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RESEARCH ARTICLE

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# Autism spectrum disorder identification in schools: Impact of criteria, assessments, and student data for identification decisions

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## Abstract

Autism spectrum disorder (ASD) is\ often diagnosed by clinical practitioners with criteria from the American Psychiatric Association, but an educational diagnosis is usually based on state special education law and is geared towards addressing concerns within schools. The current study aims to examine the extent to which the clinical diagnosis of ASD corresponds to the educational diagnosis of Autism, and what factors and assessments influenced the diagnosis. Data consisted of 32 randomly selected deidentified initial school evaluation reports (autism = 16; non-autism = 16) from one midwestern state. The reports were coded based on identification methods and student data. Results indicate that the Autism Diagnostic Observation Schedule, Second Edition assessment was the strongest predictor of Autism eligibility within schools, but students with a cognitive ability score that was one standard deviation below the mean (i.e., standard score £84) were more frequently identified with educational eligibility of ASD (AU) by a factor of 14.67 as compared with individuals with a higher cognitive score. Implications for future research and practice are included.

**KEYWORDS**
assessment, autism, special education

  

# 1 | INTRODUCTION

Autism spectrum disorder (ASD) is a developmental disorder that is characterized by deficits in the areas of social communication and restrictive, repetitive patterns of behavior (American Psychiatric Association, 2013; White et al., 2007; Wouters & Spek, 2011). Diagnosing ASD can be an extensive process (Fombonne, 2005; Huerta & Lord, 2012; McMorris et al., 2013; Sansosti et al., 2012). Diagnostic standards like the Diagnostic and Statistical Manual of Mental Disorders: 5thEdition (DSM-5; American Psychiatric Association, 2013) and Individuals with Disabilities Education Act (IDEA; 2004) have helped unify and distinguish Autism from other disabilities (US Department of Education, 2017). However, even with diagnostic and eligibility standards established to create uniformity, there is still debate surrounding the consistency of Autism identification decisions within schools and the best methods to make these decisions, as many variables can affect the decision-making process (Aiello et al., 2017; Luallin, 2020; Worley & Matson, 2012).

## 1.1 | ASD diagnosis across settings: Medical versus special education

ASD identification can vary greatly depending on setting, profession, examiner, and measures used (Matson et al., 2008). The United States Department of Education (2017) estimated that in 2015–2016, roughly 617,000 children received special education services under the IDEA Autism disability category, which was 1.2% of students enrolled in schools and represented a 634% increase since 2000. Thus, 1 in 89 students (Sullivan, 2013) is identified with educational eligibility of ASD (now referred to as AU; Nowell et al., 2015), which is approximately 33% less likely than the prevalence rate of 1 in 59 children who are diagnosed with ASD (ASD now refers to clinical diagnosis only) in clinical settings (Baio et al., 2020; Centers for Disease Control and Prevention CDC, 2018; Hyman et al., 2020). The likelihood that a student will be identified with AU compared to a clinical diagnosis of ASD is less, due to many variables surrounding the educational impact of Autism.

Discrepancies between settings have sparked confusion and debate among clinicians, diagnosticians, school psychologists, and even parents (Fombonne, 2005; Matson et al., 2008; Tincani et al., 2009; Zuckerman et al., 2014). Most notably this stems from the lack of consistency among state definitions and requirements for AU identification within schools (Sullivan, 2013). The DSM-5 serves as the foundation for the clinical diagnostic criteria for Autism, which explicitly states that the symptoms presented must cause clinically significant impairment of everyday functioning (social, occupational, etc.; American Psychiatric Association, 2013). The educational criterion generated from the IDEA operates under the same notion (US Department of Education, 2017). However, there is an important specification that the behavior must adversely affect the student's *educational* performance to receive special education services from the school (Missouri Department of Elementary and Secondary Education, 2019; Noland & Gabriels, 2004).

A total of 36% of children clinically diagnosed with ASD receive special education services under non-Autism eligibility including, but not limited to, Developmental Delay, Other Health Impairment, or Specific Learning Disability (Rubenstein et al., 2018). Characteristics of a clinical ASD diagnosis do not always adversely impact a child's ability to succeed in school as some students do not exhibit externalizing behaviors, deficits in academic areas or difficulties to create and maintain appropriate relationships (Barnard-Brak, 2019). Within schools, the process of identifying and examining a student for AU typically is not initiated unless it is affecting the student's performance in the educational setting (Wilkinson, 2010).

## 1.2 | Identification methods

Eligibility decisions in schools should be made from a specialized, multidisciplinary evaluation team and follow set criteria formulated at a district level. Criteria for all eligibility categories can vary from district to district but all should follow their respective state's guidelines (Safer-Lichtenstein & McIntyre, 2020). Information to help develop

state AU criterin comes from a variety of sources, like the DSM-5, but have to meet the national standards under IDEA (Nowell et al., 2015). As long as federal and state guidelines are met, districts can adapt eligibility processes based on their population and governing body.

### 1.2.1 | IDEA, state, and district criteria

IDEA is the primary classification and eligibility tool that is used within an educational setting. However, each state develops the IDEA criteria further to provide a more detailed classification model, with school districts specifying the assessment and evaluation procedures in further detail (Wilkinson, 2010). This lack of cohesion across states and districts can muddle the educational diagnosis of AU and can also make it difficult to examine the differences between criteria across settings (Sullivan, 2013). Additionally, students who move could potentially lose their eligibility because they either no longer meet new district and/or state qualification criteria or because the eligibility procedures vary vastly (MacFarlane & Kanaya, 2009; Mandell & Palmer, 2005). School decision-makers are also not required to have the same clinical expertise of ASD as clinicians do, but often rely on ASD screening measures to make AU decisions (Matson et al., 2007; Safer-Lichtenstein & McIntyre, 2020). All of these variables combined can make the AU eligibility process confusing and prompt evaluators not to follow recommended best practices (Aiello et al., 2017).

IDEA requires that there are observable deficits in a student's communication and sociability that impact their educational performance (US Department of Education, 2017). This slightly differs from the DSM-5 which requires the presence of behavioral concerns in addition to communication and socialization concerns (Safer-Lichtenstein & McIntyre, 2020). Minimal research has been conducted on the convergence of these different criteria and their impact on the prevalence of identification. However, it is repeatedly noted throughout research that a clinical diagnosis of ASD does not indicate special education eligibility of AU (Barnard-Brak, 2019; Sullivan, 2013).

