

An alternative approach to identifying students with learning disabilities in Australian schools¹

Jason L. Skues & Everarda G. Cunningham
Swinburne University of Technology

ABSTRACT

This study examined the validity of using teacher-administered educational and intelligence tests to screen students for learning disabilities (LDs). Twenty-seven Technical and Further Education (TAFE) students from regional Victoria who were enrolled in a program that was designed to reconnect school dropouts with education via TAFE participated in the study. The findings from this study provide preliminary evidence for the validity of using the Kaufman Brief Intelligence Test - Second Edition (KBIT-2) and limited evidence for using the Standard Progressive Matrices (SPM) as measures of intelligence for the screening of students with LDs.

INTRODUCTION

Learning disabilities (LDs) have a prevalence rate of approximately ten percent in the population and result from processing problems that are neurological in origin and permanent in nature (Bradley, Danielson, & Hallahan, 2002; Prior, 1996). Indications of LDs in students are frequently manifested by underachievement in one or more academic areas such as reading, spelling, writing or mathematics despite intelligence scores in the normal range (Prior, 1996). However, there is limited emphasis placed on the identification of students with LDs in Australian schools as students with LDs are not eligible for additional funding (van Kraayenoord & Elkins, 1998). More importantly, there is no national definition of LDs in Australia (Watson & Boman, 2005), which means that teachers and other professionals who work in schools are often not aware that students who experience difficulties in reading, spelling, writing and maths have a learning problem that is permanent in nature and resistant to intervention.

Students who experience learning difficulties are sometimes referred to other professionals such as speech pathologists and school psychologists for an assessment, though these professionals frequently do not assess students for LDs. Instead, students are often forced to seek external LD assessments from private providers, which typically involve the administration of educational tests and a comprehensive intelligence assessment by a registered psychologist. However, these assessments are time-consuming and expensive, with the administration of a comprehensive intelligence test and follow up report taking hours to complete and costing several hundreds of dollars. An additional drawback is that teachers often experience difficulties interpreting psychological reports and translating information from these reports into classroom practice. Given the costs associated with intelligence testing and the lack of school resources to have students individually assessed for LDs, it has been argued that comprehensive intelligence assessments are not an appropriate method for measuring intelligence as part of an LD assessment. Hence, there is a need

¹ Contact

Dr. Jason Skues
Faculty of Life and Social Sciences
PO Box 218 (H24), Hawthorn, VIC 3122, Australia
Voice: +61 3 92157234
Fax: +61 3 92148912
email: jskues@swin.edu.au

for an alternative model for assessing LDs that is less costly, less time-consuming and more practical.

An alternative model

We propose an alternative method for screening students for LDs using standardised educational tests and intelligence screening tests. The first step is to obtain a measure of educational achievement. By definition, students with LDs demonstrate unexpected underachievement in one or more areas such as reading, spelling, writing and/or mathematics. Various methods are available for teachers to assess educational achievement, including direct observation, analysis of work samples, diagnostic interviews and informal and formal testing (Westwood, 2001a). One method of formal testing is standardised testing, which involves tests that can be administered, scored and interpreted in a consistent manner. The use of standardised tests enables the performance of students to be compared to other students or to the expected performance of a particular age level (Westwood, 2001a).

An advantage of group-administered standardised tests is that they can be used to screen whole classrooms of students for low educational achievement. For instance, standardised reading tests can be administered to a classroom of students and those students who score below the 25th percentile are deemed to have low achievement in reading (Fletcher et al., 1994; Lyon et al., 2001). In such cases, these same students would also need to complete some form of intelligence measure in order to determine whether they demonstrate unexpected underachievement. More importantly, the biggest advantage is that teachers would know which students demonstrate unexpected underachievement so that these students could be further assessed and provided with appropriate accommodations.

The second step involved in screening students for LDs is to obtain a measure of intelligence. The most widely used comprehensive intelligence assessments for children and adults are the Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV) and the Wechsler Adult Intelligence Scale – Third Edition (WAIS-III) respectively (Whitaker, 2008). Although both of these tests are reliable and valid measures of intelligence (Flanagan & Kaufman, 2004; Kaufman & Lichtenberger, 1999), there are some practical limitations associated with the use of such tests in schools, specifically the cost of administration and the need for a registered psychologist to administer intelligence tests.

Two potentially useful alternatives for measuring intelligence are the Kaufman Brief Intelligence Test - Second Edition (KBIT-2) and the Standard Progressive Matrices (SPM). The KBIT-2 is a brief individually-administered intelligence test that takes 15-30 minutes to complete and can be administered by non-psychologists (Kaufman & Kaufman, 2004). The SPM is a non-verbal intelligence test that can also be administered by non-psychologists to groups of individuals. These two tests are typically used as screening tools for measuring intelligence in research and have robust psychometric properties (Kaufman & Kaufman, 2004; Raven, Raven, & Court, 2000). The advantage of these tests, in relation to assessing students, is that they can be administered by classroom teachers who have received some additional training.

