PRACTICAL SOLUTIONS TO IDENTIFYING DYSLEXIA IN JUVENILE OFFENDERS

Report of a Joint Project of the British Dyslexia Association and HM Young Offender Institution Wetherby 2004-05
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Funded by
Connexions, West Yorkshire

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Executive summary

The aim of this project was to evaluate the use of computer-based screening as a practical solution to identifying dyslexia in juvenile offenders. Funding was provided by Connexions, West Yorkshire.

The relationship between dyslexia and offending is complex and contentious. A variety of studies have reported higher rates of dyslexia among offenders than in the general population, leading to the argument that undiagnosed and/or untreated dyslexia, resulting in poor educational achievement and lowered self-esteem, makes young people more vulnerable to delinquent behaviour and to the subsequent development of an anti-social, criminal lifestyle. However, these findings are not without controversy and further research is needed. Results depend on how dyslexia is defined and assessed, and the issue is complicated not only by social and educational background factors but also by the generally poor levels of literacy and below average verbal intelligence in offender samples. Nevertheless, the latest studies using psychometric testing suggest that the incidence of dyslexia amongst offenders is three to four times that found in the general population.

The lack of a full understanding of the intricate relationship between dyslexia and offending does not discharge society's responsibility to identify dyslexia amongst offenders and to address the educational needs of those who show indications of dyslexia. To neglect dyslexia as a possible causal factor in offending or to ignore the educational needs of dyslexic offenders would be to squander potential opportunities for reducing reoffending. Consequently, the British Dyslexia Association believes that, regardless of the actual incidence of dyslexia in this population, it is imperative that vigorous efforts are made to identify dyslexia amongst young offenders, prisoners and those on probation, so that appropriate and effective educational support can be provided to improve their occupational opportunities and reduce the likelihood of reoffending.

Computer-based tests have significant advantages for screening for dyslexia in the offending population. They are speedier and easier to use than conventional tests and staff need less training. There is evidence that offenders, who often have poor levels of literacy, are less intimidated by computer-based assessment than conventional assessment and more likely to cooperate in the screening process. However, it is recognised that in this study we are dealing with a special population and screening methods which work well in other settings may not be as accurate or effective in this setting, thus alternative or modified methods may be required.

The project was carried out in three phases. Phase 1 was conducted during the Spring of 2004 and involved collecting data from an unselected sample of 116 male juvenile offenders aged 15–17 years at Wetherby YOI using a commercially available computer-based dyslexia screening test (LADS) and conventional tests of reading and spelling. The results indicated that as a screening tool LADS was acceptable to this population and straightforward for staff to administer but that in its standard form it produced an unacceptably high incidence of false positives (i.e. cases that may have been wrongly classified as having a high probability of dyslexia).

Phase 2 was conducted during the summer and autumn of 2004 and involved assessing cognitive and literacy skills in a selected sample of 36 male juvenile
offenders aged 15-17 years, 18 of whom had high probability of dyslexia and 18 of whom had low probability of dyslexia. The results showed that a very large proportion of the young offenders had low verbal ability, which is consistent with findings from similar studies. To a large extent, this is likely to be due to educational and social disadvantage as well as to lack of reading experience, which contributes significantly to vocabulary growth, especially after the primary stage of education. By contrast, the average non-verbal ability of participants in all phases of the study was found to be within the average range. These results indicate that in this population it is critical to have an instrument for identifying dyslexia which will allow for low levels of reading ability, low verbal intellectual skills and lack of educational opportunities. It was concluded that by incorporating a test of verbal ability into LADS and modifying the classification rules used by the program it should be possible to identify those young offenders who have dyslexia with a satisfactory degree of accuracy while reducing the number of false positives to more acceptable levels.

Phase 3 was carried out during early 2005 and involved administering a modified version of the computer-based screening test (referred to as 'LADS Plus') to a new unselected sample of 62 juvenile offenders aged 15-17 years. The results indicated that about 31% of young offenders at Wetherby YOI have dyslexia, a figure that is reasonably consistent with comparable studies that have used cognitive tests (as opposed to check lists and rating scales). A further 32% showed borderline symptoms. The borderline category is useful because it tells education staff that the individual has some literacy problems although these are probably unlikely to be due to dyslexia. They could, for example, be due to failure to learn basic reading skills when at school, or simply a lack of experience of reading and writing.

The overall conclusions of this project were that computerised screening using the modified program LADS Plus is a practical and efficient solution for identifying dyslexia in juvenile offenders. However, it is recommended that further trials of LADS Plus should be carried out in other secure establishments and in different offender settings in order to establish the wider utility of the program as a screening method for dyslexia in offenders. The incidence figure of 31% suggests that dyslexia is a significant issue in the education of juvenile offenders, and the findings of the present study and those reported elsewhere raise the possibility that the incidence of dyslexia in younger offenders is somewhat greater than that found in older prisoners. The British Dyslexia Association, in conjunction with the Dyslexia Institute, is currently trialling at Wetherby YOI a training programme for education staff in understanding, teaching and supporting young people and adults with dyslexia.
Introduction

Dyslexia has been defined as “…a complex neurological condition which is constitutional in origin. The symptoms may affect many areas of learning and function, and may be described as a specific difficulty in reading, spelling and written language.” (BDA, 1995).

A variety of studies have reported higher rates of dyslexia among offenders than in the general population. Although this field is not without controversy, the number of such reported findings means that the matter cannot be dismissed, and further research on the subject is warranted. One of the core objectives of the youth justice system is the reduction of reoffending, rates for which are currently regarded as unacceptably high. Current government statistics indicate that 37% of juvenile offenders are reconvicted within one year (Home Office, 2005). The Home Office has set targets for reducing reoffending; education and training is viewed as a cornerstone of that initiative because being in stable employment reduces subsequent reoffending rates by between a third and a half. The British Dyslexia Association believes that, regardless of the actual incidence of dyslexia in this population, it is imperative that vigorous efforts are made to identify dyslexia amongst all offenders, so that appropriate and effective educational support can be provided to improve their occupational opportunities and reduce the likelihood of reoffending.

Identifying dyslexia in this special population presents a number of challenges (see Singleton, in preparation). Tools that are used for identification in the general population may not be entirely suitable for various reasons.

- Tests and assessments may be perceived as threatening by the prisoner or young offender, perhaps reminding him or her of the humiliation experienced when failing at school. In such circumstances, the person may simply refuse to be tested or not give their full attention and effort to the test, reducing the reliability of the results.

