Misdiagnosis and Missed Diagnosis of Twice-Exceptional Students: Examining Current

Psychoeducational Assessment Practices

by

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Abstract

Twice-exceptional (2e) is a term used to identify students who are identified with dual diagnoses of giftedness and some type of learning challenge which qualifies them for special education programs, such as attention deficits and learning disabilities. 2e students are often overlooked in schools. In the present study, 19 existing psychoeducational assessment reports were reviewed to determine current assessment practices, particularly as they pertain to gifted and 2e students, and examine whether these practices are accurate at identifying students' needs or special education categories. I also explored whether current practices are in alignment with recommended best practices. This study was designed to serve as a pilot study for future research on factors related to the identification of 2e students.

Keywords: gifted, twice-exceptional, assessment

Preface

This thesis is an original work by Kathryn Jelly. The research project, of which this thesis

is a part, received research ethics approval from the University of Alberta Research Ethics

Board, Project Name "Psychoeducational Assessment of Twice-Exceptional Students: A Review

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Table of Contents

List of Tables

List of Figures

Misdiagnosis and Missed Diagnosis of Twice-Exceptional Students: Examining Current

Psychoeducational Assessment Practices

Twice-exceptional (2e) students—those who are both gifted and face some kind of learning challenge—are often overlooked in schools. Identification of students who would benefit from alternative programming or extra supports in school is typically done in one of two ways: (a) screening within schools; or (b) private psychoeducational assessments. Typically, assessments for giftedness and neurodevelopmental disorders (e.g., learning disorder, attention-deficit/hyperactivity disorder, autism spectrum disorder) are mutually exclusive. Therefore, students are unlikely to receive comprehensive assessments considering both giftedness and learning challenges simultaneously. Despite a growing body of research regarding twice-exceptionality, the under-identification of this population remains an ongoing issue in the practice of school and clinical child psychology (Gilman et al., 2013; Morrison & Rizza, 2007). There is, currently, no agreed upon way for assessing and identifying 2e students consistently and accurately. To further complicate the issue, assessment processes vary depending on the referral question and, in some cases, the school authority. For example, in Alberta, each school board is responsible for establishing its own process for identifying giftedness, and there is little to no transparency from boards about their processes (Government of Alberta, 2021). A contributing factor in the variable practice across the province is the fact that Alberta's Standards for Special Education are outdated, with the most recent amendment published in 2004. Furthermore, the Standards for Psychoeducational Assessment referenced in the Standards for Special Education are from 1995. As a result, these standards fail to address recent developments in research and understanding of students with diverse needs, thus creating an additional barrier

to the proper identification of 2e students. Clearly, considerable work needs to be done to bring some clarity to the identification of 2e students.

The purpose of the current study is to review existing psychoeducational assessment reports of students to determine current assessment and identification practices for 2e students. Specifically, this study will aim to address whether current psychoeducational assessment practices are accurate at identifying students' needs or special education categories (e.g., what proportion of students meet the criteria for their identified group vs. another group?). Current practices will also be compared to recommended best practices.

Defining Twice-Exceptionality

Twice-exceptional (2e) is a term used to identify students who are identified with dual diagnoses of giftedness and some type of learning challenge which qualifies them for special education programs, such as attention deficits and learning disabilities. Students with cognitive disabilities are excluded from this definition (Reis et al., 2014). For example, a student diagnosed with a specific learning disability in math who has also been identified as gifted would be labelled 2e. Mills and Brody (1999) contend that the three main indicators of twice-exceptionality are:

- evidence of profound talent or ability;
- evidence of a discrepancy between expected and actual outcomes; and
- evidence of a processing deficit.

They go on to state, "appropriate diagnosis, therefore, requires understanding of how these characteristics are witnessed in student behaviour and designing a plan that incorporates best practices" (Mills & Brody, 1999, p. 59).

Difficulties in Assessing and Identifying Twice-Exceptionality

Although the concept of dual exceptionalities is not necessarily new, lack of consensus regarding the definition of 2e coupled with a limited understanding of the 2e population's needs and characteristics have led to difficulties in the proper identification of 2e students. A study by Foley-Nicpon et al. (2013) found that a majority of participants, consisting of educators and psychologists, were familiar with the concept of twice-exceptionality but argued that the variation in identification practices for giftedness and learning disabilities may be contributing to the under-identification of 2e students.

The complex presentation of twice-exceptionality also contributes to challenges in accurately assessing and identifying 2e students. To properly identify 2e students, it is essential for the assessor to understand how co-morbid exceptionalities affect one another. 2e students may not display the same characteristics as their gifted non-disabled or disabled non-gifted peers (Reis et al., 2014). In some instances, 2e students may present with greater intensity of aspects related to both giftedness and/or their comorbid learning challenge. For example, 2e students with attention-deficit/hyperactivity disorder (ADHD) may have greater difficulty shifting focus or inhibiting certain behaviours than peers with ADHD who are not 2e and typically-developing peers. Another complexity that presents with twice-exceptionality is trait inhibition, wherein a student's giftedness may mask their learning challenges or vice-versa, resulting in misdiagnosis or underdiagnosis of comorbid conditions (Reis et al., 2014).

Gilman and colleagues (2013) suggest that current special education policies in the United States, which focus on low performance on achievement-based assessments, are contributing to the under-identification of 2e students. While it is difficult to determine if regional or provincial policies in Canada result in a similar issue, concern regarding some

provinces' (e.g., Alberta) outdated standards for special education and psychoeducational assessment is warranted when considering barriers to appropriate assessment and identification of 2e students.