A small number of studies have examined the use of the K-BIT as an alternative intelligence measure to comprehensive intelligence assessments when screening students for LDs. For instance, Canivez (1996) examined the concurrent validity of the K-BIT in a sample of 75 middle school students who had previously been identified with LDs using the WISC-III. Canivez found a strong correlation ($r = .82$) between IQ scores on the WISC-III and IQ scores on the K-BIT, which indicates that higher scores on the WISC-III corresponded to higher scores on the K-BIT. More recently, Canivez, Neitzel, and Martin (2005) examined the construct validity of the K-BIT and WISC-III in a sample of 207 students who were receiving special education assessments. Canivez et al. also reported a strong correlation ($r = .89$) between IQ scores on the WISC-III and IQ scores on the K-BIT. This suggests that the K-BIT is a promising general intelligence screening tool when a comprehensive assessment is not possible or needed. Although the K-BIT is less time consuming to administer and score than the WISC-III and does not require a registered psychologist to administer, it is still not a practical screening tool for classroom teachers. This is because it must be individually administered.

The SPM provides a more practical method for teachers to measure intelligence as it can be group-administered to whole classrooms. Notwithstanding the practical advantages, there is a paucity of research investigating the use of the SPM as a measure of intelligence when screening students for possible LDs. This is despite the SPM having been found to correlate ($r = .80$) with the Wechsler

Intelligence Scale for Children-Revised (WISC-R) for a stratified sample of children aged between seven and 11 years (Rogers & Holmes, 1987). Hence, there is a clear need for more research to examine the use of the SPM as an intelligence screening tool when screening students for LDs.

The current study

The purpose of this study was to examine the validity of using teacher-administered educational and intelligence tests to screen students for LDs. It was hypothesised that there would be a substantial correspondence between teacher-administered screening tools and a comprehensive assessment by a registered psychologist. That is, teacher-administered screening tools may be a valid way of screening students for LDs.

METHOD

Participants

Data were collected from 27 Technical and Further Education (TAFE) students from regional Victoria who were enrolled in a program that was designed to reconnect school dropouts with education via TAFE. However, data from three participants were excluded because these students were identified as having severe emotional problems during the comprehensive intelligence assessment and the definition of LD excludes emotional disturbance as a possible cause of LD. Two participants were also excluded because they were absent during the administration of both educational tests. The final sample comprised 18 males (82%) and four females who ranged in age from 15 to 18 years ($M = 16.37$ years, $SD = 0.71$ years).

Measures

The measures administered in the current study included educational tests, intelligence screening tests and comprehensive intelligence tests. The educational tests used in the current research were based on the recommended tests for a LDs assessment in Victorian Government schools. The areas that need to be assessed using the Progressive Achievement Test in Reading (PAT-R; Australian Council of Education Research, ACER, 2001) and the South Australian Spelling Test (SAST; Westwood, 2005), which are both group-administered standardised tests.

Progressive Achievement Test in Reading: Comprehension (PAT-R; Australian Council of Education Research, ACER, 2001)

The PAT-R is a standardised test designed to measure reading comprehension skills for students ranging from Year 3 to Year 9. The PAT-R consists of four reading test forms, which are sequential. Each form contains eight or nine prose items accompanied by four to six multiple-choice questions assessing both literal and inferential reading comprehension. The selection of an appropriate form for TAFE students (i.e., Form 4) and Year 5 and 6 students (i.e., Form 2) was based on guidelines found in the PAT-R manual (ACER, 2001). Correct responses on the PAT-R were summed to form a raw score, which was converted into a percentile rank. A cut-off score of less than or equal to the 25th percentile was used where scores below the cut-off indicated low achievement in reading (Fletcher et al., 1994).

South Australian Spelling Test (SAST; Westwood, 2005)

The SAST is a standardised test of spelling achievement for students between six and 16 years of age. The SAST has two separate forms (i.e., Form A and Form B), though only Form A was used in the current research. Form A contains 70 spelling words of increasing difficulty and requires students to generate a written response. Correct responses on the SAST were summed to form a raw score, which was converted into an approximate spelling age. A spelling age cut-off of two or more years below chronological age was specified to indicate students with low achievement in spelling.

Intelligence tests

Four intelligence measures were used in the current research, namely the Standard Progressive Matrices (SPM; Raven et al., 2000), Kaufman Brief Intelligence Test - Second Edition (KBIT-2;

Kaufman & Kaufman, 2004), Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV; Wechsler, 2003) and Wechsler Adult Intelligence Scale – Third Edition (WAIS-III; Wechsler, 1997). While the SPM and KBIT-2 are screening tools with robust psychometric properties, the WISC-IV and WAIS-III are the most widely used tests for comprehensive intelligence assessments. Each test is described in more detail in the following sections.

