revealed that 57% of the subjects predicted to be not eligible were found to be not eligible three years later. Therefore, the null hypothesis was rejected, and it can be accepted that the DAYC is helpful in the forecast of future special education eligibility.

CHAPTER FIVE: DISCUSSION

The purpose of this study was to determine which, if any, DAYC subscale scores (predictor variables) are useful in predicting future special education eligibility, as defined by the State of Tennessee Department of Education, upon subsequent re-evaluation (criterion variable). One central research question was asked in order to find how accurately eligibility for special education services can be predicted from a linear combination of Developmental Assessment of Young Children (DAYC) scores for 3-year-old students.

Analysis of the data demonstrated that 75.7% of the subjects were correctly classified using the mathematical model provided by the logistic equation. Of the five DAYC subtests used as predictor variables, the cognitive measure proved to be most highly correlated with future special education eligibility. This study attempted to determine if the DAYC is a useful tool in the prediction of future special education eligibility. The results of this research indicated that the DAYC is reasonably accurate in predicting which 3-year-old students evaluated in preschool will remain eligible three years later. Additionally, this research confirmed the importance of strong early cognitive abilities as a predictor of future academic success. Stock et al. (2009) found that mental capabilities are powerful forecasters of success in school with crystallized intelligence possessing a slightly greater influence than fluid intelligence. Macy (2012) established that screening instruments like the DAYC make an important contribution to evidence-based assessment and can help in the alignment of preschool and kindergarten curriculum by identifying areas of weakness so that they may be addressed with intensive intervention. The results of this study confirmed that academic and cognitive deficiencies are often identifiable early in the school setting and that they correlate with future areas of need.

Conclusions

Eligibility for special education services continues to be a concern for students, parents, and professional educators. Questions about eligibility often arise when a student begins preschool and may be reexamined each time the child's triennial evaluation occurs. Predicting future eligibility can affect many aspects of the educational process including curriculum planning, instructional setting, and parent-school relationships. All of those involved in student success would benefit from knowing which students are likely to remain eligible for services and which are prospective candidates for the general education program. In this study, a frequently used preschool evaluation tool, the Developmental Assessment of Young Children, was used to evaluate preschool entrants and demonstrated reasonable accuracy in successful prediction of future special education eligibility.

The DAYC is used by the school district in this study to determine special education eligibility, according to the State of Tennessee's standards, for preschool children. Students are re-evaluated three years later to determine if they remain eligible for services and are placed accordingly. Predicting the likelihood of later eligibility is helpful to teachers and parents on both practical and emotional levels. The efficacy of the DAYC in making this prediction was examined using a binary logistic regression model and results indicated that the DAYC is reasonably accurate in determining which students remain eligible for services and which do not. Specifically, the cognitive subtest of the DAYC was ascertained to be most highly correlated with future eligibility. This was not surprising given that many studies have shown intellectual ability to be associated with achievement level and school outcomes (Pianta & McCoy, 1997). Piaget found that formal operational cognitive tasks were highly related to the results of later intelligence testing, though some tests may measure qualitatively different abilities in

preschoolers compared with older children (Baron & Leonberger, 2012). Additionally, the communication subtest of the DAYC was similarly correlated with future eligibility, suggesting that these two factors have good predictive power as both interrelated and independent measures. Caution should be used when interpreting these results due to the small sample size and the lack of racial and socio-economic diversity in the sample.

Implications

The findings of this study indicated that the DAYC is a useful instrument in predicting future special education eligibility. Early identification of special education students is of paramount concern to educators because high-quality intervention in preschool settings can assist students with disabilities in becoming academically successful and provide long-term cost savings to public programs including education, health and criminal justice (Aron & Loprest, 2012). The implementation of RTI programs continues to increase the demand and use of screening tools which can identify children at-risk for failure so that later, more serious learning problems can be avoided and states remain under pressure to increase elementary achievement through targeted instruction (Pianta & McCoy, 1997). The DAYC, when used in combination with other assessment tools, provides a viable basis for prediction of special education needs that can assist educators in meeting these standards.

When parents bring their children to enroll in preschool, it is most often their first experience with the local school district and possibly the first time that outside professionals will evaluate the child's potential across a wide spectrum of pre-academic skills. Understandably, these parents are anxious about the process of evaluation and the outcome of the assessment particularly, as is often the case, if they experienced difficulties during their own school years. Often, hard truths concerning the child's potential for academic success are discussed and the

parent must confront unexpected delays in development, the failure to reach age-appropriate behavioral milestones, and the possibility of cognitive impairment. The DAYC is one of a group of instruments used in this evaluation process and designed to assess very young children and compare them to age-mates in order to determine the presence of incongruent levels of skill among students. The ability to predict future areas of academic concern from these instruments could be very helpful to parents as well as professionals across a broad array of relevant educational practices. With the current interest in RTI programs, targeted instruction and learning trajectories have become standard to all grade levels and elementary schools in particular. Screening tools like the DAYC can provide baseline assessment data that not only provides information about the child's current abilities, but also correlates with potential areas of future academic weakness. By understanding and making use of this data, parents and teachers can help students better address individual weaknesses and possibly mitigate the need for more intensive remediation at a later date.