Importance of Accurate Identification

Existing studies on the effects of dual diagnoses indicate that this population has distinct social, emotional, and cognitive traits that are not found within either gifted or learning-disabled populations alone (Reis et al., 2014). Many of these differences are related to traits such as decreased motivation and self-efficacy and increased presentation of disruptive behaviours and emotional disturbances. Many 2e students struggle with anxiety, requiring high social and emotional support (Baum et al., 2014; Reis et al., 2014). These challenges negatively influence school engagement, often resulting in high dropout rates and poor performance for 2e students (Baum et al., 2014). According to Bengoechea et al. (2019), a high level of student engagement prevents dropping out, leads to better grades, can be a protective factor against suicidal behaviours, decreases participation in violent/risky behaviour, and is related to lower rates of depression and substance abuse; thus, highlighting the importance of effective identification practices to ensure student's needs are met and appropriate interventions are implemented.

According to Baum and colleagues (2014), past research shows that 2e students are more likely to receive deficit-based services in school rather than gifted programming. In addition, exceptionalities are often addressed separately in educational settings rather than considering the student's profile as a whole. From a positive psychology lens, focusing only on students' deficits does not allow for a comprehensive understanding of a student's potential and leads to a loss of achievement. In cases where 2e students are placed in gifted and talented programs, they are unlikely to receive the necessary accommodations to address their areas of challenge, which

creates barriers to their ability to access sufficiently challenging curriculum and benefit from an appropriate instructional level (Baum et al., 2014; Schultz, 2012).

Current Practices in Psychoeducational Assessment

The Canadian Psychological Association (n.d.) defines psychoeducational assessment as a process that involves "assess[ing] the cognitive, academic, social, emotional, and behavioural functioning of children and adolescents using observations, interviewing, and standardized tests," providing a diagnosis and recommendations, and communicating the results to the student, parents, and any other relevant professionals such as teachers or multidisciplinary team members.

There is limited information publicly available about what practices are being employed locally at this time; however, some insights can be gleaned from the results of a survey conducted by Benson and colleagues (2019) on test use and assessment practices of school psychologists in the United States. They found that the most common referral concerns were for suspected specific learning disabilities (25%), followed by ADHD (18%) and ASD (10%). According to the results of this survey, only 3% of referrals are for gifted and talented students (Benson et al., 2019). The most commonly used measures were found to be the Weschler Intelligence Scale for Children – Fifth Edition (WISC-V) and the Behaviour Assessment System for Children – Third Edition (BASC-3) parent and teacher rating scales. Developmental history interviews ranked next on the list, followed by academic achievement measures. Curriculum-based measures were more popular than standardized batteries like the Kaufman Test of Educational Achievement or the Wechsler Individual Achievement Test – Third Edition (WIAT-III). Responses indicated that narrow-band measures for specific disorders and structured interviews may be under-utilized by school psychologists (Benson et al., 2019).

Farmer and colleagues (2021) found that many school psychologists continue to implement questionable assessment practices even when negative research evidence emerges. Some proposed reasons for this are that academic textbooks often fail to keep up to date with peer-reviewed literature and that clinical practices are passed down by generations of clinicians through "clinical lore" (Farmer et al., 2021). Silverman and Gilman (2019) argue that despite being less accurate, school boards often use group ability tests rather than individually administered assessments as a means of cutting costs. The use of group testing is suggested as a contributing factor to the underrepresentation of students from diverse backgrounds, including racial minorities, students with lower socioeconomic status, and 2e students (Silverman & Gilman, 2019). The authors further go on to explain that school boards often impose strict cut-off scores to determine eligibility for special education programming. Doing so fails to account for the standard error of measurement and is another contributing factor to the underrepresentation of students from diverse backgrounds (Silverman & Gilman, 2019).

Best Practices in Psychoeducational Assessment

Gifted Assessment

According to Valler et al. (2017), the most endorsed tests for identifying giftedness are the Kaufman Assessment Battery for Children-Second Edition, Stanford-Binet Intelligence Scales, Fifth Edition, and the Wechsler Intelligence Scales for Children, Fourth and/or Fifth Editions. Traditionally, IQ scores that are at least two standard deviations above the mean are considered to reflect giftedness. Valler and colleagues (2017) surveyed fourteen authors of leading tests used in the assessment of giftedness. Most authors in this study did not endorse the use of cutoff scores as the sole means of identifying gifted students. Furthermore, most authors

responded that gifted assessment should never rely on only one test and suggest that gifted students should be re-assessed every two to four years (Valler et al., 2017).

The National Association for Gifted Children (NAGC) in the United States published a position statement on the use of the WISC-V for gifted and 2e identification (2018). In this, they argue that the use of the full-scale IQ (FSIQ) score results in the under-identification of gifted students. This is because gifted children often present with significant score discrepancies. Research has found that gifted children typically exhibit higher scores on indexes that measure abstract reasoning than on those that measure processing speed (Silverman & Gilman, 2019). The NAGC (2018) proposed that examiners should examine individual patterns of strengths and weaknesses and use supplementary subtests and ancillary scores to identify giftedness.

Assessment of Learning Challenges

Previous research has demonstrated that there is a great deal of variation and inconsistency in how learning disabilities are assessed (Foley-Nicpon, 2013; Ruban & Reis, 2005). However, trends in the literature seem to suggest that disorders such as Specific learning disabilities and ADHD are typically identified in schools through response to intervention (RTI) or psychoeducational assessments. With respect to RTI, students who are performing below average are provided tiered intervention in multiple areas. If no improvements are seen or if the student does not improve to grade-level expectations, they are referred for psychoeducational testing. Ideally, these assessments should be comprehensive in nature; however, Gilman and colleagues (2013) suggest that assessments often focus only on the area of suspected disability.