## 1.3 | Factors that affect identification

Many factors influence how criteria are interpreted, ASD is diagnosed medically, and AU is identified within the educational setting. These variables include demographic variables (i.e., sex and age), criterion-based variables (i.e., language skil and autism assessment), and commonly utilized eligibility assessments (i.e., cognitive assessments).

### 1.3.1 | Student demographics

*Age*

An ASD diagnosis can occur in children as young as 2 (Matson et al., 2008), but it is more common for children to be diagnosed when they become of school age, roughly around 4–6 years old (Mandell et al., 2007; Shattuck et al., 2009). Age of identification can also vary vastly based on race, geographical location, presentation/severity of delays, and socioeconomic status, which too can have an impact on treatment outcomes (Brett et al., 2016; Hyman et al., 2020). This is important because timely identification is essential to establishing the proper academic and behavioral supports for students (McMorris et al., 2013; Randall et al., 2018; Zuckerman et al., 2016).

*Sex/gender*

Differences in sex/gender and ASD/AU identification has been at the forefront of autism research because males are more likely than females to be diagnosed (McFayden et al., 2018). Males are four times (4:1) more likely to receive the diagnosis than their female counterparts (Begeer et al., 2013; Solomon et al., 2012). There are numerous proposed explanations for this discrepancy, but the two primary arguments are the child's presentation of

symptoms, also referred to as the child's phenotypic profile, and later identification for females. Females are observed to be underreported on measures of restricted interests and repetitive behaviors by parents, clinicians, and teachers (Evans et al., 2019; Holtman et al., 2007; McFayden et al., 2018) because referred males have a broader range of interests, predominantly object-related, and referred females have a narrower focus of interest pertaining to more socially related topics (Harrop et al., 2018; Kopp & Gillberg, 2011; McFayden et al., 2018). Across age cohorts, females presented with a 2.3-year (*SD* = 4.4) delay between onset of concerns and diagnosis as compared with 1.9 years in males (*SD* = 3.5; Begeer et al., 2013). The median age of identification was also found to be statistically significant, with females being identified at 6.1 years of age and males at 5.6 years of age (Shattuck et al., 2009).

*Race and ethnicity*

Many cultural considerations should be accounted for when evaluating for Autism in both the medical and school-based setting that could impact eligibility determination. Race has led to misdiagnosis and disproportionality in the diagnosis of autism (Fombonne, 2005; Harris et al., 2014). Mandell et al. (2007) found that Black students were 2.6 times *less* likely than White children to be accurately diagnosed when parental concerns were brought to a medical specialist for the first time. The underdiagnosis and/or differential diagnosis of ASD is also seen in the Hispanic community and is arguably more prominent than any other minority group as Hispanic children are on average diagnosed at 8 years old, compared to their White peers at 6 years old (Mandell et al., 2002). In a recent study of prevalence between the clinical and educational settings, Barnard-Brak (2019) again found that Black students were underrepresented within the school setting. While the proportion of the total primarily aligned for other ethnicities, Black students' proportionality was skewed as they accounted for approximately 25% of clinical diagnoses and only approximately 15% of educational qualification, representing a negatively skewed distribution (Barnard-Brak, 2019).

### 1.3.2 | Autism assessments

The Model for Assessing Autism proposed by Bradley-Johnson et al. (2008) uses a three-level assessment model (Figure 1) to help (a) verify educational AU eligibility, (b) guide a response to intervention (RTI) approach to help organize individualized instruction and progress monitoring, and (c) emphasize the importance of a multidisciplinary approach to assessment. The model advances from more subjective assessments to specific-objective ones so that information garnered from the first and second level of assessment (record reviews and interviews, rating scales) can drive the assessment selection at the third level (direct assessment; Bradley-Johnson et al., 2008). The model and components from Levels 2 and 3 are described below.

*Level 2: Behavior*

Observations of behavior across settings are a primary component of many educational evaluation decision-making processes (Aiello et al., 2017), and are especially important within Level 2 of the Bradley-Johnson et al. (2008) model for AU identification. Behavioral rating scales can be used to assess behavior for students referred for AU (Bradstreet et al., 2017), and can help identify the educational impact and socio-emotional concerns. Maladaptive behaviors are a common component of Autism, with individuals displaying externalizing behaviors (i.e., tantrums, aggression, and self-injurious), decreased emotional/adaptive regulation, as well as mounting internalizing concerns (i.e., depression and anxiety; Park et al., 2012; Rodas et al., 2017; Samson et al., 2015), all of which can be assessed with commonly used behavioral rating scales (Duley, 2020). The Behavior Assessment System for Children, third edition (BASC-3; Reynolds & Kamphaus, 2015) is frequently highlighted as a multidimensional rating scale that can aid in the screening process for AU and is already a commonly utilized assessment tool in many school systems (Bradstreet et al., 2017; Duley, 2020; Gardner et al., 2018). These broadband rating scales can help identify behavioral concerns and/or social deficits that are frequently associated with autism symptomology.