1. Standard Progressive Matrices (SPM; Raven et al., 2000).

The SPM is a measure of nonverbal intelligence. The SPM consists of 60 visual puzzles divided into five equal sets (A,B,C,D,E) where puzzles within each set become progressively more difficult. Each puzzle has a missing section where participants are required to select the missing part from six options. The SPM was group-administered by the classroom teacher. Correct responses were summed to form a raw score, which was converted into a percentile rank. An arbitrary cut-off of the 10th percentile was specified to indicate low intelligence. According to the SPM manual, split-half reliabilities have exceeded 0.90 and the test-retest reliability for individuals under 30 years of age for the SPM is 0.88 (Raven et al., 2000). Correlations with other intelligence measures (e.g., WISC-R) between 0.8 and 0.9 have also been reported (Raven et al., 2000).

2. Kaufman Brief Intelligence Test - Second Edition (KBIT-2; Kaufman & Kaufman, 2004)

The KBIT-2 is a brief, individually-administered test that measures verbal and nonverbal intelligence for people between four and 90 years of age. The KBIT-2 provides a verbal, nonverbal and overall intelligence score. The verbal score comprises two subtests (Verbal Knowledge and Riddles) and the nonverbal score is based on one subtest (Matrices). The Verbal Knowledge subtests consist of 60 items that measure receptive vocabulary knowledge. The Riddles subtest has 48 items and measures verbal comprehension, reasoning and vocabulary knowledge. The Matrices subtest is a 46-item subtest that assesses the ability to identify relationships among meaningful and abstract visual stimuli. Correct responses on the Verbal Knowledge and Riddles subtests are totalled to form the verbal raw score, and the correct number of responses on the Matrices subtest forms the nonverbal raw score. Both the verbal and nonverbal raw scores are then summed to form the overall raw score. Raw scores were converted into standard scores for the verbal, nonverbal and overall intelligence scores, which is known as the IQ composite score. Consistent with previous studies (Siegel, 1989), an IQ composite cut-off score of 80 was used with scores below the cut-off indicating low intelligence

3. Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV; Wechsler, 2003)

The WISC-IV is an individually-administered test that measures intelligence for individuals aged between six and 16 years. It provides an overall full scale intelligence quotient score (FSIQ) and four index scores, namely the verbal comprehension index (VCI), the perceptual reasoning index (PRI), the working memory index (WMI) and the processing speed index (PSI). The WISC-IV has a total of 15 subtests where 10 of these are core subtests and the other five supplemental subtests. The structure of the WISC-IV includes three subtests each for VCI and (Similarities, Vocabulary, Comprehension) PRI (Block design, Picture Concepts, Matrix Reasoning), and two subtests each for WMI (Digit Span, Letter-Number Sequencing) and PSI (Coding, Symbol Search). Raw scores for each subtest were calculated by summing the correct responses, which were converted in scaled scores. The scaled scores were used to form the four index scores and the FSIQ. A cut-off FSIQ score of 80 was used where participants who scored below the cut-off were classified with low intelligence (Siegel, 1989).

4. Wechsler Adult Intelligence Scale – Third Edition (WAIS-III; Wechsler, 1997)

The WAIS-III is an individually-administered test that measures intelligence for individuals aged between 16 and 89. It provides an overall full scale IQ score (FSIQ), verbal IQ score (VIQ) and performance IQ score (PIQ), and four index scores including the verbal comprehension index (VCI), the perceptual organisation index (POI), the working memory index (WMI) and the processing speed index (PSI). The WAIS-III has a total of 14 subtests where 11 of these are core subtests and the other three are supplemental subtests. The structure of the WAIS-III includes three subtests each for VCI (Vocabulary, Similarities, Information) and PRI (Picture completion, Block design, Matrix reasoning), and two subtests each for WMI (Digit span, Letter-number Sequencing) and PSI (Digit-

symbol coding, Symbol search). Raw scores for each subtest were calculated by summing the correct responses, which were converted into scaled scores. The scaled scores were used to form the three index scores, the VIQ and PIQ and the FSIQ. A cut-off FSIQ score of 80 was also specified where participants who scored below the cut-off were classified with low intelligence (Siegel, 1989).

Procedure

Participants involved in the current study were enrolled in a program for students who had dropped out of school and were suspected as having LDs. This sample was selected based on an existing professional relationship with the disability/equity co-ordinator who suspected an over-representation of students with possible LDs enrolled in the program. However, it is important to highlight that students who have experienced years of underachievement are often resistant to any form of assessment. Hence, prior to the study, the students enrolled in this program attended a two-day camp about LDs. At this camp, a guest speaker spoke to the students about his personal experience with LDs and the importance of their identification. Students also engaged in a number of activities aimed at developing coping strategies to succeed in tertiary education. It was only after this camp that most of the students were comfortable to talk about LDs and were open to the idea of taking part in this study. Following the two-day workshop, participants were recruited via letters sent to all parents of students under 18 years of age who were enrolled in a TAFE return-to-education program for school dropouts. Students for whom parent consent had been obtained also gave their consent to complete the tests that formed part of this study.