- Such instruments, having been developed and standardised on adults in other settings (such as universities, colleges and the workplace) may be less accurate or reliable when used to assess prisoner and young offenders, many of whom have not had ‘normal’ schooling. Educational and psychometric assumptions that are taken for granted when assessing other adults will not necessarily apply in offender settings.

- Identification procedures need to be swift, easy to administer and straightforward to interpret by personnel who are not necessarily experts in dyslexia. Particularly in juvenile and young offender institutions, the stay can be very brief, severely limiting opportunities to screen for dyslexia and begin tackling the problem. Identifying dyslexics amongst this population is therefore particularly time-sensitive.

- Conventional approaches to screening and assessment can be extremely time-consuming and require specially trained and appropriately qualified staff. This can hinder the swift and efficient identification of dyslexics so that they can be targeted for intervention.
For the reasons given above it was decided that a computer-based system for screening for dyslexia would be most suitable to use in this project. Previous research has shown that computer-based screening and assessments are typically found to be more acceptable and less intimidating that conventionally administered assessments, especially by children and adults with special educational needs (Singleton, 2000). This may be because the computer is seen as being more impersonal and not judgemental. These computer systems have been well-researched and conform to internationally recognised psychometric standards (Singleton, 2004).

Research background

The relationship between dyslexia and offending behaviour is contentious. It has been argued that dyslexia, particularly if undiagnosed or not properly addressed, increases the likelihood of educational failure, personal frustration, low self-esteem and social exclusion, with consequent greater risk of offending. This hypothesis finds support from many studies in the UK and elsewhere that have reported a higher incidence of dyslexia among offenders than in the general population (which is usually accepted at 5–10%). Using a computerised self-report rating scale, Kirk and Reid (2001) found that 50% of juveniles in the largest young offender institution in Scotland showed signs of dyslexia. The DYSPEL project, based in the London area, screened for dyslexia and found rates of 40–50% among offenders (Klein, 1998). Morgan’s pilot study within the DYSPEL project showed 52% of probationers to have strong indicators of dyslexia (Morgan, 1997). The STOP project revealed that 31% of their offender sample showed positive indicators of dyslexia (Davies & Byatt, 1998). A study by the British Dyslexia Association found a 56% incidence of dyslexia among young offenders in Bradford (BDA, 2004). Similar figures have been reported by several studies in Sweden: for example, Dalteg and Levander (1998) reported prevalences of dyslexia in samples of juvenile delinquents in excess of 50%. A study by Alm and Andersson (1997) found that 64% of a sample of Swedish prisoners were significantly handicapped by literacy difficulties and 31% had dyslexia. Jensen, Lindgren, Meurling, Ingvar and Levander (1999) also found that 41% of a sample of Swedish prisoners showed clear indications of dyslexia and a further 10% showed borderline characteristics.

The variation in incidence of dyslexia in different studies may be attributed to several factors, including how dyslexia is defined, what methods are used to identify it, and the age and nature of the offender sample. Studies employing self-report inventories, which are less objective and not as reliable as psychometric tests, have tended to find higher levels of incidence. In response to these studies, Rice (1999, 2001) has refuted a connection between dyslexia and offenders altogether, arguing that rates of dyslexia are no higher among offenders than they are in the general population. Rice argues that where social disadvantage could be a cause of poor literacy, dyslexia is a less plausible explanation for offending than that offered by social factors. He concluded from a study of 196 adult male prisoners that the incidence of dyslexia was about 6%, while 34% should be regarded as ‘ordinary poor readers’.

Studies using more rigorous assessment methods have generally produced somewhat lower incidence figures. Snowling, Adams, Bowyer-Crane and Tobin (2000) used psychometric tests to assess 91 male young offenders aged 15–17. In this sample, 57% had significantly poorer literacy skills than would be predicted from their non-verbal intelligence, 43% had had significantly poorer literacy skills than would be
predicted from their verbal intelligence, and 38% had specific phonological deficits. However, when those with IQs less than 85 were excluded, only 8% met criteria for dyslexia. Similarly, Svensson, Lundberg and Jacobson (2001) found that 50% of inmates in 22 juvenile institutions in Sweden showed problems in reading and spelling, although only 11% could be classified as having dyslexia based on the criterion of showing very poor phonological skills. Samuelson, Gustavsson, Herkner and Lundberg (2000) and Samuelson, Herkner and Lundberg (2003) also used poor phonological skills as defining criteria and reported incidence of dyslexia around 9-10% for adult prisoners in Sweden.

Turner and Allchorn (2000) screened 97 young offenders at Feltham YOI, testing their literacy skills and cognitive abilities. On the basis of discrepancy between predicted and actual levels of literacy attainment, together with specific diagnostic indicators, 17.5% of the sample were found to show evidence of dyslexia. Henderson (2004) studied 70 prisoners in HMP Brixton aged 17-19. Using a criterion of reading and spelling skills being below those expected on the basis of general ability, an incidence of 31% having dyslexia was found. However, when positive indicators of dyslexia, such as poor phonological decoding and low processing speed, are also used as key criteria, the incidence dropped to 25%. Finally, if those with low general ability were excluded, the incidence decreased to 14%.

The most recent study, carried out by the Dyslexia Institute in eight prisons in the Yorkshire and Humberside region, employed a combination of a screening interview to identify the likelihood of ‘hidden disabilities’ (including dyslexia, dyspraxia, attention deficit disorder, Asperger’s syndrome), followed up by a more extensive assessment (Dyslexia Institute, 2005). Indicators of hidden disabilities were found to be at a high level in 38% of the total sample of 357 prisoners. In the second phase, a subsample of 93 prisoners (comprising mostly participants whose high indicators of hidden disabilities were at a high level, but also some whose levels were borderline or low) were tested on intelligence, reading and spelling, as well as on diagnostic measures of short-term memory, information processing speed, and phonological skills. Of these, 19% were found to have both reading and spelling below levels expected on the basis of their intelligence. Using the criterion of reading below expected level together with evidence of specific difficulties on diagnostic tests, 14% were classified as having dyslexia. Using the criterion of spelling below expected level together with evidence of specific difficulties on diagnostic tests, 21% were classified as having dyslexia. The authors consequently concluded that “…the incidence of dyslexia is between three to four times that found in the general population.” (p. 24).

