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THE PREDICTIVE UTILITY OF TEACHER INFORMATION FOR BILINGUAL STUDENTS: FROM KINDERGARTEN TO GRADE 3

A Dissertation in

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by

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ABSTRACT

The purpose of this study was to examine the predictive utility of teacher information for Spanish-speaking bilinguals in order to provide insights on non-discriminatory assessment and intervention practices and to increase our understanding of the teacher's role in such practices. The predictive utility of teacher information was conceptualized in terms of special education placement at grade 3 and parent-reported diagnoses that students received by third grade. Notably, limited research has examined the predictive utility of teacher information for either academic/learning-related skills or social skills in bilingual populations. Using the Early Childhood Longitudinal Study, Kindergarten Class of 2010-2011 database, the current study's unweighted sample (N = 13,150) was comprised of 900 Spanish-speaking bilinguals and 12,250 English-speaking monolinguals. Overall, results indicated that kindergarten teacher information regarding language and literacy skills, approaches to learning, and social skills was not generally predictive in terms of special education or clinical diagnosis. In regards to Response to Intervention, analyses indicated that the intervention itself may be predictive of special education placement; however, it is not a moderator. Implications for school psychologists and other school personnel working with bilingual students are discussed.

Keywords: bilingual students, predictive utility, teacher information, special education, clinical diagnosis, Response to Intervention

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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CHAPTER 1: INTRODUCTION

The percentage of public school students in the United States who were English Language Learners (ELLs) or English Learners (ELs) has increased over the past decade with an estimated 4.4 million (9.2%) ELL students in the school year of 2012 - 2013 compared to an estimated 4.1 million (8.7%) students in 2002 - 2003 (U.S. Department of Education, National Center for Education Statistics, 2015). The majority of ELLs attend lower school grades with 16.7% of kindergarten students identified as ELLs (Trent, Zamora, Tyree, & Williams, 2018). ELLs speak a wide variety of languages; in the school year of 2014-2015, the most common languages reported across the United States included Spanish, Arabic, Chinese, and Vietnamese (U.S. Department of Education, Office of English Language Acquisition, 2018). Notably, more than 70% of ELLs in the United States speak Spanish in the home environment (National Center for Education Statistics, 2017).

Bilingual students appear to have different developmental trajectories compared to their monolingual English-speaking peers and consequently may experience negative academic consequences (Hoff, 2013). In addition, the issue of disproportionality for ELL and language minority populations has been raised in the literature. However, the available research is limited and has yielded inconsistent findings regarding whether ELL and language minority students are disproportionally represented (over-represented or under-represented) in special education (Artiles, Rueda, Salazar, & Higareda, 2005; Bal, Sullivan, & Harper, 2014; Sullivan, 2011).

Nondiscriminatory assessment procedures have been applied to ensure the fairness of psycho-educational evaluations (Ortiz, 2010). School psychologists and educators have implemented a variety of procedures in order to evaluate and monitor the progress of ELL students, such as practices consistent with the traditional model of assessment, and the Response to Intervention (RtI) framework procedures (e.g., Linan-Thompson, Vaughn,

Prater, & Cirino, 2006; Richards-Tutor, 2012), including curriculum-based assessments (e.g., Muyskens, Betts, Lau, & Marston, 2009). Scholars have argued for a shift from the traditional assessment model (Figueroa, 2002) to other practices, such as procedures that observe ELL students in enriched and effective instruction (Figueroa, 2002) or RtI (Collier, 2010; Doolittle, 2008; Fien et al., 2010; Xu & Drame, 2008). However, surveys conducted with school psychologists and other school personnel have indicated the extended use of the traditional model with ELLs (Ochoa et al., 1996; Sotelo-Dynega & Nixon, 2014; Vega, Lasser, & Afifi, 2016).

Legal and ethical guidelines do not specify the role of teachers in nondiscriminatory assessment. Nonetheless, in both assessment frameworks (traditional and RtI), teachers and the information they provide play a significant role. Specifically, within both frameworks, teacher information is used to screen and assess socio-emotional functioning and academic/learning-related skills (Dever, Raines, Dowdy, & Hostutler, 2016; Levitt, Saka, Romanelli, Hoagwood, 2007; Splett et al., 2018). Limited research has examined the role of teachers and teacher information in bilingual psychoeducational evaluations, although it appears to be an important aspect of the process.

The purpose of this study is to address the role of teachers and how the information they provide in kindergarten can predict the placement of bilingual students in special education in a later elementary, specifically, by third grade. The study will focus on students who are identified in kindergarten as Spanish-speaking bilingual students and how teacher information can predict special education placement. Moreover, the differential predictive utility of teacher information will be examined as it is hypothesized that different types of teacher input (academic and social skills ratings) can better predict certain clinical and educational diagnoses (e.g., learning-related disabilities, attention-related disabilities, and socio-emotional functioning/regulation disabilities). Further, the role of school-based

interventions (i.e., RtI) implemented in early elementary school will be discussed. Specifically, this study will determine the moderation effects of RtI services delivered school-wide in grades 1 through 3. By examining the predictive utility of teacher information for bilingual students, this study is aiming to explore the feasibility of early identification of Spanish-speaking bilingual students with academic, behavioral, and socio-emotional issues.

CHAPTER 2: LITERATURE REVIEW

Terminology

Language minority students are students who come from households where a language other than English is spoken, and language use can range from English dominance to other language dominance, meaning that a language minority student may have limited second language proficiency, or be bilingual, or be essentially monolingual in the second language (August & Hakuta, 1997; Hoff, 2013). The term "second language learners" (SLL) refers to students who come from language backgrounds other than the dominant societal language and whose second language proficiency is not yet developed to the point where they can benefit from instruction that is provided in the second language (August & Shanahan, 2006). Current legislation and specifically the Every Student Succeeds Act (ESSA; 2015) uses the term English Learners and states that the term "native language", when used with a student who has limited English proficiency, indicates the language the student typically uses or the language typically used by the parents of the student. Previous legislation including Title IX of the Elementary and Secondary Education Act (ESEA; 2002) used the term Limited English Proficient (LEP) students. An LEP student is defined in as a student "between the ages of 3 and 21 years whose difficulties in speaking, listening, reading, writing or understanding the English language may be sufficient to deny the individual the ability to meet the State's proficient level of achievement…, the ability to successfully achieve in classrooms where the language of instruction is English..." (ESEA, 2002, p. 537).

The term bilingual has not been used consistently in either research or theory (Cummins & Swain, 1986). Definitions vary across disciplines, and many are presented in an overly broad or narrow sense (Michalopoulou & Schaefer, 2015). Moreover, little consensus exists for what exactly bilingualism means and the term has been used to describe a wide variety of phenomena (Cummins & Swain, 1986). The National Association of School

Psychologists (NASP; 2015) uses the terms ELL and bilingual interchangeably, thus acknowledging that a student does not need to be bilingual to be an ELL, and conversely, an individual does not need to be an ELL to be bilingual.

In this study, the terms language minority students, English Language Learners (ELLs), bilinguals, and culturally and linguistically diverse will be used. In accordance with NASP and for the purposes of this study, the terms *bilingual* and *ELL* will be used interchangeably; however, when referencing original studies and primary sources the terminology will remain consistent with how other researchers have chosen to identify their sample.

Disproportionality of Bilingual Students in Special Education

Disproportionality is a complex problem that has been addressed by educators and families more intensely in recent years (Artiles, Kozleski, Trent, Sosher, & Ortiz, 2010). Although different definitions of disproportionality appear in the literature (Coutinho & Oswald, 2000), a commonly used definition states that disproportionate representation is "the extent to which membership in a given (ethnic, socioeconomic, linguistic, or gender) group affects the probability of being placed in a specific disability category" (Oswald, Coutinho, Best, & Singh, 1999, p. 198).

Two hypotheses have been proposed regarding why disproportionality occurs: (a) disabilities have different distributions across groups which, consequently, leads to higher or lower rates of referral and classification for these groups, and (b) special education referral, assessment, and eligibility depend on procedures and instruments that are culturally and linguistically loaded and differentially assess the abilities, achievement, and behavior of students belonging to different groups (Coutinho & Oswald, 1998). Empirical studies have yielded results supporting both conceptual frameworks (Coutinho & Oswald, 2000). However, findings appear complicated and inconsistent; some studies have indicated that

some minority students referred for special education services have different characteristics from students that belong in the majority group while other studies have demonstrated that minority students' special education eligibility procedures are different compared to their majority student counterparts (Coutinho & Oswald, 2000).

Empirical research findings. Disproportionality of culturally and linguistically diverse students in special education has been a well-established educational issue (Artiles et al. 2010; Erwin & Worrell, 2012; Sullivan, 2011). Current research has provided inconsistent results based on the extent to which language-minority students are either over- or underrepresented in special education. More specifically, Morgan et al. (2015) found that "minority children were consistently less likely than *otherwise* similar White, English-speaking children" (p. 278) to be identified as disabled and receiving special education services. However, in a previous study, Samson and Lesaux (2009) found that language-minority students were underrepresented in special education in early elementary school, but overrepresented beginning in third grade. In addition, Artiles et al. (2010) reviewed data from 1968 to 2008 and concluded that minority students are overrepresented in special education. However, limited research exists examining disproportionality of ELL students (Sullivan, 2011). In a southwestern state, Sullivan (2011) found that ELLs were increasingly overrepresented in special education over an eight-year period (1999–2006), so regional variability may also exist.

Researchers have indicated that distinct representation patterns emerge as they analyze data at the national, state, district, school, and grade level, or across disability category, year, student ethnicity, language status, and gender (Artiles et al., 2010; Gage, Gersten, Sugai, & Newman-Gonchar, 2013). Further, disproportionality can be affected by the integration of information regarding the family and student's ecocultural system during the assessment and decision-making process (Coutinho & Oswald, 2000). One study

identified a number of issues in the procedures that led to the disproportionate representation of ELL students in referrals, diagnostic evaluations, and special education placement (Hardin, Mereoiu, Hung, & Roach-Scott, 2009). Hardin and colleagues (2009) reported that inconsistent screening and evaluation methods, lack of sufficient bilingual educators and trained interpreters, and barriers in the communication with the parents all appeared to contribute to disproportionality. Thus, it appears that disproportionality cannot be attributed to a single factor (Sullivan, 2011).

Disability category. Empirical research has investigated how language minority and ELL students are represented across disability categories. Disproportionality in Specific Learning Disability (SLD) identification – and any disability category – presents a significant problem for special education because (a) students may be referred for special education services as a result of problems other than a learning disability, (b) the identification procedure may vary and yield results that are not appropriate for interpretation, and (c) students that are not identified may not receive needed services (Shifrer, Muller, & Callahan, 2011).

Language minority students. In a nationally representative sample of high school students, Shifrer et al., 2011 indicated that language-minority students were more likely to be identified as manifesting a learning disability. However, a more recent article noted that after adjusting for a family's socioeconomic status (SES), academic achievement, and behavioral functioning, language-minority children were *less likely* to be identified as having (a) learning disabilities or (b) speech or language impairments compared to their majority student counterparts (Morgan et al., 2015).

English Language Learners. In a southwestern State, Sullivan (2011) concluded that ELL students were overrepresented in high-incidence categories (SLD, Intellectual Disability, and Speech and Language Impairment). Similarly, Artiles and his colleagues

(2005) demonstrated that, in 11 large California districts, ELL students were overrepresented in receiving services under SLD and SLI, whereas they were underrepresented in Intellectual Disability (ID) programs. However, when researchers examined within-group trends, they found that ELL students with both limited first language (L1) and second language (L2) proficiency had the highest rates among the ELL population for ID, SLD, and SLI diagnoses across grade levels (Artiles et al., 2005). Another study examining the risk indices for placement in special education categories found that ELL students enrolled in a large school district were less likely than their non-ELL counterparts to be classified as students with a Specific Learning Disability (SLD), an Intellectual Disability (ID), an Emotional Disturbance (ED), an Other Health Impairment (OHI), or a Speech and Language Impairment (SLI) across data collected during the academic years of 2006, 2008, and 2010 (Bal et al., 2014). Disproportionality of ELLs in the SLD category was not supported in a recent meta-analysis by Gage et al. (2013) which found that the odds of being identified as a student with SLD were equal between ELLs and their native-speaker peers. These researchers acknowledged that this finding may be attributable to their study selection process (Gage et al., 2013).

Emotional disturbance (ED) has been another disability category for which concerns about disproportionality of ELL students have been raised. Limited research exists for the representation of ELL students who receive special education services for emotional and/or behavioral disorders (Gage et al., 2013). Gage et al.'s (2013) meta-analytic work also demonstrated that ELL students are underrepresented in the ED disability category as they were significantly less likely to be identified with ED compared to their peers.

Predictors of disproportionality. Within the existing literature, a number of disproportionality predictors have been identified. These predictors either pertain to factors that are student specific (e.g., the age of schooling in L2, gender, SES) or to factors that are school/district specific (e.g., a school in a district with high percentages of ELL students).

With regard to student-specific variables, the age at which language-minority students started instruction in L2 has been found to influence their probability of being identified as having a disability. For example, Shifrer et al. (2011) demonstrated that students who started school in the US by kindergarten were 96% less likely to be diagnosed with a disability compared to students who started school between sixth and tenth grade in the U.S. Notably, SES has also been consistently demonstrated to impact disproportionality. For example, poverty or lower SES was inversely associated with the disproportional representation of ELL students in special education programs, such as SLI programs (Sullivan, 2011; Sullivan & Bal, 2013). Moreover, low average SES, gender (being male), and academic history have been found to contribute to disproportionate representation (Shifrer et al., 2011).

In some studies, school district characteristics have been strong predictors of disproportionality (Artiles et al., 2005; Sullivan, 2011). Districts with a higher proportion of students identified as ELLs were less likely to have a disproportional representation of ELL students in SLD or SLI programs, and school districts with high percentages of certified ESL teachers were more likely to place ELL students in the least restrictive environment (Sullivan, 2011). However, other studies have demonstrated that school variables, such as the percentage of LEP enrollment or percentage of racial minority enrollment, were not significant predictors of student risk for identification (Sullivan & Bal, 2013).

To sum up, empirical studies have yielded inconsistent results regarding the representation of ELL students in special education programs (e.g., Artiles et al., 2005; Morgan et al., 2015; Sullivan, 2011). In addition, research findings exist to support either conceptual framework of disproportionality (Coutinho & Oswald, 1998). Researchers have investigated multiple variables associated with disproportionality and have found that the disproportionate representation of ELL students cannot be accounted for by a single factor, but rather predictors vary by group and type of disability (Sullivan, 2011).

Ethical and Legal Framework of Bilingual Assessment

When assessing bilingual, ELL, language minority, or culturally and linguistically diverse students, school psychologists need to be aware of the particular challenges associated with this type of assessment and to ensure that his or her practices align with ethical and legal standards. In regard to assessing the eligibility of students for special education services, five ethical-legal characteristics emerge from analyzing the codes of ethics, professional standards, and federal laws: psychoeducational evaluations necessarily should be multifaceted, comprehensive, fair, valid, and useful (Jacob, Decker, & Hartshorne, 2011).

According to the Individuals with Disabilities Education Improvement Act (IDEIA, 2004), Section 614(b)(3)(A)(i), assessments and other evaluation materials used in the evaluation of a student need to be selected so as not to be discriminatory on a racial or cultural basis. Thus, IDEIA (2004) supports the nondiscriminatory assessment for minority students and recognizes that some assessments may potentially be biased towards children with differences in language and socialization practices (Department of Education, August 2006). Nondiscriminatory assessment is defined as a wide range of approaches that seek to gather as equitable as possible relevant information and data with the goal to make fair, data-based decisions about a student's functioning and performance (Ortiz, 2010). Further, IDEIA (2004) mandates that assessment tools used in the evaluation process "are provided and administered in the child's native language or other mode of communication and in the form most likely to yield accurate information on what the child knows and can do academically, developmentally, and functionally, unless it is not feasible to so provide or administer" (34 C.F.R. § 300.304 [c][1][ii]). Moreover, when determining special education eligibility, a public agency is required to "draw information from a variety of sources, including aptitude and achievement tests, parent input, teacher recommendations, as well as information

regarding a child's physical condition, social or cultural background, and adaptive behavior" (34 C.F.R. § 300.306 [c][i]).