Funding was made available for participants to receive an independent comprehensive intelligence assessment for possible LDs by a registered psychologist. Each participant was provided with a concise report documenting their performance on the educational and intelligence screening tests. In addition, a formal psychological report explaining the results from the comprehensive intelligence assessment was given to each participant. Given the time and costs associated with administering comprehensive intelligence assessments, the sample size was small.

The total time for all testing, including the administration, scoring, interpretation and report writing, was around three months. Participants completed two educational tests, namely the PAT-R (ACER, 2001) and the SAST (Westwood, 2005), a comprehensive intelligence assessment including either the WISC-IV (Wechsler, 2003) or WAIS-III (Wechsler, 1997), and two intelligence screening tests, the KBIT-2 (Kaufman & Kaufman, 2004) and the SPM (Raven et al., 2000). Participants were group-administered the educational tests and the SPM by their classroom teacher. This was followed by the administration of the KBIT-2. While the KBIT-2 could readily be administered by a classroom teacher, in this study it was individually administered by either the author or by a PhD candidate in psychology because the classroom teachers had not completed the additional training needed to administer the KBIT-2. Information was also collected, including informal measures of reading accuracy and a handwriting sample.

RESULTS

Scores on the educational tests, intelligence screening tests, and comprehensive intelligence assessments were recoded into dichotomous variables with scores classified either below or above specified cut-off values. The recoded variables were then used to allocate participants into one of three achievement groups, namely, a low achievement (LA) group, a group of students with unexpected underachievement (i.e., possible LDs), and an expected achievement (EA) group.

Specifically, participants who scored *below* the cut-offs on either the PAT-R or the SAST, and who scored *below* the cut-offs on the WISC-IV or WAIS-III were classified into the LA group. That is, students who scored below the cut-offs on one or both the educational tests and the intelligence tests were classified as demonstrating *expected* low achievement. In contrast, participants who also scored *below* the cut-offs on the PAT-R or the SAST, but who scored *above* the cut-offs on the WISC-IV or WAIS-III were classified into the LD group. The discrepancy between intellectual ability and educational achievement was the criterion for indicating *unexpected* underachievement. Finally, participants who scored *above* specified cut-offs on the educational tests were classified into the EA

group. The classification process was then repeated twice using firstly the KBIT-2 instead of the WISC-IV or WAIS-III as the measure of intelligence, and secondly using the SPM.

The means and standard deviations for the reading, spelling and intelligence tests can be seen in Table 1. Based on the specified cut-off scores, 45 percent of participants were identified with low achievement in reading comprehension on the PAT-R and 68 percent of participants identified with low achievement in spelling on the SAST. In total, 73 percent of participants were found to demonstrate low achievement in reading comprehension and/or spelling, which means that almost three-quarters of the sample had substantial reading or spelling difficulties, or difficulties in both areas.

Informal assessments were also conducted to provide support for the identification of students with LDs, with examples of some of the reading errors from the informal reading task displayed below:

“One of the participants read the word ‘setting’ as ‘sitting’, ‘descended’ as ‘discovered’, ‘bearing’ as ‘during’, ‘journal’ as ‘general’ and ‘suggest’ as ‘succeed’.”

“Another participant read the word ‘generally’ as ‘gangrally’, ‘paler’ as ‘plain’, ‘addition’ as ‘addiction’, ‘descended’ as ‘discarded’ and ‘bearing’ as ‘bringing’. ‘paler’ as ‘pearl’, ‘plain’ as ‘plan’, ‘confident’ as ‘confirmed’, ‘sought’ as ‘shout’ and ‘partly’ as ‘practically’.”

“One participant read the word ‘addition’ as ‘aditon’, ‘far’ as ‘fair’, ‘sound’ as ‘sand’, ‘sighted’ as ‘straight’, ‘descended’ as ‘destiny’, ‘filled’ as ‘failed’, ‘confident’ as ‘confidet’, ‘bearing’ as ‘beginning’, ‘continent’ as ‘continue’ and ‘suggest’ as ‘struggled’”.

Each of the participants also completed a handwriting sample that was inspected for legibility, spelling, punctuation, and grammar. A selection of the samples is provided below:

“I go to TAFE to lern trades and to help to get me an apreniship....I injoy TAFE veary much”

“As Im not shore of what I want to do when I’m older...I’m sticken at my curnt job to work my way up”

“I would like to be a macanic and do an aprenaship”

These informal observations highlight some of spelling and writing difficulties of the participants. In particular, the writing samples of students consisted of poor spelling and grammar, inappropriate letter sizes and shapes and the inconsistent use of capital letters. In combination with the reading difficulties, these observations and handwriting samples provide supporting evidence for possible LDs in reading, spelling and writing.

