Examining the association between language, expository discourse and offending behaviour: an investigation of direction, strength and independence.

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Abstract

Background

A high prevalence of Developmental Language Disorder (DLD) is reported in the population of Young Offenders (YO). However, little is known about the extent of the association between language and offending behaviour relative to social disadvantage, education attendance and non-verbal intelligence (IQ), and neither has this association been investigated with particular reference to the expository discourse abilities of YOs on community orders in the UK .

Aims

This study aimed to examine the direction and strength of the association between language and offending behaviour by comparing the receptive and expressive language and expository discourse abilities of male and female YOs and non-offenders in the UK, relative to the confounds of social disadvantage, years of education attended and non-verbal IQ. Examining expository discourse provided a measure of the YOs' ability to verbally communicate complex information; a communication ability that is fundamental to engaging effectively in youth offending services and secondary education.

Method

An opportunity sample of 52 YOs was recruited from a youth offending service. The YO group was matched on years of education, social disadvantage and non-verbal IQ to a purpose selected comparison group of 25 non-offenders. All participants had English as their first

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language and were not currently receiving any speech and language intervention. Participants completed standardized measures of receptive and expressive language and an expository discourse measure. The incidence of DLD was identified and compared across offender group using scores from the language and expository discourse measures and gender differences were also explored. Finally, logistical regression analysis was used to test the association between language performance and offending status relative to the confounds of social disadvantage, education attendance and non-verbal IQ.

Outcomes and Results

A large proportion of YOs scored below test norms for the language and expository discourse measures, which indicated a high incidence of DLD that was much larger than that displayed by the non-offenders. No differences were found on language performance between male and female YOs. Logistic regression analyses found that as language performance increased, the probability of being a non-offender significantly increased.

Conclusions and Implications

Participants were over 1 to 5 times more likely to be classified as a non-offender for every unit increase in the language and expository discourse scores. The statistically significant positive association found between language and offending behaviour relative to other confounds, highlights the important role of language in understanding offending behaviour. YOs displayed high incidences of DLD in their language and expository discourse abilities despite having not received any speech and language intervention prior to their involvement in this study. This has implications for their effective engagement in education and in youth

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offending and criminal justice services (CJS). Professionals in education, health and social care and youth justice should be made aware of the language needs of both YOs and children with emotional behavioural difficulties, and these language needs should be identified and targeted as early as possible to enable them to be effective communicators who can engage effectively in their provision.

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Key words: language, offending, expository discourse

Section 1: It is now accepted that Developmental Language Disorder (DLD) is identified frequently in Young Offenders (YOs). However, the ability of YOs to verbally communicate complex information through expository discourse has not been measured. This is a language skill crucial to their effective communication in Criminal Justice Services (CJS). Furthermore, the extent of the association between language and offending behaviour relative to social disadvantage, education attendance and non-verbal IQ has not been established in YO populations in the UK.

Section2: Developmental language disorder must be identified in YOs as well as children and young people at risk of offending behaviour. Such identification should lead to support and intervention to enable these young people to be effective communicators.

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Introduction

Approximately 60% of Young Offenders (YO)s in the UK have Developmental Language Disorder (DLD) (Bryan, 2004; See Anderson et al 2016). This figure varies across international studies from 52% in Australia (Snow & Powell, 2008), to 19% in the USA (Sanger et al, 2001). Language is a system containing rules that support the process of linguistic comprehension (receptive language) and production (expressive language), (Bernstein & Tigerman, 1985). The rules that govern language development relate to the formation of language (phonology, morphology and syntax), the content of language (semantics) and the use of language (pragmatics) (Bloom & Lahey, 1978), all of which can be assessed either at a word or sentence level, or through use of extracts of discourse (Bernstein & Tigerman, 1985).

To date, research has not compared the language abilities of YOs in the UK to a matched comparison group of non-offenders. Such a comparison is needed to understand if DLD is specific to offending behaviour or a result of confounds that are associated with both language and offending behaviour such as social disadvantage (Clegg et al 2015), educational attendance (Ministry of Justice, 2013) and non-verbal intelligence (IQ), (Clegg et al, 2015).

The only study to control for the above confounds of social disadvantage, education attendance and non-verbal IQ when comparing the language abilities of YOs to a matched group of non-offenders was conducted in Australia by Snow and Powell (2008). Using standardized language assessments, the scores of a group of male YOs were found to be significantly below those of a younger aged comparison group and over half of the group was identified as language impaired (LI) as identified by scores that fell 1 standard deviation (SD)

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below the comparison group's mean. The authors discuss the strong evidence for the global language impairments present in their sample and propose that this can be partly explained by their low socio-economic status and the socio-linguistic repertoires intrinsic to this. Snow and Powell (2008) suggest that the YOs' language impairments may have prevented them from accessing and engaging in the verbal instruction provided by school teachers in the classroom.

A high proportion of YOs experience considerable social disadvantage during their lives (White & Cunneen, 2006). Social disadvantage can be defined and measured by narrow criteria, such as low household income or by broader factors that encompass social and cultural capital such as occupation, health, social mobility and geographical location (Abercrombie & Warde, 1988). In comparison to the general population and in comparison to children and young people residing in areas of social advantage, language scores for children and adolescents attending schools in areas of social disadvantage have been shown to be significantly lower (Spencer et al in press; Spencer, et al 2012; Locke et al 2002). An individual's early communication environment, maternal language input and experience of parent/carer child interaction are cited as instrumental in language development. Social disadvantage is considered to impact negatively on these early childhood experiences, subsequently resulting in negative implications for children's language development and school readiness (Roy & Chiat, 2013; Roulstone et al, 2011; Hoff 2003; Hart & Risley, 1995).