NASP (2015) advocates for the rights of bilingual students who are referred for psychoeducational evaluations and, in accordance with IDEIA (2004), recommends assessment of these students in their native language when such procedures can lead to useful data that inform interventions. Based on the American Psychological Association's standards of conduct (APA; 1990), psychologists acknowledge and work to eliminate biases, prejudices, and discriminatory practices in the schools. Moreover, psychologists working with culturally diverse populations should document pertinent cultural and socio-political factors in client records, such as number of generations in the country, number of years in the country, fluency in English, extent of family support, community resources, level of education, change in social status as a result of coming to this country, intimate relationship with people of different backgrounds, and level of stress related to acculturation (APA, 1990).

The No Child Left Behind Act (NCLB; 2002), which replaced the Bilingual Education Act (National Association for Bilingual Education, n.d.), had a substantial impact on states' policies regarding assessment of ELL students, as the legislation required states to develop or implement valid and reliable English language proficiency assessment (Wolf, Farnsworth, & Herman, 2008). Moreover, NCLB and state legislation required that all students, including ELLs, complete the state's large-scale assessments, and, consequently, districts and states were held accountable to the same standards for all students (Lane & Levanthal, 2015). For accountability purposes, NCLB mandated that states disaggregate test data and report subgroup performance, such as ELL student performance (Lane & Levanthal, 2015).

NCLB was replaced by ESSA in December of 2015 as the most recent reauthorization of the ESEA (Office of Superintendent of Public Instruction, 2016). ESSA mandates that the adequate yearly progress would be defined by each State in a way that "includes separate measurable annual objectives for continuous and substantial improvement for students with limited English proficiency" (ESSA, 2015, p. 21). Moreover, according to ESSA, an annual evaluation of the content and the effectiveness of parent and family engagement would be conducted in order to improve the academic quality of all schools. Part of this evaluation would be the identification of barriers to parent participation "with particular attention to parents who are economically disadvantaged, are disabled, have limited English proficiency, have limited literacy, or are of any racial or ethnic minority background" (ESSA, 2015 p. 74). The transition to ESSA started during the 2016–2017 school year and ESSA is fully implemented during the 2017–2018 school year (Department of Education, 2016).

Case Law. The disproportionality of language minority students in special education -- specifically their over-representation -- has led to several well-known court cases such as *Diana v. State Board of Education* (1970), *Guadalupe Organization v. Tempe Elementary School District* (1972), and *Larry P. v. Riles* (1972/1979/1984/1986; Coutinho & Oswald, 2000). In *Diana v. State Board of Education*, the issue focused on the overrepresentation of LEP students in programs for students with mild intellectual disabilities. Diana, a Spanish-speaking student in California, had been placed in a class for mildly mentally retarded students because she had a low intelligence quotient (IQ) score on a test that was administered in English. A class action lawsuit was brought on behalf of nine Mexican-American students challenging the administration of IQ tests to place students in special education programs. The major argument against IQ testing was that LEP children were unable to understand the test materials and, thus, the IQ scores obtain were invalid. The case holding concluded that the school practices were in violation of the Equal Protection Clause

of the U.S. Constitution as the students were not afforded equal protection if they could not comprehend test materials.

In *Guadalupe Organization v. Tempe Elementary School District* (1972), elementary school children of Mexican-American and Yaqui Indian origin brought civil rights action against the school district to compel it to provide non-English speaking students with bilingual-bicultural education and also focused on the administration of intelligence testing in English to ELL students, concerns about the due process procedural safeguards, and the training of evaluators and special educators. The court ruled that children could not be placed in ID programs unless they scored lower than two standard deviations below the population mean on an IQ test administered in their native language. In addition, the court required the school district to use other assessments methods in addition to intelligence testing and obtain parental permission prior to special education placement.

The *Larry P. v. Riles* (1972/1979/1984/1986) case led to an expansion of the ruling of the Diana case and it is probably the best-known case regarding disproportionate representation (Coutinho & Oswald, 2000). This case highlighted the existence of over-representation of minority students in the ID program, and the over-reliance of educators on IQ tests that were not validated for use among minority students. The defendants requested the court to determine whether IQ tests were racially and culturally biased. The court's holding was that the nondiscriminatory assessment mandate was violated along with the Civil Rights Act (1964) and the Rehabilitation Act (1973).

Assessment Practices with Bilingual students

The purpose of psychoeducational assessments is to provide information that can be used to describe students' performance and make decisions, such as identifying at-risk students or progress toward meeting standards (Sandberg & Reschly, 2010). Student assessment is critical in ELL education as teachers need to monitor students' L1 and L2

language development and track the quality of their learning; it also entails the use of assessment in ways that are unique for this population (August & Hakuta, 1997). A common use of assessment that goes beyond the ELL status is placement in funded education programs, such as special education, gifted/talented, and Title I programs (August & Hakuta, 1997).

Traditional (referral to intervention) assessment model. Within the referral-to-intervention assessment framework, "bilingual assessment" refers to an assessment that is conducted in a bilingual mode, while the "assessment of bilinguals" does not necessarily seek to gather information in a bilingual mode (Ortiz, 2010). Ortiz (2010) claims that the vast majority of evaluations conducted by school psychologists fall under the category of the assessment of bilinguals, in which cultural and linguistic awareness can be applied in the systematic and comprehensive framework of nondiscriminatory assessment.

Over the years, researchers have surveyed school psychologists and other school personnel involved in the psycho-educational assessment of ELL students. In one of the first comprehensive surveys conducted in the field regarding school psychologists' assessment practices with bilingual and ELL students, Ochoa, Powell, and Robles-Piña (1996) found that cognitive, achievement, and adaptive behavior assessment was more diverse in the assessment of bilinguals compared to the assessment of ELL. Standardized assessment measures (e.g., the Wechsler series, the Woodcock-Johnson series, and the Vineland Adaptive Behavior Survey Scales) were commonly administered in the assessments of both bilingual and ELL students along with curriculum-based assessments (Ochoa et al., 1996). Assessment practices and, specifically, the use of standardized assessments for school-based evaluations of culturally and linguistically diverse students, including bilinguals and ELLs, appear consistent over the years, as the published literature indicates that school psychologists continue implementing similar procedures. For example, similar to Ochoa and

colleagues (1996), Vega and colleagues (2016) reported that school psychologists evaluating culturally and linguistically diverse students primarily use the Kaufman series, the Wechsler series, the Woodcock-Johnson series, that is standardized cognitive and achievement measures in their school-based special education evaluations. Further, in the same study, school psychologists indicated that they primarily used the Behavior Assessment for Children-Second Edition (BASC-2) and the Conners-Third Edition to assess behavioral concerns, while they use the Vineland Adaptive Behavior Survey Scales and the Adaptive Behavior Assessment System (ABAS) to assess adaptive skills (Vega et al., 2016).

Research has also indicated that the majority of practicing school psychologists (91.8%) modify their practices when evaluating a student who was culturally and/or linguistically different (Sotelo-Dynega & Nixon, 2014). Such modifications included using measures of nonverbal intelligence (88.6%), conducting informal assessments (62.4%), using interpreters (40%), determining the validity of their findings using clinical tools such as the Culture-Language Interpretive Matrix (20%), using native language tests (19.7%), and translating English-language tests (2.4%). Furthermore, with regard to testing, 98.3% of the participants reported that they considered the validity of test scores, 97.9% considered the examinee's level of English-language proficiency on test performance, and 93.1% considered the effect of the examinee's level of acculturation on test performance (Sotelo-Dynega & Nixon, 2014).

Little is known about bilingual assessment practices of bilingual school psychologists (Sotelo-Dynega, 2015). Contributing factors to our lack of knowledge in this area is that psychologists who are bilingual use the term bilingual psychologist to communicate their ability to interact in a second language and the fact that the majority (48 out of the 50) of school psychology state credentialing agencies do not provide credentials or training standards for bilingual school psychologists (Sotelo-Dynega, 2015). Moreover, specific

procedures for the interpretation of bilingual assessment results have not been established (Thordardottir, Rothenberg, Rivard, & Naves, 2006). A study that investigated how bilingual school psychologists evaluate ELLs (O'Bryon & Rogers, 2010) reported that bilingual school psychologists used both formal (57.6%) and informal (83.3%) language proficiency assessment methods. The majority of psychologists (84.1%) used multifaceted approaches to assess acculturation as part of the assessment battery, and a minority of whom utilized interpreters (O'Bryon & Rogers, 2010). The most commonly reported factors that bilingual psychologists considered when selecting assessment measures for use with ELLs (both when they shared a language with the student and when they did not) included: the characteristics of the standardization sample, the psychometric properties of the measure, research conducted on the measure, and the student's test-taking experience (O'Bryon & Rogers, 2010).

The psychometric challenges of assessing ELL students have been well documented and have focused on the limitations of the traditional assessment model (e.g., Abedi, 2002; Abedi, 2006; Figueroa, 2002; Lane & Leventhal, 2015; Pérez, Harris, Martínez, & Ridley, 2015). For example, the use of nonverbal or native language instruments does not automatically guarantee reliable and valid data, as even nonverbal tests may rely on some form of functional communication between examiner and examinee (NASP, 2015; Pérez et al., 2015). In addition, these tests may be as culturally loaded as verbal tests, thus, limiting the validity of evaluation results, and the norms for native language tests may not represent the types of ELLs typically found in U.S. schools (NASP, 2015). Further, limited research exists on how U.S. bilingual students perform on tests in their native languages compared to English (NASP, 2015).

In order to overcome fairness challenges related to ELL's language proficiency, test accommodations, such as test modifications and procedural changes, have been proposed (Li

& Suen, 2012). Effective accommodations are test accommodations that improve the performance of ELLs by helping them to overcome language barriers, while valid accommodations are the accommodations that help ELLs but do not impact the performance of other students (Abedi, Hofstetter, & Lord, 2004). Li and Suen's (2012) meta-analysis compared the effects of test accommodations in ELL samples and non-ELLs samples in order to investigate the fairness and validity of this approach. Results demonstrated that test accommodations improved ELLs' performance, but did not significantly influence non-ELLs' test performance, thus, providing evidence of fairness and validity of test accommodations for ELLs (Li & Suen, 2012).

Researchers have used other evaluation methods (beyond psychometrics) to examine school practices regarding ELL assessments. Harris, Sullivan, Oades-Sese, and Sotelo-Dynega (2015), conducted an exploratory study to investigate school psychologists' practices by reviewing 34 psychoeducational reports of ELL students. Researchers concluded that school psychologists often demonstrated limited adherence to legal and ethical guidelines and rarely used culturally and linguistically responsive practices, such as the use of interpreters and language proficiency assessment data to help make eligibility decisions (Harris et al., 2015). Overton, Fielding, and Simonsson (2004) surveyed assessment personnel in 39 Texas school systems by giving them four case scenarios and asking them to make eligibility decisions and explain their decision in an open-ended format. Although researchers expected that school assessment personnel would defer making a decision due to the lack of information and recognize the need for additional information, the majority of the school personnel (83%) used insufficient data to generate decisions (Overton et al., 2004). Klingner and Harry (2006) applied a qualitative design and ethnographic techniques to investigate the nature of decision-making processes during 19 child study team meeting and placement conferences. Their findings indicated that the school psychologist was the individual with the

most authority and influence over the decision-making process; however, the school psychologist rarely had any interactions with the students prior to the evaluation (Klingner & Harris, 2006). Moreover, the researchers concluded that most ELLs were referred for special education placement based on the assumption that their performance or behavioral deficit originated within the student rather than contextual or school-based factors, and meetings demonstrated great variability based on the knowledge, skills, and commitment of team members (Klingner & Harris, 2006).

Overall, it appears that school psychologists should assess ELL students carefully when using traditional assessments created for English native speakers (Pérez et al., 2015). Additionally, when interpreting assessment results, school psychologists need to be mindful of linguistic along with cultural factors that can impact ELLs' performance on standardized assessments (Trent et al., 2018). Figueroa (2002) has argued for a shift from the traditional assessment model to one that observes ELL students in enriched and effective instructional environments.

Multi-tiered Systems of Support (MTSS) and Response to Intervention (RtI). RtI has been recommended for school psychologists who are interested in minority over- or under-representation in special education as a viable method to assess minority and culturally and linguistically diverse students (Castro-Villareal, Villareal, & Sullivan, 2016; Cohen, Burns, Riley-Tillman, & Hosp, 2015). It has been argued that given that RtI focuses on intervention efficacy and contextual factors rather than the evaluation of within-student traits, it may provide more valid assessment results for culturally and linguistically diverse populations (McIntosh, MacKay, Andreou, & Mathews, 2011).

Brown and Doolittle (2008) provide a RtI framework tailored to the needs of ELL students and they identify three major advantages: (a) universal screening and progress monitoring, the main components of any RtI model, allow for comparison of ELL students to

other similar peers based on local rather than national norms; (b) given that in a RtI model collaboration among all educators (e.g., speech and language therapists, school psychologists, counselors, ESL/Bilingual specialists) is warranted, educators have increased opportunities for professional dialogue, peer coaching, and the design of instructional models or materials, including those for ELL students, based on best practices and research from all educational fields; (c) early identification of struggling ELL students and early intervention is likely to occur. Similar RtI models that address ELLs' instruction, referral, and assessment issues can be found in the literature (Fien et al., 2010; Rinaldi & Samson, 2008).

Curriculum-Based Measurement (CBM). CBMs are often administered in schools that implement RtI as a method to collect progress monitoring data and conduct universal screening (Richards-Tutor et al., 2012). CBMs can also function as a standalone approach that uses formal assessment to evaluate ELLs both in English and their native language (Pérez et al., 2015). Moreover, Sandberg and Reschly (2011) reviewed research that utilized CBMs with ELL students and concluded that CBMs can be a useful source of information for a problem-solving model of assessing ELL students. CBMs in this context can be used in progress monitoring, determining language proficiency, predicting achievement, and identifying students with disabilities (Sandberg & Reschly, 2011). For example, De Ramírez and Shapiro (2006) found that reading CBMs were sensitive to the growth of ELL students and, thus, the authors concluded that CBMs can be a practical method to evaluate the progress rate of Spanish-speaking ELLs. Further, in a sample of 1,529 ELL students, oral reading fluency performance as measured by CBMs was a significant predictor of later performance on accountability testing for the overall ELL group as well as for the subgroups of Spanish, Hmong, and Somali ELL students (Muyskens, Betts, Lau, & Marston, 2009).

The Role of Teachers in the Assessment of Bilingual Students

In regards to school-based evaluations, and especially within the referral-to-intervention model, teachers are typically the ones referring students for special education assessment and placement (Dever et al., 2016). Within the MTSS/RtI and the referral-to-intervention assessment frameworks, students' socio-emotional functioning, especially those who attend elementary school, is typically evaluated via teacher and/or parent ratings on standardized scales (Levitt, Saka, Romanelli, Hoagwood, 2007; Splett et al., 2018). Teacher ratings are also typically used to assess academics, learning-related skills, and executive functioning.

Teacher rating scales can provide a sufficient and inexpensive way to monitor the socio-emotional status of students (Van Horn, Atkins-Burnett, Karlin, Ramey, & Snyder, 2007). Research evaluating school-based screening tools, such as the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) or the Ages and Stages Questionnaires: Social-Emotional (ASQ-SE; Squires et al., 2002), has demonstrated teacher ratings' predictive utility for identifying socio-emotional and behavioral issues in kindergarten and early elementary school-aged children (Feeney-Kettler, Kratochwill, Kaiser, Hemmeter, & Kettler, 2010; Owens et al., 2016). Teacher ratings on literacy and language (Titley, D'Amato, & Koehler-Hak, 2014), learning approaches (Bodovski & Farkas, 2007), learning-related skills (McClelland, Acock, & Morrison, 2006), and executive functioning scales (Morgan, Farkas, Hillemeier, Pun, & Maczuga, 2018) have been proven to predict to academic achievement and learning trajectories, especially in reading and math, between kindergarten and sixth grade.