The results from the comprehensive intelligence assessments revealed that 15.4 percent and 14.3 percent were identified as having low intelligence on the WISC-IV and WAIS-III respectively. When combining these results, it was revealed that 15 percent of the participants did exhibit low intelligence based on their scores on the WISC-IV/ WAIS-III. Moreover, nearly five percent of participants were identified with low intelligence on the KBIT-2 and almost 30 percent of participants identified with low intelligence on the SPM.

The results from cross-tabulations that examined the correspondence between the combined WISC-IV/WAIS-III scores and the scores on the KBIT-2 and SPM are displayed in Table 2. As can be seen in Table 2, all of the participants who scored above the cut-off on the WISC-IV/ WAIS-III also scored above the cut-off on the KBIT-2. However, two participants who scored below the cut-off on the WISC-IV/ WAIS-III, scored above the cut-off on the K-BIT2. These participants were classified as false positive. This suggests that these students would have been incorrectly classified as having possible LDs rather than demonstrating low achievement if the KBIT-2 was used as a measure of intelligence.

Table 1: Means and Standard Deviations for the Educational Tests, Comprehensive Intelligence Assessments and Intelligence Screening Tests

	<i>M</i>	<i>SD</i>	<i>N</i>
PAT-R	34.15	22.48	20
SAST	144.09	30.83	22
WISC-IV	92.08	9.60	13
WAIS-III	92.14	9.94	7
KBIT-2	92.14	8.61	22
SPM	42.86	6.22	21

Note. PAT-R = Progressive Achievement Test in Reading; SAST = South Australian Spelling Test; WISC-IV - Wechsler Intelligence Scale for Children – Fourth Edition; WAIS-III = Wechsler Adult Intelligence Scale – Third Edition; KBIT-2 = Kaufman Brief Intelligence Test – Second Edition; SPM: Standard Progressive Matrices. *** = $p < .001$; ** = $p < .01$; * = $p < .05$

Table 2: A comparison between Scores on the Comprehensive Intelligence Assessments and Intelligence Screening Tests

	WISC-IV / WAIS-III	
	Below cut-off	Above cut-off
KBIT-2		
Below cut-off	1	0
Above cut-off	2	17
SPM		
Below cut-off	1	4
Above cut-off	2	12

Note. WISC-IV - Wechsler Intelligence Scale for Children – Fourth Edition; WAIS-III = Wechsler Adult Intelligence Scale – Third Edition; KBIT-2 = Kaufman Brief Intelligence Test – Second Edition; SPM: Standard Progressive Matrices. Sample sizes for the KBIT-2 and SPM were $N = 20$ and $N = 19$ respectively.

Three-quarters of the participants who scored above the cut-off on the WISC-IV/ WAIS-III also scored above the cut-off on the SPM. However, not only were there two false positives using the SPM, the results also revealed four false negatives using the SPM where students who scored above the cut-off on the WISC-IV and/or WAIS-III scored below the cut-off on the SPM. These students would have been incorrectly classified in the low achievement group if the SPM was being used as a measure of intelligence. This finding has serious implications that are addressed in the discussion.

Further investigation of the indices from the WISC-IV/WAIS-III results showed that participants who were found to be false negatives when including the SPM tended to score lower on the working memory index (WMI) and/or processing speed index (PSI) scores on the WISC-IV. There were two false negatives. One participant had completed the WISC-IV and scored 86 on the WMI and 68 on the PSI, compared to scores of 100 on the verbal comprehension index (VCI) and 104 on the perceptual reasoning index (PRI). The other participant had a WMI score of 77 and a PSI of 68 while scoring 95 and 102 on VCI and PRI respectively. The remaining two false negatives completed the WAIS-III and reported lower VIQ scores (86, 88) compared to PIQ scores (90, 95). Although the WAIS-III also has four index scores, some of the subtests (e.g., letter number sequencing, symbol search) that are used to form these scores were not administered. Thus, only the VIQ and PIQ scores were available. Taken as

a whole, these findings suggest that general intelligence scores from the screening tests may be affected by specific processes such as working memory and processing speed.

Group classification

On the basis of the specified cut-offs on the educational and intelligence tests, a large proportion of students was classified with possible LDs. This was the case when using either the comprehensive intelligence tests or the intelligence screening tests. As can be seen from Table 3, while 11 of the 20 (55.5%) students who completed the WISC-IV or WAIS-III were classified as having possible LDs, 15 out of 22 students (68.2%) and 9 out of 21 students (45.5%) were similarly identified using the KBIT-2 and SPM respectively. There were also similar prevalence rates for the students identified with EA using the different intelligence measures (see Table 3).