In summary, therefore, studies relying on phonological deficits as a key criterion for identifying dyslexia and studies where participants with below average IQ have been excluded have tended to report somewhat lower incidence rates of dyslexia – commonly in the same range as that for the general population. However, the phonological deficit criterion may be too restrictive, as the evidence that all dyslexics have phonological deficits is equivocal (for review, see Beaton, 2005; Beaton, McDougall & Singleton, 1997; Nicolson & Fawcett, 1995; Stein, 2001). Furthermore, given that dyslexia is an inherited neurological condition (Beaton, 2005) we should expect to see it distributed across the whole population: i.e. it should be just as common in persons of low ability as in persons of high ability. While the strategy of excluding all persons with IQs below 85 from any possible diagnosis of dyslexia (as in the study by Snowling et al, 2000) may perhaps be regarded as pragmatic for research
purposes because it avoids confounds between dyslexia and general low ability, this practice is unacceptable for educational purposes. Snowling et al readily admit that the generally low levels of reading ability found in this population, coupled with a high rate of intellectual deficits and lack of educational opportunities creates extreme difficulties in determining the incidence of dyslexia. Persons with IQs below 85 constitute about 17% of the general population but evidence indicates that the incidence is much higher in offenders (Barak, 1998; Beinart, Anderson, Lee & Utting, 2002; Sheldrick, 1995; Snowling et al, 2000). In the Dyslexia Institute study described above, approximately 60% had IQs below 85. If all these low ability at-risk individuals had been excluded from any possible identification process it is likely that many with dyslexia would have gone undetected. It is noteworthy that the report of that study comments: “We argue that in planning educational provision, it is not appropriate to use [an IQ] cut-off because hidden disabilities can occur at any level of ability. Indeed, it seems quite likely that those with hidden disabilities and additional difficulties with language and cognitive processing, as indexed by IQ tests, will find it even more difficult to make progress than those learners who are more able and who have additional compensatory resources to draw upon.” (Dyslexia Institute, 2005, p.24).

There are many factors that are known to be causal in offending, including low intelligence, social disadvantage, unemployment, adverse family experiences, and temperamental factors such as impulsivity (Farringdon, 2002, 2003; Rutter, Giller & Hagell, 1998). There are many different models of how dyslexia fits into this nexus (see Singleton, in preparation). A simple model of the link between dyslexia and offending might be called the ‘last straw’ hypothesis. According to this hypothesis dyslexia is just another factor, which, when added to the other predisposing factors is the ‘last straw’ that can tip the balance from non-offending to offending. Another possible explanation is the ‘causal chain’ hypothesis. Understanding causality in human behaviour often involves ‘chains’, where one factor leads to another, which in turn leads to a third, and so on. For example, in predicting delinquency from early developmental factors, family discord is a more significant factor than family poverty (e.g. Conger & Elder, 1994). On the other hand, lack of economic resources greatly increases the probability of discord in the family, and hence poverty can be seen as part of a causal chain. Similarly, since we know that dyslexia can be a cause of educational failure, that individuals who have not done well at school will find it harder to gain satisfactory employment, and that unemployment is a significant risk factor for offending, dyslexia could be viewed as part of a causal chain that increases the likelihood of criminal behaviour, rather than a direct cause of offending per se. This would be consistent with findings that levels of dyslexia are higher among unemployed adults. Lindgren and Ingvar (1999) found that amongst unemployed Swedish adults the level of dyslexia was 17%. A third possibility could be called the ‘amplification’ hypothesis, in which it is postulated that dyslexia amplifies the impact of social disadvantage on the individual because of a lack of personal resources to engage effectively with society. Such personal resources would not only include literacy skills and other educational attainments, but also the ability to organise day-to-day life.

It is apparent, therefore, that determining the incidence of dyslexia amongst offenders and establishing the relationship between dyslexia and offending are not trivial exercises. Probably our best estimates of incidence at the present time come from studies that have looked for a discrepancy between predicted and actual levels of literacy attainment together with a range of specific diagnostic indicators. Such studies have generally reported incidence rates in the region of 14-25%, which are somewhat
higher than those found by studies employing more restrictive (and, arguably, contentious) criteria but considerably lower than those reached by studies employing self-report and subjective rating scales, which may not fully address the issue of false positives. Any satisfactory theoretical model of the relationship between dyslexia and offending must account for a complex interaction of social, educational, and psychological variables. However, the fact that empirical research is still needed in this area, and that sophisticated causal models have yet to be devised, does not remove society's responsibility to identify dyslexia amongst offender populations and to address the educational needs of those who show indications of dyslexia. To neglect dyslexia as a potential causal factor in offending or to ignore the educational needs of dyslexic offenders would be to squander significant opportunities for reducing reoffending.

Identification of dyslexia

The question might be posed: since people with dyslexia typically have problems with reading, writing and spelling, why not simply measure those skills in order to identify the ones who have dyslexia? The problems with this approach are:

(a) the differences in literacy skills between dyslexic and non-dyslexic persons are largely quantitative rather than qualitative,

(b) such differences are also significantly affected by environmental factors, such as home background, social disadvantage and educational opportunity, and

(c) the development of compensatory strategies often masks such differences.

If one were to take a group of dyslexic and a group of non-dyslexic adults, statistically significant differences between these groups in reading, writing and spelling would almost certainly be found. But if one took an individual adult with dyslexia, he or she may have literacy skills in the average range (although probably below that which might be reasonably expected from their intelligence and education), while an individual adult who does not have dyslexia may have below average literacy skills. A screening test has to be capable of identifying which individuals do, and do not, have dyslexia to a reasonable degree of accuracy. For that purpose measures are needed that display higher levels of accuracy and reliability than are afforded by tests of literacy skills.

In the offender population the problem is complicated still further. When diagnosing dyslexia, educational psychologists frequently employ a ‘discrepancy approach’ of comparing actual levels of literacy attainment with literacy attainment predicted on the basis of intelligence. Although this approach is not without its critics (e.g. Frederickson & Reason, 1995; Stanovich, 1991) it does have practical and statistical merits. However, in offender settings the discrepancy approach is problematic because the correlation between literacy and intelligence is much lower in the offender population than in the general population. The reasons for this are that many offenders have not had ‘normal’ schooling and consequently have lower levels of literacy than would necessarily be expected for their general intelligence. As the discrepancy approach is based on a significant correlation between literacy and intelligence, its validity in the offender setting is called into question.