Regarding ELL populations, teachers (e.g., ESL, ESOL, or bilingual education teachers) can be considered specialists who are available to assist school psychologists in the evaluation process (Páez, 2004), to help prevent ELLs from school failure, and to provide

classroom support (Ortiz et al., 2011). However, research has also demonstrated that teachers and other school personnel have difficulty differentiating between students for whom special education referral was appropriate and those whose learning difficulties could be better explained by other factors such as inconsistent schooling or a lack of interventions to address their needs (Ortiz et al., 2011). In regards to teacher rating scales, in a nationally representative sample of language minority students, teacher ratings of language and literacy skills in kindergarten were found to be predictive of special education placement in both first and third grade (Samson & Lesaux, 2009). Indeed, teacher ratings and students' reading proficiency were better predictors of special education placement compared to language minority status, indicating that teacher reports and direct assessment provide more accurate information about students' needs (Samson & Lesaux, 2009).

Intervention in Kindergarten and Early Elementary School for Bilingual Students

A consistent but unsurprising research finding is that language minority students enter school with lower levels of English skills compared to their monolingual counterparts (Hoff, 2013). Delays and difficulties in providing ELL students with educational services have been noted in the literature (Sullivan, 2011). However, the early language skills of language minority children can be accommodated in schools that provide programs that address their needs (Hoff, 2013). Prevention and intervention early in ELLs' academic career can improve their academic achievement by reducing the number of at-risk students (Ortiz, 2002). Moreover, such efforts can also reduce the possibility of unnecessary referrals to special education and inappropriate identification of ELLs as students with special needs (Ortiz, 2002).

Few experimental intervention studies conducted with ELLs have been published and even fewer researchers have conducted follow-up studies (Cirino et al., 2009). The existing research has focused on academic outcomes rather than socio-emotional issues. Overall,

published literature has demonstrated that early intervention literacy programs yield significant positive academic effects for ELL students.

Response to Intervention (RtI). As the aforementioned literature has highlighted, RtI is a promising framework for the evaluation of ELL students. In addition, RtI is a promising intervention system for ELLs. In the general population, the interventions associated with the implementation of RtI have yielded significant and sustained effects for at-risk students. For example, Vellutino, Scanlon, Small, and Fanuele (2006) examined the effectiveness of RtI reading interventions over time. They found that either small-group kindergarten intervention alone or its combination with more intense first-grade intervention decreased the rates of at-risk students and, by third grade, most students (84%) were performing in the average range on literacy measures (Vellutino et al., 2006). In their discussion of ELL education, Ortiz and colleagues (2011) link RtI and early intervention, given that intervention is an essential component of RtI. Intervention is implemented when a problem first becomes evident and this consequently can prevent a more serious problem from evolving and can even prevent referrals to special education (Ortiz et al., 2011).

In an empirical study, Gyovai, Cartledge, Kourea, Yrick, and Gibson (2009) implemented the Early Reading Intervention curriculum (ERI; Simmons & Kame'enui, 2003) with 12 at-risk ELL students attending kindergarten or first grade. Results indicated that while all students made gains in nonsense word fluency and in the number of letter sounds produced correctly, not all students managed to reach higher instructional levels (Gyovai et al., 2009). The researchers interpreted this finding within a RtI approach to early reading intervention and labeled those students as non-responders (Gyovai et al., 2009). Moreover, published research has examined groups of ELL students who did not respond to intervention even after a long period of intensive support and reading instruction. Linan-Thompson and her colleagues (2006) followed a group of 103 ELL students who were at-risk for reading

difficulties from grade 1 through grade 2 and assigned them to intervention (intensive yearlong intervention) and control group (supplemental support). Researchers were unable to identify pretest data variables that could predict which students would benefit from intervention since the students who responded and students who did not respond did not differ in language proficiency, baseline levels on most assessments, or academic performance (Linan-Thompson et al., 2006). However, this study adds to the literature supporting the benefits of RtI for ELL students. Results indicated that at-risk ELLs benefitted from explicit, systematic, and intensive reading intervention because they made gains that distinguished them from the control group and they were less likely to be referred for special education services (Linan-Thompson et al., 2006).

Although RtI appears as a promising practice, limited empirical evidence has investigated the efficacy of RtI with ELL populations (Linan-Thompson, 2010; Xu & Drame, 2008). In addition, limited research has been conducted on the methods used to determine response or nonresponse of ELL students to general or specific interventions (Linan-Thompson, Cirino, & Vaughn, 2007). Overall, the existing empirical research has demonstrated that, even when using different methods to assess responsiveness, the percentage of ELL students meeting the criteria for response were higher after the intervention, indicating that the majority of ELL students are responding to intervention (Linan-Thompson et al., 2007; Richards-Tutor et al., 2012).

Other interventions/programs. In a recent study, Vadasy, Sanders, and Nelson (2015) investigated the effects of two small-group supplemental vocabulary instruction programs (explicit instruction and interactive storybook reading approach) with 324 at-risk ELLs in kindergarten and followed these two cohorts through first grade. Results indicated that ELLs in both programs made significant gains in measures of receptive vocabulary, reading vocabulary, decoding, and spelling; however, the two programs yielded different

effect sizes indicating that ELLs benefitted differentially in their literacy skill development based on the intervention utilized (Vadasy et al., 2015). In first-grade, follow-up results indicated that both interventions had long-term benefits for the ELLs, with students in the explicit instruction reporting greater gains in reading vocabulary and decoding and with students in the storybook approach reporting greater gains in receptive vocabulary skills (Vadasy et al., 2015). In another longitudinal study conducted with Spanish-speaking ELL students, Cirino et al. (2009) randomly assigned 215 first-grade students to intervention and control conditions and followed their progress through second grade. ELLs in the intervention group received supplemental intervention – an enhanced version of Proactive Reading (Mathes, Torgesen, Wahl, Menchetti & Grek, 1999) – in first grade and classroom reading instruction during second grade (Cirino et al., 2009). One-year follow-up data indicated that the ELL students in the intervention group performed significantly better than the comparison group in measures of English oral language, decoding, passage comprehension, English reading fluency, and spelling (Cirino et al., 2009).

Vaughn et al. (2006) successfully implemented an early intervention reading program with ELL students and found that students in the experimental condition significantly outperformed the control group students on multiple measures of English letter naming, phonological awareness and other language skills, and reading and academic achievement. Similarly, Haager and Windmueller (2001) found that an early intervention reading program with ELL students had a positive effect, with students demonstrating steady improvement throughout the yearly implementation of the program.

Another study compared ELLs with their native-English speaking counterparts in terms of benefitting from Reading Recovery (Clay, 1993), a manualized early intervention program that targets reading and writing (Kelly, Gómez-Bellengé, Chen, & Schulz, 2008). This study found that native English-speaking students were performing significantly better

than ELL students, as 76.42% of native speakers performed at grade-level standards upon completion of the program compared with 69% of ELLs (Kelly et al., 2008). Harper, Platt, and Pelletier (2011) implemented an early literacy program in which parents implemented a nine-week intervention with native English speakers and ELLs. A total of 132 linguistically and culturally diverse kindergartners and their parents were assigned to intervention and control groups with ELLs participating in both conditions (Harper et al., 2011). Results indicated ELLs in the experimental group made greater gains in their knowledge of the alphabet and their ability to infer meaning from text compared to native English speakers in the intervention group and to both control groups (Harper et al., 2011).

In summary, unlike empirical research with monolingual English students, intervention studies conducted with ELLs early in their academic career are limited. Most researchers have focused on academic early literacy interventions for at-risk ELLs (e.g., Cirino et al., 2009; Gyovai et al., 2009; Linan-Thompson, 2006; Vadasy et al., 2015). Interventions have been implemented in schools – sometimes within a RtI framework – and in home environments. Moreover, research has demonstrated that intensive and supplemental reading interventions can benefit ELLs and that those benefits can be sustained (e.g., Haager & Windmueller (2001); Linan-Thompson et al., 2006; Vadasy et al., 2015; Vadasy, Nelson, & Sanders, 2011; Vadasy & Sanders, 2012).

Purpose of the Study

The purpose of this study is to address some of the existing gaps and limitations in the literature regarding the assessment of bilingual students. More specifically, this study examines the predictive utility of teacher information for *Spanish-speaking bilinguals* who attend kindergarten. The predictive utility of teacher information is measured in terms of special education placement at grade 3 and parent-reported diagnoses that students have received by third grade. As published research has indicated that language minority students

have been overrepresented in special education settings beginning third grade (Samson & Lesaux, 2009), third-grade outcomes were selected.

This study targets bilingual kindergarteners' outcomes as the majority of bilingual/ELL students attend lower elementary school grades (Trent et al., 2018). Further, this study specifically focuses on Spanish-speaking bilingual kindergarteners for two primary reasons. First, more than 70% of bilingual students in the United States speak Spanish in the home environment (NCES, 2017). Second, researchers aim to create a homogeneous bilingual sample. Although linguistic and cultural variations exist among Spanish-speaking subgroups, "specific issues that pertain to the testing of all Spanish-English bilingual Latinos" exist (Confresi & Gorman, 2004, p. 100).

For the purposes of this study, teacher-reported information was selected as a predictor for the following reasons. First, in psychoeducational evaluations, school psychologists typically ask teachers to complete questionnaires as a way to collect information from multiple sources and across environments. Second, within an MTSS framework, teachers are also asked to complete questionnaires primarily regarding students' socio-emotional functioning (Levitt, Saka, Romanelli, Hoagwood, 2007; Splett et al., 2018). Third, previously published research has demonstrated the predictive utility of teacher-rated questionnaires and the associated benefits of early assessment and intervention (Bodovski & Farkas, 2007; Feeney-Kettler e al., 2010; McClelland et al., 2006; Morgan et al., 2018; Owens et al., 2016; Titley et al., 2014). In addition, research has demonstrated that early assessment tests that were scored through ratings were found to be most effective in terms of predictive validity (Kim & Suen, 2003). The importance of early assessment and identification is based on the following two assumptions: (a) children are more responsive to positive change during early schooling, and (b) interventions delivered in kindergarten or early elementary school have the potential to help children before learning problems develop

into chronic conditions and secondary problems appear (Tramontana, Hooper, & Selzer, 1988). However, previous research has also demonstrated that "early assessment measures are not generally predictive" (Kim & Suen, 2003, p. 561). Notably, limited research has examined the predictive utility of teacher information for either academic/learning-related skills or social skills in bilingual populations.

Last, the study examines the moderating role of RtI (intervention received in first, second, and third grade) in the placement of bilinguals in special education. Intervention studies conducted with ELL populations in kindergarten and early elementary school have provided promising and sustained results (Linan-Thompson et al., 2006; Vadasy et al., 2015; Vadasy, Nelson, & Sanders, 2011; Vadasy & Sanders, 2012), indicating that such interventions can function as a protective factor for the developmental trajectories of bilingual students and can contribute to the early identification and intervention of struggling ELLs (Brown & Doolittle, 2008). General education teachers are the ones typically delivering Tier1 and Tier 2 interventions in schools that implement RtI practices (Barrio, Lindo, Combes, & Hovey, 2015) and, have increased opportunities to collaborate with other school professionals (Brown & Doolittle, 2008; Cummings, Atkins, Allison, & Cole, 2008), to access school-based data, and to participate in data-based decision making procedures. This study aims to better understand the utility of teacher information provided by RtI schools as compared to non-RtI schools.

Overall, teachers, especially general education teachers, are frequently asked to provide information (e.g., by completing rating scales and questionnaires) for their students either as part of psychoeducational evaluations or for screening purposes (typically within MTSS frameworks). Teacher information along with other data points is then used to identify at-risk students or students who may benefit from special education services. The importance of involving teachers in decision-making practices is well-establish for monolingual

populations. However, in non-discriminatory assessment practices, our understanding of the teacher's role and the information they provide is limited. This study by examining the predictive utility of teacher information for bilingual students aims to provide insights on if and how we, as school psychologists, can better use teacher information for the early identification of at-risk bilingual students. Moreover, although, RtI appears as a promising practice, limited empirical evidence exists on the efficacy of RtI with bilingual populations (Xu & Drame, 2008). This study aims to address this gap by examining the moderating role of RtI.

Research Questions and Hypotheses

To better understand how teacher information can inform intervention decision-making processes and predict special education placement and learning-related, attention-related, and socio-emotional related diagnoses of bilingual students, the following questions are being addressed. Notably, teacher information includes rating scales teachers completed regarding students' social skills, learning-related skills, and academic (i.e., literacy and language) skills. A detailed description of the included tools is provided in Chapter 3.

1) Using the Early Childhood Longitudinal Study, Kindergarten Class of 2010-2011 (ECLS-K:2011), does teacher information collected in kindergarten predict special education placement for Spanish-speaking bilingual students and their monolingual counterparts in third grade, when controlling for sex, socio-economic status (SES), and cognitive flexibility?
2) Using ECLS-K:2011, how well can teacher information collected in kindergarten predict parent reported learning-related (e.g., learning disability), attention-related (e.g., ADHD), and socio-emotional functioning-related (e.g., anxiety) diagnoses for Spanish-speaking bilingual students and their monolingual counterparts in third grade, when controlling for sex, SES, and cognitive flexibility?

3) Using the ECLS-K:2011, what is the moderator effect of Response to Intervention on special education placement for Spanish-speaking bilingual students and their monolingual counterparts in third grade, when controlling for potential confounding variables (i.e., sex, SES, and cognitive flexibility)?

This study includes a number of covariates and a moderator. The following variables are considered covariates: sex, socio-economic status (SES), and cognitive flexibility. It has been argued that demographic characteristics, including race, gender, and native language, are better predictors of special education placement than both academic performance and economic conditions (Dever et al., 2016). Further, being male and ELL is associated with a higher risk of being placed in special education (Shifrer et al., 2011). In terms of SES, ELL students who come from lower SES households are more likely to be disproportionately represented in special education programs (Sullivan, 2011; Sullivan & Bal, 2013). In regards to executive functioning, including cognitive flexibility, direct measures in kindergarten populations have shown to be good predictors of second-grade academic achievement (Morgan et al., 2018). This finding by Morgan and colleagues (2018) was established for both monolingual and language-minority kindergarteners. In the ECLS-L:2011, in order to assess executive function, students were administered two measures of executive functioning: the Dimensional Change Card Sort (DCCS) and the Numbers Reversed task from the Woodcock-Johnson Third Edition (WJ-III). For the purposes of this study, only the DCCS (Frye, Zelazo, & Palfai, 1995; Zelazo, 2006), a measure of cognitive flexibility, is used as a control variable. Unlike the Numbers Reversed task, the DCCS has been designed specifically to assess cognitive flexibiltiy across the lifespan and to assess a key component of executive function which is the flexible use of rules that control behavior (Zelazo, 2006). In the present study, by controlling for age, sex, SES, and cognitive flexibility, data noise is reduced and result accuracy increases. In other words, by controlling for variables that have

been previously demonstrated to potentially impact this study's outcome (i.e., disability status and academic trajectories), the unique predictive utility of teacher information, (i.e., this study's main predictor and focus), is more accurately assessed.

RtI has been selected as a moderator for the purposes of this study. In the database used for this study, school administrators were asked whether RtI was fully or partially implemented in their schools during first, second, and third grade. RtI has been recommended for school psychologists who are interested in minority over- or under-representation in special education as a viable method to assess minority and culturally and linguistically diverse students (Castro-Villareal et al., 2016; Cohen et al., 2015) as RtI-related practices may yield more valid assessment results than referral to intervention assessment models for culturally and linguistically diverse populations (McIntosh et al., 2011). Further, RtI has been shown to be a promising intervention framework for ELL and monolingual students (Linan-Thompson et al., 2007; Richards-Tutor et al., 2012; Vadasy et al., 2011; Vadasy et al., 2015; Vadasy & Sanders, 2012; Vellutino et al., 2006). Based on the available published literature, it is predicted that, in schools that implement RtI, it would be less likely for monolingual and bilingual students to be placed in special education programs. Further, when it comes to the interaction term between teacher information and RtI, it is expected that teacher information would be a stronger predictor of special education placement in schools that implement RtI, given that RtI provides teachers increased opportunities to collaborate with other school professionals, to access school-based data, and to participate in data-based decision-making procedures.