In sum, the results showed that almost three-quarters of the sample demonstrated poor reading and/or spelling. A comparison of the results from the intelligence screening tests and comprehensive intelligence assessments revealed a substantial correspondence between the tests. In particular, 94 percent of the sample who scored above the specified cut-off on the comprehensive assessment also scored above the cut-off on the individually-administered KBIT-2. Moreover, 75 percent of the sample who scored above the specified cut-off on the comprehensive assessment also scored above the cut-off on the group-administered SPM. This provides preliminary evidence for the validity of using the KBIT-2 and limited evidence for using the SPM as measures of intelligence for the screening of students with LDs.

Table 3: Proportion of Students classified into Low Achievement, Learning Disabilities, and Expected Achievement groups

	WISC-IV/WAIS-III <i>N</i> =20	KBIT-2 <i>N</i> =22	SPM <i>N</i> =21
LA	3	1	6
LDs	11	15	9
EA	6	6	6

Note. LA = Low Achievement; LDs = Learning Disabilities; EA = Expected Achievement

DISCUSSION

The purpose of this study was to examine the validity of using teacher-administered educational and intelligence tests to screen students for LDs. To this end, participants completed standardised reading and spellings tests, an individual and a group-administered intelligence test as well as a comprehensive intelligence assessment. Moreover, informal reading and handwriting assessments were also collected. The results showed a substantial correspondence between intelligence screening tests administered by a classroom teacher and comprehensive intelligence assessments conducted by an independent registered psychologist. Based on these screening tools, as expected, a large proportion of the sample was identified with LDs.

The correspondence between the comprehensive intelligence assessment and intelligence screening tests is consistent with the findings of previous research (Canivez, 1996; Canivez et al., 2001). The correspondence between the intelligence screening test and comprehensive intelligence assessment can be attributed to the fact that both provide measures of general intelligence, which can be defined as an underlying factor that explains behaviours on a range of ability tests (Kaplan & Saccuzzo, 2005). This explanation also applies to the SPM because it provides a measure of the educative component of general intelligence, which is the ability to forge new insights and identify relationships (Raven et al., 2000). In sum, these results suggest that both the KBIT-2 and the SPM are measuring a similar construct as the WISC-IV and WAIS-III, namely general intelligence, and that these intelligence screening tests are valid measures of general intelligence.

Despite the substantial correspondence between the comprehensive assessments and screenings tools, there were some discrepancies (i.e., false negatives and false positives). Four false negatives

were found using the SPM as a measure of intelligence. This implies that, had the SPM been used as the sole measure of intelligence, these four students would have been incorrectly identified as having expected low achievement when, in fact, they demonstrated unexpected underachievement. These students may be misidentified with generally low intelligence instead of having a possible LD. This misidentification has serious implications. Teachers may perceive these students as being less capable than they are, which may result in inappropriate behaviours. For example, students with expected low educational achievement (the result of low intelligence) may need modifications to their work to make it less challenging. However, students with LDs do not need their work to be made easier. Instead, students with LDs need adjustments to teaching methods and modes of assessment to make their work more accessible.

One explanation for these discrepancies relates to differences between general versus specific intelligences. For instance, the results of this study showed that four students who were identified as false negatives showed lower working memory and processing speed index scores compared to their verbal comprehension and perceptual reasoning index scores. It is plausible that a very low score in a specific cognitive process would be sufficient to reduce the overall general intelligence score, which may cause a score to move from above to below the specified cut-off. With regards to the SPM, the ability to solve the visual puzzles may be affected by limited working memory and slow processing speed. This explanation is consistent with previous research that has shown low working memory and processing speed to be associated with LDs (Fiorello et al., 2007; Mayes & Calhoun, 2007).

With regards to the two false positives, it is less clear why students who scored below the cut-off on the WISC/WAIS also scored above the cut-off on the KBIT- 2 and SPM. A false positive would mean that a student would be incorrectly identified with unexpected underachievement when he/she has actually shown low achievement. As there were only two false positives and no obvious trend in the results, a possible explanation is the presence of measurement error in psychological testing.

For instance, test theory is based on the assumption that a person has a true score which would be obtained if there were no errors in measurement (Kaplan & Saccuzzo, 2005). However, because measures are imperfect, there are differences between the true score and the observed score. The difference between the true score and observed score is the result of measurement error (Kaplan & Saccuzzo, 2005). Although both the KBIT-2 and SPM have robust psychometric properties they still contain measurement error which could account for the discrepancies between intelligence scores.