Within the context of using the DAYC as a developmental screener and predictor of future special education eligibility, it is important to recognize that not all students who obtain significantly low scores on this instrument in preschool will go on to need special education services as older students. It is possible for students to "test out" of special education at any time during their academic career if it is determined by the individual education planning team that services are no longer needed and corroborating evidence is presented to support this decision.

Limitations

Many factors are involved in special education eligibility and student academic success. These factors may include, but are not limited to, environmental and home influences, heredity and health, teacher and school effectiveness, and curriculum. Student effort and motivational

factors may have also impacted this study since they affected the results of all assessments and academic progress. All of these should be considered as possible limitations to this study and may have impacted the results in a positive or negative fashion.

The convenience sample used in this study was small and limited to one rural school district in West Tennessee located in a region known for its high rate of poverty and the low socioeconomic status of its residents. All of the schools involved were recipients of Title I funding and all of the participants received free or reduced lunch. Therefore, caution is indicated in the interpretation of the results. In order for the findings of this study to be generalized, it would be necessary to include a bigger sample from a larger range of socioeconomic levels and from a more diverse population which included a more balanced racial group.

Additionally, this study was completed using the guidelines for special education eligibility from the State of Tennessee Department of Education. Special education requirements for eligibility vary by state as do the testing instruments used in the evaluation process. Therefore, the results of this study are not generalizable to states whose guidelines are dissimilar from those of Tennessee.

Recommendations for Future Research

Although this study answered the research question and found that the DAYC is useful in the prediction of special education eligibility, many other central questions regarding the use of developmental screeners remain unanswered. In order to increase the generalizability of the results, it is recommended that any efforts to replicate this study make use of a larger sample from more diverse cultural, racial, and socioeconomic settings. Although other developmental screeners are similar in design and content to the DAYC, it would be interesting to determine if

they are as good or better predictors of future special education eligibility and how these results might vary depending on variable state eligibility guidelines.

This study expanded the body of research concerning developmental screening, special education eligibility, and developmental delay. Other research demonstrated that early intervention can improve academic outcomes for special education students and that these environments can facilitate the acquisition of language, the development of social skills, as well as assist cognitive development (Jenkins et al., 2006; Odom & Wolery, 2003). Future research should focus on expanding the use of developmental screeners as first-line identification tools that are aligned with prospective academic goals which encompass and address latent areas of deficit.

This study also demonstrated that particular areas of development are important predictors of special education eligibility. Future studies should investigate and prescribe the design of new instruments which are capable of identifying aspects of development central to the early identification of learning disabilities so that timely intervention can become more targeted and oriented to the individual student, and thereby more effective. Relatedly, future studies should also focus on the development of interventions designed to increase skill levels in those developmental domains that demonstrate strong relationships with later academic achievement, particularly cognitive skills. The capacity to predict ability and its counter side, prediction of disability will always be an advantage when designing academic instruction, curriculum, and intervention. Instruments such as the DAYC, when used responsibly and with consideration for their limitations, can provide a valuable tool for professional educators at all academic levels and within all domains of instruction.

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APPENDIX A: SCHOOL PERMISSION

Permission to access and use the archived data for this study was granted by the superintendent of schools.



Superintendent

October 2, 2014

To Whom It May Concern:

I, _____, Superintendent of _____ give Helen Newman consent to access the archived test scores of _____ for the purpose of completing her research. Any questions may be directed to my office

Sincerely,

Superintendent

APPENDIX B: IRB LETTER

December 22, 2014

Helen E. Shaw Newman

IRB Exemption 2066.122214: Predicting Future Special Education Eligibility from Developmental Assessment of Young Children (DAYC) Scores

Dear Helen,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application and no further IRB oversight is required.

Your study falls under exemption category 46.101(b)(4), which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:101(b):
(4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

Please note that this exemption only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued exemption status. You may report these changes by submitting a change in protocol form or a new application to the IRB and referencing the above IRB Exemption number.

If you have any questions about this exemption or need assistance in determining whether possible changes to your protocol would change your exemption status, please email us at irb@liberty.edu.

Sincerely,

Professor, IRB Chair

Counseling

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APPENDIX C: SAMPLE EXCEL DATA

ID	Birth Year	Gender	Race	DAYC Date	Cog	Comm	SE	Phy	Adapt	Elig. Date	Elig. Stat.
1	2003	1	1	3/13/2006	89	81	82	97	89	8/20/2009	Y
2	2004	1	1	11/7/2006	85	84	84	107	94	12/3/2009	Y
3	2006	2	1	6/9/2009	70	72	77	81	96	8/15/2012	N
4	2007	1	2	11/11/2009	85	73	89	90	79	1/17/2013	N
5	2007	1	1	8/13/2010	50	55	56	75	78	5/20/2013	Y
6	2004	2	2	6/5/2008	68	63	70	77	78	5/23/2011	Y