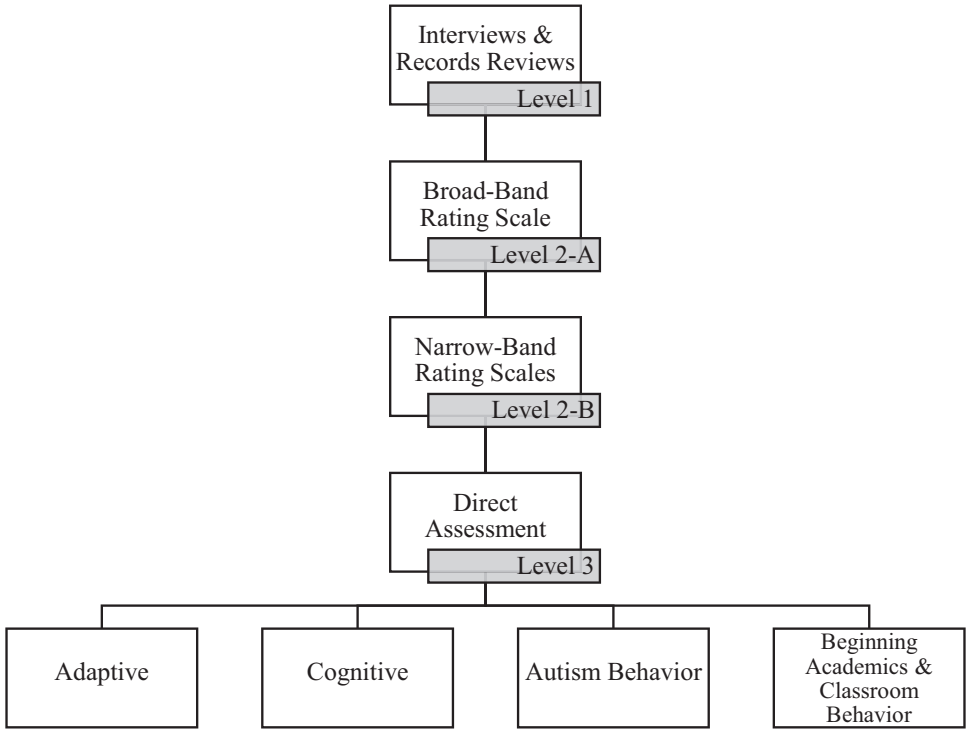


**FIGURE 1** Model for assessing autism (based on Bradley-Johnson et al., 2008)

*Level 3: Language*

Delays in receptive and expressive language are a common indicator in students with Autism and a core identification area in AU eligibility (communication; IDEA, 2017; Nordahl-Hansen et al., 2014). A delay in communication is often one of the first concerns identified by parents that prompts an ASD referral (Fombonne, 2005). Receptive and expressive language is the ability to understand and use language within social communication (Rodas et al., 2017), and students clinically diagnosed with ASD fell an average of 1.5–2 *SD* below the mean compared to same-age peers in both receptive and expressive language areas (Kwok et al., 2015). Language and communication delays can also have a trickle-down effect on other educational concerns like behavioral and learning outcomes (Nevill et al., 2019; Park et al., 2012; Rodas et al., 2017). Thus, verbal and non-verbal communication are frequently assessed when an individual is suspected of ASD or AU (Prelock & Nelson, 2012).

### 1.3.3 | Level 3: Autism assessment tools

Within the clinical and educational setting, no assessment on its own can appropriately identify an individual with Autism. However, there are a few assessments that help clinicians assess the severity of symptoms and estimate alignment to diagnostic criteria. The "gold standard" (Kamp-Becker et al., 2018, p. 1193) for this within the clinical and school-based assessment is the Autism Diagnostic Observation Schedule – Second Edition (ADOS-2; Lord et al., 2012). The ADOS-2 has gained tremendous traction in school identification because the assessment has high specificity and sensitivity in appropriately identifying areas of deficit and discriminating between ASD and non-ASD (Luallin, 2020). Although many school districts do not require the ADOS-2 to be a part of the evaluation process, it is strongly encouraged since it is one of the only standardized, evidence-based assessment observational tools for

identifying AU (Aiello et al., 2017). The ADOS-2 has a series of four modules that can be selected based on the level of language skill a student possesses as well as their chronological age. It assesses behavioral aspects pertaining to restricted and repetitive behavior (RRB), as well as social affect (SA), and a score is derived and coded to represent if a student has no Autism symptoms, is on the Autism spectrum, or has Autism (Lord et al., 2012).

Additional evidence-based tools commonly utilized within the ASD/AU process are assessments or rating scales completed by parent/guardian and/or teacher. Examples of these rating scales include the *Gilliam Autism Rating Scale* (GARS; Gilliam, 2014), the *Social Communication Questionnaire* (SCQ; Rutter et al., 2003), the *Social Responsiveness Scale* (SRS; Constantino & Gruber, 2012), and the *Autism Spectrum Rating Scale* (ASRS; Goldstein & Naglieri, 2009). Little research has been conducted on the convergent validity of these assessment tools and the ADOS-2, but rating scales can provide valuable information when attempting to differentiate those individuals with Autism and those without (Luallin, 2020). Although evidence-based assessment tools can aid AU identification, they are not consistently used in school settings as part of the eligibility process due to limited access to resources (i.e. many assessment tools are costly) and trained personnel (Aiello et al., 2017; Klose et al., 2012).

*Level 3: Intelligence*

IQ has played a predominant role in the eligibility process within schools and while not required for AU identification, data from IQ assessments can provide information for different eligibilities like cognitive impairment and specific learning disability (Bradley-Johnson et al., 2008). A common misconception of individuals identified with ASD or eligible under AU is that they must also have an intellectual disability, characterized by having an IQ of < 70 (Charman et al., 2011). While the appearance of a diminished IQ may increase the chances for early identification within the school and clinical settings, IQ is extremely variable across students identified with Autism (Brett et al., 2016; Shattuck et al., 2009).

### 1.4 | Current study

The current study builds upon research regarding the educational assessment of AU and the impact of certain demographic information on the identification of ASD, while also examining Level 3 assessments (Bradley-Johnson et al., 2008). The research was guided by the following questions:

1. To what extent do assessment data affect AU eligibility decision?
2. To what extent do demographic data affect AU eligibility decision?

## 2 | METHODS

The present study analyzed data that were obtained from 32 initial AU evaluations (16 were identified as AU and 16 were not). The data were taken from the evaluation reports (ERs) that were written to summarize the assessment data that were used to determine an AU identification.

### 2.1 | Sample

Data were taken from 32 initial ERs that were obtained from one midwestern special education school district (SESD). The SESD supports 265 schools from 22 school districts by providing special education personnel (e.g., teachers and school psychologists) and overseeing special education processes (e.g., eligibility decisions). The initial ERs for educational eligibility of AU were selected on the following criteria: the students within the initial evaluation

for AU (a) were between the ages of 5–9 during the 2018–2019 and 2019–2020 school year, and (b) possessed demographic data including age, race, and sex/gender.