The extent to which social disadvantage and these associated environmental factors contribute to language development in the older child and adolescent is unclear. The role of

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the early communication environment, maternal input and parent/carer child interaction is thought to lessen over time, with the school environment and other social and cultural factors becoming more important, e.g., the role of literacy in language learning and the different language learning environments the young person experiences (Roulstone et al 2011). Educational attendance and attainment are also implicated. YOs are more likely than their non-offending peers to experience fewer years in education (as a result of school absence, school exclusion or leaving school early) which can subsequently impact on their language and literacy development (Snow et al, 2014) and increases the risk of poor psychosocial adaptation and social marginalisation. Much more research is needed to understand the potential impact social disadvantage has on children's and adolescents' language learning over time and the subsequent impact this has on educational engagement, attainment and psychosocial functioning.

Research identifying the predictive value of non-verbal IQ on language development is limited, and so the validity of using non-verbal IQ as part of the discrepancy criteria for Specific Language Impairment (SLI) has been questioned (Bishop, 2014). A retrospective analysis of cohort data has identified non-verbal IQ as a correlate of emotional and behavioural outcomes (Clegg et al 2015) and non-verbal IQ is still recognised as a correlate of language ability (Wetherell et al 2007). On this basis, non-verbal IQ should be controlled for when examining the extent of the association between language and offending behaviour.

Understanding the association between language and offending behaviour is important to the youth justice sector. A social adaptation model of language and behaviour (Redmond & Rice,

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1998) proposes that young people with DLD may lack the necessary communicative repertoires that are important for successful social exchange. This may contribute to the use of alternative aggressive means of communicating that can be evident in communicative exchanges between YOs and authority figures in the education and YJS (Hopkins et al, 2016; Sanger et al, 2003). Difficulty participating in formal situations that require listening, communication and the ability to understand domain specific vocabulary may also be evident (Hopkins et al, 2016; Snow, Powell & Sanger, 2012; Snow, 2013b). The association between language and literacy (Snow et al 2014) shows that young people with developmental language and literacy disorders are more likely to fall behind their peers and disengage from school education, especially where language skills such as expository discourse are central to the school curriculum content (Nippold et al, 2008). Young people with DLD are also more likely to be excluded by their typically developing peers, thus increasing the risk of further school disengagement and offending behaviour (Snow & Powell, 2008).

The ability to produce a coherent narrative is one aspect of expressive language that is regarded as important for a variety of settings, including the youth justice service (YJS) and is therefore an important skill for YOs to master (Snow & Powell, 2008). Narrative involves the ability to coherently structure and convey information from a real or fictional story of events, in a chronological order (Longacre, 1983). Research has found that YOs perform poorly on assessments of narrative discourse in addition to results obtained from standardized language assessments (Snow & Powell, 2008).

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Another form of discourse that is important for effective communication, particularly in the context of education and youth justice is expository discourse. Expository discourse is defined as language that conveys knowledge of technical and factual information specific to a given topic (Bliss, 2002). Whilst both types of discourse contain evaluation as part of their structure, expository discourse is comprised of and organised around other informative structural subtypes that include the definition of terminology, description of concepts, and the explanation of procedure, all of which are specific to factual information. This is in contrast to the summary and reflection of a temporally organised story of events (Bernan & Nir, 2010; Bliss, 2002; Hadley, 1998; Longacre, 1983). Expository discourse also differs from narrative discourse in that it is logically organised through comment on cause and effect and through comparison and contrast of ideas and objects that are the focus of the subject area (Longacre, 1983). Narrative discourse is temporally organised and is more focused on agency (Nelson, 1996; Longacre, 1983; See Lundine & McCauley (2016), for a review and comparison of the linguistic properties of narrative and expository discourse).

Expository discourse involves the ability to verbally communicate complex information and has not been measured in the YO population in the UK. This skill is required for successful engagement in secondary school education subjects such as science and maths, where young people are expected to verbally explain and describe a concept or method as well as infer, evaluate and analyse complex relationships between variables (Nippold et al, 2008). In addition, expository discourse is required for successful participation in the YJS where YOs are expected to describe cause and effect and coherently verbalise their understanding of contractual rules, correct legal procedures and specific terminology incorporated within the

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YJS and in court proceedings (Hopkins et al, 2016; Communications Trust, 2014; Snow, Powell & Sanger, 2012). YOs are also expected to discuss and formulate an informed opinion of specific concepts, such as peer influence or victim awareness that form offender management intervention or restorative justice conferences (Communications Trust, 2014; Snow, Powell & Sanger, 2012).

The ability to verbally express complex information using expository discourse requires complex language skills that are associated with adolescent language development, such as the increased use of subordinate clauses (Nippold et al, 2008). It is this increase in syntactic complexity that presents expository discourse as unique in comparison to other forms of discourse, such as narrative (Nippold et al, 2009, 2008, 2007). For example, Scott & Windsor (2000) found that a group of 11 year old children with language learning disability produced shorter utterances measured through main and subordinate clauses, compared to a group of typically developing children matched on chronological age. Longer utterances were produced by both groups on an expository discourse task in comparison to a narrative task.

There are additional benefits in measuring the language of YOs using expository discourse alongside the use of standardized language measures. Facilitating production of expository discourse through a description of (for example) a favourite known sport, is not only relevant for the specific population but also controls for the variance in familiarity, knowledge and experience of content of which can limit standardized expressive language measures (Dethorne & Watkins, 2006). It should be recognised however that obtaining expository discourse samples can result in a lack of experimenter control, due to the non-standardisation

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of stimulus, procedure and analysis. Guidance and protocols have been researched and applied to clinical administration though (Heilmann & Malone, 2014).

Another variable under researched in the area of language and offending behaviour is gender. With the exception of Snow et al (2016) and Sanger et al (2001), research has focused on male YOs presumably due to the higher ratio of male to female YOs (Youth Justice Board, 2015; United Nations, 2003). Importantly, research has identified a significant proportion of female YOs in custodial settings also have DLD (Snow et al 2016). However more needs to be known about the language and communication abilities of female YOs compared to male YOs.