Learning disabilities are typically indicated by a score that is at least one standard deviation below the mean on standardized achievement tests (Maddocks, 2018). Some professionals use the ability-achievement discrepancy model, which requires students to exhibit

significantly lower achievement than expected, given their cognitive ability (Maki & Adams, 2019). Another commonly used model is the pattern of strengths and weaknesses (PSW) model. There are multiple approaches to using the PSW model, but, in essence, this model requires students to exhibit a cognitive deficit that theoretically aligns with an achievement deficit (Maki & Adams, 2019). However, both the ability-achievement and PSW models have failed to demonstrate treatment validity and may not result in consistent identification of learning disabilities (Maki & Adams, 2019). The use of a hybrid model of identification that includes RTI, comprehensive assessment, and ruling out of additional factors can address some of the psychometric weaknesses present in existing models (Fletcher & Miciak, 2018).

Some neurodevelopmental disorders, such as ASD and ADHD, require comprehensive assessments done by specialists to be accurately diagnosed (Gilman et al., 2013). Clinicians must rule out medical and psychiatric conditions that could account for presenting symptoms. Features of other disorders, such as anxiety and depression, overlap significantly with features of ADHD especially. However, the underlying cause for the symptoms differs and thus would require different treatments (Sparrow & Erhardt, 2014). This further highlights the need for comprehensive assessment practices when attempting to identify the source of learning challenges.

Suggested Assessment Practices for Identification of 2e Students

While there is currently no consensus regarding best practices for the reliable and valid identification of 2e students, there are suggestions in the literature regarding how to improve existing practices. Silverman and Gilman (2019) advocate for use of both quantitative and qualitative assessment measures as well as multiple identification pathways to address the underrepresentation of diverse students. In particular, they argue that multiple criteria are

'needed for children whose actual abilities are higher than their IQ scores' (Silverman & Gilman, 2019, p. 1572). Studies by both Gilman et al. (2013) and Maddocks (2018) conclude that 2e students are best identified by analyzing patterns of strengths and weaknesses determined through comprehensive assessments and argue for the use of an intra-individual approach to this analysis. That is, rather than comparing assessment scores to the norms of average children, practitioners should look to the discrepancy in the individuals' strong and weak scores. This is in line with the NAGC's (2018) position statement on the use of the WISC-V for gifted and 2e identification. Dynamic assessment, which focuses on learning processes as opposed to static scores, has also shown some promise in improving the identification of 2e students (Al-Hroub, 2021).

In summary, 2e students are often misdiagnosed or missed altogether in the current education system due to their complex presentation and outdated or inconsistent assessment and identification procedures. The current study used existing research as a framework to guide the review of current psychoeducational assessment processes and aimed to provide preliminary findings to guide future research into the creation of effective standardized assessment measures and test batteries to improve reliability and validity in the assessment and identification of 2e students.

Methods

This study was conducted between May 2022 and April 2023. I reviewed existing psychoeducational assessment reports to determine current assessment practices, particularly as they pertain to gifted and 2e students, and examine whether these practices are accurate at identifying students' needs or special education categories. I also explored whether current

practices are in alignment with recommended best practices. Based on existing literature, the following hypotheses were formulated:

1. Misidentification or mismatched school placements will be highest among the 2e group.

2. Current assessment practices will not align with suggested assessment practices for the identification of 2e students but will align with best practices for either gifted assessment and/or assessment of learning challenges.

Participants

Students in grades one through nine who had a psychoeducational assessment done within the last six years were recruited to participate in this study. This timeframe was chosen to align with the Alberta Education requirement for updated psychoeducational assessments to be done every four years for schools to receive special education funding for identified students while accounting for service delays due to the COVID-19 pandemic. While this study was primarily concerned with determining current assessment and identification practices pertaining to 2e students, a comprehensive sample was recruited to allow for the inclusion of students who were potentially misidentified or missed altogether. Two school authorities were identified for student recruitment. Namely, a charter school for gifted students (School One) and a private school for 2e students (School Two).

A total of 73 consent forms were returned for this study. Of these students, 44 reports were not provided by the sample schools, nine did not meet the inclusion criteria for the study, and one report did not provide sufficient information. Thus, a total of 19 participants are included in our analyses (age range: 4:2 to 12:2, $M = 7:0$, $SD = 2:6$, 16% female).

Inclusion Criteria

      School One requires a cognitive assessment for admission and uses an FSIQ score of 120+ as the cut-off score for student eligibility. School Two serves students of average to superior intelligence who have extraordinary potential and/or achievement in one or more areas but are challenged by academic, attentional, and/or social challenges. Examples of challenges faced by students at school two are learning disabilities, ADHD, anxiety/depression, Tourette's Syndrome, and ASD. School Two does not use specific cut-off scores to determine student eligibility. In addition to the school criteria, students were required to fit the criteria of one of the following groups to be eligible for participation in this study.

1. Twice-exceptional: Students who have been identified as both gifted and as facing some kind of learning challenge described in the "learning challenged" group.

2. Gifted: Students who have been identified as having an FSIQ of 120+ and have no co-existing diagnoses of a learning challenge.

3. Learning challenged: Students with an average FSIQ (90-109) who have been diagnosed with a learning disability, ADHD, Tourette syndrome, ASD, or mental health disorder.