Teacher information collected during kindergarten is the primary predictor of this study. In the ECLS-K:2011, teachers completed the Academic Rating Scale assessing children's academic achievement in three domains: language and literacy, science, and mathematical thinking. In addition, teachers completed the Approaches to Learning scale,

which was adapted from the SSRS and asked the teachers to evaluate learning-related skills (e.g., organization skills, ability to work independently, persistence, ability to follow classroom rules). Using the ECLS-K (previous version of ECLS-K:2011), Samson and Lesaux (2009) demonstrated that teacher ratings of early literacy skills were significant predictors of special education placement among language minority students. In monolingual student populations, research using the ECLS-K has indicated that teacher ratings on literacy and language (Titley et al., 2014) and learning approaches (Bodovski & Farkas, 2007) have been proven to predict to academic achievement and learning trajectories. Moreover, it appears that, in monolingual student populations, teacher ratings on learning-related skills have been shown to predict academic trajectories between kindergarten and sixth grade even after controlling for cognition, age, ethnicity, and maternal education level (McClelland et al., 2006). Consistent with Samson and Lesaux (2009), it is hypothesized that teacher ratings on the Approaches to Learning and the Academic Rating Scale (specifically the language and literacy component) will be significant predictors of special education placement among Spanish-speaking bilingual students. Moreover, as with previous research outcomes, it is predicted that teacher ratings on the Approaches to Learning and the Academic Rating Scale will significantly predict special education placement for monolingual students. Given that, per IDEIA (2004), it is necessary to establish the academic (negative) impact of each educational disability category, in order to place a student in special education, it is hypothesized that the strongest predictor of overall special education placement will be language and literacy skills. Moreover, it is hypothesized that teacher ratings on the learning-related skills scales can predict learning-related diagnosis reported as of third grade, including learning disabilities and speech issues. Such ratings can be better predictors of learning-related diagnoses compared to social skills ratings.

Teachers participating in the ECLS-K:2011 cohort rated kindergarteners' social skills in the areas of self-control, interpersonal skills, externalizing problem behaviors, and internalizing problem behaviors (Tourangeau et al., 2015). In regards to the predictive utility of teacher social-skills ratings, available literature has not examined this issue with bilingual or language-minority student populations. In monolingual populations, research has demonstrated teacher ratings' predictive utility for identifying socio-emotional and behavioral issues in kindergarten and early elementary school-aged children (Feeney-Kettler et al., 2010; Owens et al., 2016). It is predicted that teacher ratings on the social-skills composite will predict special education placement for both monolingual and bilingual students.

In monolingual kindergarten populations, existing literature has demonstrated that teacher-rated social-skills deficits tend to co-occur with teacher-rated Attention Deficit Hyperactivity Disorder (ADHD) symptoms (Merrell & Wolfe, 1998). Further, students with ADHD especially lack social cooperation/interaction skills (De Boo & Prins, 2007; Merrell & Wolfe, 1998). In addition, social skill deficits may impede social functioning, adaptability, and adjustment of individuals (Angélico, Crippa, & Loureiro, 2013). Conversely, socio-emotional skills can function as a protective factor for students at-risk for developing problem behaviors (Catalano et al., 2002). This argument is supported by research indicating that universal school-based socio-emotional intervention programs have yielded positive outcomes, such as improvement in prosocial skills, academic achievement, and decrease in antisocial behaviors and mental-health issues (Sklad, Diekstra, De Ritter, Ben, & Gravesteijn, 2012). Consequently, it is hypothesized that teacher ratings of social skills in kindergarten, and specifically social skills deficits, can predict attention-related diagnoses (i.e., ADHD and ADD) and socio-emotional functioning issues (e.g., anxiety, depression, and oppositional defiant disorder) in early elementary school for both monolingual and bilingual students.

CHAPTER 3: METHOD

Overview

The Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K:2011) database was the source of data for this study. The ECLS-K:2011 is an ongoing investigation sponsored by the National Center for Education Statistics (NCES). The children who participate in the ECLK-K:2011 come from diverse socioeconomic and racial/ethnic backgrounds. Parents, teachers, before- and after-school care providers provide child-level data in the study. Additional information is gathered regarding children's home environment, home-based educational activities, school environment, classroom environment, classroom curriculum, teacher qualifications, and before- and after-school care. Demographic information is available only for statistical purposes. In this study, a number of constructs and variables across time points were selected. Figure 1 presents an overview of the chosen constructs.

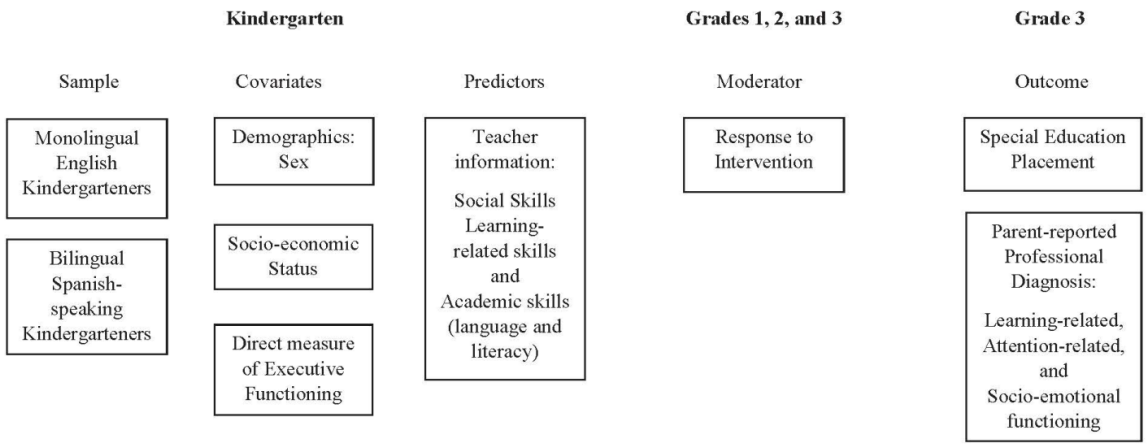

Figure 1. Overview of constructs used in the study.

Participants

In the ECLS-K:2011, 18,174 children enrolled in full-day and half-day kindergarten in 2010-2011 comprise the nationally representative sample, which was recruited from 968 public and private schools (Tourangeau et al., 2015).

Sample selection. From the full ECLS-K:2011 sample, a subsample was identified for the purposes of this study. First, students who received special education services in kindergarten were excluded from the sample. Second, procedures were implemented to identify bilingual students within the subsample of students who reportedly spoke a language other than English at home. Similarly to Hartanto, Toh, and Yang (2018) who also used the ECLS-K:2011, students were considered bilingual if they (a) demonstrated sufficient English skills as demonstrated by their score on the Preschool Language Assessment Scale (16 out of 20), and (b) spoke a language other than English at home. Based on these procedures, this study's unweighted sample (N = 13,150) was comprised of 900 Spanish-speaking bilinguals and 12,250 English monolinguals. Figure 2 provides an overview of the sample selection process used in this study while Table 1 provides descriptive information.

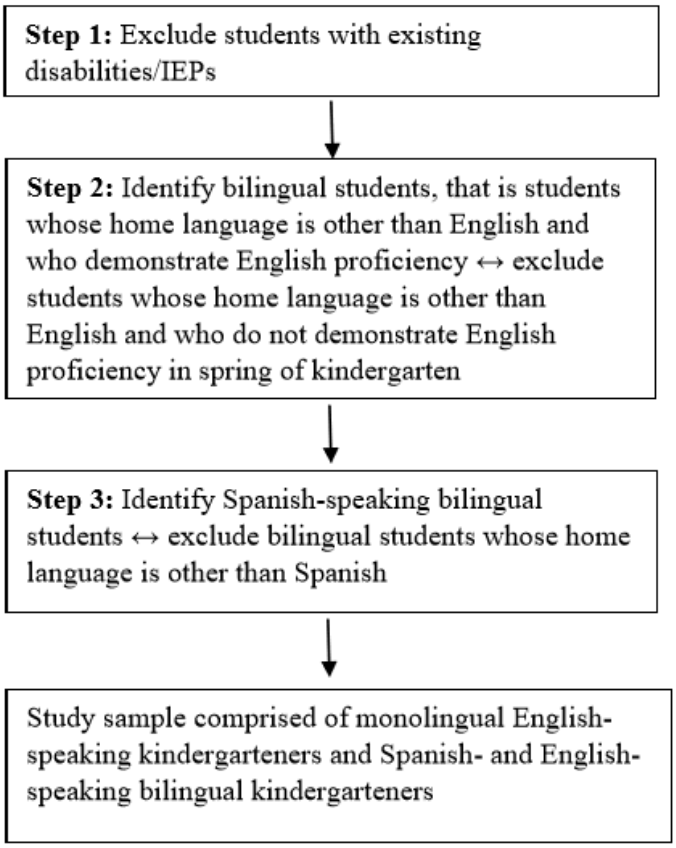

Figure 2. Sample selection process at the kindergarten level.

Table 1

Descriptive Statistics for the Unweighted Sample

	Total Sample *N* (%)	Monolinguals *n* (%)	Bilinguals *n* (%)
N	13,150	12,250	900
Sex			
Females	6,470 (49.2)	6,050 (49.3)	430 (47.2)
Males	6,680 (50.8)	6,210 (50.7)	480 (52.8)
Ethnicity			
White	7,190 (54.7)	7,180 (58.6)	10 (1.1)
Black	1,840 (14.0)	1,840 (15.0)	<10 (0.1)
Hispanic	2,740 (20.8)	1,860 (15.1)	885 (98.2)
Other	1,340 (10.5)	1,380 (11.3)	<10 (0.5)
SES			
Lowest		2,630 (21.4)	660 (73.5)
Quartile 2		3,140 (25.6)	160 (17.8)
Quartile 3		3,220 (26.3)	50 (6.0)
Highest		3,260 (26.6)	30 (2.8)

Note. Student mean age in months at the time of the spring kindergarten assessment was 73.51 (4.37) for the total sample, 73.58 (4.37) for the monolingual group, and 72.68 (4.23) for the bilingual group.

Teacher participants. A total of 18,170 teachers were asked to complete questionnaires at the kindergarten level. Descriptive statistics associated with teacher characteristics are reported below in Table 2. Unfortunately, teacher-level characteristics could not be incorporated in the analyses due to a large number of missing values (initial system missing = 15.7%). Of the available responses, most teachers identified themselves as

being a Highly Qualified Teacher (75.9%). On average, teachers taught for 14 years (range = 0.5 – 47 years) at the point they completed the questionnaires. Kindergarten teachers were also asked if they had completed a college-level course in Response to Intervention (RtI). Of those teachers who responded, 40.6% noted that they have completed such a course. The question about receiving such a class was not included in the questionnaires first-grade, second-grade, and third-grade teachers completed.

Table 2

Highest Degree Completed by General Education Kindergarten Teachers (N = 18,170)

Degree	%
High School or GED	<1
Some College or Technical/Vocational School	<1
Associate's Degree	<1
Bachelor's Degree	53.9
Master's Degree	42.7
Advanced Professional Degree Beyond a Master's	2

Measures

In the ECLS-K:2011, data have been collected on a number of topics from the children, the parents or guardians, teachers, and school administrators utilizing direct or indirect assessments.

Child-level measures. Two child-level measures were selected, the Preschool Language Assessment Scale (preLAS; Duncan & De Avila, 2000) and the Dimensional Change Card Sort (DCCS; Zelazo, 2006). Specifically, two preLAS subtests, a subtest that required children to follow simple direct instructions in English (Simon Says) and a picture vocabulary subtest (Art Show), were administered to every student in spring of kindergarten

in order to measure English language competence (Tourangeau et al., 2015). The preLAS publishers recommended a cutoff score of 16 as the minimum score reflecting English language proficiency (Tourangeau et al., 2015). The DCCS, a widely used direct measure of cognitive flexibility (Zelazo, 2006), was used as a covariate in this study. The DCCS requires students to sort a series of bivalent test cards, first according to color (pre-switch) and, then, according to the shape (post-switch; Tourangeau et al., 2015; Zelazo, 2006). In the ECLS-K:2011, the DCCS was used as a measure of cognitive flexibility (Tourangeau et al., 2015). According to the ECLS-L:2011 manual, the DCCS developer has recommended using the overall score (a combined score that reflects students' performance across three tasks) to estimate general performance (Tourangeau et al., 2016). In the current study, the overall score obtained during the spring of kindergarten was used. Based on previous research, the estimated reliability of the DCCS in the spring of kindergarten is .86 (Hartanto et al., 2018).

Parent/Guardian-level measures. Utilizing computer-assisted interviews, parents or guardians were asked questions regarding family structure, family literacy practices, parental involvement in school, non-parental care arrangements, household composition, family income, parent education level, and other demographic indicators. For the purposes of this study, the following parent-completed measures were selected.

Primary language. A composite was generated based on parent-reported data during kindergarten to indicate whether English or another language was the primary language spoken in the home environment. This composite was used during the sample selection process.

Socio-economic status (SES). In the ECLS-K:2011, an SES continuous composite was created based on data from the parent interviews conducted in fall 2010 or spring 2011 and was comprised of the following components: parents/guardians education,

parents/guardians occupational prestige score, and household income. For the purposes of this study, the SES composite was recoded into quartiles and used as a covariate.

Learning-related, attention-related, and socio-emotional related diagnoses. At the third-grade data collection point, parents were asked to report if their child had a disability diagnosed by a professional and if their child received therapy services (Tourangeau et al., 2016). For the purposes of this study, parent-reported diagnoses were collapsed in to the following categories: learning-related diagnoses (learning disability, dyslexia, dyscalculia, and speech problems), attention-related diagnoses (ADHD and ADD), and socio-emotional functioning-related diagnoses (severe emotional disturbance, panic disorder, separation anxiety, OCD, generalized anxiety, other anxiety disorder, bipolar disorder, depression, and oppositional defiance disorder).

Teacher-level measures. General education and special education teachers completed a number of measures as part of the ECLS-K:2011. Regular education teachers provided information about the students, the learning environment, and themselves (Tourangeau et al., 2015). Special education teachers and service providers of students with Individualized Educational Programs (IEPs) provided information about the nature and types of services implemented and about themselves (Tourangeau et al., 2015). The following teacher-completed measures were used.

Academic Rating Scale (ARS). The ARS was developed for the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K) to obtain teachers' input of children's academic achievement in three domains: language and literacy, science, and mathematical thinking. A text-revised version was used in the ECLS-K:2011 (Tourangeau et al., 2015). In this study, only the language and literacy items were used. In the unweighted sample (N =15,811; listwise deletion of 2,363 missing cases), Cronbach's alpha was estimated at .95 for

the nine scale items for the overall sample. Cronbach's alpha was .94 for both the English monolingual and for the Spanish-speaking bilingual sample.

Socio-emotional measures. The ECLS-K:2011 included measures of socioemotional development that focus on aspects of social competence, including social skills (e.g., social interaction, attentional focus, and self-control) and problem behaviors (e.g., impulsivity and externalizing problem behaviors). Teacher questionnaires also included items that asked teachers and parents to report how often the children demonstrated certain learning behaviors (e.g., keeps belongings organized; shows eagerness to learn new things; works independently; easily adapts to changes in routine; persists in completing tasks; pays attention well; and follows classroom rules). In addition, teachers reported on closeness and conflict between themselves and the study children.