The aim of the study was to further examine the strength and direction of the association between language and offending behaviour by comparing the receptive and expressive language and expository discourse abilities of YOs and non-offenders on community orders in the UK, relative to the confounds of social disadvantage, education attendance and non-verbal IQ. The study also aimed to explore the impact of gender on the association found between language and offending behaviour by comparing the language and expository discourse abilities of male and female YOs.

In order to meet the aims of the study, the following questions were posed:

1. What is the incidence of DLD for YOs and non-offenders based upon their performance on the receptive, expressive language and expository discourse measures?
2. Are there any gender differences in the receptive and expressive language and expository discourse abilities of YOs?

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3. Does language performance predict offender status, and what is the strength of this association relative to the confounds of social disadvantage, education attendance and non-verbal IQ?

Method

Design

The study was a cross-sectional design, in which the receptive and expressive language and expository discourse abilities of a group of YOs were compared to a group of non-offenders, matched on social disadvantage, educational attendance and non-verbal IQ.

Participants

G power software was used to estimate the appropriate number of participants required for a statistically significant effect (Faul, et al, 2007). Incorporating this independent design with an alpha level of 0.05 and based upon strong effect sizes obtained in similar research (Snow & Powell, 2008) it was estimated that a group of 40 would be sufficiently large to detect a moderate effect size.

Young offenders (YOs).

An opportunity sample of 52 YOs was recruited from a local community youth offending service in the North of England. The inclusion criteria stipulated that YOs were on court orders and not in custody or on intensive supervision plans. None of the YOs was receiving any speech and language therapy (SLT) to control for the influence it may have on test

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performance and all had English as their first language. YOs were not excluded from the study if they had received SLT intervention prior to their involvement in this study. The aim was to obtain a sample of YOs that represented the typical demographic of the youth offender population, thus no other exclusion criteria were applied.

All YOs were serving court orders for their offences, which ranged from 4-18 months (mean: 10 months). The YOs were aged between 13 years and 18 years (mean: 16 years) and 46 were male and 6 were female. The majority of the YOs were of white Caucasian ethnicity (n=33) and 11 were of mixed ethnicity. The remaining 8 YOs were of an ethnic minority background (Black Caribbean or Asian Pakistani). The majority of the group had committed assault or robbery either as separate crimes or in addition to others. Other crimes committed included public order offences, criminal damage, vehicle theft and drug possession.

Non-offenders

Information letters were sent to 5 head-teachers of secondary schools that were purposively identified as being situated in areas of social disadvantage (see below for information on this criteria) and 2 of these schools responded, to express an interest in participating. The Special Educational Needs Co-ordinator (SENCO) of both schools sent out information letters and consent forms to the parents of the Year Nine students, (the reason for this is discussed in the education section below), of two classes identified by the school's SENCO. Signed parental consent forms were returned by 25 students aged between 13-14 years who had agreed to participate.

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Identical inclusion and exclusion criteria were applied during recruitment of the non-offender group, though they also needed to have never received a formal warning by police and had no criminal record. By consenting to the study, participants and their parents stated that they did not have a criminal record, which was then confirmed by the school. Of the 25 non-offenders, the majority of the group was male (n=14) and of mixed ethnicity (n=14), consisting of Black Caribbean, African American or Asian Pakistani young people.

Social disadvantage

Information about social disadvantage was obtained by comparing the school's post-code to the National Indices of Multiple Deprivation (NIMD; Great Britain, Department for Communities and Local Government, 2011). Any school that resided in a local area identified as being in the bottom half of the deprivation index (equating to an index score of 5 or less according to the NIMD; Great Britain, Department for Communities and Local Government, 2011) had higher than average free school meal figures (FSM), lower than average General Certificate of Secondary Education (GCSE) pass rates and was classified as being situated in an area of social disadvantage. Using this criteria, 73% of the YOs and all of the non-offenders were identified as attending schools in areas of social disadvantage. For the schools residing in areas of social disadvantage, the mean percentage of students on FSM was 56% and the mean percentage of students with at least five GCSEs at grades A-C was 36%. A high percentage of these schools (72%) were situated in the bottom 10% of all neighbourhoods within the city according to the NIMD (2011).

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Education

Educational attendance from Year One to Year Eleven (or the participants' current school year if younger) was obtained from the YJS for the YO group. This data was available for 49 of the 52 YOs and all the non-offender group via school attendance registers.

To identify how many days the YOs had missed school, the total days attended for each young offender was compared to the 190 days per year expected in the UK (Great Britain, Department For Education; DfES, 2012). The YO group had missed a mean number of 532 days, equating to a total of 2.8 years (1.5SD) of education missed. In order to match the non-offender group with the YOs on educational attendance, specific inclusion criteria were applied to the recruitment of non-offenders, resulting in the recruitment of young people who had 8 years educational attendance (currently attending Year nine). The non-offender group's yearly attendance at secondary level was also obtained to check the extent to which this group accurately matched the overall 8 years of education attended by the YOs. The mean overall percentage of education attended by the non-offenders over this 3 year period was 96%, reflecting high school attendance (2.6SD). The low variability associated with this figure shows it accurately represents the group's overall attendance. A small amount of variability was present in the number of days of education attended each year by the YOs (1.5SD) despite the presence of outliers that, when removed, did not significantly alter the group's overall mean number of years missed. It was for this reason that all the data was included in the analysis.

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Out of the 49 YOs for whom educational data was available, 44 had received a statement of special educational needs (SEN), with emotional and behavioural difficulties (n=35) as the most common, followed by moderate learning difficulties (n=14), .dyslexia (n=7) and autism (n=1). A child or young people with a learning disability is statemented with an educational need by the local authority to ensure that sufficient support is provided to them and their family (DFE, 2015). However, this has been recently replaced by an educational health care plan (DFE, 2015). In comparison, only 1 of the 25 non-offenders had received a statement of SEN for a learning disability.