This is not to imply that comprehensive intelligence tests such as the WISC-IV and WAIS-III do not include measurement error. However, they are considered the ‘gold standard’ of intelligence tests. As such, it would be reasonable to expect that there would be some variation in scores between the comprehensive intelligence assessment administered by a registered psychologist and the teacher-administered intelligence screening test. These few discrepancies should not be used as an argument for not utilising intelligence screening tools. It should be noted that there was a substantial correspondence between the comprehensive intelligence assessment and teacher-administered intelligence tests.

It may be that teacher-administered screening tools should be supplemented with some informal measures of reading, spelling and writing. The results from this study did include information from informal measures of reading accuracy and handwriting samples. This information was used to provide further evidence for the reading and spelling problems experienced by the participants. For instance, participants who scored below the cut-off on the reading comprehension test tended to demonstrate more errors in reading accuracy. Also, participants who scored below the cut-off on the spelling tests also made various spelling errors in their handwriting sample. These observations could be used to provide further support for the decision to administer intelligence screening tests to students to screen for possible LDs. Equally, the information from the informal measures could be used to inform teachers about the nature of the reading and spelling errors. Teachers could then chose appropriate strategies to reduce the errors.

Limitations

Despite the importance of the findings, there were a number of limitations to the current study. The sample size was necessarily small. Accordingly, there were not enough participants in the study to use the Pearson’s chi-square test. This would be the appropriate test for determining whether there was a significant relationship between two categorical variables (Field, 2005). According to Field, one

assumption of the chi-square test is that expected frequencies should be greater than five. Although it is accepted that large samples can have up to 20 percent of expected frequencies below five, this is not the case for small samples because the result is a loss of power. Since the findings about the correspondence between the comprehensive intelligence assessment and the intelligence screening tests are based on a relationship between two dichotomous variables, they need to be interpreted with caution.

It should be highlighted that screening students for LDs using the procedure of the current study is not appropriate for students with additional problems such as emotional problems. Three participants were identified in the current study with emotional disturbances and were subsequently omitted from the analyses. These students would require a registered psychologist to assess them and compare their educational and psychological findings to provide appropriate interventions. Skilled teachers are able to provide suitable educational interventions for students with LDs. However, teachers are limited in their abilities to assess and treat students with emotional problems. This is more the domain of a registered psychologist. Currently, students with suspected emotional problems would be referred to a psychologist who would conduct clinical assessment.

Furthermore, although the KBIT-2 is the preferred intelligence screening measure because it was associated with fewer false negatives than the SPM, it should be noted that this sample comprised older adolescents who had dropped out of school. Further comparisons are needed in samples of primary and secondary school students to determine whether the KBIT-2 remains the preferred option for screening intelligence levels in mainstream classrooms.

Implications

Given that students with LDs in Australian schools spend most of their time in the mainstream classroom, the classroom teacher is a critical resource for students with LDs (Watson & Boman, 2005). Since most schools do not have the resources to have students individually assessed, an important practical implication from this study is that teachers can administer their own tools to screen students for LDs. Given the prevalence rate of students with LDs, there may be, on average, three students per class who would require a comprehensive intelligence assessment. Such assessments would take up to 12 hours to administer with many more hours of report writing. Multiply this by the number of classes in a school and it becomes evident that individual assessments are not a feasible way of identifying students with LDs in mainstream schools.

Another benefit in having teachers administering screening tools is that it may challenge the beliefs of some teachers who are often unaware that students with LDs have intelligence levels in the normal range. Allowing teachers to screen students for LDs may change how some teachers think and behave toward students with LDs: these students do not have low intelligence but do have specific reading and/or spelling problem. Teachers may make adjustments to teaching methods and modes of assessment so that work is more accessible for these students rather than modifying the work so that it is less challenging.

An advantage of having teachers screen students for LDs is that it reduces the number of assessments school psychologists have to complete. This would free up time for psychologists to perform other duties such as providing counselling, organising group programs for students, organising workshops and providing information to students, keeping up to date with current research, and conducting research in schools (Thielking & Jimerson, 2006). In cases where students demonstrate emotional and behavioural problems, or other problems that may explain underachievement, a psychologist would need to conduct an assessment to separate educational from psychological issues.

Conclusion

This study revealed a substantial correspondence between intelligence screening tests and comprehensive intelligence assessments. Despite the presence of a small number of discrepancies, teacher-administered intelligence screening tests provide a valid method of measuring intelligence as part of the screening process for students with LDs. This is especially the case for the Kaufman Brief Intelligence Test – Edition 2 (KBIT-2). The use of teacher-administered screening tools is a feasible low-cost approach for assessing students for LDs. There needs to be further work before the Standard Progressive Matrices (SPM) can be recommended as an intelligence screening test in schools.