In practice, the more strongly psychological tasks rely on acquired knowledge (e.g. reading or vocabulary) the less suitable they turn out to be for dyslexia screening.
because results are likely to be confounded by educational factors. On the other hand, the cognitive difficulties that underpin dyslexia, not only phonological processing but also working memory and speed of lexical access, are much more fundamental and difficult to compensate. They are also less likely to be masked by factors such as insufficient schooling. There is extensive research evidence that, in adulthood, persons with dyslexia still exhibit limitations in tasks involving these cognitive skills (see Beaton, McDougall and Singleton, 1997; Gottardo, Siegel, & Stanovich, 1997; Hanley, 1997; Snowling, 2000; Snowling, Nation, Moxham, Gallagher & Frith, 1997). When educational psychologists assess for dyslexia, they use a wide variety of psychometric tests, many of which give clear diagnostic indicators of dyslexia (see McLoughlin, Leather & Stringer, 2002). The assessment process can take in excess of two hours and requires a high level of professional expertise in order to administer the tests, analyse the results and make a diagnosis allowing for non-assessed factors, such as educational background. The recent Dyslexia Institute (2005) study, reported in the previous section, used a combination of interview (taking about 45 minutes) and a series of psychometric tests (about 1 hour 40 minutes). Notwithstanding its merits as a research study, this approach is clearly impractical for widespread use in offender settings because of the difficulty of finding psychologists or other specialists with the requisite skills to administer and interpret such tests. It would also be prohibitively expensive and it is not clear how many prisoners would routinely cooperate or maintain concentration for such a long period of assessment. The conclusions of the foregoing are that a computer-based system capable of assessing the cognitive difficulties which underpin dyslexia offers the most favourable prospect for a screening method for use with offenders that is practical as well as effective. A computer-based system would not require a high level of professional expertise to administer and interpret, and would take a fraction of the time taken by comparable conventional approaches to screening. One such computerised system is currently available on the market: Lucid Adult Dyslexia Screening (LADS).

**Computer-based screening**

**Advantages of computer-based tests**

The advantages of computerised assessment and screening in educational settings have been explored by Singleton (see Singleton, 1997b, 2001, 2004). Computers provide more precise measurement, especially when complex cognitive skills are being assessed. Tests are administered in an entirely standardised manner for all persons taking the test, which enhances reliability of measurement. Timings and presentation speeds can be controlled precisely. The subjective judgement and variations in test delivery of the administrator do not affect the test outcome as they may in conventional tests. Research also shows that many people prefer computerised assessment to conventional assessment. Many adults – particularly those with reading or writing problems or who experienced difficulties at school – find conventional assessment by another person stressful and anxiety provoking, particularly when the assessor is viewed as being in the role of a teacher or some equivalent professional. By contrast, they are generally more relaxed and confident when taking computerised tests, and less worried about ‘getting something wrong’ (see Singleton, 2001).

Computer-based tests can be programmed so that they are ‘adaptive’, i.e. the performance of the individual taking the test is constantly monitored and the program
varies the items given according to patterns of success or failure on previous items. Computerised adaptive psychological tests have been shown to be significantly speedier and much more efficient than equivalent conventional tests because the person taking the test receives a smaller proportion of items that are too easy or too difficult, and a greater proportion of items that closely match the individual’s ability level. Adaptive tests require fewer items overall in order to achieve an equivalent level of accuracy and reliability of measurement, and so the cognitive load on the person taking the test is reduced. Test fatigue is lessened, and positive test motivation maintained (see Singleton, 1997b).

**Lucid Adult Dyslexia Screening (LADS)**

The program chosen for the current project was LADS (Lucid Adult Dyslexia Screening) which is currently the market leader in this field and is the only fully-standardised computer-based system presently available for adult dyslexia screening (Lucid Research, 2002). The company that produces LADS, Lucid Research Ltd, has been creating computerised screening and assessment systems for children and adults for more than ten years. Lucid’s programs are based on extensive scientific research and are currently used in over 6,000 schools and other establishments in the UK. Several foreign language versions have been developed and are in use in other countries. LADS was first published in 2002 and is currently used in well over a thousand establishments that provide education and/or advice for persons over 16 years of age, including universities, further education colleges, sixth form colleges, adult basic skills units, employment centres and careers advice centres (including Connexions). It is also used in some prisons and youth offender institutions, and by youth offending teams. In some settings, e.g. universities, LADS is used as an initial screening of individual self-referred students (usually in conjunction with an interview) followed by referral to an educational psychologist for a full assessment in cases where the program indicates that dyslexia is probable. This procedure is largely dictated by the regulations regarding evidence required in applications for Disabled Students Allowances in higher education. In other situations, e.g. further education colleges, LADS is often used as a general screening method applied to all entrants, using a networked version of the program designed to run on many computers simultaneously. In some settings, e.g. adult basic skills units and youth offender institutions, LADS may form part of an overall individual assessment by a special needs teacher, who will also administer conventional tests of literacy and other abilities in order to facilitate decisions about the most appropriate teaching and learning approaches for the individual.

LADS comprises four standardised adaptive psychometric test modules: non-verbal reasoning, word recognition, word construction, and working memory. It should be noted that the last three of these are dyslexia-sensitive tests that were specially developed for the purposes of screening but they do not provide conventional measures of reading and spelling ability *per se*. The non-verbal reasoning test was included to calibrate the word recognition and word construction tests so that very bright adults are not misclassified as false negatives, and to guard against misclassification of adults with low general ability being misclassified as false positives. The four tests are described below.

**Non-verbal reasoning** is an adaptive test involving matrix puzzles that can be solved by logical reasoning. Each item comprises a $3 \times 3$ matrix with the bottom right hand
square empty. The task is to choose which of six squares at the bottom of the screen complete the pattern logically. The results are scored on a ranking scale from 1 to 5, where 1 = lowest 10% of population (approximate IQ <80); 2 = next 15% (approximate IQ 80 – 89); 3 = middle 50% (approximate IQ 90 – 109); 4 = next 15% (approximate IQ 110 – 119); 5 = top 10% (approximate IQ 120+).

**Word recognition** is an adaptive test of lexical decoding involving speeded recognition of real words. In each test item, five words appear on the screen in random positions. Only one of these five is a real word; the other four are nonwords or misspellings of real words. Using the mouse, the person taking the test has to click on the real word as quickly as they can. This test draws upon automatized lexical knowledge and phonological coding skills.

**Word construction** is an adaptive test of speeded lexical encoding of nonwords from syllables. In each test item, the computer speaks a three-syllable nonword (e.g. ‘Subromast’) and the person taking the test has to click on the syllables that make up this nonword in the correct order, selecting them from an array of nine different syllables. This test draws upon automatized phonological skills and working memory.