4. Typical with assessment history: Students who do not have any formal diagnoses and who have not been identified as gifted but have had a recent psychoeducational assessment.

      Students with intellectual disabilities were not eligible to participate in the study. Students with physical disabilities were only eligible to participate in the study if they met the criteria for one of the defined groups and were not eligible based solely on their disability status.

Procedures

Ethical approval for this study was obtained from the University of Alberta Research Ethics Board 2 (REB 2; Pro00116160). Following approval from the University of Alberta REB 2, ethics approval was also sought from the other two school authorities that participants will be recruited from in alignment with their policies and procedures surrounding research ethics and approval.

Participation in this study did not require any direct contact or involvement with the research team beyond the initial consent procedures. Schools and families who agreed to participate in the study were required to give the researcher access to students' files. Principals who were interested in the study were asked to share an information letter with an overview of the study with parents and guardians of their students. This letter invited interested families to contact the researcher to participate in the study. Interested participants who contacted the researcher were given the opportunity to obtain further information about the study and clarify any questions they had. All participants were informed of their right to withdraw their participation at any time during data collection without penalty. Participants were also given the option to indicate whether they would like to receive a copy of the results of the study once it is completed. Informed consent was obtained from the primary caregiver(s) of each participant as this study includes children as participants, including children with special needs.

Using information from the student's school files, participants were assigned to one of four possible groups based on their special education code(s) and program type. The groups are the same as the groups described in the 'participants' section above. Students with a special education code of 80 were initially placed in the 'gifted' group, students with a special education code of 80 in combination with a secondary code were initially placed in the '2e' group, and

students with any other special education code were initially placed in the 'learning challenged' group. All students in this study had at least one special education code; thus, no participants were initially placed in the 'typical with assessment history' group.

Once initial groups were determined, the researcher reviewed each student's most recent psychoeducational assessment report. Information collected from these reports included tests and procedures used, the age of the student at the time of assessment, test scores and variance in scores, and any relevant qualitative information provided by the psychologist who wrote the report, such as referral reason and source, background information, and diagnostic impressions.

Following the review of the psychoeducational assessment reports, students were reassigned to groups based on their assessment results. Mills and Brody's (1999) conceptualization of 2e will be used as 'diagnostic' criteria for the 2e group as there are no criteria in the *Diagnostic and Statistical Manual of Mental Disorders Fifth Edition, Text Revision* (DSM-5-TR; American Psychological Association, 2022) for this group. DSM-5-TR criteria and assessment cut-off scores were used for the other groups. The researcher then compared students' initial group assignments to their reassigned groups to address the question of whether current psychoeducational assessment practices are accurate at identifying students. A second coder also reviewed the raw data and group assignments to enhance internal validity.

Data Analysis

As a result of the small sample size in this study, much of the data analysis relied on data visualization and descriptive statistics. The first hypothesis was analyzed using a combination of descriptive and inferential statistics. Descriptive data, such as group assignments and differences, are presented using visuals and percentages or frequencies. Interrater reliability for group assignments was also calculated. A series of Fisher-Freeman-Halton exact tests were used to

determine whether there was a relationship between group assignments and differences. Diagnostic accuracy was also examined by calculating sensitivity and specificity. The second hypothesis was analyzed by coding qualitative information about the tests and procedures used in each assessment. Once all information from the reports was coded, descriptive statistics were calculated and compared to the recommended best practices outlined in the existing literature.

Results

Accuracy of Group Placements

Prior to reviewing the assessment reports, ten students were assigned to the 2e group, five students assigned to the gifted group, and four students assigned to the learning challenged group based on their existing special education codes. Following the review of the assessment reports, the 2e group consisted of eight students, the gifted group consisted of seven students, and the learning challenged group consisted of five students. In total, four students were reassigned to different groups after a review of the assessment reports. Three 2e students were reassigned to different groups – one to the learning challenged group and two to the gifted group. One gifted student was reassigned to the 2e group. No learning challenged students were reassigned to a different group. No students were assigned to the typical group at any time during this study, likely due to the nature of the sample schools used. A second coder also reviewed the raw data and group assignments. Interrater reliability was calculated to be 78.9%.

Figure 1

Group Assignments Before and After Review of Assessment Reports
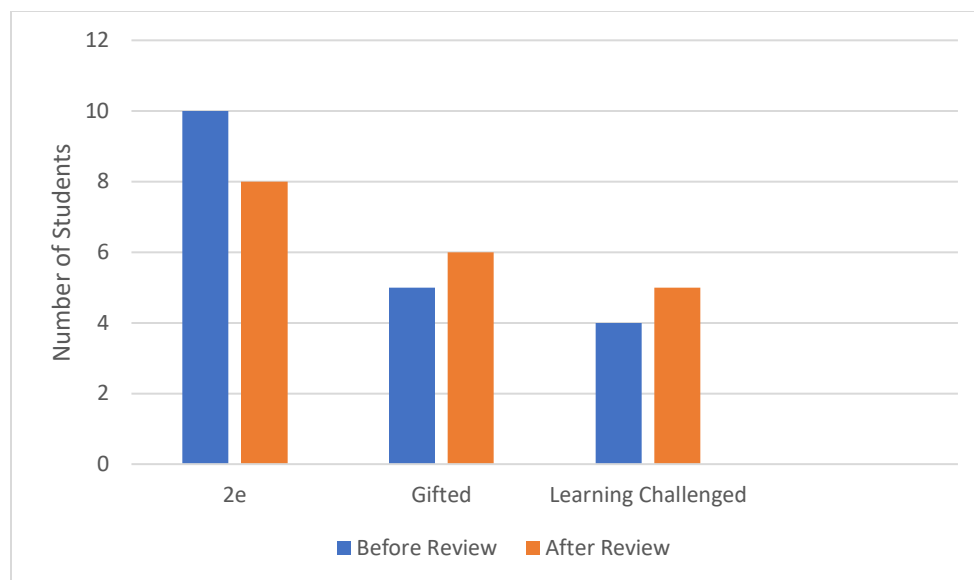
Table 1