*Social skills, problem behaviors, and approaches to learning***.** During kindergarten, teacher interviews administered in the spring included the components of the student's Social Skills, Problem Behaviors, and Approaches to Learning (Tourangeau et al., 2015). This component is comprised of an abbreviated 25-item adapted version of the Social Skills Rating System (SSRS; Gresham, & Elliott, 1990). The SSRS is designed to assess students in preschool through twelfth grade who may be at risk for serious interpersonal difficulties and are referred to a number of special education disabilities (Gresham & Elliott, 1990). In this version of the SSRS, teachers rated children on social-emotional skills, including the ability to exercise self-control or problem behaviors. According to the ECLS-K:2011 manual, reliability coefficients for the four Social Skills subscales in the spring of kindergarten were as follows Internalizing (.78), Externalizing (.89), Self-Control (.82), and Interpersonal Skills (.86; Tourangeau et al., 2015). An overall composite for these four SSRS subscales could not be calculated as scale component items are not provided by the database developers. The

Approaches to Learning scale had an estimated reliability coefficient of .91 for spring kindergarten (Tourangeau et al., 2012).

Special education placement. In the ECLS-K:2011, a composite variable was created to indicate whether special education teacher questionnaires were requested in the spring of 2014 (third grade), indicative of a student assigned to a special education teacher (Tourangeau et al., 2016), and, thus, that he or she was receiving special education services.

School administrator-level measures. School administrators at each participating school completed a questionnaire. In first, second, and third grade, two versions of the school administrator questionnaire were used: a version for schools that were new to the study or for which a completed school administrator questionnaire was not received in a prior data collection point, and an abbreviated version for returning schools (Tourangeau et al., 2016). For this study, information regarding full or partial Response to Intervention implementation in first grade, second grade, and third grade was included in order to generate a variable that indicated RtI services.

Procedure and Analysis

Approval to conduct this study was obtained from the Penn State University Institutional Review Board. A license to obtain the data from NCES was submitted to obtain access to the database of the ECLS-K:2011. The database was obtained from NCES upon license application approval.

Missing data. As detailed in the ECLS-K:2011 manuals, due to missing values, the kindergarten sample is less than 18,174 students (number of targeted base-year respondents); similarly, the third-grade sample is less than 13,579 students (number of third-grade respondents). The relative differences in the unadjusted estimates between kindergarten and third-grade ranged from 0% to 14.71%, and average 3.28% (Tourangeau et al., 2016).

Nonresponse bias. The NCES standards require that surveys with a "weighted unit response rate less than 85% be evaluated for potential nonresponse bias" (Tourangeau et al, 2016, p. 5-24). The ECLS-K:2011 investigators (Tourangeau et al., 2015) ran nonresponse bias analyses for the kindergarten data to determine whether or not bias has been introduced as a result of nonresponse. Investigators used three different methods -- a comparison of estimates from the ECLS-K:2011 to those produced using frame data, a comparison of estimates from the ECLS-K:2011 to other data sources, and a comparison of estimates produced using weights that included adjustments for nonresponse to estimates produced using weights without nonresponse adjustments-- and concluded that it was unlikely that significant nonresponse bias exists in the kindergarten data (Tourangeau et al., 2015). For the third-grade data, two study components demonstrated weighted response rates lower than 85%: direct child assessment (79.9%) and parent interview (70.1%). In the current study, the researcher was interested in parent interview data. For that data specifically, it is reported that nonresponse bias in the unweighted parent interview information is possible (Tourangeau et al., 2016, p.5-29).

Analytic method. For each of the research questions, a different statistical analysis was employed. Based on the ECLS-K-2011 manuals (Tourangeau et al., 2015; 2016). Unweighted analyses were employed. For the analyses, bilingualism was dummy coded to compare Spanish-speaking bilingual to English-speaking monolingual students.

Logistic regression analysis. A hierarchical logistic regression model was proposed for examining the first research question regarding the predictive utility of teacher information in terms of special education placement. Logistic regression was used as the equation to be estimated has a dichotomous dependent variable (Pampel, 2000): placement in special education versus not placement in special education. Hierarchical logistic regression was selected for the purposes of this study given that this type of analysis allows the

examination of whether a set of predictors contributes significant prediction over and above another set of predictors (Cohen, Cohen, West, & Aiken, 2003). In the regression model employed, bilingual status (dichotomous variable reflecting monolingual or bilingual status) was the first predictor (Step 1) while the previously identified covariates (i.e., sex, SES, and cognitive flexibility) were considered the second set of predictors (Step 2). Moreover, the various types of teacher-reported information (language and literacy-related skills [Step 3], learning-related skills [Step 4], and social skill ratings [Step 5]) are considered separate sets of predictors. Per Cohen et al. (2003), Wald tests for the equality of coefficients permit the comparison of the predictive strengths of each variable.

Polytomous logistic regression analysis. Polytomous (multinomial) logistic regression models were applied to address the second research question. The outcome variable for this analysis was parent-reported diagnosis (0 = no diagnosis, 1 = learning-related diagnosis, 2 = attention-related diagnosis, and 3 = socio-emotional functioning related diagnosis). For this type of analysis, one value of the dependent variable was designated as the reference category and the probability of membership in other categories was compared to the probability of membership in the reference category (Menard, 2002). The reference group for this analysis was the group that has no reported diagnoses.

Moderator analysis. RtI has been identified as a potential moderator for this study. According to the literature, the identification of a moderator can facilitate the establishment of boundary conditions of an effect, stimuli, or type of people for which the effect is large versus small, present versus absent, positive versus negative, and so forth (Hayes, 2013). In this study, it was hypothesized that the effect of teacher information on special education placement would be moderated by RtI if its effect depends on or can be predicted by RtI. Notably, in a moderation model, a moderator is not considered a predictor (Hayes, 2013). Moderation can be estimated by including the interaction product of two predictors as an

additional predictor in the regression model (Warner, 2013). In order to evaluate the potential moderation effect of RtI, another regression model similar to the one described for research question 1 was employed. Step 1 included the bilingual status variable, while Step 2 included the covariates identified in research question 1. Step 3 included teacher information (social skills, learning-related skills, and literacy and language-related skills ratings) and Step 4 included the RtI information. In Step 5, the interaction term of teacher information x RtI was included in order to examine the potential moderating effect of RtI on the relation between teacher information and special education placement. The model was run three times in order for each type of teacher information to be examined separately. Moderation analyses were conducted using the PROCESS macro for SPSS (Hayes, 2013).

CHAPTER 4: RESULTS

Logistic Regression Assumptions

Logistic regression equations (sequential and multinomial) were employed to address this study's research questions. According to Wright (1995), the following assumptions exist for logistic regression models. First, the outcome variable must be dichotomous with one outcome per individual recorded. In this study, the outcomes were categorical variables with two (special education) or four (parent-reported diagnosis) distinct values. Second, the specificity assumption requires that a logistic regression model contains all relevant predictors and no irrelevant predictors. As outlined in Chapters 2 and 3, predictors were selected based on previously published literature, thus, it can be stated that the predictors included in each model were evidence-informed. Third, the categories under analysis must be mutually and collectively exhaustive, that is a case cannot be more than one outcome category at a time. Indeed, special education status has two categories that are mutually and collectively, receiving or not receiving services. The parent-reported clinical diagnosis variable was comprised of four categories (no diagnosis, learning-related diagnosis, attention-related diagnosis, socio-emotional functioning diagnosis). Such diagnoses can be comorbid (American Psychiatric Association, 2013); however, cases with reported comorbidity (n = 100) were excluded from the analyses. Last, logistic regression models require large samples and, for most analyses, a minimum of 50 cases per predictor variable is considered sufficient (Aldrich, Nelson, & Adler, 1984). Given the large number of participants in the ECLSK:2011, this assumption has been met.

Sequential/Hierarchical Logistic Regression

To address Research Question 1, sets of predictors were added to logistic regression equations in separate steps. The purpose of these analyses was to determine if teacher information provided in kindergarten could predict special education placement by third

grade. The analyses were conducted using the unweighted sample. For these analyses, only cases that had no missing information on key variables (i.e., teacher ratings) were included in the analyses (Tables 4 and 5). The total sample size for the sequential logistic regression was 11,420 students (13.17% attrition from the original study sample). The sample size for the first research question was comprised of 780 Spanish-speaking bilinguals (13.21% attrition) and 10,640 English monolinguals (13.16% attrition). In the sample, 3.9% Spanish-speaking third-grade students were receiving special education services compared to 4.6% of their monolingual counterparts. Notably, no cases had missing information regarding the outcome variable (i.e., special education placement). Continuous independent variables (cognitive flexibility and teacher-reported language and literacy skills) were centered before being entered in the equations. In terms of dichotomous variables, sex was coded as 0 being female and 1 being male; and language status was coded as 0 being an English monolingual and 1 being a Spanish-speaking bilingual. SES which is reported in quartiles was entered in the equations as a categorical variable with lowest SES quartile being the reference group.

Language status as a predictor. The Hosmer and Lemeshow test showed good goodness of fit for Models 2, 3, 4 and 5 but not for Model 1 (language status). The initial – *2LL* for this model was 4,235.09. At Step 1, the language status variable (Spanish-speaking bilingual, English monolingual) was entered in the equation. The model chi-square showed that adding this variable did not result in a significant improvement in the model's ability to predict special education placement, model χ^2 (1, N = 11,420) = 0.72; p = .397. At Step 2, three control variables were added to the equation: sex, SES (coded in quartiles and entered as a categorical variable), and cognitive flexibility (DCCS). The Hosmer and Lemeshow test showed good goodness of fit (χ^2 = 6.82; p = .556). Summary statistics indicate that adding these variables resulted in a significant improvement in the model's ability to predict the outcome variable, $\Delta\chi^2$ (5, N = 11,420) = 112.44; p < .001. The Model 2 equation displayed a

statistically significant relationship with the outcome as the model chi-square statistic was χ^2 (6, N = 11,420) = 113.16; $p < .001$. At Step 3, the Academic Rating Scale (ARS) scores were added to Model 2, resulting in Model 3. The Hosmer and Lemeshow test showed good goodness of fit (χ^2 = 13.584; p = .093). Summary statistics indicate that adding this variable resulted in a significant improvement in the model's ability to predict the outcome variable, $\Delta\chi^2$ (1, N = 11,420) = 344.93; $p < .001$. The Model 3 equation displayed a statistically significant relationship with the outcome as the model chi-square statistic was χ^2 (7, N = 11,420) = 458.09; $p < .001$. At Step 4, the Approaches to Learning ratings were added to Model 3, resulting in Model 4. The Hosmer and Lemeshow test showed good goodness of fit (χ^2 = 9.53; p = .299). Summary statistics indicate that adding this variable resulted in a significant improvement in the model's ability to predict the outcome variable, $\Delta\chi^2$ (1, N = 11,420) = 12.86; $p < .001$. The Model 4 equation displayed a statistically significant relationship with the outcome as the model chi-square statistic was χ^2 (8, N = 11,420) = 470.955; $p < .001$. At Step 5, the teacher-reported social skills ratings (i.e., Internalizing, Externalizing, Self-control, and Interpersonal) were added to Model 4, resulting in Model 5. The Hosmer and Lemeshow test showed adequate goodness of fit (χ^2 = 10.03; p = .263). Summary statistics indicate that adding this set of variables resulted in a significant improvement in the model's ability to predict the outcome variable, $\Delta\chi^2$ (4, N = 11,420) = 22.94; $p < .001$. The Model 5 equation displayed a statistically significant relationship with the outcome as the model chi-square statistic was χ^2 (12, N = 11,420) = 493.90; $p < .001$.

Across the five models, language status emerged as a significant predictor in all models with the exception of the Model 1. In terms of covariates, sex remained significant across models. Compared to the lowest SES quartile, SES quartiles 1, 2, and 3 did not remain significant across models. Cognitive flexibility scores were significant in Model 2 and Model 3. In terms of teacher ratings, language and literacy (ARS) and Approaches to Learning were

significant predictors of special education placement in the models in which they were included. Among social skills ratings included in Model 5, teacher ratings on Internalizing behaviors and Self-control were significant. Based on Model 5 (Table 5), results indicate that, when controlling for all other variables, bilinguals were less likely to be receiving special education services, while males were more likely to be receiving special education services. Moreover, for a one-unit increase in the ARS and the Approaches to Learning, students were less likely to be in special education; while, for a one-unit increase in Internalizing and Self-Control students were more likely to be in special education by third grade. The Cox and Snell Model R^2 increased as variables were added to the equation. Given that the model with the largest R^2 statistic can be considered "best," then Models 3, 4, and 5 appear to contain variables that have a stronger association with the outcome variable of special education placement.

The sensitivity and the specificity of the full model (Model 5) were estimated based on the classification tables generated. Overall, 95.4% of the students were correctly classified. However, the model had low sensitivity (0.2%; cases that had the characteristics and were correctly predicted to have that characteristic) and high specificity (100%; cases that do not have the characteristic and were correctly predicted not to have it).

Table 3

Correlation Matrix for the Full Model (N = 11,420)

Predictors	1	2	3	4	5	6	7	8	9	10	11	12
1. Language Status	--											
2. Sex	–.24	--										
3. SES (Quartile 1)	.18	–.01	--									
4. SES (Quartile 2)	.20	–.03	.47	--								
5. SES (Quartile 3)	.21	–.04	.49	.47	--							
6. DCCS	.01	.01	–.02	–.05	–.09	--						
7. ARS	.06	–.02	–.06	–.11	–.18	–.13	--					
8. Approaches to Learning	–.06	.12	–.01	.01	.01	–.05	–.49	--				
9. Internalizing	.01	.08	.01	.01	.03	–.02	.06	.09	--			
10. Externalizing	.03	–.08	–.02	.02	.05	.04	–.19	.19	–.11	--		
11. Self-Control	–.01	–.06	–.01	–.01	>.01	.02	.06	–.21	–.08	.50	--	
12. Interpersonal	–.02	.05	–.01	.01	>.01	–.01	–.04	–.26	.14	–.03	–.52	--

Table 4

Full Model Results For Special Education Placement per Predictor (N = 11,420)

					Adjusted Odds Ratios	
Predictor	*B*	*SE*	Wald χ^2	*p*	*OR*	[95% CI]
Language Status	–.40	.20	3.91	.048	0.67	[0.45, 1.00]
Sex	.39	.10	14.78	<.001	1.47	[1.21, 1.79]
SES			6.68	.083		
SES (Quartile 1)	.22	.14	2.57	.109	1.06	[0.83, 1.36]
SES (Quartile 2)	.16	.13	1.47	.225	0.87	[0.67, 1.14]
SES (Quartile 3)	.37	.14	6.47	.011	1.25	[0.95, 1.63]
DCCS	.03	.02	3.05	.081	0.97	[0.94, 1.00]
ARS	.74	.06	157.38	<.001	0.48	[0.43, 0.54]
Approaches to Learning	.45	.12	13.92	<.001	0.64	[0.51, 0.81]
Internalizing	–.26	.09	8.82	.003	1.29	[1.09, 1.53]
Externalizing	–.16	.10	2.46	.117	1.17	[0.96, 1.43]
Self-control	–.48	.15	10.73	.001	1.61	[1.21, 2.15]
Interpersonal	.04	.13	0.08	.775	0.97	[0.76, 1.23]

Note. *B* = coefficient. *SE* = standard error. Wald χ^2 = Wald Chi-Square tests the unique contribution of each predictor in the context of the other predictors. *p* = significance level. *OR* = adjusted odds ratio for predictor variable.