REFERENCES

- Australian Council for Education Research. (2001). *Progressive Achievement Tests in Reading: Comprehension and Reading* (3rd ed.). Camberwell: ACER Press.
- Bradley, R., Danielson, L., & Hallahan, D. P. (2002). *Identification of learning disabilities research to practice*. Mahwah, N.J: Lawrence Erlbaum Associates.
- Canivez, G. L. (1996). Validity and diagnostic efficiency of the Kaufman Brief Intelligence Test in reevaluating students with learning disability. *Journal of Psychoeducational Assessment, 14*(1), 4-19.
- Canivez, G. L., Neitzel, R., & Martin, B. E. (2005). Construct validity of the Kaufman Brief Intelligence Test, Wechsler Intelligence Scale for Children-Third Edition, and Adjustment Scales for Children and Adolescents. *Journal of Psychoeducational Assessment, 23*(1), 15-34.
- Field, A. (2005). *Discovering statistics using SPSS* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.
- Fiorello, C. A., Hale, J. B., Holdnack, J. A., Kavanagh, J. A., Terrell, J., & Long, L. (2007). Interpreting intelligence test results for children with disabilities: Is global intelligence relevant? *Applied Neuropsychology, 14*(1), 2-12.
- Fletcher, J. M., Shaywitz, S. E., Shankweiler, D., Katz, L., Lieberman, I. Y., Stuebing, K. & Shaywitz, B.A. (1994). Cognitive profiles of reading disability: Comparisons of discrepancy and low achievement definitions. *Journal of Learning Disabilities, 1*, 6-23.
- Kaplan, R.M., & Saccuzzo, D.P. (2005). *Psychological testing: principles, applications and issues* (6th ed.). Australia: Thomsen /Wadsworth.
- Kaufman, A., & Kaufman, N. L. (1996). *Kaufman Brief Intelligence Test (Australian adaptation)*. Melbourne: Australian Council of Education Research.
- Kaufman, A. S., & Kaufman, N. L. (2004). *K-BIT2: Kaufman Brief Intelligence Test* (2nd ed.). Circle Pines: AGS Publishing.
- Kaufman, A. S., & Lichtenberger, E. O. (1999). *The essentials of WAIS-III assessment*. New York, NY: J Wiley & Sons.
- Lyon, G. R., Fletcher, J. M., Shaywitz, S., Shaywitz, B. A., Torgesen, J. K., Wood, F. B.,... Olson, R. (2001). Rethinking learning disabilities. In C. J. Finn Jr, A. J. Rotherham & C. R. Hokanson Jr (Eds.), *Rethinking Special Education for a New Century* (pp. 259-287). Washington DC: Thomas B. Fordham Foundation.
- Mayes, S. D., & Calhoun, S. L. (2007). Wechsler Intelligence Scale for Children-Third and -Fourth Edition predictors of academic achievement in children with attention-deficit/hyperactivity disorder. *School Psychology Quarterly, 22*(2), 234-249.
- Prior, M. (1996). *Understanding Specific Learning Difficulties*. East Sussex: Psychology Press.
- Raven, J., Raven, J. C., & Court, J. H. (2000). *Manual for Raven's Progressive Matrices and Vocabulary Scales*. Texas: Harcourt.
- Rogers, W. T., & Holmes, B. J. (1987). Individually administered intelligence test scores: Equivalent or comparable? *Alberta Journal of Educational Research, 33*(1), 2-20.
- Siegel, L. S. (1989). IQ is irrelevant to the definition of learning disabilities. *Journal of Learning Disabilities, 22*(8), 469-478.
- Thielking, M., & Jimerson, S.R. (2006). Perspectives regarding the role of school psychologists: Perceptions of teachers, principals, and school psychologists in Victoria, Australia. *Australian Journal of Guidance and Counselling, 16*(2), 211-223.
- van Kraayenoord, C., & Elkins, J. (1998). Learning difficulties in regular classrooms. In A. Ashman & J. Elkins (Eds.), *Education children with special needs* (3rd ed.). Frenchs Forest: Pearson Australia.
- Watson, J., & Boman, P. (2005). Mainstreamed students with learning difficulties: Failing and underachieving in the secondary school. *Australian Journal of Learning Disabilities, 10*(2), 43-49.
- Wechsler, D. (1997). *Wechsler Adult Intelligence Scale-Third Edition* San Antonio, TX: The Psychological Corporation.

- Wechsler, D. (2003). *Wechsler Intelligence Scale for Children–Fourth Edition*. San Antonio, TX: The Psychological Corporation.
- Westwood, P. (2001a). Assessment must lead to action. *Australian Journal of Learning Disabilities*, 6(2), 3-10.
- Westwood, P. (2001b). 'Differentiation' as a strategy for inclusive classroom practice: Some difficulties identified. *Australian Journal of Learning Disabilities*, 6(1), 5-11.
- Westwood, P. (2005). *Spelling: Approaches to teaching and assessment*. Camberwell: ACER Press.
- Whitaker, S. (2008). WISC-IV and low IQ: review and comparison with the WAIS-III. *Educational Psychology in Practice*, 24(2), 129-137.