Language measures

Expository discourse

Expository discourse was measured using the task from the Systematic Analysis of Language Transcripts (SALT; Miller & Chapman, 1985). Within this task, participants discussed the rules of a sport or game that they were familiar with. Assessors then evaluated participants' ability to discuss different components of the sport/game, scoring each one out of five before calculating a total. The expository scoring scheme from the SALT software was used to score the speech extracts, which contained elements required for either a minimal, emerging or proficient description of each game component. The components that were scored included; object of the game, preparations, start, course of play, rules, scoring, duration and strategy. Participants were also scored on their ability to define specific terminology and provide a coherent description of the game. It was decided that due to students' varying knowledge and familiarity of sport and games, television game shows could also be included as they still

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corresponded to the above assessment criteria. The protocol specified in the SALT guidelines was adhered to by the researcher, which involved the use of open questions but avoiding interference or leading questions. Planning time was also provided for the participants, to enable them to write down any thoughts/prompts they had for the corresponding sections. All the discourse extracts produced by participants were audio recorded for analytical purposes.

To control for scoring bias, reliability was checked by comparing the researcher's scores on all discourse samples with those obtained from two final year students enrolled on a speech and language therapy degree, who were independent to this study. Both students were experienced and trained in scoring expository discourse using the SALT software.

The researcher randomly allocated half of the transcripts to each student, omitting participant information to achieve blinding of group membership. High inter-rater reliability was achieved evidenced by high percentage point agreements of 80% and 86% when each student's overall category rating for each participant was compared to the researcher's total category ratings for each participant.

Subordination index

Clausal density was used to measure the syntactic complexity of the discourse samples. This was achieved by segmenting the discourse samples into Communicative Units (C-units), which enabled a subordination index (SI) ratio to be calculated. A C unit is defined as a speech utterance containing a main clause (including a verb and a noun) and any additional subordinate clauses attached to it (Hunt, 1970). Subordination index is the ratio of clauses

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(main and subordinate) to C-units present in the discourse sample. For each discourse sample, the transcription accuracy and the accuracy of SI and C-unit scoring were checked by 2 speech and language therapists who listened to the recordings and were trained in coding for clausal density using the SALT software. By reviewing each C-unit for every speech sample, the raters highlighted any incorrect transcription or scoring, which was then altered accordingly after discussion between the researcher and the two therapists: this resulted in a 100% agreement for the transcription and scoring of each language sample.

Expressive vocabulary

Measures of expressive vocabulary that were considered in each discourse sample and that were scored using the SALT software, included mean length of utterance (MLU), the total number of words (TNW) and total number of different words spoken (NDW). These measures have been reported to correlate significantly with one another in language samples obtained from typically developing children, which has been explained by links to expressive vocabulary as well as morphosyntactic development (Dethorne, Johnson & Loeb, 2005).

The SALT contained a normative sample of scores from 87 typically developing American students who were situated in Madison and Milwaukee. These scores were compared to the raw scores obtained for expository discourse, expressive vocabulary, and subordination index, to identify the extent of language disorder that existed in the sample of YOs. As the language sample was not standardized, there are no statistical measures that can be used in order to confirm reliability or validity, however this normative language sample is often used to aid the clinical diagnosis of expressive language difficulty (Heilmann & Malone, 2014).

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Listening Comprehension and Recalling Sentences (from the UK CELF-4, Semel et al 1995).

The Understanding Spoken Paragraphs (USP) and Recalling Sentences (RS) subtests are standardized formal language assessments, with the former measuring receptive language (Semel, et al 1995) and the latter verbal working memory (Poll et al 2013). These assessments have been used before in research with YOs (Gregory & Bryan, 2011; Snow & Powell, 2008; Sanger et al, 2003) as they measure aspects of language ability considered to be essential for YOs' successful participation in the youth justice system. Listening comprehension was measured using the USP subtest obtained from the Clinical Evaluation of Language Fundamentals (CELF-4, Semel et al 1995). This measured participants' ability to answer questions relating to novel, factual information they had heard from a short paragraph, thus measuring participants' ability to comprehend expository text (Nippold & Scott, 2010). Due to the demands listening to and producing expository discourse has on working memory, participants' ability to recall information verbally immediately after listening to it was also assessed using the RS subtest from the CELF-4. This subtest has been identified as measuring aspects of working memory as well as expressive syntax (Poll et al 2013; Snowling, et al 1991). The number of errors were noted, determining a score for each sentence, which was then totalled. Total raw scores for both subtests were then transformed into scale scores using the UK standardized norms of the CELF-4, enabling comparison to UK age norm scores. The CELF-4 is shown to have high reliability and validity as a measure of language, demonstrating excellent test sensitivity and specificity levels in the ability it has to accurately identify the presence of DLD in samples of language disordered and typically developing children (Semel,

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et al 1995). The subtests were chosen based upon good test-retest correlations and high Cronbach Alpha scores demonstrating high reliability (Semel, et al 1995).

Non-verbal IQ

Groups were matched on non-verbal ability ($p>0.05$), which was established using the matrices task from the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). This task required participants to detect a common pattern from a series of figures. Raw scores were totalled and converted to a scaled T-score, which was used to compare to age norms. Both groups had a mean score that fell below the age equivalent normative mean, with the YOs scoring -1.2SD compared to the non-offenders scoring 0.8SD below. The WASI is also reported to have strong reliability and validity based upon high internal consistency scores, test-retest correlations and the strong positive correlations it has with similar non-verbal tests (Wechsler, 1999).

Procedure

Managers in the local Youth Offending Team (YOT) agreed to support the study after being approached by the researcher. The YOs were recruited via their caseworkers at a local youth offending service. The researcher volunteered to support offender workshops and group activities that were organised and managed by the restorative justice charity REMEDI. This provided the researcher with an opportunity to spend more time with the YOs informally, which helped the researcher develop a rapport and trusting relationship with the YOs.