Table 5

Results from Sequential Logistic Regression for Special Education Placement (N = 11,420)

	Adjusted odds ratios (*OR*)				
	Model 1	Model 2	Model 3	Model 4	Model 5
	OR [95% CI]	*OR* [95% CI]	*OR* [95% CI]	*OR* [95% CI]	*OR* [95% CI]
Predictors added at each step:					
Step 1: Creating Model 1					
Constant	0.05	0.04***	0.03***	0.07***	0.01***
Language Status	0.86 [0.59, .1.24]	0.67 [0.45, 0.97]*	0.61 [0.42, 0.91]*	0.66 [0.45, 0.98]*	0.67 [0.45, 1.00]*
Step 2: Creating Model 2					
Sex (Males)		1.89 [1.57, 2.28]***	1.57 [1.30, 1.91]***	1.46 [1.20, 1.78]***	1.47 [1.21, 1.79]***
SES (Quartile 1)		0.87 [0.69, 1.10]	1.05 [0.82, 1.35]	1.06 [0.83, 1.36]	1.06 [0.67, 1.36]
SES (Quartile 2)		0.59 [0.45, 0.77]**	0.86 [0.66, 1.13]	0.87 [0.66, 1.14]	0.87 [0.67, 1.63]
SES (Quartile 3)		1.20 [0.91, 1.58]*	1.21 [0.82, 1.58]	1.23 [0.94, 1.61]	1.25 [0.95, 1.63]
DCCS		0.91 [0.89, 0.93]***	0.96 [0.93, 0.99]*	0.97 [0.94, 1.00]	0.97 [0.94, 1.00]
Step 3: Creating Model 3					
ARS			0.41 [0.38, 0.45]***	0.46 [0.41, 0.52]***	0.48 [0.43, 0.54]***
Step 4: Creating Model 4					
Approaches to Learning				0.74 [0.63, 0.87]***	0.64 [0.51, 0.81]***
Step 5: Creating Model 5					
Internalizing					1.29 [1.09, 1.53]**

Externalizing					1.17 [0.96, 1.43]
Self-control					1.61 [1.21, 2.15]***
Interpersonal					0.97 [0.76, 1.23]
Model summary statistics					
Model *–2LL*	4,234.37	4,128.18	3,776.99	3,764.13	3,741.19
Model χ^2 *(df)*	0.72 (1)	113.16 (6)***	458.09 (7)***	470.96 (8)***	493.90 (12)***
$\Delta\chi^2$ *(df)*	0.72 (1)	112.44 (5)***	344.93 (1)***	12.86 (1)***	22.94 (4)***
Cox & Snell Model R^2	<.001	.010	.039	.040	.042

Note. OR = Adjusted odds ratio for predictor variable. Model *–2LL* = -2 Log Likelihood for model. Model χ^2 = chi-square test of null hypothesis that the logistic regression coefficients for all predictors included in the model are equal to zero. *df* = Degrees of freedom. $\Delta\chi^2$ = chi-square test of null hypothesis that the logistic regression coefficients for predictors added to model at most recent step are equal to zero. Cox & Snell R^2 = index of strength of association between dichotomous outcome variable and the predictor variables.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Comparing outcomes for bilingual and monolingual populations. A second set of sequential logistic regressions was completed in order to further address Research Question 1. This time, results are presented by different groups, that is monolingual and bilingual population outcomes (Tables 6 and 7). Respectively, 4.6% (490 cases) of the monolingual and 4% (30 cases) of bilingual students were in special education.

Spanish-speaking bilinguals. The initial model *–2LL* was 260.88. The Hosmer and Lemeshow test indicated good data fit for Model 1 (predictors; $\chi^2 = 11.48$; $p = .176$). At Step 1, the covariates (sex, SES, and DCCS) were added to the model. The model chi-square showed that adding these variables resulted in a significant improvement in the model's ability to predict special education placement, model χ^2 (5, $N = 780$) = 11.84; $p = .037$. At Step 2, teacher-reported language and literacy skills were added to Model 1 resulting in Model 2. The Hosmer and Lemeshow test indicated good data fit for Model 2 ($\chi^2 = 13.94$; $p = .083$). Summary statistics indicate that adding this variable resulted in a significant improvement in the model's ability to predict the outcome variable, $\Delta\chi^2$ (1, $N = 780$) = 27.66; $p < .001$. The Model 2 equation displayed a statistically significant relationship with the outcome as the model chi-square statistic was χ^2 (6, $N = 780$) = 39.50; $p < .001$. At Step 3, the Approaches to Learning ratings were added to Model 2, resulting in Model 3. The Hosmer and Lemeshow test showed good goodness of fit ($\chi^2 = 13.63$; $p = .092$). Summary statistics indicate that adding this variable did not result in a significant improvement, $\Delta\chi^2$ (1, $N = 780$) = 0.29; $p = .533$. However, the Model 3 equation still displayed a statistically significant relationship with the outcome as the model chi-square statistic was χ^2 (7, $N = 780$) = 39.89; $p < .001$. At Step 4, the social skills ratings were added to Model 3, resulting in Model 4. The Hosmer and Lemeshow test showed adequate goodness of fit ($\chi^2 = 10.47$; $p = .234$). Summary statistics indicate that adding these variables did not result in a significant model improvement, $\Delta\chi^2$ (4, $N = 780$) = 8.01; $p = .091$. The Model 4 equation displayed a

statistically significant relationship with the outcome as the model chi-square statistic was χ^2 (11, N = 780) = 47.90; p < .001.

Across models, the predictor that remained significant was language and literacy skills ratings. The Cox and Snell R^2 value increased when language and literacy teacher ratings were added to the model at Step 2 and kept increasing as other teacher ratings were added, indicating that the relation between the independent variables and the outcome grew stronger. However, the Cox and Snell R^2 values remained relatively low across models. Further, the sensitivity and the specificity of the overall model was estimated based on the classification table for Model 4. Overall, 96.0% of the students were correctly classified. However, the model had low sensitivity (3.2%) and high specificity (99.9%).

English-speaking monolinguals. The initial *–2LL* for this sequential logistic regression was 3,973.49. At Step 1, the same aforementioned covariates were entered in the equation. The Hosmer and Lemeshow test showed adequate goodness of fit (χ^2 = 10.25; p = .248). The model chi-square showed that adding the covariates to the null model resulted in a significant improvement, model χ^2 (5, N = 10,640) = 102.82; p <.001. At Step 2, the ARS scores were added to Model 1, resulting in Model 2. The Hosmer and Lemeshow test showed good goodness of fit (χ^2 = 12.35; p = .136). Summary statistics indicate that adding this variable resulted in a significant improvement in the model's ability to predict the outcome variable, $\Delta\chi^2$ (1, N = 10,640) = 318.46; p < .001. The Model 2 equation displayed a statistically significant relationship with the outcome as the model chi-square statistic was χ^2 (6, N = 10,640) = 421.28 p < .001. At Step 3, the Approaches to Learning ratings were added to Model 2, resulting in Model 3. The Hosmer and Lemeshow test showed good goodness of fit (χ^2 = 15.24; p = .055).Summary statistics indicate that adding this variable resulted in a significant improvement in the model's ability to predict the outcome variable, $\Delta\chi^2$ (1, N = 10,640) = 12.579; p < .001. The Model 3 equation displayed a statistically significant

relationship with the outcome as the model chi-square statistic was χ^2 (7, N = 10,640) = 434.10; p < .001. At Step 4, the social skills ratings (i.e., Internalizing, Externalizing, Self-control, and Interpersonal) were added to Model 3, resulting in Model 4. The Hosmer and Lemeshow test showed adequate goodness of fit (χ^2 = 9.64; p = .291). Summary statistics indicate that adding the social skills ratings resulted in a significant model improvement, $\Delta\chi^2$ (4, N = 10,640) = 18.95; p = .001. The Model 4 equation displayed a statistically significant relationship with the outcome as the model chi-square statistic was χ^2 (11, N = 10,640) = 453.06; p < .001.

The Cox and Snell R^2 value increased when teacher ratings were added to the model (Step 2); however, it remained at .04 across all models that contained teacher information. Given the low values of Cox and Snell R^2 across models, it appears that although the predictors were significant, their relation to the outcome variable was weak. Further, the sensitivity and the specificity of the overall model was estimated based on the classification table for Model 4. Overall, 95.4% of the students were correctly classified. However, the model had low sensitivity (0.2%) and high specificity (100%).

Table 6
Results from Sequential Logistic Regression for Special Education Placement (Spanish-Speaking Bilinguals N = 780)

	Adjusted odds ratios (*OR*)			
	Model 1	Model 2	Model 3	Model 4
	OR (95% CI)	*OR* (95% CI)	*OR* (95% CI)	*OR* (95% CI)
Predictors added at each step:				
Step 1: Creating Model 1				
Constant	0.02*	0.03**	0.02*	0.00***
Sex	2.82 [1.24, 6.41]***	2.45 [1.06, 5.69]*	2.30 [0.96, 5.47]	2.26 [0.93, 5.53]
SES (Quartile 1)	0.68 [0.23, 2.00]	0.77 [0.25, 2.35]	0.75 [0.24, 2.30]	0.76 [0.24, 2.39]
SES (Quartile 2)	1.08 [0.24, 4.79]	1.48 [0.32, 6.90]	1.51 [0.32, 7.05]	1.85 [0.39, 8.79]
SES (Quartile 3)	0.97 [0.12, 7.60]	1.25 [0.15, 10.28]	1.21 [0.15, 10.00]	1.12 [0.12, 10.07]
DCCS	0.88 [0.79, 0.98]*	0.93 [0.82, 1.05]	0.93 [0.82, 1.05]	0.91 [0.81, 1.03]
Step 2: Creating Model 2				
ARS		0.35 [0.24, 0.53]***	0.38 [0.24, 0.60]***	0.40 [0.25, 0.64]***
Step 3: Creating Model 3				
Approaches to Learning			0.81 [0.42, 1.56]	0.49 [0.19, 1.28]
Step 4: Creating Model 4				
Internalizing				1.90 [0.93, 3.88]
Externalizing				1.31 [0.57, 3.02]
Self-control				1.53 [0.50, 4.66]
Interpersonal				2.22 [0.78, 6.31]

Model Summary Statistics				
Model *–2LL*	249.04	221.38	220.99	212.98
Model χ^2 (*df*)	11.84 (5)**	39.50 (6)***	39.89 (7)***	47.90 (11) ***
$\Delta\chi^2$	11.84 (5)**	27.66 (1)***	0.39 (1)	8.01 (4)
Cox & Snell Model R^2	.015	.049	.050	.059

Note. OR = Adjusted odds ratio for predictor variable. Model *–2LL* = -2 Log Likelihood for model. Model χ^2 = chi-square test of null hypothesis that the logistic regression coefficients for all predictors included in the model are equal to zero. *df* = Degrees of freedom. $\Delta\chi^2$ = chi-square test of null hypothesis that the logistic regression coefficients for predictors added to model at most recent step are equal to zero. Cox & Snell R^2 = index of strength of association between dichotomous outcome variable and the predictor variables.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 7
Results from Sequential Logistic Regression for Special Education Placement (English Monolinguals N = 10,640)

	Adjusted odds ratios (*OR*)			
	Model 1	Model 2	Model 3	Model 4
	OR [95% CI]	*OR* [95% CI]	*OR* [95% CI]	*OR* [95% CI]
Predictors added at each step:				
Step 1: Creating Model 1				
Constant	0.04*	0.03***	0.07***	0.02***
Sex	1.85 [1.53, 2.24]***	1.54 [1.26, 1.87]***	1.43 [1.17, 1.74]***	1.43 [1.17, 1.75)***
SES (Quartile 1)	0.88 [0.69, 1.12]	1.06 [0.83, 1.37]	1.08 [0.84, 1.38]	1.08 [0.84, 1.39)
SES (Quartile 2)	0.58 [0.45, 0.76]***	0.85 [0.68, 1.13]	0.86 [0.65, 1.14]	0.86 [0.66, 1.12)
SES (Quartile 3)	0.71 [0.55, 0.91]**	1.20 [0.91, 1.58]	1.23 [0.93, 1.61]	1.24 [0.94, 1.63)
DCCS	0.91 [0.88, 0.94]***	0.97 [0.93, 1.00]	0.97 [0.94, 1.01]	0.98 [0.94, 1.01)
Step 2: Creating Model 2				
ARS		0.42 [0.38, 0.46]***	0.47 [0.42, 0.53]***	0.48 [0.43, 0.54)***
Step 3: Creating Model 3				
Approaches to Learning			0.74 [0.62, 0.87]***	0.64 [0.51, 0.82]***
Step 4:Creating Model 4				
Internalizing				1.27 [1.06, 1.51]**
Externalizing				1.16 [0.94, 1.43]
Self-control				1.61 [0.94, 2.18]**
Interpersonal				0.92 [0.72, 1.18]

Model Summary Statistics				
Model *–2LL*	3,870.67	3,552.21	3,545.15	3,520.43
Model χ^2 (*df*)	102.82 (5)***	421.28 (6)***	434.10 (7)***	453.06 (11)***
$\Delta\chi^2$	102.82 (5) ***	318.47 (1)***	12.83 (1)***	18.96 (4)***
Cox & Snell Model R^2	.010	.039	.040	.042

Note. OR = Adjusted odds ratio for predictor variable. Model *–2LL* = -2 Log Likelihood for model. Model χ^2 = chi-square test of null hypothesis that the logistic regression coefficients for all predictors included in the model are equal to zero. *df* = Degrees of freedom. $\Delta\chi^2$ = chi-square test of null hypothesis that the logistic regression coefficients for predictors added to model at most recent step are equal to zero. Cox & Snell R^2 = index of strength of association between dichotomous outcome variable and the predictor variables.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Polytomous (Multinomial) Logistic Regression

To address Research Question 2, sets of predictors were added to a multinomial logistic regression (MLR) equation in separate steps. The purpose of this analysis was to determine if teacher information provided in kindergarten can predict parent-reported diagnoses by third grade. The analyses were conducted using the unweighted sample. Similarly to the aforementioned sequential logistic regression equations, covariates included sex, SES, and cognitive flexibility (DCCS). Teacher information included ratings on language and literacy (ARS), Approaches to Learning, and social skills (Internalizing, Externalizing, Self-control, and Interpersonal). When attempting to conduct the MLR with language status as a predictor, SPSS provided a number of warnings including that unexpected similarities in the Hessian matrix were encountered and that the validity of the model fit is uncertain. Consequently, results are not reported for the overall sample with language status as a predictor. Descriptive information is provided in Table 8.

Table 8

Frequencies and Percentages for Parent-reported Diagnosis at Grade 3

	Full Sample	Monolinguals	Bilinguals
	%	%	%
No Diagnosis	96.0	95.8	98.8
Learning-related	<1	<1	<1
Attention-related	2.1	2.2	<1
Socio-emotional Functioning	<1	<1	<1
Comorbidity	<1	<1	<1

For these analyses, only cases that had no missing information on key variables (i.e., teacher ratings) were included in the analysis. Further, cases in which comorbidity existed were excluded from the analysis. The total sample size for this regression was 11,320 students (13.91% attrition from the original study sample). The sample size for the first research question was comprised of 780 Spanish-speaking bilinguals (13.43% attrition) and 10,540 English monolinguals (13.95% attrition). The MLR was conducted using the no parent-reported diagnosis group as the reference group. This yielded comparisons of students with no parent-reported diagnosis versus students with parent-reported learning-related diagnosis, students with no parent-reported diagnosis versus students with parent-reported attention-related diagnosis, and students with no parent-reported diagnosis versus students with parent-reported socio-emotional functioning-related diagnosis. Results are reported separately for the bilingual and the monolingual samples.

Spanish-speaking bilinguals. The likelihood ratio test of the final model (with all the independent variables) against the null model (only with a constant and where all the parameter coefficients are 0) and the chi-square statistic, as the difference between the *–2LL* of the null and final model are presented in Table 9. Once the *p*-value is less than the significance levels (i.e., less than .05 and for this study $p < .001$), data indicate that the adjusted model is statistically significant and is outperforming the null model. Therefore, at least one independent variable has a significant influence on parent-reported diagnoses. The goodness-of-fit tests, the Pearson test ($\chi^2 = 524.68$, $p = 1.000$) and Deviance test ($\chi^2 = 524.68$; $p = 1.000$) were non-significant. Further, it should be noted that in terms of the validity of the goodness-of-fit, there are 1,560 cells (i.e., dependent variable levels by subpopulation) with zero frequencies; consequently, the high percentage of empty cells (66.7%) means that the results of this analysis cannot be safely interpreted.