The resulting sample consisted of 32 student reports (75% male), with 18.75% in preschool ($n = 6$), 37.50% in kindergarten ($n = 12$), 18.75% in first grade ($n = 6$), 12.5% in second grade ($n = 4$), 9.38% in third grade ($n = 3$), and 3.13% in fourth grade ($n = 1$). The racial breakdown was 90.63% White ($n = 29$), 6.25% Black ($n = 2$), and 3.13% Asian American ($n = 1$). The number of suspected eligibilities were also collected, with only 37.50% being suspected of only AU ($n = 12$), 40.63% with two suspected eligibilities ($n = 13$), 12.50% with 3 ($n = 4$), and 9.37% with 4 or more ($n = 3$). Medical diagnoses for students were also noted. The distribution of medical diagnoses was 28.13% had no specified medical diagnoses ($n = 6$), 15.63% had a medical diagnosis of ASD ($n = 5$), 25.00% had a medical diagnosis of ASD and a comorbid and/or additional diagnosis (i.e., attention deficit/hyperactivity disorder, anxiety, language disorder; $n = 8$), and 31.25% had a medical diagnosis(es) that did not include ASD ($n = 10$).

## 2.2 | Measures

Data were collected solely from the initial ERs provided, except for race, which was data provided by the SESD. The measures that were used to address the research questions assessed language, Autism symptomology/stereotypic behavior, behavior, and cognitive functioning. There were multiple measures used for each area, all of which are described below and displayed in Table 1. Because assessment selection may vary based on student, suspected eligibility, and school psychologist, all assessments conducted were recorded. Each assessment name and score type was recorded.

### 2.2.1 | Language

Language consisted of six different measures: *Clinical Evaluation of Language Fundamentals - Fifth Edition* (CELF-5; $n = 18$), *Social Language Development Test* (SLDT; $n = 4$), *Preschool Language Scales - Fifth Edition* (PLS – 5; $n = 3$), *Social Responsiveness Scale – Second Edition* (SRS-2; $n = 3$), *Behavior Assessment System for Children – Third Edition* (BASC-3; $n = 2$), and the *Receptive, Expressive, and Social Communication Assessment – Elementary* (RESCA-E; $n = 2$). While a majority of the language assessments were derived from direct language testing, two measures utilized subtest scores: the SRS-2 and the BASC-3. As both of these measures were rating scales, if the measure had multiple raters, the mean of the teachers' rating scores was utilized. For the SRS-2, the Social Communication subscale score was selected as it assesses reciprocal communication. For the BASC, the subscale Functional Communication served as the student's language score because it represents a student's ability to appropriately communicate and respond (Iarocci et al., 2017).

The test-retest reliability coefficients for the BASC-3 are high enough ($\alpha = 0.77–0.91$) to support using the data for disability identification (Dever & Gaier, 2020). Research suggests that both direct testing (i.e., CELF-5) and parent/teaching rating scales (i.e., SRS-2) can be utilized for assessing receptive and expressive language in students with suspected AU (Nordahl-Hansen et al., 2014). Data consisted of an age-based standard score with a mean of 100 and a standard deviation of 15. If the test used a different scale, then it was first converted to a standard score metric and entered into the data set.

## 2.3 | Autism assessment

Autism assessments were comprised of two different measures, the *Autism Diagnostic Observation Schedule – Second Edition* (ADOS-2; $n = 25$) and the SRS-2 ($n = 7$). These two measures are considered two of the top assessments to assess Autism symptomology, with the ADOS-2 being considered the “gold standard” (Kwok et al., 2015).

**TABLE 1** Assessments used within the autism (AU) evaluation reports

| Test | Age | Reliability* | Skills measured | Score |
|---|---|---|---|---|
| Language | | | | |
| CELF | 5 to 21 | 0.84–0.89 | Non-verbal communication skills, semantics, morphology, syntax, in oral and written language[2] | Age-based Standard Score (SS) |
| SLDT | 6 to 11:11 | 0.79 | Inferences, interpret social language, problem-solving, social interactions, and interpreting ironic statements | Age-based SS |
| PLS-5 | Birth to 7:11 | 0.86–0.95 | Expressive (E) and receptive (R) language skills through auditory comprehension and expressive communication scales | Age-based SS |
| RESCA-E | 5 to 12 | 0.93–0.99 | E, R, and social language development | Age-based SS |
| SRS-2 | 2:06 to 18 | 0.88–0.95 | R language and communication | T-Score |
| BASC-3 | 6 to 11 | 0.87 (0.77–0.91) | Express and communicate thoughts/ideas | T-Score |
| AU Assessment | | | | |
| ADOS-2 | 1 to Adult | 0.68–0.92 | Social Affect, Restricted and Repetitive Behaviors (RRB) | Cut-off Scores |
| SRS-2 | 2:06 to 18 | 0.88–0.95 | Social awareness, social cognition, social communication, social motivation, RRB, and interests | T-Score |
| Behavior | | | | |
| BASC-3 | 6 to 11 | 0.90–0.95 | Internalizing, externalizing, hyperactivity, aggression, and depression | T-Score |
| BRIEF-2 | 5 to 18 | 0.76–0.90 | Inhibit, self-monitor, shift, emotional control, initiate, working memory, plan/organize, task-monitor, organization of materials, task completion | T-Score |
| SRS-2 | 2:06 to 8 | 0.88–0.95 | Social awareness, social cognition, social communication, social motivation, RRB | T-Score |
| GARS-3 | 3 to 22 | >0.90 | RRB, social interaction, social communication, emotional responses, cognitive style, maladaptive speech | T-Score |
| Cognitive | | | | |
| KABC-II NU | 3 to 18 | 0.82–0.90 | Cognitive development | Age-based SS |

**TABLE 1** (Continued)

| Test | Age | Reliability* | Skills measured | Score |
|---|---|---|---|---|
| WISC-V | 6 to 16:11 | 0.69–0.91 | Cognitive development | Age-based SS |
| WPPSI-IV | 2:6 to 7:7 | 0.85–0.96 | Cognitive development | Age-based SS |

Abbreviations: Autism Diagnostic Observation Schedule – Second Edition (Lord et al., 2012); BRIEF-2, Behavior Rating Inventory of Executive Functioning – Second Edition (Gioia et al., 2015); CELF-5, Clinical Evaluation of Language Fundamentals - Fifth Edition (Wiig et al., 2013); CEFI, Comprehensive Executive Functioning Inventory (Naglieri & Goldstein, 2014); GARS-3, Gilliam Autism Rating Scale – Third Edition (Gilliam, 2013); KABC-II NU, Kaufman Assessment Battery for Children – Second Edition (Kaufman et al., 2018); PLS-5, Preschool Language Scales – Fifth Edition (Zimmerman et al., 2011); SLDT, Social Language Development Test (Bowers et al., 2008); Social Responsiveness Scale – Second Edition (Constantino & Gruber, 2012); SS, standard score; WPPSI-IV, Wechsler Preschool & Primary Scale of Intelligence – Fourth Edition (Wechsler, 2012); WISC-V, Wechsler Intelligence Scales for Children: Fifth Edition (Wechsler, 2014).