Informed consent was obtained for each YO. For those who were under 16 years of age, parental consent was also obtained verbally. Verbal consent was the preferred option as it

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was considered that speaking about the study would help clarify points for parents, enable them to ask questions, and in turn increase their understanding of the study. The procedure for establishing parental verbal consent involved the researcher reading out the information sheet and answering any questions parents had about the study. Each part of the consent form was then read out and answers were recorded. A copy of the consent form was sent out to the parents. Of those YOs who consented to the study and required parental consent, all of the parents approved their child's participation.

Data collection took place at the local youth offending service during the YOs scheduled appointment with their caseworker in order to avoid disrupting routine. YOs met on an individual basis with the researcher and total assessment time lasted no more than 1 hour for each YO, occurring over a number of sessions. Two sessions was the average number required to fulfil assessment completion for each YO, ranging from one to three sessions and the total time for each session ranged from approximately 10 minutes to 1 hour. To minimise the possibility of order effects, the sequence of assessments was randomly generated by the YO who chose a number that signified one of the three tasks.

For the recruitment of the comparison group, letters were sent to the parents of year nine students and parental consent was requested. For those who returned their parental consent form, the researcher met with the student to discuss the project again, making sure all the information was understood before the student agreed to consent.

Data collection took place in the school during school time with the researcher present and each assessment session lasted no longer than 1 hour in total. To comply with safeguarding

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procedures of the schools and the YJS, staff were present in the near vicinity and could be made available during the session if required.

Ethical permission for the study was granted by the University of Sheffield, via the Research Ethics Committee of the Department of Human Communication Sciences, as well as from the local city council. Participants who completed all aspects of the research study were given the opportunity to win several £15 shopping vouchers, which were awarded through a randomised raffle on the completion of the data collection stage of the study.

Mean raw scores of both groups were compared to each other and to the standardized test norms. The raw scores of the YOs were then statistically compared to the matched non-offender group's raw scores. Inferential statistical testing investigated the association between spoken language ability and offending behaviour. As one of the variables (offender group) was categorical, logistic regression analysis was conducted to investigate the likelihood of the language scores significantly predicting group status above the probability of chance ($p<0.05$).

Results

The mean age of the offender group was 16 years and so the group's mean raw scores were compared to the normative mean score of a 16 year old obtained from the CELF-4's UK standardized norms. To be certain that the group mean age of 16 years accurately reflected the group's overall language ability, the group was split using the mean age. Independent t-tests revealed no significant difference between scores on any of the language measures for YOs younger and older than the mean age ($p>0.05$).

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The YOs had missed a mean of 2.8 years of education and so the YOs mean language score was also compared to the normative mean score expected for a 14-year-old on the CELF-4. The norm of the SALT for the relevant expressive language measures matched the age range of both the YOs and the non-offenders. The mean raw scores obtained from the non-offender group were compared to the normative mean score expected for a 14 year old using the CELF-4, based upon the mean age of the group. There was little variation in age within this group because the non-offenders were in the same year of education. For the USP subtest, age norms were based on specific subtest stimuli and as the non-offenders were given the 15-16-year-old subtest stimuli to match with the YOs, comparisons to the CELF-4 15-16-year-old UK norms were made.

What is the incidence of DLD for YOs and non-offenders based upon their performance on the receptive, expressive language and expository discourse measures?

According to the standard deviation for each language measure the YOs did not meet the subtest norm irrespective of whether this was in comparison to the 16-year-old or 14 year old norm (Table 1). In comparison, the non-offenders performed closer to the subtest means (Tables 2-4).

[Insert table 1 about here]

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Table 3 shows a possible incidence range of 69% to 100% (excluding the RS test) and an overall mean percentage of 81% for DLD in this sample of YOs using a criterion of -1SD from the 16-year-old subtest norm and similar rates of incidence were found when results were compared to the 14-year-old subtest norm (with the exception of SI). Even when using more conservative criterion of -2SD from the 16-year-old subtest norm, high incidence of DLD are still found for some subtests ranging from 40% to 95%, (with the exception of the RS and total number of words measure) and a mean percentage of 44% of YOs met this criterion. In addition, over half of the sample met this criterion of DLD for the USP subtest, MLU and expository discourse task. Significantly fewer non-offenders were scoring either -2SD or -1SD from the 14-year-old subtest norm on each of the language measures, yet over half of the non-offender group were scoring -1SD below the test norm on the expository discourse and MLU measure.

Are there gender differences in the receptive and expressive language and expository discourse abilities of YOs?

Due to the small sub-sample of females that formed the YO group, the possibility of gender difference on language performance for the YO group was examined before the relationship between language and offending was analysed. Independent T-tests revealed no significant difference ($p>0.05$) between male and female YOs on any of the language measures and the same result was found for the non-offenders. As a result of this finding, the female and male YO scores for each language measure were conflated to form one YO group and the same

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procedure was applied to the non-offenders in order to examine the overall relationship between offending and language performance.

Does language performance predict offender status and what is the strength of this association relative to the confounds of social disadvantage, education attendance and non-verbal IQ?

To identify the extent to which each language measure predicted the category of offender status, a series of binary logistical regression analyses was conducted. Normal distribution was checked and found for all language measures apart from total number of words and number of different words, which was solved using square root transformation (Field, 2009).

The assumption of multi-collinearity was met as evident by adequate Variable Importance in the Projection (VIP) figures and tolerance levels (Field, 2009) and the Durbin Watson figure obtained by the model (1.87) showed sufficient independence of residuals between predictors, given the sample size and number of predictors (Durbin & Watson, 1971). Finally, the assumption of linearity was also met as there were no significant correlations between each language assessment and its own transformed log score ($p<0.05$) (Field, 2009).