**Working memory** is an adaptive test of backwards digit span. A sequence of digits is spoken by the computer, and the person has to enter these in reverse order from memory using the keyboard. The test commences with two digits in sequence, progressing incrementally to a maximum of nine digits in sequence. The task has to be completed as swiftly as possible.

*Figure 1. Example LADS report screen*
The LADS program takes 15 to 20 minutes to complete and the tests are adaptive, i.e. the computer automatically adjusts the difficulty of the items to match the ability and performance of the person being tested; each test terminates automatically once the task has become too difficult for that individual. This makes testing swifter and avoids unnecessary frustration and the emotional repercussions of being presented with tasks that are much too difficult.

No special training is required to administer or interpret the results of the LADS screening program as all administration is carried out by the computer, which uses an algorithm based on standardised data from normative studies to create an automatically interpreted report giving probability of dyslexia, as well as an estimate of non-verbal intelligence (see Figure 1 for an example). LADS scores for the three dyslexia sensitive tests are reported on a scale of risk, ranging from 1 (lowest risk) to 9 (highest risk). The scores within that range are not distributed normally in the general population as the vast majority of people obtain scores of 3 or below (i.e. low risk of dyslexia).

No screening system is 100% accurate since it is inherent within the technique of screening that a certain level of error or misclassification is inevitable. The accuracy of screening is indicated by the frequency of misclassifications made by the system. There are two types of misclassifications: ‘false positives’ are cases where a person who does not have dyslexia has been misclassified by the program as probably having dyslexia, and ‘false negatives’ are cases where a person who does have dyslexia has not been identified by the program. In educational screening it is generally accepted that false positives and false negatives should both be below 25% for the system to be regarded as having reasonable accuracy (Kingslake, 1982; Potton, 1983; Singleton, 1997a). The accuracy of LADS as a tool for identifying dyslexia was established by means of a number of validation studies, the details and results of which are reported in the administrator’s manual for the program. These validation studies, which were carried out on students in universities, colleges and adult literacy classes, found an overall classification accuracy of over 90%, with fewer than 4% false positive and 5% false negatives. The accuracy figures for LADS are therefore extremely satisfactory for a screening tool of this nature. However, it should be stressed that in the present project the program is being used with a sample drawn from a completely different population, for which the findings may be at variance.

**Phase 1**

**Method**

Phase 1 of the study was conducted during the Spring of 2004 and involved collecting data from an unselected sample of 116 male juvenile offenders aged 15–17 years at Wetherby YOI using LADS and conventional tests of reading and spelling (Wide Range Achievement Tests of Reading and Spelling, WRAT–3). The screening was carried out by Karen Thomas, Special Educational Needs Coordinator at Wetherby YOI, and her staff. The main aims of this phase were to discover how the offenders responded to the computer-based tests and how the LADS results related to reading and spelling ability.

The staff involved in carrying out the screening reported that hardly any of the juvenile offenders objected to doing the computer-based tests and that, in general, they showed a greater degree of enthusiasm for the computer-based tests than the
conventional tests. That is not to say that the juvenile offenders found the computer-based tests easy; quite the contrary, many spontaneously commented on how challenging they were. Nevertheless, most, if not all, seemed highly engaged in the computer-based tests and stayed on-task throughout, which suggests that from their point of view, at least, such tests are appropriate and acceptable. In general, staff found LADS easy to administer and thought that the results would be useful in their work.

Results

The overall results are shown in Table 1. (Note that the Total LADS score is the summation of the scores of three dyslexia sensitive tests; maximum 27.) The scores obtained on the non-verbal reasoning test enabled non-verbal intelligence to be estimated, which showed that the mean non-verbal IQ for the sample was 98.5. This is very close to average for the general population (100) and establishes that this is not a low ability sample per se.

<table>
<thead>
<tr>
<th>TEST</th>
<th>ALL PARTICIPANTS (n=116)</th>
<th>HIGH PROBABILITY OF DYSLEXIA (n=74)</th>
<th>NOT HIGH PROBABILITY OF DYSLEXIA (n=42)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LADS Reasoning</td>
<td>2.85</td>
<td>2.72</td>
<td>3.16</td>
</tr>
<tr>
<td>LADS Word Recognition</td>
<td>6.70</td>
<td>7.46</td>
<td>4.94</td>
</tr>
<tr>
<td>LADS Word Construction</td>
<td>5.72</td>
<td>6.81</td>
<td>3.19</td>
</tr>
<tr>
<td>LADS Working Memory</td>
<td>4.99</td>
<td>6.07</td>
<td>2.53</td>
</tr>
<tr>
<td>LADS total score</td>
<td>16.88</td>
<td>20.26</td>
<td>9.74</td>
</tr>
<tr>
<td>WRAT–3 Reading</td>
<td>90.97</td>
<td>85.94</td>
<td>100.46</td>
</tr>
<tr>
<td>WRAT–3 Spelling</td>
<td>76.01</td>
<td>72.73</td>
<td>83.19</td>
</tr>
</tbody>
</table>

The data for reading and spelling indicated that for the sample of 116 young offenders taken as a group, the mean reading accuracy (single word recognition) was just above the lower boundary of the average range (standard score 90.97; centile 27), while the mean for spelling was much poorer (standard score 76.01; centile 5). Almost two thirds (62%) had reading ages at secondary school level, the remainder being at primary school level (see Figure 2). 12% had exceptionally low reading ages in the 6–8 year old range. Over three-quarters had spelling skills at primary school level, leaving...
less than a quarter whose spelling was in the range expected of secondary school pupils (see Figure 3).

*Figure 2. Phase 1: the sample broken down by reading ages.*

*Figure 3. Phase 1: the sample broken down by spelling ages.*
Of the 116 participants, almost two-thirds (74) were classified by LADS as having a high probability of dyslexia (63.8%). (For ease of exposition the remainder of the sample will be referred to as the ‘Not high’ probability of dyslexia group.) Table 1 also shows the breakdown of results into the ‘High’ and ‘Not high’ groups. The Standard Scores (equivalent to IQs) for the mean LADS Reasoning results for the groups may be estimated as follows: All participants: 98.5; ‘High’ group: 97.2; ‘Not high’ group: 101.6. These differences are not statistically significant. Nor did the three groups differ significantly in age (All participants: Mean age 16.36 yrs; ‘High’ group: Mean age 16.26 yrs; ‘Not high’ group: Mean age 16.57 yrs). However, the ‘High’ group had significantly poorer scores than the ‘Not high’ group on both reading and spelling (F tests; p < 0.01) (see Figure 4). The ‘High’ group also had significantly higher risk scores than the ‘Not high’ group on each of the three dyslexia sensitive LADS tests as well as on the LADS total score (F tests; p < 0.01) (see Figure 5).