*All reliability estimates are taken from the respective test manuals.

Minimal research has been conducted on the convergent validity of these two assessments, but the screening utility of the teacher report adds significantly to the accuracy of the ADOS (Duvekot et al., 2015). For the ADOS-2 score, the module administered to the student was noted.

The ADOS-2 scoring procedure utilizes coding as a way to represent observational data. The code uses a range that went from 0 = behavior is not present, 1 = behavior is present but not severe, 2 = behavior is present and meets specific criteria, 3 = behavior is present and interferes with daily functioning, 7 = abnormality but not type specified, 8 = not applicable, and 9 = not known. Those data are then totaled converted into a classification score 0 – Non-spectrum, 1 – ASD, 2 – Autism. To put the SRS-2 and the ADOS-2 on the same scale, the Social Affect score, Restricted and Repetitive Behavior score were all converted on the same three-point classification score as the total score utilizing the calibrated severity score and ADOS Classifications (Gotham et al., 2009; Has et al., 2014). Raw scores, based on Module and age were translated into calibrated severity scores. Scores 1–3 were then coded as 0 (non-spectrum), scores 4–5 were coded as 1 (ASD), and scores 6–10 were coded as 2 (Autism). The SRS-2 has predefined ranges of severity: ≤ 59 is within normal limits, 60–65 is a mild range, 66–75 is a moderate range, and ≥ 76 is a severe range (Constantino & Gruber, 2012). These bounds were translated into classification scores that aligned with ADOS-2 classifications. As the ADOS-2 is on a 3-point scale, the mild and moderate ranges were combined to represent the score of 1 (ASD) to put the SRS-2 on the same 3-point scale. The same was applied to the Restricted Interest and Repetitive Behavior subscale, as well as the Social Communication subscale.

### 2.3.1 | Behavior

The Behavior variable consisted of five different measures, BASC-3 (Behavioral Symptom Index; $n = 24$), SRS-2 ($n = 3$), *Behavior Rating Inventory of Executive Functioning – Second Edition* (BRIEF-2; $n = 2$), *Gilliam Autism Rating Scale – Third Edition* (GARS-3; $n = 2$), and *Comprehensive Executive Functioning Inventory* (CEFI; $n = 1$). The inter-rater reliability of these assessments ranged from 0.76 to 0.95. No research has been conducted on the convergent validity of these assessments. All rating scale measures utilized teacher report only; if multiple teachers completed the rating scale the mean score of the ratings was recorded. Parent report data was not included as parent rating scales were not collected from each participant. The data consisted of an age-based standard score for the BASC-3 which had a mean of 50 and a standard deviation of 10. If the test used a different scale, then it was first converted to a standard score metric and entered into the data set.

### 2.3.2 | Cognitive

Three measures were used to assess cognitive functioning, *Kaufman Assessment Battery for Children – Second Edition Normative Update* (KABC-II NU; $n = 16$), *Wechsler Intelligence Scale for Children – Fifth Edition* (WISC-V; $n = 6$), and the *Wechsler Preschool & Primary Scale of Intelligence – Fourth Edition* (WPPSI-IV; $n = 5$). Test-retest reliability for the FSIQ of the cognitive assessments ranged from 0.69 to 0.96. Data were recorded as the age-based standard score, with a mean of 100 and a standard deviation of 15. Students, where cognitive assessments were started but could not be completed because of limited adaptive skills, were given the lowest score possible for the assessment. Only two scores reported utilizing the non-verbal index of the assessment.

## 2.4 | Coding

Each deidentified ER that met the inclusion criteria was reviewed and coded to align with categories formulated by the research questions. Each coding procedure is described below.

### 2.4.1 | Demographic information

Age, grade, sex/gender, suspected eligibilities, previous eligibility decisions, current eligibility decision, and medical diagnoses were recorded and coded accordingly. Sex/gender (female = 0, male = 1) was not always explicitly identified and therefore the pronouns utilized throughout the ER informed the sex/gender of the student. Suspected eligibilities were coded by count and the suspected eligibility names were also recorded. The same process applied to previous eligibility decisions. The current eligibility decision was coded twice: (1) as AU or Non/AU and (2) as the eligibility outcome (i.e., does not qualify, Other Health Impairment, Multiple Disabilities, etc.). Medical diagnoses were coded into four categories *none* (0), *ASD* (1), *ASD and more* (2), *others excluding ASD* (3).

## 2.5 | Procedures

To examine the academic diagnostic criteria of the initial AU ERs, access to these reports was provided by SESD. Potential initial ERs to be included in the study were identified with an electronic search using three fields, (a) new AU identification ($n = 480$), AU suspected but different disability identified ($n = 171$), and AU suspected but no disability identified ($n = 45$). The latter two categories were then combined to create a non-AU category ($n = 216$). A total of 75 students from both categories ($n = 150$) were randomly selected to be asked to participate in this study by SESD.

The study used pre-existing data, which was approved by IRB as an exempt study and by the SESD research department. Upon receiving approval, SESD personnel mailed a research request informed consent form and a SESD invitation to participate in a research letter to each guardian's address as indicated within the SESD system. After a limited response was received, the second round of consent was sent to the participant pool via email. A total of 32 (21.3%) consents were received, 81.25% by mail ($n = 26$) and 18.75% by email ($n = 6$). Half ($n = 16$) of the ER consents received were for students who did not meet the criteria for eligibility under AU.