Results from the binary logistical regression analyses (Table 2) revealed a statistically significant association between all predictors and the offender group ($p<0.05$). This association can be interpreted as a positive one based upon the positive b values and odds ratios above 1 (due to the numerical scoring of the grouping variable on the Statistical Package for the Social Sciences software), by which language scores increased the likelihood of being a non-offender. Small to medium effect sizes were found for all the language measures,

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signalling a small to medium associative strength between offender group and language performance, with the smallest effect found for the RS subtest. The beta values highlight the total number of words and different words, MLU and subordination index as strong predictors of offender group. Corresponding log odd ratios for these predictors include odds ranging from 1.5 to 4.8, suggesting that for every 1 unit increase in language score for each of these measures, the odds of being categorised as a non-offender increased by approximately 1.5 to 4.8 times.

A larger number of females had been recruited to the non-offender group in comparison to the YO group and so a post-hoc logistical regression analysis was conducted to explore the extent to which gender interacted with the association found between language and offender group association (beyond its main effect). No interaction effects were found to be statistically significant ($p>0.05$).

[Insert table 2, 3, 4, about here]

Discussion

This study aimed to further investigate the direction and strength of the association between language and offending behaviour in YOs on community orders in the UK, relative to the confounds of social disadvantage, education attendance and non-verbal IQ. In this study, language was assessed using a standardized measure of receptive and expressive language alongside an expository discourse measure. Analysis of the descriptive mean scores identified

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lower levels of ability on each independent language measure in the YOs compared to the non-offenders, and performance on each language measure significantly predicted offender group status as shown by the small to medium effect sizes obtained from the regression analyses. Participants who scored poorly in each language measure were over 1 to almost 5 times more likely to be classified as YOs, supporting the evidence for an association between language and offending behaviour. The inclusion of a non-offender control group in this analysis, who were matched on social disadvantage, education attendance and non-verbal IQ, show this association to be independent of these confounds (Snow & Powell, 2008).

Expository discourse has not been previously measured in a sample of YOs. The ability to successfully verbalise the rules and details of a game or sport also depend upon an individual's vocabulary and syntactic complexity. During the developmental stages of adolescence, novel words are introduced to the lexicon and students are required to verbalise complex concepts efficiently (Nippold et al, 2007). In this study, the YOs had a smaller range of vocabulary and a low level of syntactic complexity based on their MLU, number of different words and SI scores. The YOs were more likely to use basic conjunctions such as 'and' as opposed to 'because' or 'however', which were more apparent in the non-offender extracts. Nippold et al (2008) also found adolescents with specific language impairment produced expository discourse that contained lower MLU, in comparison to typically developing adolescents.

The low scores obtained on the expository discourse measure shows that YOs find verbally communicating complex information challenging. This supports the findings of poor narrative discourse skills in the population of YOs studies by Snow and colleagues (Snow & Powell, 2008,

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Snow & Powell, 2005). Taken together, these findings support the need for YOs to be supported to be more effective communicators.

Comprehension difficulties were also identified as shown by the YOs' scores on the USP subtest, a measure of listening comprehension. This subtest measures the comprehension of novel, factual information, often referred to as expository text (Nippold & Scott, 2010). Adolescents with language difficulties find processing this type of information difficult (Nippold, 2010). Snyder and Caccamise (2010) discuss the information processing and storage demands on working memory that support the successful comprehension of expository text. This includes the ability to store and select appropriate information (including contextual cues) whilst simultaneously ignoring irrelevant information (see Nippold & Scott, 2010). YOs may therefore have difficulties that are associated with these working memory processes in addition to their language problems. The poor performance of the YOs in this study on the RS subtest in comparison to the non-offenders supports this as this subtest is considered to tap into auditory working memory, as well as expressive syntax (Poll et al, 2013; Snowling et al, 1991). However, only a weak effect was found between offender group and performance on the RS subtest.

The YOs scored below the subtest norms in every aspect of language measured. The variability with which the YOs deviated from the subtest norms ranged from just under 1SD to -3SDs. Research varies on the criterion used to identify DLD, applying differences of 1SD to 2SD below subtest norms and by applying this to the YOs' scores, DLD would be identified in approximately 81% and 44% of YOs. These percentages are based on the overall mean

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percentage of YOs that scored 1SD and 2SD below the norm in at least one subtest (Table 3). If a liberal criterion (-1SD) was applied to this sample of YOs, then most male and female YOs (at least 69% excluding RS scores) would be labelled as having a DLD warranting speech and language intervention. The high incidence of DLD found in the YOs in this study, supports findings from other UK based studies (Gregory & Bryan, 2011; Bryan et al, 2007.) In addition, the percentage of female YOs who scored at least -1SD below the subtest norms, closely resembles the reported incidence of DLD found for the population of female offenders in the UK (RCSLT, 2012). However, the small sample of female YOs recruited to this study means that this comparison is based only on estimated incidence figures. A more reliable estimate of the incidence of DLD in the female YO population in the UK would be obtained with a larger sample of female YOs, as that will enable greater statistical power to accurately account for the contribution gender has on the association between language and offending behaviour. In this study, no statistically significant differences were found between the language performance of male and female YOs. This finding supports research reporting high incidences of DLD in male and female YOs when male and female YOs have either been studied separately (Gregory & Bryan, 2011; Snow & Powell, 2008; Sanger et al 2001) or have been recruited as one sample and compared (Snow et al 2016). Despite differences in the reported incidence of DLD in YOs compared to community estimates, research that has compared male and female YOs conclude that this difference is greater in male YOs (Snow et al 2016).

The incidence of DLD in the non-offender group was much lower when compared to the YOs, with an average of 37% based on performance at least -1SD below 14-year-old subtest norms,

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which reduced to an average of 13% when the stricter criterion of -2SD below the subtest norms was applied. It is noteworthy however, that a significant percentage of non-offenders would still potentially be identified as requiring support for DLD when applying a criterion of 1SD below the subtest norm. This differs to the reported 10% prevalence rate of DLD found in adolescents within UK secondary mainstream schools (Joffe, 2015). A potential explanation for this difference could be that parental concern regarding their child's language ability may have inflated the number of young people consenting to the study, and that these young people were more likely to have unidentified DLD. The matching of the non-offenders to the YOs on social disadvantage suggests that social disadvantage may also contribute to the higher than expected rates of DLD for some of the non-offender group, given that their school attendance was good. However, complex and multi-factorial associations are identified between social disadvantage, language development, learning and educational attainment, and subsequent psychosocial adjustment including mental health and offending behaviour (Bryan et al, 2015; Clegg et al 2015; Snow et al 2016, Snow, 2009; Cohen, 2001).