Sensitivity, Specificity, and Diagnostic Accuracy by Reassigned Groups

Group	Sensitivity (%)	Specificity (%)	Diagnostic accuracy (%)
2e	87.5	72.7	78.9
Gifted	66.7	92.3	84.2
Learning challenged	80.0	100.0	94.7

Diagnostic accuracy was examined by calculating sensitivity and specificity for each group. Sensitivity refers to the ability to accurately identify cases within a group (i.e., true positives). Specificity refers to the ability to accurately identify cases that do not belong to a group (i.e., true negatives). In general, a diagnostic accuracy of 80% is adequate. The sensitivity among the 2e group was 87.5%, and the specificity was 72.7%. The overall diagnostic accuracy among the 2e group was 78.9%. The sensitivity among the gifted group was 66.7%, and the specificity was 92.3%. The overall diagnostic accuracy among the gifted group was 84.2%. The sensitivity among the learning challenged group was 80.0%, and the specificity was 100%. The

overall diagnostic accuracy among the learning challenged group was 94.7%. This provides

some support for the hypothesis that misidentification would be highest among the 2e group, as

this group had the lowest diagnostic accuracy.

The results of the first Fisher-Freeman-Halton exact test ($p < .001$) indicated a significant

relationship between initial group assignments and post-review group assignments. A second

Fisher-Freeman-Halton exact test ($p = .783$) indicated that there was not a significant relationship

between post-review group assignments and whether students had been reassigned. Thus, the

data does not support the hypothesis that group reassignment would be highest among the 2e

group.

Table 2

Education Programs and Percent of Students in Each Group

Program	2e group		Gifted group		Learning challenged group	
	Initial	Reassigned	Initial	Reassigned	Initial	Reassigned
2e program	50%	37%	0.0%	0.0%	50%	62.5%
Gifted program	55%	45%	45%	55%	0.0%	0.0%

A total of eight students in this study were enrolled in an educational program for 2e

students, and 11 students were enrolled in an educational program for gifted students. Based on

their special education codes, four of the eight students from the 2e program were assigned to the

2e group, and 4 were assigned to the learning challenged group. After reviewing the assessment

reports, three of the eight students were assigned to the 2e group, and 5 were assigned to the

learning challenged group. Of the 11 students enrolled in the gifted program, five were initially

assigned to the gifted group based on their special education codes, and six were assigned to the

2e group. Following the review of the assessment reports, five of the 11 students were assigned to the 2e group, and six were assigned to the gifted group. In total, nine out of the 19 students in this study (47%) were identified as being enrolled in an educational program that matched their identified group. The data does not support the hypothesis that mismatched school placements would be highest among the 2e group, as 100% of the students identified as learning challenged were not in an appropriate educational program. However, the data does indicate that mismatched school placements were higher among the 2e group (62.5%) than the gifted group (14%).

Evaluation of Current Practices

Figure 2

Percent of Referrals by Referral Reason
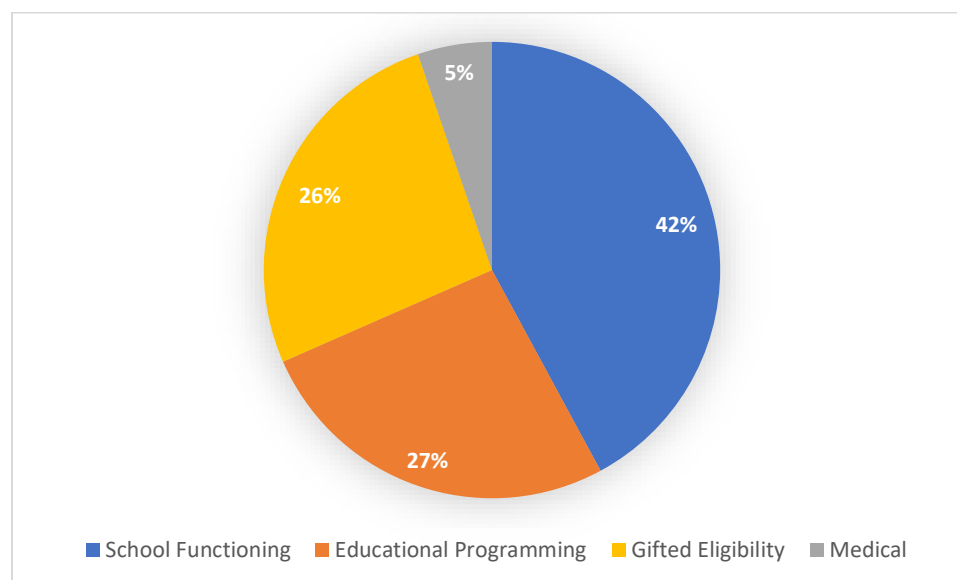
Among the 19 assessment reports reviewed, four referral categories were identified. "Gifted eligibility" refers to referral reasons which explicitly stated that the purpose of the assessment was to either determine eligibility for specialized gifted programming or to better understand possible gifted profiles. These referrals made up 26% of the sample. "Educational

programming" refers to referral reasons which mentioned determining appropriate programming for reasons other than giftedness. These referrals made up 27% of the sample. "School functioning" referrals, which made up 42% of the sample, consisted of assessments which were sought due to concerns about school functioning or to get updated information about functioning without reference to educational programming. "Medical" refers to an assessment referral which was made by medical staff through a child psychiatry program. Due to the uniqueness of this referral, the report was not included in the analysis of current practices. There were no referrals specifically seeking to identify twice-exceptionality. Assessments were comprehensive if they included at least one measure each for cognitive functioning, academic achievement, and social-emotional/behavioural functioning (Benson et al., 2019).