Once informed consent was received, a member of the SESD team deidentified the ERs and placed an evaluation ID number at the top of the report, as well as the eligibility decision (AU or Non-AU). No deidentified ERs were allowed to leave the premises of SESD, therefore all coding occurred at SESD offices. The researcher reviewed each ER and entered the assessment data from it into a Microsoft Excel spreadsheet under the respective category (Language, Autism Assessment, Behavior, and Cognitive). Only standardized assessment data were collected. All other supplemental data (behavior observations, informal speech, and/or occupational therapy assessments) within the ER were reviewed by the researcher but not collected as part of this study.

## 2.6 | Data analysis

To address Research Question 1, "To what extent do assessment data included in the ER affect AU eligibility decisions?" a logistic regression was used to examine the predictive power of each assessment domain. The dependent variable indicated AU or non-AU eligibility; if a student qualified under AU then it would be equal to 1 and if not, then the response would be 0. Additional odds ratio analyses were conducted to examine how each assessment would predict the eligibility decision.

There was limited diversity within the sample, which made it difficult to address the second research question, "To what extent do demographic data included in the ER affect the AU eligibility decision?" Therefore, an odds ratio was computed and reported as a preliminary analysis to examine how each demographic information would predict the eligibility decision.

## 3 | RESULTS

A breakdown for the overall sample with individuals eligible under AU criteria and individuals not eligible under AU students is shown in Table 2. Just over two-thirds (68.75%) of the students identified with AU were male, although males accounted for 75% of the sample. The sample disproportionally consisted of white students (90.63%) and contained a majority of students from preschool and kindergarten (56.25%). On average, students entered the evaluation with approximately two suspected eligibility areas ($M = 1.97$; $SD = 1.03$). Thirteen students (40.63%) of the sample had a clinical diagnosis of ASD before their educational evaluation. Of those 13 students, 8 met AU eligibility criteria, which accounts for 50% of the total number ($n = 16$) of students who qualified for AU.

**TABLE 2** Descriptive statistics for the sample and students identified with autism (AU) and non-AU

| | | | | | AU | | Non-AU | |
|---|---|---|---|---|---|---|---|---|
| | *N* | % | M | *SD* | *n* = 16 | % | *n* = 16 | % |
| Age | | | 5:8 | 1.3 | | | | |
| Sex/gender | | | | | | | | |
| Male | 24 | 75 | | | 11 | 68.75 | 13 | 81.25 |
| Female | 8 | 25 | | | 5 | 31.25 | 3 | 18.75 |
| Race/Ethnicity | | | | | | | | |
| White | 29 | 90.63 | | | 15 | 93.75 | 14 | 87.5 |
| Black | 2 | 6.25 | | | 1 | 6.25 | 1 | 6.25 |
| Asian | 1 | 3.13 | | | | | 1 | 6.25 |
| Grade | | | | | | | | |
| Preschool | 6 | 18.75 | | | 6 | 37.5 | | |
| Kindergarten | 12 | 37.5 | | | 7 | 43.75 | 5 | 31.25 |
| First | 6 | 18.75 | | | | | 6 | 37.5 |
| Second | 4 | 12.5 | | | 1 | 6.25 | 3 | 18.75 |
| Third | 3 | 9.38 | | | 1 | 6.25 | 2 | 12.5 |
| Fourth | 1 | 3.13 | | | 1 | 6.25 | | |
| Suspected disabilities | | | 1.97 | 1.03 | | | | |
| Autism diagnosis | 13 | 40.63 | 0.41 | 0.5 | 8 | 50.00 | 5 | 31.25 |
| Language Score | | | 78.62 | 17.4 | | | | |
| Autism assessment Score | | | 1.03 | 0.97 | | | | |
| Behavior Score | | | 68.97 | 11.95 | | | | |
| Cognitive Score | | | 85.62 | 26.49 | | | | |

### 3.1 | Question 1: Predicting AU status-Assessments

A logistic regression analysis was conducted to determine the extent to which assessment results included in the ER affect the AU eligibility decision. The dependent variable in each model was the eligibility decision outcome (*Eligible AU* = 1, *Non-Eligible AU* = 0). Each model included vaWeschlerrying blocks based on the eligibility relevant independent variables. The results of the models are shown in Table 3.

The results indicated that language was a significant predictor of student AU identification ($B = -0.068$, $p < .05$, $r^2 = 0.29$). Model 2 added the Autism assessment score, which was a significant predictor of AU identification ($B = 1.602$, $p < .001$, $r^2 = 0.58$), but the language score was no longer significant ($B = -0.039$, $p > .05$). The significance of the Autism assessment score maintained when adding in the behavior and cognitive scores ($B = 1.519$, $p < .05$), despite the language ($B = -0.078$, $p > .05$), behavior ($B = 0.116$, $p > .05$), and cognitive scores ($B = -0.035$, $p > .05$) not being significantly associated with AU identification.

Overall, the student's language score accounted for a large amount of variance (0.29) in the identification of AU. As the models were built, so did the explanatory power demonstrated through Nagelkerke's pseudo $r^2$. Adding in Autism assessment scores increased the pseudo $r^2$ to 0.58, which increased further to 0.68 after adding in the behavioral and cognitive scores.

Additional logistic analyses were conducted on the individual assessment areas within the ER to determine the odds of AU qualification based on the type of assessment as shown in Table 4. Each score was dichotomized as either a 1 or a 0 based on severity. For language scores, scores 1 *SD* below the mean (≤ 84) were coded as a 1, and scores above were coded as 0. A score of 1 signified a language concern. A language score 1 *SD* below the mean was not a significant predictor of AU identification ($B = 1.299$, $p > .05$) with the odds of a student who scored 1 *SD* below the mean qualifying for AU are higher by a factor of 3.667 compared to individuals who scored ≥ 85 on the language assessment (95% confidence interval [CI]: 0.849–15.844).