In addition to the low language abilities identified within the YO group, almost all had received a statement of special educational needs (SEN). A high incidence of SEN is reported in the YO population (Ministry of Justice, 2013) and the high number of YOs recruited to this study that had SEN may have been a result of caseworkers concern for potential language problems as a result of YOs' recognised educational needs. The majority of the YO group had statements of special educational needs for emotional behavioural difficulties. DLD is known to have a high comorbidity with other developmental disorders including emotional and behavioural difficulties (EBD) (Snow et al, 2016; Mackie & Law 2010; Ryan & Redding, 2004).

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YOs in this study were on community orders having all committed less violent interpersonal crimes compared to research with YOs on custodial sentences, where offending severity has been documented as being associated with language performance (Snow & Powell, 2011). Despite this, a large percentage of YOs in this study displayed DLD, suggesting DLD to be prevalent in YOS regardless of offending severity.

This is the first UK study to find an association between language and offending behaviour independent of educational attendance, social disadvantage and non-verbal IQ. The Social Adaptation Model (Redmond & Rice, 1998) is helpful in considering how language may operate within this association. Based upon evidence comparing children with and without SLI (Redmond & Rice, 1998), the model proposes that children compensate for their language limitations by applying behavioural and verbal strategies that impact on their social interactions and relationships (Redmond & Rice, 1998). Young people with poor language skills may fail to understand verbal instructions provided and may be unable to communicate their distress and concerns to others in a presentable and socially acceptable manner. Not only can this affect self-esteem and mental health but it may also result in an increasing amount of stress and frustration for the young person, which can manifest in challenging and or aggressive behaviour leading to offending behaviour (Hopkins et al, 2016; Snow & Powell, 2011; Snow & Powell, 2008; Sanger et al, 2003).

In light of this study's findings, the important role expressive and receptive language has for participation within the youth justice system and in education should be acknowledged. YOs in custody and in the community have themselves commented on the demand for strong

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language skills, e.g., speaking and listening in formal court settings and police interviews as well as understanding the complex vocabulary that is used by professionals in these settings (Hopkins et al, 2016; Sanger et al, 2003). Snow (2013a) details the high language demands required of YOs on community orders participating in restorative justice conferences. These require the YO to listen to victims of crime, whilst being expected to communicate empathetically and verbalise their thoughts and feelings. A high level of language and communication ability is needed to do this effectively and this study suggests that YOs will find this challenging. As a consequence, YOs may be viewed negatively and perceived as displaying a lack of remorse for their actions (Snow, 2013a, b). In addition, it is likely that the YOs' DLD will negatively impact upon their successful engagement in verbally mediated offender management and intervention programmes (Snow, 2013a, b; Snow et al 2016) although this has yet to be empirically tested. Staff delivering management and intervention to YOs should therefore be made aware of YOs' possible language limitations and should collaborate with speech and language therapists in the youth justice service to ensure that the needs of the YO are met and their engagement in such services is supported. It would be beneficial for research to explore the extent of which professionals in the YJS and secondary education collaborate along with the SLTs as well as their experience of this and the perceived success it has on the young person.

The curriculum of secondary education also requires strong language skills, including expository discourse (Nippold et al, 2008). The language difficulties of the YOs may have impacted on their engagement in the school curriculum and may also explain their low school attendance (Hopkins et al, 2016; Snow & Powell, 2008; Sanger et al, 2003). The long term risks

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associated with DLD have been documented (Clegg et al, 2005) and it is likely that poor expressive language ability in areas such as expository discourse that rely on the ability to convey and explicate complex information, are associated with poor outcomes educationally, socially and vocationally (Nippold & Scott, 2010). Providing speech and language therapy services in secondary education is also therefore important, especially in schools located in areas of social disadvantage where young people may be more at risk of language difficulties and of offending.

The YOs were recruited to this study on the basis that none of them was receiving any current input from a SLT. However, despite high incidences of DLD found in this sample of YOs, it transpired that none of the YO group had ever received any SLT. This finding suggests that these language difficulties are often hidden, masked by the more overt emotional and behavioural needs that are perhaps more likely to be identified by the relevant services working with YOs (Bryan et al, 2015; Snow & Powell, 2008; Sanger et al, 2003). This emphasises the importance of increasing awareness of DLD to all staff engaged with both YOs and children with educational health care plans for emotional behavioural disorder. It also highlights a need for implementing a means of assessing and identifying DLD, by using a care plan approach similar to that used for other health-education needs, in order to promote successful long-term psychosocial and employment outcomes (House of Commons, 2016). Further research should establish the causal nature of the relationship between language and offending behaviour by longitudinally following subgroups of children deemed at risk of offending, such as those that have emotional behavioural needs, those who are located in areas of social disadvantage and those who have poor educational attendance.

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Evidence of the effectiveness of speech and language intervention on behavioural outcomes for YOs and young people with emotional behavioural needs would also provide strong evidence for the association that exists between language and behaviour and would strengthen the claim for a higher provision of SLT in education and YJS.

Limitations

Whilst this study supports an association between language and offending behaviour independent of the confounds discussed, a small non-significant ($p>0.05$) group difference in non-verbal IQ scores may have contributed to the difference found in language performance of both groups. Future studies should continue to compare non-verbal ability and language performance of YOs to their non-offending peers, in order to validate the strength of the association that exists between language and offending behaviour.