Table 3

Summary of Descriptive Statistics by Referral Reason

Referral reason	Mean age (year: months)	Mean # of measures used	% of comprehensive assessments
Gifted eligibility	4:8	1.8	20
Educational programming	7:3	3.8	20
School functioning	8:4	4.25	37.5
Twice-exceptional	7:11	4.4	25

Gifted Eligibility

The gifted eligibility referrals reviewed in this study were for children ranging from the ages of three years, nine months to six years, 10 months. The mean age was four years, eight months. 100% of these referrals were initiated by parents. None of the children in this group had

pre-existing diagnoses at the time of their assessments, according to the assessment reports. Background information was reported in 60% of these reports. In all cases, this information came from parent interviews. One (20%) assessment included a record review in combination with a parent interview to collect background information.

Given the young age of these children, the most used assessment measure was the Wechsler Preschool and Primary Scale of Intelligence – Fourth Edition (WPPSI-IV). The WPPSI-IV is used to assess cognitive functioning in children aged two years and six months to seven years and seven months. The WISC-V, which is used to assess cognitive functioning in children aged six years to 16 years and 11 months, was the only other cognitive measure used among the gifted eligibility referrals. No other standardized assessment measures beyond the WPPSI-IV were used in the assessments for children in this group under the age of six years. Five standardized measures were used in the assessment of the six-year, 10-month-old, including the WISC-V, WIAT-III, BASC-3, Conners-3 Rating Scale, and the Autism Spectrum Rating Scales (ASRS). Both parent and teacher ratings were obtained on the Conners-3 and ASRS.

Educational Programming

Educational programming referrals reviewed in this study were for children aged four years, five months to 12 years, two months. The mean age was seven years, three months. 60% of these referrals were initiated by parents, and 40% were initiated by the student's current school. According to the assessment reports, 40% of the children in this referral group had pre-existing diagnoses of a learning challenge, while 60% had no previous diagnosis. Background information was reported in 100% of these reports, with 60% citing parent interviews as their only source of background information and 40% including file reviews and school questionnaires in addition to parent interviews.

The mean number of standardized measures used in these referrals was 3.8. The greatest number of measures used was 10, and the fewest was one. 40% of these assessments used the WISC-V as their measure of cognitive functioning, 40% used the WPPSI-IV, and 20% used the Woodcock-Johnson Tests of Cognitive Abilities – Fourth Edition (WJ-IV-COG). 40% of these assessments did not include a measure of academic achievement, 40% used the Woodcock-Johnson Tests of Achievement – Fourth Edition (WJ-IV-ACH), and 20% used the WIAT-III. 40% of these assessments included a measure of social, emotional, and behavioural functioning. In all cases, the BASC-3 was used, with both parent and teacher ratings being obtained. The Adaptive Behaviour Assessment System – Third Edition (ABAS-3) was also used in one assessment (20%). In the assessment which used 10 standardized measures, checklists for specific disorders, a test of visual-motor integration, and numerous auditory and visual memory tests were administered.

School Functioning

The school functioning referrals reviewed in this study were for children ranging from the ages of five years, 10 months to 11 years, seven months. The mean age was eight years, four months. 62.5% of these referrals were initiated by schools, and 37.5% were initiated by parents. 62.5% of the children in this group had a pre-existing diagnosis of a learning challenge, 12.5% had previously been identified as gifted, and 25% had no previous identification or diagnosis listed in their report. Background information was reported in 100% of these reports. 100% of reports cited file review as a source of background information. In addition to this, 87.5% used parent interviews, 37.5% used teacher interviews, and 25% used classroom observations. At least two sources of background information were used in each report.

The number of standardized measures used in these assessments ranged from one to seven, with a mean of 4.25. 62.5% of these assessments used the WISC-V to assess cognitive functioning, 12.5% used the Stanford-Binet Intelligence Scales, Fifth Edition, and 25% did not include a measure of cognitive functioning. To measure academic achievement, 50% of the assessments used the WIAT-III, and 25% used the WJ-IV-ACH. The remaining 25% did not include a measure of academic achievement. 28.5% of the school functioning assessments included the Beery-Buktenica Developmental Test of Visual-Motor Integration – Sixth Edition (Beery VMI). Other performance measures used included the Test of Written Language – Fourth Edition, the Test of Variables of Attention, and the CNS Vital Signs Continuous Performance Test. 75% of the assessments included a measure of social, emotional, and behavioural functioning. The BASC-3 was used in 83% of these cases. 80% obtained ratings from both parents and teachers and 20% obtained only a parent rating. 20% obtained a self-report rating in addition to parent and teacher ratings. Other social-emotional measures used included the BASC-2, the Revised Children's Manifest Anxiety Scale – Second Edition, the Bar-On Emotional Quotient Inventory: Youth Version, the Conners-3, the Barkley Scales for Oppositional Defiant Disorder, the Barkley Screening Checklist for ADHD, the Comprehensive Executive Function Inventory, and the Vineland Adaptive Behaviour Scales – Third Edition.