The Autism assessment maintained a significant predictor ($B = 2.565$, $p < .05$). Scores in this assessment were recoded into binary terms. Scores indicated as 1 if the assessment score was 2 (indicating *Autism*), and 0 if the assessment score was either 1 (*ASD*) or 0 (*non-spectrum*). The odds of students who were identified through the Autism diagnostic assessments as displaying traits for Autism (i.e., scoring a 2), qualifying for AU are higher by a factor of 13 compared with individuals who did not (95% CI: 2.398–70.461). Additionally, a student's cognitive score was also a significant predictor of AU eligibility when examined alone ($B = 2.686$, $p < .05$). Scores 1 *SD* below the mean (≤ 84) were coded as 1, and scores ≥ 85 were coded as 0. The odds of students who had a cognitive score ≤ 84 being identified as AU are higher by a factor of 14.67 compared with individuals with a higher cognitive score.

**TABLE 3** Logistic regression of autism assessment data ($N = 32$)

| Variable | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | *B* | *SE* | *B* | *SE* | *B* | *SE* |
| Constant | 5.357* | 2.221 | 1.423 | 2.903 | 0.246 | 4.848 |
| Language Score | −0.068* | 0.028 | −0.039 | 0.034 | −0.078 | 0.059 |
| Autism Assessment Score | | | 1.602* | 0.560 | 1.519* | 0.719 |
| Behavioral Score | | | | | 0.116 | 0.087 |
| Cognitive Score | | | | | −0.035 | 0.048 |
| Chi-Square $X^2$ | 7.97 | | 18.33* | | 18.45* | |
| Nagelkerke's psuedo $r^2$ | 0.29 | | 0.58 | | 0.68 | |

*Note*: SE, standard error.

*$p < .05$

**TABLE 4** Odds ratios for scores and demographic information from the autism identification evaluations ($N = 32$)

| Variable | *B* | *SE* | OR | 95% CI | $X^2$ | $r^2$ |
|---|---|---|---|---|---|---|
| Language Score | 1.23 | 0.75 | 3.67 | 0.85–15.84 | 3.19 | 0.13 |
| Autism Assessment Score | 2.57* | 0.86 | 13.00* | 2.40–70.46 | 10.80* | 0.38 |
| Behavioral Score | 0.76 | 0.72 | 2.14 | 0.52–8.81 | 1.14 | 0.04 |
| Cognitive Score | 2.69* | 1.18 | 14.67* | 1.46–146.95 | 7.54* | 0.34 |
| Grade | 2.26* | 0.84 | 9.53* | 1.85–49.20 | 8.54* | 0.31 |
| Sex/gender | −0.68 | 0.84 | 0.51 | 0.10–2.62 | 0.67 | 0.03 |
| Clinical autism diagnosis | 0.70 | 0.74 | 2.20 | 0.52–9.30 | 1.17 | 0.05 |
| Previously qualified | 1.98* | 0.82 | 7.22* | 1.44–36.22 | 6.62* | 0.25 |

Abbreviations: CI, confidence interval; OR, odds ratio.

*$p < .05$.

## 3.2 | Question 2: Predicting AU status – Demographic information

Due to the limited sample size, logistic regression analyses were conducted only on individual demographic variables to determine if the variables played a role in qualifying for AU. All variables were put on a binary scale to run these analyses. Grade was separated by early identification, around the clinical mean age of identification of 6, where students in preschool and kindergarten were coded as first and second grade and up were coded as 0. Sex/gender remained on the same binary scale (F = 0, M = 1). Students with a clinical diagnosis of ASD were coded as 1 and students who did not have a clinical diagnosis of ASD were coded as 0. If a student had previous educational eligibility of Young Child with a Developmental Delay (YCDD) in the area of Communication, they were coded as a 1, and if they did not, then they were coded as a 0 because communication is a primary concern with AU identification (Binger & Light, 2008; Nordahl-Hansen et al., 2014).

The logistic regressions indicated that grade ($B = 2.26$, $p < .05$) and previous eligibility ($B = 1.977$, $p < .05$) were significant predictors of AU identification as seen in Table 4. Students in preschool or kindergarten were identified as AU by a factor of 9.53 (95% CI: 1.85–49.20) more than older students, and students who were previously eligible for YCDD in the area of communication were identified as AU by a factor of 7.22 (95% CI: 1.44–36.22) more than those with no previous eligibility or eligibilities in other areas. Sex/gender and clinical diagnosis of ASD was not significant demographic predictor of AU identification.

# 4 | DISCUSSION

The primary focus of the current study was to identify factors that contribute to AU identification decisions within schools based on assessment data as well as demographic information. The study utilized 32 initial evaluation reports for students referred for educational support in the area of Autism (AU) to examine factors within the evaluation report (ER) that would likely contribute to meeting AU eligibility.

Results indicated that the language scores of students were a significant predictor of AU identification when not accounting for other variables. However, when language score was placed on a binary scale, where scores were separated by severity, language was no longer a significant predictor of AU, and language was no longer a significant

predictor when other data were included in the model. This finding is important to note as communication is such a strong focal point of AU identification as indicated through State criteria (Missouri Department of Elementary and Secondary Education, 2019). However, previous research suggests that a comprehensive evidence-based assessment practice within schools should focus on (1) autism-specific assessments, (2) intelligence, (3) adaptive functioning, and (4) social-emotional/behavioral functioning to provide a full picture of a student's educational concerns and best target supports (Aiello et al., 2017).

Autism assessment measures were also examined as a part of the assessment model. Results showed that the Autism assessment was the variable that was most indicative of a student being identified as AU when accounting for language scores, IQ assessments, and behavior scores. Students who were rated high on the Autism assessments were 13 times more likely to be identified as AU than students who did not display as many symptoms. While this result may not come as a surprise, it demonstrates a reliance on Autism assessments within schools. The ADOS is frequently recommended within school settings because it is considered a validated, evidence-based, standardized observational tool (National Research Council, 2001). However, the current results are consistent with previous research that suggested that school psychologists rely almost solely on Autism assessments for identification decisions (Aiello et al., 2017; Pearson, 2008; Singer, 2008). Although the DSM-5 and IDEA do not require an ADOS score, many agencies are beginning to require it as part of the evaluation plan, and some argue that data produced by this assessment is no longer being utilized properly in conjunction with multiple sources of information (Gwynette et al., 2019). The potential overemphasis on Autism assessment data, particularly with regard to the ADOS, appears to be an area in need of additional research.