**Figure 4** Mean standard scores for LADS Reasoning, WRAT–3 Reading and Spelling, by group (Phase 1).

![Literacy and intelligence scores for Wetherby YOI, March 2004](image)

**Conclusions**

The results of Phase 1 of the study produced a higher-than-expected incidence of participants being classified as having a high probability of dyslexia (64%), implying an unacceptably larger number of false positives. Inspection of the data indicated that the mean for all three of the dyslexia sensitive tests in LADS was somewhat higher than usually found in non-offender samples. Results published in the LADS administrator’s manual indicates that scores for non-dyslexic adults are usually in the range 1 – 4 for each of the three dyslexia sensitive tests, with dyslexic adults mostly averaging in the range 4 – 8. In particular, a majority of the young offenders in the sample experienced problems with the word recognition test, which requires the person to quickly identify real words amongst non-words with similar visual and phonological characteristics. This was attributed to the relatively low level of spelling skills in the sample as a whole as well as to a general lack of fluency in reading, both probably being due largely to disrupted schooling. These findings suggest that in the offender population overall risk scores on LADS dyslexia sensitive tests are likely to be higher than in other
populations and that, in particular, the LADS word recognition test has lower
discriminating power than when used with non-offender groups.

The main conclusions from Phase 1 of the study were that as a screening tool
LADS was acceptable to this population and straightforward for staff to administer but
that in its standard form it produced an incidence of false positives that was
unacceptably high and consequently that some modification was desirable to improve
its screening accuracy when used in offender settings.

\[\text{Figure 5. Mean LADS scores by group (Phase 1).}\]

\[\text{LADS Results for Wetherby YOI, March 2004}\]

- Reasoning Word Recognition
- Word Construction
- Working Memory

\[\text{Phase 2}\]

\textbf{Method}

Phase 2 was conducted during the summer and autumn of 2004 and involved
collecting data from a selected sample of 36 male juvenile offenders 15-17 years at
Wetherby YOI, 18 of whom had shown high probability of dyslexia (the ‘dyslexic’ group)
and 18 who had shown low probability of dyslexia (the ‘non-dyslexic’ group). When
selecting these individuals, their profiles were examined carefully to ensure that they
were consistent with a dyslexic (or non-dyslexic) pattern to avoid false positive cases
being included in the sample. Any cases that seemed anomalous were excluded from
the study. The aim was to clarify the cognitive differences between the ‘dyslexic’ and
‘non-dyslexic’ groups in order to determine what modifications to LADS might be made
in order to improve its accuracy when used with offender populations. The measures
used included test of literacy skills (WRAT–3 Reading and Spelling), verbal intelligence
(British Picture Vocabulary Scale [BPVS], Second Edition); and phonological ability
(Phonological Assessment Battery [PhAB], Spoonerisms). Unfortunately, because of
unexpected subject attrition due to prisoners being moved at short notice, the data set
for the phonological skills test was incomplete and hence statistical comparison of the
groups on this measure was limited. The data were collected by Karen Thomas,
Special Educational Needs Coordinator at Wetherby YOI, and her staff, assisted by
staff of the Psychological Assessment Unit, University of Hull.
Results
The results of Phase 2 the study are shown in Table 2. Statistical analysis using t-tests showed that the dyslexic group scored significantly lower on tests of reading, spelling and verbal intelligence (all results significant at the p<0.01 level or better). Although it can be seen that low vocabulary skills were a characteristic of almost all participants the significant difference between the groups in verbal intelligence seems to have been due largely to a small number of participants in the non-dyslexic group achieving BPVS scores in the normal range. The mean score for phonological skills was substantially lower in the non-dyslexic group, which is consistent with well-established research findings of phonological difficulties in dyslexia persisting into adulthood (see Beaton, McDougall and Singleton, 1997; Gottardo et al, 1997; Hanley, 1997; Snowling, 2000; Snowling et al, 1997). However, in the present study, this difference was not found to be statistically significant, probably because of the small data set for this variable (only 19 of the 36 participants did this test) and also because of considerable variation in the scores for the dyslexic group, in which almost half the group achieved a score that equalled or exceeded the mean for the non-dyslexic group.

Table 2. Means and standard deviations of the dyslexic and non-dyslexic groups for the literacy and cognitive measures used in Phase 2.

<table>
<thead>
<tr>
<th></th>
<th>Reading</th>
<th>Spelling</th>
<th>BPVS</th>
<th>PhAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyslexic group</td>
<td>Mean</td>
<td>78.07</td>
<td>71.13</td>
<td>69.44</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>12.58</td>
<td>13.91</td>
<td>7.46</td>
</tr>
<tr>
<td>Non-dyslexic group</td>
<td>Mean</td>
<td>100.40</td>
<td>84.61</td>
<td>79.44</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>13.49</td>
<td>10.09</td>
<td>14.05</td>
</tr>
</tbody>
</table>

It is worth noting that use of spelling measures is not helpful for identification of dyslexia in this setting. Although the dyslexic group had poorer spelling than the non-dyslexic group, in fact almost all members of both groups had spelling skills well below expected levels for their age. This is in line with the results of Phase 1, in which the mean spelling score for the whole unselected sample was found to be 76. Although the results of this phase of the study suggest that reading may perhaps be more helpful than spelling for identification of dyslexia in this setting, use of this measure alone leads to misclassifications, as some members of the dyslexic group had reading accuracy scores in the normal range and some members of the non-dyslexic group had very low reading scores.

In the dyslexic group, higher verbal intelligence and better phonological skills were positively correlated with better reading (r = 0.75 and 0.90, respectively) and spelling (r = 0.68 and 0.69). In the non-dyslexic group, higher verbal intelligence and phonological skills were positively associated with better reading (r = 0.36 and 0.43), albeit to a lower degree than shown in the dyslexic group, but no significant relationship with spelling was found. Thus in the dyslexic group there appeared to be a fairly close relationship between literacy skills, vocabulary and phonological processing. This suggests that in the dyslexic group, better vocabulary skills and better phonological skills have a compensatory effect on reading and spelling. This finding held (but to a
lesser extent) for the non-dyslexic group as far as reading was concerned, but not spelling, which would be consistent with the view that the causes of poorer spelling amongst those in the non-dyslexic group are less connected with linguistic deficits but more probably with educational deficiencies. In the dyslexic group, on the other hand, poorer spelling appears to be more closely associated with deficits of a phonological nature.