Twice-Exceptional Assessment

As mentioned above, there were no assessment referrals specifically seeking to identify twice-exceptionality. Of the eight students assigned to the 2e group after review of the assessment reports, 62.5% were initially referred under the "school functioning" category, and 37.5% were initially referred under the "educational programming" category. 50% of these students had a pre-existing diagnosis of some kind of learning challenge, 12.5% were previously

identified as gifted, and 37.5% had no previous identification or diagnosis. Of the children with pre-existing diagnoses, 50% were identified as gifted and given a new, additional diagnosis and 50% were identified as gifted with no additional diagnoses made. Of the children with no previous diagnoses, 33% were identified as gifted and given one additional diagnosis, and 66% were identified as gifted and given two additional diagnoses. The student previously identified as gifted was given two additional diagnoses. The most identified dual exceptionality was ADHD, which was diagnosed in 75% of the 2e students. ASD was diagnosed in 37.5% of the 2e children, as were anxiety disorders. Oppositional defiant disorder was diagnosed in 25% of this group. A specific learning disorder was only identified in one (12.5%) of these cases. The mean age of identification was seven years, 11 months.

The number of standardized measures used in these assessments ranged from one to 10, with a mean of 4.4 measures used. 87.5% of these assessments included a measure of cognitive functioning. 71% of these used the WISC-V, Other cognitive measures used were the WJ-IV-COG (14%) and the Stanford-Binet Intelligence Scales, Fifth Edition (14%). 50% of these assessments included a measure of academic achievement, with 75% of these using the WIAT-III and 25% using the WJ-IV-ACH. 50% of these assessments included additional performance measures, such as the Beery VMI, the Test of Variables of Attention, the CNS Vital Signs Continuous Performance Test, and tests of visual and auditory memory. 62.5% of these assessments included a measure of social-emotional functioning. In all cases, the BASC-3 was used, with both parent and teacher ratings obtained. 37.5% of the assessments used additional measures to assess social-emotional functioning, including the Conners-3, the Copeland Symptom Checklist for ADHD, and the Barkley rating scales.

62.5% of the students in the 2e group were identified over multiple assessments, ranging from one to four years apart. 40% of students in the learning challenged group, and 0% of the gifted group required multiple assessments. This provides some evidence to support the hypothesis that current assessment practices do not align with suggested assessment practices for the identification of 2e students, given that most students in this group were not correctly identified in a single, comprehensive assessment.

Discussion

The goal of this study was to address whether current psychoeducational assessment practices are accurate at identifying students' needs or special education categories and compare current practices with recommended best practices. I hypothesized that the 2e group would have the highest level of misidentification or mismatched school placements. I also hypothesized that current assessment practices would not align with suggested assessment practices for the identification of 2e students but that they would align with best practices for either gifted assessment and/or assessment of learning challenges.

Accuracy of Group Placements

The results of this study indicate that diagnostic accuracy was lowest among the 2e group and that mismatched school placements were higher among the 2e group than the gifted group. However, the learning challenged group had the highest rate of mismatched school placements, and there were no significant differences in group reassignments among the three groups. These mixed results provide weak evidence for the hypothesis that the 2e group would have the highest level of misidentification or mismatched school placements. It is important to note that due to the small sample size, no significant conclusions can be drawn from these data. That being said,

these findings align with claims in the existing literature that 2e students are under-identified and underserved (Ruban & Reis, 2005).

Reasons for the under-identification of 2e students have been well-established in the research. Mills and Brody (1999) argued that there are at least three presentations of twice-exceptionality that contribute to difficulties with proper identification:

- students whose giftedness masks their disability;

- students whose disability masks their giftedness; and

- students whose exceptionalities mask each other.

Further, existing models of identification for both giftedness and learning challenges fail to consider the co-existence of both profiles (Mullet & Rinn, 2015; Ruban & Reis, 2005). Reis and colleagues (2014) suggest that multidisciplinary teams who are familiar with both giftedness and disabilities should be involved in the identification of 2e students. If clinicians are not familiar with twice-exceptionality, there is a higher risk of students being misidentified due to bias (Reis et al., 2014).

In terms of school placements, Baum and colleagues (2014) contend that 2e students often do not receive services for both their giftedness and their learning challenges. This argument is supported by Chen and colleagues (2022), who found that 2e students were identified more in schools that offer both gifted and special education services. While knowledge of twice-exceptionality is increasing, existing systems are inadequate at addressing 2e students' needs (Foley-Nicpon et al., 2013). Future research should continue to focus on the practical aspects of 2e identification and school placements. Such studies may wish to focus on factors that improve 2e identification in schools in the absence of specialized programming. Systems-

level changes, such as additional funding to specialized services in schools and updated
standards for special education, are also necessary.

Evaluation of Current Practices

The data indicate that only 26% of the assessments reviewed in this study were
comprehensive. Thus, the data do not support the hypothesis that current assessment practices
would align with best practice recommendations in the literature for any of the groups in this
study. Assessments were considered comprehensive if they included at least one measure each
for cognitive functioning, academic achievement, and social-emotional/behavioural functioning
(Benson et al., 2019). Comprehensive assessments are required for proper identification of
students' needs.