In order to select the "best" predictors to include in the model, an automatic stepwise method Forward Entry was used, which starts with a model that only includes the intercept and in which the final model should only include important predictors. Predictors included in the model included: sex, SES, DCCS, ARS, Approaches to Learning, Internalizing, Externalizing, Self-control, and Interpersonal. Predictors included in the final model included: the DCCS score, teacher ratings on Approaches to Learning, and teacher ratings on Externalizing problem behaviors. Table 10 presents the likelihood ratio tests, which reports the contribution of each effect to the model. For each one, the *–2LL* is computed for the reduced model (i.e., a model without the effect) and the chi-square statistic is the difference between the *–2LL* of the reduced model from Table 10 and the final model reported in Table 9. The probability of observing each dependent variable category is a function of the predictors given by the estimated parameters (Table 13).

Results indicate that for learning-related diagnoses, no significant predictors were identified, compared to the reference category. For attention-related diagnoses compared to the reference category, significant predictors were the cognitive flexibility score and teacher ratings on externalizing behaviors. For the bilingual group, no parent reported socio-emotional functioning diagnosis, thus, no results are reported for this group. The Cox and Snell Model R^2 for the model was .043. McFadden R^2 is another type of pseudo R^2 statistic reported in MLRs aimed to indicate the predictive power of a model. This index is preferred over other similar pseudo-R^2s (Peng, So, Stage, & John, 2002). The McFadden R^2 for the model was .381. A classification table was generated. Overall, 99.2% of the students were correctly classified. However, the model had low sensitivity (0% correct for learning-related and 25% correct for attention-related diagnoses) and high specificity (100% correct).

Table 9

Model Fitting Information for Bilingual Sample (N = 780)

	Model Fitting Criterion	Likelihood Ratio Tests		
Model	*–2LL*	χ^2	*df*	*p*
Intercept Only	89.49			
Final	55.41	34.08	6	<.001

Table 10

Likelihood Ratio Tests for the Bilingual Sample (N = 780)

	Model Fitting Criterion	Likelihood Ratio Tests		
Model	*Reduced –2LL*	χ^2	*df*	*p*
Intercept Only	55.65	0.24	2	.887
DCCS	64.61	9.21	2	.010
Approaches to Learning	65.87	10.46	2	.005
Externalizing	65.42	10.02	2	.007

Note. The reduced *–2LL* reflects scores from the reduced model, which is formed by omitting an effect form the final model.

English-speaking monolinguals. The likelihood ratio test of the final model, as the difference between the *–2LL* of the null and final model is presented in Table 11. Once the *p*-value is less than the significance levels (i.e., less than .05 and for this study $p < .001$), data indicate that the adjusted model is statistically significant and is outperforming the null model. Therefore, at least one independent variable has a significant influence on parent-reported diagnoses. The goodness-of-fit tests, the Pearson test ($\chi^2 = 29{,}179.91$; $p = 1.000$) and Deviance test ($\chi^2 = 3{,}408.15$; $p = 1.000$) were non-significant. Further, it should be noted that, in terms of the validity of the goodness-of-fit, there are 31,319 cells (i.e., dependent

variable levels by subpopulation) with zero frequencies, indicating that there are many empty cells (75%) and the results of this analysis need to cautiously interpreted.

In order to select the "best" predictors to include in the model, an automatic stepwise method Forward Entry was used, which starts with a model that only includes the intercept and in which the final model should only include important predictors. Predictors included in the model included: sex, SES, DCCS, ARS, Approaches to Learning, Internalizing, Externalizing, Self-control, and Interpersonal. Predictors included in the final model included teacher ratings (Approaches to Learning, Externalizing problem behaviors, ARS, and Internalizing problem behaviors) and student sex. Table 11 presents the likelihood ratio tests, which reports the contribution of each effect to the model. For each one, the *–2LL* is computed for the reduced model (i.e., a model without the effect) and the chi-square statistic is the difference between the *–2LL* of the reduced model from Table 12 and the final model reported in Table 11. The probability of observing each dependent variable category is a function of the predictors given by the estimated parameters (Table 14).

Results indicate that for monolingual students with learning-related diagnoses compared to students with no parent-reported diagnosis, the only significant predictor was teacher ratings on language and literacy. For students with attention-related diagnoses, significant predictors were teacher ratings on Approaches to Learning and Externalizing problem behaviors, as well as sex. For students with socio-emotional functioning related diagnoses, significant predictors included teacher ratings on language and literacy as well as teacher ratings on Internalizing problem behaviors. The Cox and Snell Model R^2 for the model was .022 while the McFadden R^2 was .064. Notably, these pseudo R^2 indices were higher for the bilingual model compared to the monolingual one. A classification table was generated for this model. Overall, 96.7% of the students were correctly classified. However, the model had zero sensitivity and high specificity (100% correct).

Table 11

Model Fitting Information for Monolingual Sample (N = 10,540)

	Model Fitting Criterion	Likelihood Ratio Tests		
Model	*–2LL*	χ^2	*df*	*p*
Intercept Only	3,648.67			
Final	3,415.09	233.58	5	<.001

Table 12

Likelihood Ratio Tests for the Monolingual Sample (N = 10,540)

	Model Fitting Criterion	Likelihood Ratio Tests		
Model	*Reduced –2LL*	χ^2	*df*	*p*
Intercept Only	3,444.11	29.03	3	<.001
Sex	3,424.01	8.92	3	.030
ARS	3,427.84	12.75	3	.005
Approaches to Learning	3,464.33	49.25	3	<.001
Internalizing	3,429.28	14.19	3	.003
Externalizing	3,424.78	9.69	3	.021

Note. The reduced *–2LL* reflects scores from the reduced model, which is formed by omitting an effect form the final model.

Table 13

Estimated Parameters of the MLR for the Bilingual Sample (N=780)

	Predictors	*B*	*SE*	Wald χ^2	*P*	Adjusted Odds Ratios	
						OR	[95% CI]
Learning Related	Intercept	2.16	4.51	0.23	.632		
	DCCS	0.02	0.24	0.01	.945	1.02	[0.64, 1.61]
	Approaches to Learning	–0.98	0.88	1.23	.267	0.38	[0.07, 2.12]
	Externalizing	–3.57	2.52	2.01	.156	0.03	[0.00, 3.91]
Attention-Related	Intercept	–0.80	5.88	0.02	.893		
	DCCS	1.94	0.95	4.17	.041	6.96	[1.09, 44.67]
	Approaches to Learning	–5.46	3.09	3.12	.077	0.00	[0.00, 1.82]
	Externalizing	2.50	1.20	4.35	.037	12.28	[1.16, 128.16]

Note. B = coefficient. *SE* = standard error. Wald χ^2 = Wald Chi-Square tests the unique contribution of each predictor in the context of the other predictors. *p* = significance level. *OR* = adjusted odds ratio for predictor variable.

Table 14

Estimated Parameters of the MLR for the Monolingual Sample (N = 10,540)

	Predictors	*B*	*SE*	Wald χ^2	*P*	Adjusted Odds Ratios *OR*	Adjusted Odds Ratios [95% CI]
Learning Related	Intercept	–2.83	1.69	2.82	.093		
	Sex	–0.40	0.37	1.16	.280	0.67	[0.23, 1.02]
	ARS	–0.64	0.21	9.56	.002	0.53	[0.35, 0.79]
	Approaches to Learning	–0.66	0.39	12.89	.089	0.52	[0.24, 1.11]
	Internalizing	0.10	0.32	0.09	.765	1.10	[0.59, 2.06]
	Externalizing	–0.45	0.33	1.91	.167	0.64	[0.34, 1.20]
Attention-Related	Intercept	–0.72	0.64	1.30	.254		
	Sex	–0.04	0.15	6.13	.013	0.69	[0.52, 0.93]
	ARS	0.09	0.08	1.07	.301	1.09	[0.93, 1.29]
	Approaches to Learning	–1.03	0.15	46.56	<.001	0.36	[0.27, 0.48]
	Internalizing	–0.10	0.13	0.59	.443	0.91	[0.70, 1.17]
	Externalizing	–0.03	0.11	7.60	.006	1.37	[1.09, 1.70]

Socio-emotional Functioning	Intercept	–5.53	1.13	24.09	<.001		
	Sex	–0.29	0.23	1.55	.213	0.45	[0.46, 1.18]
	ARS	0.23	0.16	2.02	.156	1.26	[0.92, 1.73]
	Approaches to Learning	–0.07	0.25	0.08	.777	0.93	[0.57, 1.53]
	Internalizing	0.76	9.19	15.22	<.001	2.14	[1.46, 3.14]
	Externalizing	0.07	0.21	0.11	.737	1.07	[0.71, 1.62]

Note. *B* = coefficient. *SE* = standard error. Wald χ^2 = Wald Chi-Square tests the unique contribution of each predictor in the context of the other predictors. *p* = significance level. *OR* = adjusted odds ratio for predictor variable.

Moderator Analysis

To address the third research question moderation analyses were conducted with RtI being the moderator of teacher information. RtI was dummy coded (0 = never attended a school that implemented RtI services; 1 = have attended a school that implemented RtI). The total sample size for this set of regression analysis was 9,810 students (25.40% attrition from the original study sample). The sample size for the first research question was comprised of 780 Spanish-speaking bilinguals (19.87% attrition) and 10,640 English monolinguals (25.81% attrition). In the sample, 30 (4.3%) Spanish-speaking third-grade students were receiving special education services compared to 490 (5.4%) of their monolingual counterparts. The majority of Spanish-speaking bilinguals (n = 690) and English monolinguals (n = 8,110) was exposed to RtI services.

Regression models for the moderation analyses were estimated using the PROCESS macro (Hayes, 2013). Based on the results of the sequential logistic regressions used to address the first research question, only statistically significant covariates (that is sex, SES, and cognitive flexibility) were entered in the models in the respective equations. Given that PROCESS allows only one predictor variable at a time, the various teacher-reported ratings were entered in separate equations. To note, PROCESS results are reported in log-odds metric and not in odds-ratios. Further, when utilizing this macro in SPSS, the command split file (used to compare outcomes between monolingual and bilingual populations) is unavailable.

In the first moderation analysis, language status, sex, cognitive flexibility were entered as covariates, ARS scores were entered as the independent variable, and RtI was the moderator. The *–2LL* for this model was 3,553.14. The Cox and Snell Model R^2 was .050. The model chi-square showed that adding these variables in the null model resulted in a significant improvement in the

model's ability to predict special education placement. Every individual predictor was significant; however, the interaction term ARS x RtI was not significant. Table 15 presents the results for this moderation analysis.

Table 15

Moderation Analysis Results (ARS) for Special Education per Predictor (n = 9,810)

Predictor	*B*	*SE*	*P*
Constant	–4.09	.25	<.001
Language Status	–0.68	.19	.001
Sex	0.47	.09	<.001
DCCS	–0.04	.02	.027
ARS	–1.03	.19	<.001
RtI	0.68	.25	.006
ARSxRtI	0.11	.19	.577

In the second moderation analysis, language status and sex were entered as covariates, Approaches to Learning scores were entered as the independent variable, and RtI was the moderator. The *–2LL* for this model was 3,747.87. The Cox and Snell Model R^2 was .031. The model chi-square showed that adding these variables in the null model resulted in a significant improvement in the model's ability to predict special education placement. Approaches to Learning and sex were the only significant predictors. The interaction term was insignificant. Table 16 presents the results for this moderation analysis.

Table 16

Moderation Analysis Results (Approaches to Learning) for Special Education per Predictor (n = 9,810)

Predictor	*B*	*SE*	*P*
Constant	0.77	.74	.304
Language Status	–0.25	.19	.193
Sex	0.35	.10	<.001
Approaches to Learning	–1.56	.28	<.001
RtI	–0.85	.76	.262
ApproachesxRtI	0.57	.29	.052

In the third moderation analysis, language status and sex were entered as covariates, Internalizing scores were entered as the independent variable, and RtI was the moderator. The *–2LL* for this model was 3,900.82. The Cox and Snell Model R^2 was .016. The model chi-square showed that adding these variables in the null model resulted in a significant improvement in the model's ability to predict special education placement. Teacher-reported internalizing symptoms, sex, and RtI emerged as the significant predictors. The interaction term was not statistically significant. Table 17 presents the results for this moderation analysis.

Table 17

Moderation Analysis Results (Internalizing) for Special Education per Predictor (n = 9,810)

Predictor	*B*	*SE*	*P*
Constant	–5.82	.57	<.001
Language Status	–0.24	.19	.191
Sex	0.67	.10	<.001
Internalizing	1.21	.30	<.001
RtI	1.50	.59	.010
InternalizingxRtI	–0.50	.31	.103

In the fourth moderation analysis, language status and sex were entered as covariates, Externalizing scores were entered as the independent variable, and RtI was the moderator. The *–2LL* for this model was 3,900.82. The Cox and Snell Model R^2 was .011. The model chi-square showed that adding these variables in the null model resulted in a significant improvement in the model's ability to predict special education placement. Teacher-reported externalizing symptoms, sex, and RtI emerged as the significant predictors. The interaction term was not statistically significant. Table 18 presents the results for this moderation analysis.

Table 18

Moderation Analysis Results (Externalizing) for Special Education per Predictor (n = 9,810)

Predictor	*B*	*SE*	*P*
Constant	–5.26	.52	<.001
Language Status	–0.23	.19	.235
Sex	0.56	.10	<.001
Externalizing	0.81	.24	<.001
RtI	1.41	.54	.001
ExternalizingxRtI	–0.39	.31	.114

In the fifth moderation analysis, language status and sex were entered as covariates, Self-control scores were entered as the independent variable, and RtI was the moderator. The *–2LL* for this model was 3,938.98. The Cox and Snell Model R^2 was .011. The model chi-square showed that adding these variables in the null model resulted in a significant improvement in the model's ability to predict special education placement. Teacher-reported student self-control behaviors and sex emerged as significant predictors. The interaction term was statistically non-significant. Table 19 presents the results for this moderation analysis.

Table 19

Moderation Analysis Results (Self-Control) for Special Education per Predictor (n = 9,810)

Predictor	*B*	*SE*	*P*
Constant	–1.37	.83	.099
Language Status	–0.25	.19	.194
Sex	0.58	.10	<.001
Self-Control	–0.79	.28	.050
RtI	–0.34	.86	.695
Self-ControlxRtI	0.33	.29	.254

In the last moderation analysis, language status and sex were entered as covariates, Interpersonal scores were entered as the independent variable, and RtI was the moderator. The *–2LL* for this model was 3,897.04. The Cox and Snell Model R^2 was .016. The model chi-square showed that adding these variables in the null model resulted in a significant improvement in the

model's ability to predict special education placement. Teacher-reported student self-control behaviors and sex emerged as significant predictors. The interaction term was statistically non-significant. Table 20 presents the results for this moderation analysis.

Table 20

Moderation Analysis Results (Interpersonal) for Special Education per Predictor (n = 9,810)

Predictor	*B*	*SE*	*P*
Constant	–0.47	.80	.559
Language Status	–0.26	.19	.167
Sex	0.52	.10	<.001
Interpersonal	–1.11	.28	<.001
RtI	–0.76	.82	.352
InterpersonalxRtI	0.49	.29	.089

Overall, moderation analyses indicated that RtI was not a significant moderator. However, RtI as a unique predictor emerged as significant in some of the models. In specific, RtI appears to be a significant predictor of special education placement in the models that contained the teacher ratings of language and literacy and internalizing behaviors. Moreover, language status emerged as a significant predictor of special education placement only in the model that contained the language and literacy teacher ratings. Given that the model with the largest pseudo-R^2 statistic can be considered "best," the model that appears to have the most predictive utility is the first model that was related to teacher-reported language and literacy skills. Notably and similarly to previous analyses presented in this chapter, predictors appear to have a weak relationship with the outcome variable of special education placement.