Conclusions
The results of Phase 2 lend further support to the value of LADS as a screening tool for dyslexia in this setting, although it must be remembered that, in selecting participants for this phase of the study, care was taken to exclude any cases whose profiles appeared anomalous (such as the results being overly influenced by an exceptionally high risk score on the word recognition test) and who may therefore have been false positives. Such a procedure is clearly impractical in normal everyday use of a screening test, and consequently ways of modifying LADS to improve accuracy are needed.

Analysis of the showed that a very large proportion of the young offenders in this study – whether dyslexic or non-dyslexic – had low verbal ability, as measured by the BPVS. This is apparent in the pie chart shown in Figure 6. Only five out of the 36 participants had BPVS scores at 90 or above. The remainder had standard scores below 90, including 12 who had verbal ability scores below IQ 70.

Figure 6. Breakdown of the Phase 2 sample by verbal IQ

It should be remembered that LADS was originally validated as a screening tool using several samples of adults taken from three different categories: higher education, further education, and adult basic education. Since its release in 2002, LADS has proved to be a very effective and efficient way of identifying adults with dyslexia in these different sections of education, and is now used in a large number of institutions. When using LADS with young offenders or prisoners, however, it should be recognised that this is a different population to that for which LADS was originally designed. This group may be distinguished from the other categories in the following respects:
They are largely drawn from the most socio-economically disadvantaged sections of society.

Many have interrupted schooling and/or low levels of school attendance, especially in the secondary school period.

Few have any formal qualifications.

Reading skills are often poor and few read for pleasure. In Phase 1 of the study it was found that over one-third of the sample had reading ages at primary school level.

Spelling and writing skills are mostly well below average. In Phase 1 of the study it was found that the average spelling level was around the 5th percentile.

Hence identification of dyslexia in this population presents special challenges. Although the three diagnostic tests in LADS (word recognition, word construction and working memory) do not measure reading and spelling attainment in the conventional manner, they nevertheless demand a basic capacity to read and spell and also draw upon the cognitive skills that underpin reading and spelling, such as working memory, lexical access, and phonological encoding and decoding. The factors listed above help to explain why the average risk scores for the LADS diagnostic tests in Phase 1 are higher than in other unselected samples. The average score for word recognition is particularly high (6.7), indicating that in this sample the ability to distinguish correctly spelled real words from non-words and misspelled words of similar appearance is almost uniformly poor, reflecting limited experience with reading and writing.

Phase 1 of the study showed that if LADS is used in its present form for identifying dyslexia in young offenders and prisoners, an unacceptably high number of false positive misclassifications is likely to result. However, analysis of the results from Phase 2 showed that a very large proportion of the young offenders in this study had low verbal ability, as measured by the British Picture Vocabulary Scale. In part, this is likely to be due to educational and social disadvantage as well as to lack of reading experience. (By contrast, the average non-verbal ability of participants in both phases of the study was found to be within the normal range.) Low verbal ability is therefore not only a correlate of educational and social disadvantage but also of low literacy skills. This implies that in such cases, the decision rules employed by LADS need to be modified to make allowances for expected poorer performance in the dyslexia-sensitive tests. This could be achieved by incorporating into LADS an additional test to assess verbal intelligence. Where the results of this test show low verbal intelligence, lower levels of cognitive ability and poorer literacy skills would be predicted, and hence in such cases the program could make allowances for this in the algorithms it uses to classify individuals in terms of probability of dyslexia. This would also avoid exceptionally poor performance in one area (e.g. word recognition) triggering a false positive result.

The results from the present study, together with a consideration of findings from similar studies, indicate that it is critical to have an instrument for identifying dyslexia in this population which is designed to allow for low levels of reading ability, below average verbal intellectual skills, and lack of educational opportunities. Measures based on testing reading and other literacy skills directly are not adequate as these are likely to generate unacceptably high numbers of false positives. On the other hand, simply eliminating from consideration all those with IQ below 85 is not an
Practical solutions to identifying dyslexia in juvenile offenders.

Phase 3

Method
Phase 3 was carried out during early 2005 and involved administering a modified version of the computer-based screening test (‘LADS Plus’) with a new unselected sample of 62 juvenile offenders aged 15–17 years. The data were collected by Karen Thomas, Special Educational Needs Coordinator at Wetherby YOI, and her staff, assisted by Gemma Skinner, a final year undergraduate in the Psychology Department, University of Hull. LADS Plus was developed by Lucid Research Limited and made available to the project in prototype form. The differences between LADS and LADS Plus are:

1) LADS Plus incorporates a computerised adaptive test of verbal reasoning, which involves recognising conceptual links between pictured objects or scenes. For example, a picture of a tree and a picture of a butterfly may be linked by the verbal concept ‘nature’. The target concept is displayed as a word on the computer screen along with five distractor words, some of which have conceptual links with one or other of the pictures but not both. Although in this test words appear on the screen, the person can opt to hear these words spoken if they wish. The test therefore avoids confounding verbal intelligence and reading ability and hence is suitable for non-readers or poor readers as well as for individuals who have competent reading skills. This test of verbal reasoning has been standardised by Lucid Research Ltd on a large national sample of 15 – 17 year olds and has been validated against the NFER Nelson Verbal Reasoning Test.

2) The classification rules employed by the algorithms built into the LADS program have been modified so that where the results of the verbal reasoning test indicate low verbal intelligence, LADS Plus employs more conservative criteria when classifying individuals in terms of probability of dyslexia.

Results
The LADS Plus program excluded one prisoner as unclassifiable because his verbal and nonverbal IQs were both below 70 (lowest 2% of the general population). The results for the remaining 61 participants are shown in Table 3, where ‘Category’ refers to the probability of dyslexia.
The LADS Plus results showed that in this unselected sample, 31% had moderate or high indications of dyslexia. It can be seen from Table 3 that the mean total LADS score for this group was high, indicating a consistent problem for individuals in this group across the range of LADS dyslexia sensitive tests. Inspection of the intelligence results shows that the three groups did not differ significantly in nonverbal IQ, the means all being in the average range. The ‘low risk’ and ‘borderline’ groups also did not differ significantly in verbal IQ; again, the means were both in the average range. However, the dyslexic group (high to moderate risk) had a significantly lower mean verbal IQ, although it should be noted that almost half this group had verbal IQs in the average range.