With respect to gifted assessments, the most used assessment measure in this study was
the WPPSI-IV. The average age of identification among this group was four years, eight months.
80% of these assessments relied on a single measure. The FSIQ was reported in all cases. The
NAGC (2018) recommends that ancillary scores should be used in place of the FSIQ. Further, it
is suggested that children be above the age of six years to be formally tested. This is because it is
difficult to accurately determine IQ in young children (Nilles, 2016). Valler and colleagues
(2017) contend that gifted assessment should never rely on only one test. The most endorsed
tests for identifying giftedness are the Kaufman Assessment Battery for Children-Second
Edition, Stanford-Binet Intelligence Scales, Fifth Edition, and the WISC-IV or WISC-V.

In terms of the assessment of learning challenges, 31% of the assessments were
comprehensive. School functioning referrals had higher rates of comprehensive assessment than
educational programming referrals. As suggested by Gilman and colleagues (2013), assessments
often focus only on the area of suspected disability. This indicates that clinicians are not ruling

out medical or psychiatric conditions that could account for presenting problems, as recommended in the literature (Sparrow & Erhardt, 2014). It was not clear in the reports what model or criteria was used to identify learning challenges. No reports specifically mentioned RTI or its components, and diagnoses were presented inconsistently across reports. While this speaks more to issues related to assessment report writing, there are implications for practice as the utility of these reports may be lessened. In addition to reviewing existing assessment reports, future studies should consider surveying or interviewing psychologists directly about their assessment practices to better understand what approaches are being implemented.

There were no assessment referrals which specifically sought to identify twice-exceptionality. This may speak to patterns of under-identification in schools, especially given that this sample was recruited from specialized programs for gifted and 2e students. None of the assessments which identified children as 2e appeared to employ the recommended practices of intra-individual analysis or dynamic assessment. Further, 2e students required multiple assessments to be identified more often than either gifted or learning challenged students. Assessments can be difficult to access for many families due to high costs and long waiting lists. The trend of failing to properly identify 2e students in a single assessment means it is less likely for these students to be identified altogether. Further practical research is needed to determine methods of reliable and valid assessment of 2e students, as current practices may not be sufficient.

Future research should also focus on training, professional practice, and professional development as it pertains to assessment. While in some cases there are limitations to following best practices, such as when there is a lack of consensus or guidance, it is the professional and ethical responsibility of the psychologist to prioritize their client's best interests ahead of other

conflicting interests or external pressures. Gilmore and Campbell (2019) propose that more explicit training about the importance of reflective and critical practices when conducting assessments would benefit psychologists when there is little or no evidence available about best practices.

Limitations and Directions for Future Research

There were several limitations in this project primarily related to constraints resulting from participant recruitment and available data. The primary limitation is the small sample size across all groups. Due to the limitations surrounding our sample of participants, I present the data as pilot data suggestive of trends and areas for further research. Additional data points may substantially alter the trends presented in this paper; thus, the data should not be used to draw conclusions. Further data collection is required to fully address the research questions.

Due to time and resource constraints, research in control schools was not approved for this study. As such, the lack of a control or comparison group is another limitation, as I am not able to speak to how trends in this specialized population may reflect or differ from those from a typical population. Further, due to the complex presentation of 2e students and the lack of consensus regarding assessment and identification practices, it is possible that some eligible students were missed when recruiting for this study. Finally, participants were asked to volunteer for the study, which may have skewed the characteristics of the sample.

Future research should aim to recruit a larger sample and include students who are enrolled in mainstream education programs and public-school special education programs. This research should also include students who meet the criteria for the "typical with assessment history" group. Additional demographic data could also be collected to control for potential sample biases.

Limitations related to data collection methods are also present in this study. There is potential for experimenter effects and bias to influence the data (see Declaration of Conflicting Interests). To mitigate the potential for these effects, students' names were redacted from the reports prior to data collection. Given that the diagnosis of learning challenges can be rather subjective, it is possible that my conclusions differed from the psychoeducational assessment reports, even in cases where the assessment was deemed valid. To address this, objective criteria and cut-off scores were used where possible. A second investigator also reviewed the raw and analyzed data to attempt to enhance internal validity. However, it is important to note that the second rater has limited experience and knowledge of 2e students. Finally, this study was the first of its kind to examine current psychoeducational practices. As there is limited research on this topic, future studies should continue to focus on current assessment practices and areas for improvement.

Conclusion

This study is meant to serve as preliminary research for future investigations aimed at identifying factors related to the assessment and identification of 2e students that may be useful for improving professional practices and outcomes for the understudied population of 2e students. As revealed by existing literature, 2e students are often misdiagnosed or missed altogether in the current education system due to inconsistent assessment and identification procedures. While research into the 2e population is growing, there is still a lack of consensus regarding best practices for assessing and identifying students in this population (Gilman et al., 2013; Morrison & Rizza, 2007). Many papers have been published on proposed best practices, but very little practical research has been done. As such, this study contributes to a gap in the existing literature on the assessment and identification of 2e students. This project offers some

preliminary insight into current psychoeducational assessment practices and their effectiveness as they pertain to 2e students. If the findings of this study can be replicated through future studies with more robust samples, the findings could be used to improve existing practices and procedures.

Declaration of Conflicting Interests

There is potential for a perceived conflict of interest as the primary author holds dual roles; she was previously employed at one of the sample schools from which participant data was collected and analyzed. The researcher has no financial stake in the outcome of the project. To mitigate perceived conflicts of interest, the researcher disclosed the nature of the conflict to all participants during the consent procedure, as per TCPS2 Article 7.4.

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