A student's cognitive score did not significantly impact the likelihood of qualifying for AU, but a student's cognitive score was a significant predictor when considered independently. Students who scored 1 *SD* below the mean on a cognitive assessment were 14.67 times more likely to be identified as AU. Cognitive assessments are not a required component for AU evaluations (Bradley-Johnson, 2008), but are utilized within the evaluation process and are seen as evidence-based assessments (Aiello et al., 2017). This finding is also consistent with the literature in suggesting that students with lower functioning cognitive profiles might be identified as AU more readily within school sites (Brett et al., 2016). It is also worth noting that most of the cognitive assessments were Weschler scales, but cognitive assessments for students suspected of AU should not require language (Aiello et al., 2017; Bradley-Johnson et al., 2008).

Despite having a limited sample size, the results indicated two significant findings that reemphasized the importance of early identification within school sites (McMorris et al., 2013; Randall et al., 2018; Zuckerman et al., 2016). Students in preschool and kindergarten were 9.53 times more likely to receive an educational diagnosis of AU than their older peers. Students who displayed lower cognitive functioning were also *not* identified as having a cognitive impairment but were more likely to be identified as AU. This aligns with the historical trends and the decrease in the assumption that to receive an educational diagnosis of AU, students also must be identified with cognitive impairment (Cardinal et al., 2021; Polyak et al., 2015; Rubenstein et al., 2018). Additionally, students who came into the evaluation with previous eligibility in YCDD – Communication were 7.22 times more likely to be identified as AU.

## 4.1 | Limitations

Several limitations emerged while conducting this study and should be acknowledged. Most predominately was the limited sample size within the study. The sample for this study relied on parental consent to review extant data. Due to the limited number of consents received, there was limited representation among minority students within the sample. For instance, the randomly selected recruitment pool ($n = 150$) that were mailed letters to participate in research, was comprised of 55.3% white students ($n = 83$), 34.7% Black students ($n = 52$), 4.7% Hispanic students ($n = 7$), 3.3% Multiracial students ($n = 5$), and 2% Asian students. The sample that was garnered from the pool of

potential participants did not represent the potential pool because it was comprised of 90.63% ($n = 29$) White students. Additionally, the limited sample size posed a problem with the number of variables being examined within the study. In studies with small sample sizes, odds ratios are overestimated within logistic regression models (Nemes et al., 2009). Larger sample size would limit the amount of bias within the results, as well as allow for more blocks within the multiple logistic regression analysis to account for demographic variables.

Another limitation to this study was the wide variety of assessments utilized within the ERs. As symptomology presentation in individuals with suspected AU varies greatly, it is no surprise that so did the assessments utilized within the identification process (McMorris et al., 2013). There is also limited research on the convergent validity of the assessments highlighted under the various domains presented within this study. To conduct the analyses, it was assumed that while these assessments fell under similar categories within the ER, they measured similar symptomology. Additionally, there is little research assessments and their reliability and validity when working with students with suspected AU, which opens up the door to the use of a variety of assessments that may not be best suited for addressing the concerns of a student with suspected AU (Aiello et al., 2017; Cardinal et al., 2021; Luallin, 2020). Furthermore, there are not many pragmatic language assessments that are available, which increases the dependency on the ADOS for language, as well as highlights the need for Level 1 information (Bradley-Johnson, 2008).

Lastly, non-standardized observation data was also not utilized within this study because of the numerous observations collected, varying observers, and settings. However, it should be noted that per federal and state guidelines it was collected across settings for all students in the sample. Within AU eligibility decisions, this qualitative data is extremely important in making eligibility decisions (Bradley-Johnson, 2008; Klose et al., 2012).

### 4.2 | Directions for future research and implications for practice

The present study should be expanded upon to include larger sample size and among different age groups to better address the research questions, particularly on the predictive power of demographic information on AU identification. Autism research in school is minimal, especially concerning the convergent validity of assessments and the selection of assessment tools based on best practices. Federal law, states, and districts provide minimal guidance on specific assessment tools and procedures for AU (Klose et al., 2012). Future studies could examine the extent to which the measures utilized underneath each specific domain (language, Autism assessments, behavior, cognitive) measure specific constructs relating to individuals with AU.

The emphasis on Autism assessment measures, like the ADOS, highlights a need for a better understanding of the training procedures that school psychologists and other individuals involved within the evaluation processes undergo. The ADOS is a highly subjective measure that requires extensive training and is often not taught in school psychology graduate programs (Harris et al., 2020; Kamp-Becker et al., 2018). Additionally, there is a lack of qualified individuals who can implement these assessments within school-based settings (Gottlieb, 2020). The heavy reliance on these measures, coupled with the subjectivity and specialized training required, typically beyond graduate school training, demonstrates why future research should examine the training procedures of the implementors, number of qualified assessors per district, and additional qualitative ER data to see if Autism assessment scores continue to be the strongest predictor of AU qualification.

## 5 | CONCLUSION

Autism identification and diagnostic processes are designed to be multi-faceted and multi-disciplinary; this process should not rely on singular assessment data to make eligibility decisions (Huerta & Lord, 2012). This study found that AU identification decisions were highly predicted by Autism assessment tools like the ADOS or the SRS, which

further suggested an overreliance on these tools in making identification decisions (Aiello et al., 2017; Gwynette et al., 2019). Additionally, students with lower cognitive functioning on IQ assessments were more likely to be identified with AU. While this finding is important to acknowledge, it is imperative to address that, cognitive assessments should not be a determinant in AU or ASD eligibility as the cognitive profiles of students with Autism vary vastly (Brett et al., 2016).

While Autism and the diagnostic and eligibility process of Autism varies greatly based on criteria, assessor, state, and setting, gaining a better understanding of the variables that could impact the decision-making process is crucial for training purposes as well as mitigating diagnostic bias. The results from this study highlight the complexities associated with diagnosing ASD and AU. These complexities highlight the confusion that is experienced by many practitioners and parents with understanding the correlation and discord between a diagnosis of ASD and an AU eligibility. While the special education disability identification process relies on many more components besides the use of evidence-based assessments, like observations, parent and teacher reports, social history, etc., more research is needed to better unify assessment selection and the identification process across districts and states.

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