Table 3. Categorisation of 62 juvenile offenders using LADS Plus screening (Phase 3).

<table>
<thead>
<tr>
<th>Category</th>
<th>No.</th>
<th>Percent of total sample</th>
<th>Mean total of LADS dyslexia sensitive test scores</th>
<th>Mean (&amp; SD) verbal IQ</th>
<th>Mean (&amp; SD) nonverbal IQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>22</td>
<td>36</td>
<td>11.95 (5.00)</td>
<td>92.11 (13.23)</td>
<td>97.95 (8.40)</td>
</tr>
<tr>
<td>Borderline</td>
<td>20</td>
<td>32</td>
<td>16.45 (4.47)</td>
<td>94.87 (9.48)</td>
<td>96.50 (13.68)</td>
</tr>
<tr>
<td>Moderate or High</td>
<td>19</td>
<td>31</td>
<td>23.37 (2.14)</td>
<td>82.07 (17.83)</td>
<td>94.47 (7.43)</td>
</tr>
</tbody>
</table>

Those in the ‘Borderline’ group tended to have significant problems on just one of the dyslexia sensitive tests (most commonly the word recognition test), while those in the low risk group generally had no difficulties on any of the dyslexia sensitive tests, or occasionally showed mild difficulties on just one of the dyslexia sensitive tests (again, typically, the word recognition test).

Conclusions

On the basis of the results obtained in Phase 3 of the study it would seem reasonably safe to conclude that about 31% of young offenders at Wetherby YOI have dyslexia. This incidence is somewhat higher than, but not inconsistent with, other studies of offenders that have employed detailed assessment of both cognitive and literacy skills, which have generally reported incidence rates in the range 14–25% (see previous section on Research background). However, some of those studies have been composed predominately of adult prisoners rather than juvenile offenders (e.g. in the Recent Dyslexia Institute study, 2005, more than 80% of the participants were over 20 years of age. Given the findings of the present study and those reported by Henderson (2004), it is possible that the incidence of dyslexia in younger offenders is somewhat greater than that found in older prisoners. Further analysis of data from the Dyslexia Institute study should be able to test this hypothesis.

The increase in screening time (from about 15 – 20 minutes using LADS) to about 20 – 30 minutes using LADS Plus) brought about by the inclusion of the verbal reasoning test was judged by staff at Wetherby YOI to be acceptable, particularly in view of the increased accuracy of screening and the greater amount of information obtained. Many of the young offenders said they found the verbal reasoning test extremely challenging, but none gave up or refused to attempt it.
Overall conclusions

In order to identify dyslexia in this population with an acceptable degree of accuracy and reliability a screening tool is required which is:

(a) easy and practical in administration,

(b) suitable for administration and interpretation by staff who are not necessarily experts in dyslexia, and

(c) designed to allow for low levels of reading ability, below average verbal intellectual skills, and lack of educational opportunities.

Conventional assessment and screening methods fail to meet these criteria. The young offenders in this study were of average non-verbal ability, but below average or low verbal ability. Reading skills were variable but about half the participants had basic reading ability within the average range for the general population. Reading fluency was weak, a characteristic that would be expected to be reflected in poor reading comprehension (which was not assessed in this study). Spelling ability was almost uniformly poor. These findings will come as no surprise to anyone working in this field and signify a group who have the normal range of intellectual potential but who have all too often failed to reach their potential because of social disadvantage, loss of educational opportunities and lack of reading experience. Their verbal and oral skills are consequently immature, and because they rarely, if ever, read, their reading comprehension remains undeveloped. Screening measures based on testing reading and other literacy skills directly are not adequate as these will inevitably generate unacceptably high numbers of false positives. On the other hand, excluding from consideration all those with IQ below 85 (as has been the case in some studies) is not an effective practical solution because it is likely to generate unacceptably high numbers of false negatives.

The results of the present study indicated that LADS is effective in identifying young offenders with dyslexia and acceptable to both those taking the tests and to staff administering the screening. LADS was found to be quick and easy to administer. However, modification of the program was considered desirable in order to reduce false positives. This was achieved by incorporating an additional test into the LADS program to assess verbal intelligence, which is used as an indicator of low literacy and cognitive skills due to likely social and educational disadvantage, and also by adjusting the classification rules employed by LADS.

Trials of a prototype of a new version of LADS, called ‘LADS Plus’, which included a verbal reasoning test, were successful and indicated that about 31% of young offenders at Wetherby YOI have dyslexia, a figure that is reasonably consistent with comparable studies that have used cognitive tests (as opposed to check lists and rating scales). A further 32% showed borderline symptoms of dyslexia; members of this group tended to have significant problems on just one of the dyslexia sensitive tests (most commonly the word recognition test). It is argued that a ‘borderline’ category is useful because it tells education staff that the individual has some problems although these are probably unlikely to be due to dyslexia. They could, for example, be due to failure to learn phonics when at school, or simply a lack of experience of reading and writing. The findings of this study, and some others, raises the possibility that the incidence of dyslexia in younger offenders is somewhat greater than that found in older prisoners.
The overall conclusions of this project are that computerised screening using the modified program LADS Plus is a practical and efficient solution for identifying dyslexia in juvenile offenders. However, it is recommended that further trials of LADS Plus should be carried out in other secure establishments and in different offender settings in order to establish the wider utility of the program as a screening method for dyslexia in offenders and to independently determine figures for false positives and false negatives. Few studies in this field have examined dyslexia in female offenders and this study was no exception. Future studies with LADS Plus should not neglect female juvenile offenders in order to ensure that the program is as effective in that population. Studies comparing delinquency risk factors of boys and girls have reported differential effects of education-related variables (Farrington & Painter, 2003) and hence it is possible that relationships between dyslexia and offending may differ across the sexes. The finding that 31% showed high probability of dyslexia in the present study suggests that the condition is a significant issue in the education of juvenile offenders. The British Dyslexia Association, in conjunction with the Dyslexia Institute, is currently trialling a programme at Wetherby YOI to train education staff in understanding, teaching and supporting young people and adults with dyslexia, and it is hoped that this will be extended to other institutions in the juvenile secure estate.

References


Practical solutions to identifying dyslexia in juvenile offenders.


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