CHAPTER 5: DISCUSSION

The purpose of this study was to examine the predictive utility of teacher information for Spanish-speaking bilinguals in order to provide insights on non-discriminatory assessment practices and to increase our understanding of the teacher's role in such practices. The predictive utility of teacher information was conceptualized in terms of special education placement at grade 3 and parent-reported diagnoses that students received by third grade. Notably, limited research has examined the predictive utility of teacher information for either academic/learning-related skills or social skills in bilingual populations.

Predictive Utility of Teacher Ratings and Special Education Placement

Across analyses and models, data (e.g., pseudo R^2 statistics, *–2LL*, classification tables) displayed poor model fit, indicating a weak relationship between independent variables and outcomes. Overall, this study indicates that teacher ratings had no substantial predictive utility in terms of special education placement for Spanish-speaking bilingual third graders. This finding is consistent with previous research that has demonstrated that "early assessment measures are not generally predictive" (Kim & Suen, 2003, p. 561).

Although a number of predictors (e.g., teacher ratings on language and literacy skills) were significant in certain models or across models and certain steps in the regressions were statistically significant, caution needs to be taken when interpreting the results of this study. Further, when comparing results between the monolingual with the bilingual group and examining which predictors were statistically significant, it appears that the predictors functioned differently between the two groups. This may be related to one of the hypotheses of special education disproportionality for culturally and linguistically diverse students which claims that special education referral, assessment, and eligibility depend on procedures and instruments that

are culturally and linguistically loaded and differentially assess the abilities, achievement, and behavior of students belonging to different groups (Coutinho & Oswald, 1998). Moreover, this finding can be linked to the well-established psychometric challenges of assessing ELL students (e.g., Abedi, 2002; Abedi, 2006; Figueroa, 2002; Lane & Leventhal, 2015; Pérez, Harris, Martínez, & Ridley, 2015).

Results for the logistic regressions conducted to address the first research question indicate that that Spanish-speaking bilinguals were less likely than their monolingual counterparts to be placed in special education. Given that Spanish-speaking students who had not achieved English proficiency in kindergarten were excluded from this sample, the results of the current study can be considered more pertinent to highly proficient bilingual students. Current results are consistent with the literature that highlights the academic benefits of bilingualism for highly proficient bilinguals (e.g., Hartanto, Yang, & Yang, 2018; Kempert, Saalbach, & Hardy, 2011). The current findings are similar to Morgan and colleagues' study (2015) in which it was reported that language-minority children were less likely to be identified as having (a) learning disabilities or (b) speech or language impairments compared to their majority student counterparts. The results from the current study, similarly to the interpretation of Morgan and colleagues (2015), can also be indicative of the hypothesized over-time dynamic of disproportionate representation patterns for language minority students, which suggests that in elementary school, such students are initially under-represented in special education and, then, begin to be over-represented as teachers begin to attribute underachievement to factors other than English proficiency (Hibel & Jasper, 2012; Morgan et al., 2015; Samson & Lesaux, 2009).

This study demonstrated that, in both monolingual and bilingual samples, males were more likely than females to be receiving special education services. This finding is consistent

with previously published research (American Psychiatric Association, 2013; Shifrer et al., 2011). Across logistic regression models, teacher ratings on language and literacy skills appeared to have the most predictive utility, even when controlling for possible confounding variables such as SES and cognitive flexibility. This finding is consistent with previous research on bilingual (Samson & Lesaux, 2009) and monolingual populations (Titley et al., 2014). Further, school teams must establish a need for specially designed instruction for every student who meets the definitional criteria for one of the disability categories outlined by IDEIA. This is typically established when a student is underachieving; therefore, teacher ratings on language and literacy appear to be the most pertinent to the special education evaluation process across disability categories. Consequently, it appears reasonable that among teacher ratings included in the analyses, ARS scores emerged consistently as statistically significant.

Predictive Utility of Teacher Ratings and Parent-reported Clinical Diagnoses

Similar to the analyses conducted regarding special education placement, it appears that teacher ratings on language and literacy, approaches to learning, and social skills were generally not predictive of parent-reported learning-related, attention-related, and socio-emotional functioning related diagnoses as demonstrated by model fit data. In addition, similarly to the aforementioned analyses, teacher ratings did not function comparably between the English monolingual and the Spanish bilingual group. For example, no significant predictors were identified for learning-related diagnoses in the bilingual group while teacher ratings on language and literacy were the only significant predictor for the monolingual group. Further, the cognitive flexibility score and teacher-reported externalizing symptoms were the only statistically significant predictors for parent-reported diagnoses in the bilingual group, while sex, teacher-

reported approaches to learning, and teacher-reported externalizing symptoms were deemed statistically significant in the monolingual group.

It is important to highlight the low prevalence rates of parent-reported diagnoses, especially when comparing them to previously established prevalence rates. The DSM-5 (American Psychiatric Association, 2013) provides prevalence rates for a number of disorders included in the MLR equations. Attention-Deficit/Hyperactivity Disorder (ADHD) "occurs in most cultures in about 5% of children" (American Psychiatric Association, 2013, p. 61) with this disorder typically being identified during elementary school. Attention-related disorders, which included ADHD and Attention Deficit Disorder (outdated term), were the most frequently parent-reported disorder (2.2% in the monolingual population and 0.5% in the bilingual population). In other national samples, minority students, including Hispanic populations, were less likely to have an ADHD diagnosis compared to their Caucasian counterparts (Morgan, Staff, Hillemeier, Farkas, & Maczuga, 2013; Pastor & Reuben, 2005). Moreover, the DSM-5 reports that, in Hispanic populations, the clinical identification rates tend to be lower when compared to Caucasian populations (American Psychiatric Association, 2013). Thus, this study's attention-related diagnosis prevalence rate appears to align with previous findings.

Moreover, Specific Learning Disabilities -- one of the disorders included in the learning-related diagnostic category -- typically occurs in 5% to 15% of school-age children across different languages and cultures (American Psychiatric Association, 2013). In this study, less than 1% of Spanish-speaking parents and less than 1% of English-speaking parents reported learning-related diagnoses. In terms of prevalence rate differences across ethnic groups, in another national sample, Hispanic students were as likely as their Caucasian counterparts to have Learning Disabilities with a prevalence rate ranging from 4.3% to 5.6% among ethnic groups

(Pastor & Reuben, 2005). Therefore, it appears learning-related disabilities are underreported in this study's sample. Further, as no socio-emotional functioning diagnosis was reported for the bilingual group and less than 100 cases of such a diagnosis were reported in the monolingual group, it appears that such diagnoses can be underreported or under-diagnosed.

Response to Intervention

Based on the findings of this study, RtI did not emerge as a significant moderator of teacher-reported information. It was hypothesized that teacher information would have greater accuracy or predictive utility, when teachers were in schools that were implementing RtI, given that RtI frameworks require substantial teacher training (Castro-Villareal, Rodriguez, & Moore, 2014). However, research has demonstrated that teachers and other school personnel lack training in the implementation of evidence-based practices, including RtI (Kratochwill, Volpiansky, Clements, & Ball, 2007) and often fail to demonstrate comprehensive knowledge of RtI (Castro-Villareal et al., 2014; Dutton Tillery, Varjas, Meyers, & Collins, 2010; Yarbrough et al., 2019). To date, the published literature has not specifically examined school personnel's knowledge and understanding of evidence-based practices for bilingual students or ELLs.

Moreover, RtI as a unique predictor did not consistently emerge as significant. Results do not reflect the effectiveness of RtI – in the sense that "RtI does not work." Rather, findings likely reflect the implementation issues associated with RtI practices. Fuchs and Fuchs (2017) discuss the results from the first and only national evaluation of RtI conducted in 2010 by Balu and colleagues (2015). In their discussion, they note that 38% of schools that were supposed to be fully implementing RtI did not have a single student in their three tiers, indicating that a high percentage of students in need of more intensive instructions were not receiving appropriate services (Fuchs & Fuchs, 2017). Scholars have also highlighted that data from that evaluation do

not reflect the ineffectiveness of RtI but rather the struggle educators and systems face implementing RtI practices with fidelity (Fuchs & Fuchs, 2017).

Limitations

Although this study is a contribution to the existing literature on non-discriminatory assessment and intervention practices and it increases our understanding of the teacher's role in such practices, several limitations related to the data and study design exist and can be addressed in future research.

Data limitations. Longitudinal data sets often have large amounts of missing data (Acock, 2005) and the ECLSK:2011 is no exception. A substantial number of participants who were assessed at the initial wave were not followed through grade 3. Specifically, it is reported that the relative differences in the unadjusted estimates between kindergarten and third-grade range from 0% to 14.71%, for an average of 3.28% (Tourangeau et al., 2016). Notably, students who were identified as language minority children (including Spanish-speaking bilinguals) based on parent report of home language at base year were all followed (rate of 100%) into grade 3. Consequently, it was expected that for the students of interest there was no significant attrition.

It was suggested that the application of weights to the current analyses would permit the study to generalize to children born in the year 2011 and strengthen the interpretability of the findings; however, applying weights was not feasible, given that the researcher was interested in a specific subgroup and the database sample was reduced. Further, not all of the variables of interest could have been weighted given that the ECLSK:2011 does not provide weight estimates for all variables included in the database. The lack of weights in the analyses can result in reporting standard errors that do not adequately reflect the complex sample design (West, Sakshaug, & Aurelien, 2016) and system-missing data. Further, the lack of weights increases

Type 1 error because SPSS assumes that the data were from a simple random sample and would analyze them accordingly, in effect underestimating the standard errors. Even with the increased probability of Type 1 errors, results from this study failed to demonstrate a strong relationship between teacher ratings and special education outcomes.

Given these limitations, results should be interpreted with caution, and should not be generalized to the population of interest. Instead, the results should be perceived as an initial glimpse into the relation between home language, teacher information, special education placement or reported diagnosis, and intervention early in elementary school in the final sample**.**

Last, due to the use of a pre-existing data set, the measures selected to operationalize the study variables of interest were not always optimal. The ECLS-K:2011 was useful because it was comprised of a large sample of students, including students from different language backgrounds. However, the availability of some information was limited. For example, a relatively small number of items were used to measure socio-emotional functioning, limiting the variability in responses that were provided. Moreover, given that items for the adapted SSRS were not provided due to copyright limitations, psychometric properties of resultant scores could not be estimated for this study's sample.

Design limitations. Although selected based on the previously published research, model goodness of fit tests indicated often poor data fit. Low R^2 values in logistic regression are considered typical and, according to Hosmer and Lemeshow (2000), this can be a problem when reporting their values to an audience familiar with linear regression values.

Implications for Practice

A number of implications emerge from the current study in terms of assessment practices, the role of the teacher, and RtI models. In a sample of teachers that could be considered highly

qualified, teacher ratings of language and literacy, learning-related behaviors, and social skills did not demonstrate predictive utility in terms of special education placement and parent-reported clinical diagnoses. As school psychologists, we rely on teacher information to make educational decisions for students in the referral-to-intervention and the MTSS framework. It is important to consider that a single score should not be used as the sole determinant of a student's eligibility and educational need. School teams need to consider information from multiple sources of data when determining a student's disability and educational need. Moreover, although specific procedures for the interpretation of bilingual assessment results have not been definitely established (Thordardottir et al., 2006), it is important to carefully interpret results from multiple sources and rely on data-based decision-making procedures as suggested by professional best practice standards.

Results reflect the implementation issues associated with RtI practices and are consistent with results from previous evaluation efforts of RtI (Balu et al., 2015; Fuchs & Fuchs, 2017). Considering the literature that has demonstrated that teachers may lack adequate knowledge and understanding of RtI, it appears that school psychologists may be in a good position to support teachers through consultation or professional development (Kratochwill et al. 2007; Powers, Hagans, & Busse, 2008; Vujnovic, Fabiano, Morris, Norman, Hallmark, & Hartley, 2014).

Future Directions and Conclusion

In terms of future research directions, it appears beneficial to consider examining specific RtI and MTSS implementation practices that are appropriate for bilingual students. Further, given the lack of significant evidence for the efficacy of RtI frameworks implemented with bilingual students as well as other culturally and linguistically diverse students, it may be useful

to identify and examine effective core intervention components (Forman et al., 2013) for such student populations.

In terms of statistical analyses, in order to further address research questions as those posed in this project, a number of alternative methods could be considered. First, it may be helpful to dichotomize all teacher information in low scores and high scores in order to further examine the relation between teacher-provided information and selected outcomes. Second, given the low occurrence of special education placement and especially the low occurrence of clinical diagnoses in the sample, it may be useful to consider conducting analyses with zero-inflated models. Such models have been used in social science research when examining infrequent behaviors and include Poisson, negative binomial, zero-inflated Poisson, and zero-inflated negative binomial regression models (Atkins & Gallop, 2007). Last, as the application of weights was not possible, other methods to account for the complex sampling and possible bias in the data can be considered such as raking techniques.

Overall, this study can be considered the first step in examining the relationship between bilingualism, teachers' roles, RtI practices, and special education disabilities. As NASP (2015) states, school psychologists share the responsibility to provide services that consider the needs of bilingual children and families, particularly in light of demographic trends and the current inequity in educational resources and outcomes. By gaining a better understanding of the unique needs of bilingual students and examining the efficacy of the available resources, we can tailor our practices to better serve this population.

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Ph.D., School Psychology, The Pennsylvania State University (APA accredited), University Park, PA, 2019
M. Ed. School Psychology, The Pennsylvania State University, University Park, PA, 2014
Undergraduate Diploma, Psychology, The Aristotle University of Thessaloniki, Thessaloniki, Greece, 2011

PROFESSIONAL POSITIONS

Graduate Assistant, Clearinghouse for Military Family Readiness, University Park, PA, 2013-2017, 2018-2019
School Psychology Clinician, CEDAR Clinic, University Park, PA, 2013-2019
School Psychology Doctoral Intern, Prince George's County Public Schools, Adelphi, MD, 2017-2018

PUBLICATIONS

Michalopoulou, L. E., Welsh, J. A., Perkins, D. F., & Ormsby, L. (2017). Stigma and mental health service utilization in military personnel: A review of the literature. *Military Behavioral Health*, 1-14. doi:10.1080/21635781.2016.1200504

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Michalopoulou, L.E., & Schaefer, B. A. (2015). Reading comprehension among Pontian Greek students from the Former Soviet Union during upper elementary years. *Arizona Working Papers in SLA & Teaching*, *22*, 47-61.

PRESENTATIONS AND POSTERS

Michalopoulou, L. E., (July, 2019). *The moderating role of Response to Intervention in the special education placement of English Learners.* Paper presented at the International School Psychology Association Annual Convention, Basel, Switzerland.

Michalopoulou, L. E., & Schaefer, B. A., (March, 2019). *Special education outcomes for English Learners in schools that implement Response to Intervention.* Poster presented at the annual Graduate Exhibition, University Park, PA.

Michalopoulou, L. E. & Mathison, J. D. (February, 2019). *Making the internship experience successful: Effective supervisory practices.* Paper presented at the NASP Annual Convention, Atlanta, GA.

Michalopoulou, L. E. (January, 2019). *The teachers' role within RtI frameworks tailored to the needs of English Learners*. Paper presented at the 2019 Diversity in Education conference, University Park, PA.

Michalopoulou, L.E., Hawkey, K. R., & Perkins, D. F. (February, 2017). *Alcohol Use Disorder: Clinical tools and implications for school-based practices.* Paper presented at the NASP Annual Convention, San Antonio, TX.

Michalopoulou, L.E., Hawkey, K. R, White, L. D., Welsh, J. A., Perkins D. P. (October, 2016). *Alcohol and Drug Abuse Prevention and Treatment (ADAPT) in the US Air Force*. Poster presented at Research Days at Penn State 2016, University Park, PA.

Michalopoulou, L.E., & Schaefer, B.A. (February, 2015). *Reading Comprehension among minority students in upper elementary Greek school.* Poster presented at the NASP Annual Convention, Orlando, FL.

PROFESSIONAL AFFILIATIONS

American Psychological Association (APA), 2012 - Present
National Association of School Psychologists (NASP), 2013 - Present
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