Measurement limitations include the measurement of social disadvantage, which was assessed only by matching the school post-code with the NIMD (2011) and using school performance data. The latter two were considered useful measures of social disadvantage based upon the multiple factors of social disadvantage they incorporate, which are validated by theoretical definitions of social disadvantage (Abercrombie & Warde, 1988), as well as having been used in previous research (Ripley & Yuill, 2005; Locke et al 2002). To increase the validity of research that aims to measure social disadvantage, future studies could consider using multiple measures. For example, in addition to the use of school data and school location, home post-code and parental income have often been used to measure socio-

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economic status, especially when families may not always live in the same post-code as their child's school (National Center for Education Statistics, 2012). However, justifying and explaining the need to obtain this personal data in relation to complex and sensitive concepts, such as social disadvantage, may prove difficult and could result in limited consent and access to such data. Recruiting YOs to research such as this, is often difficult enough and so obtaining data that is considered to be less sensitive but is still in accordance with the theoretical constructs of social disadvantage may be the preferred option.

Similarly, the measurement of non-verbal ability was limited to the inclusion of the Matrices task (Wechsler, 1999). Different non-verbal IQ tasks have been shown to measure varying factors: the matrices task is associated more with fluid intelligence, whilst other activities, such as block design or memory tasks, measure visual processing and short-term memory – use of a range of measures would enable researchers to obtain a multidimensional measure of non-verbal IQ (DeThorne & Schaefer, 2004).

The expository discourse task asked participants to explain a sport or game that they were familiar with, but the level of knowledge they had on the topic was not measured. Previous knowledge has been shown to affect performance on expository tasks such as this (Nippold et al, 2007), which could account for the low MLU, NDW and TW scores. However, participants were given time to plan what they were going to say to help them cover the required topics. Research that investigates the expository discourse abilities of young people should consider controlling for subject knowledge to rule out the effect it may have on language performance.

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The normative sample obtained from the SALT database was formed from a small sample of typically developing American students in Madison and Milwaukee in the USA. It is possible that existing differences between the demographic of this normative sample and the same of YOs recruited for this study, contributed to the large differences found in language performance between both groups, inflating the incidence of DLD found in this group of YOs. In addition, the procedure used to obtain parental consent prior to young person consent for the non-offender group may have resulted in a biased sample that may not have fully represented a hard-to-reach low socio-economic status comparison group. In order to reduce the possibility of such a sample bias, parents were informed of the study through accessible leaflets and young people were reminded about the project on numerous occasions through class registration and year assemblies.

Gender is known to impact on language development and competence, with females often performing at a higher level in English across all the key stages, in comparison to males (Department for Education and Skills, 2007) and the fact that the majority of the offender group were male could have confounded the association found between group and language ability in this study. However, it was found that gender did not interact significantly with the association found between language and offender status. In addition, similar language scores were obtained for both male and female YOs, indicating a high incidence of DLD found for both sub-groups. The difference in the number of female and male YOs recruited to this study may not be surprising given the disproportionate ratio of male to female YOs (78% to 22% respectively) that enter the YJS (YJB, 2015). Whilst recruiting a larger number of female YOs within the UK would also help to establish a more accurate understanding of the language

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and communication needs that exist within this sub-group, realistically, this may be difficult to achieve. It is perhaps then more important for clinical purposes, to emphasise the finding that all YOs in this study displayed low language profiles that need targeting.

The methodological option to match the YOs with the non-offenders on education attendance was preferred over the alternative option of age matching. This resulted in a younger control group, which may have inflated the language difference found between both groups. However, the fact that the YOs in this study as well as YO samples reported in other research miss a significant amount of education (Snow & Powell, 2008), justifies the need to control for the impact education absence can have on language development (Snow et al, 2014).

It was anticipated that recruiting YOs to the study would be enhanced by the researcher spending time within the youth offending service and meeting staff and YOs through the participation in various social activities and intervention groups. As a result of this effort, the researcher was able to build up a strong level of trust and a rapport with the YOs, which is believed to have helped recruitment. YOs felt able to ask questions about the study, were not suspicious and did not feel embarrassed about revealing any potential language difficulties to the researcher. Having opportunities to build positive relationships with staff in the youth justice system, particularly with the caseworkers also provided more opportunities to access the YOs and speak to them about the project. It is also believed that gaining trust from the YOs' caseworker also helped the researcher accrue acceptance from the YO. It is therefore recommended that future research continues to at least consider adopting a slightly more ethnographic approach to recruiting YOs in the community setting, to increase the possibility

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of obtaining larger sample sizes. In addition, obtaining informed consent was helped by the use of simplified information sheets and consent forms that contained visual aids to promote the understanding of the study for YOs with language difficulties. The researcher went through the sheets with both the YO and their caseworker together, checking their understanding through the use of open questions that asked for validation on points. Caseworkers were also provided with the information sheets to enable them to discuss the study with the YO first, which also prepared them for possible future discussion with the researcher.

It is important to consider the implications of limited language skills on YOs' participation in education and in the youth justice system. Qualitative research has explored the perceptions YOs have of their language, literacy and communication, revealing that YOs are very aware of their abilities and difficulties (Hopkins et al, 2016; Sanger, et al 2003). To increase our understanding of the impact language difficulties have on youth justice, more qualitative and quantitative research is needed in order to investigate the language demands of specific verbally mediated interventions that take place within the YJS, such as restorative justice conferences (Snow et al, 2016, Snow 2013a).

Conclusion

High incidences of DLD were identified in both male and female YOs and logistical regression analyses revealed that increases in language and expository discourse scores significantly increased the probability of being categorised as a non-offender.

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Examining the association between language, expository discourse and offending behaviour: an investigation of direction, strength and independence.

The complex and multi-factorial associations between language, social disadvantage, educational engagement and educational attainment are well documented. This is the first UK study to find an association between language and offending behaviour that is independent of these confounds. This study supports findings from Snow and Powell (2008) (who also compared the oral language abilities of Australian YOs to a matched group of non-offenders) but builds on their research by exploring other aspects of spoken language i.e., expository discourse, which are essential to participation in youth justice and secondary education that have not previously been studied in both male and female YOs.

In this study, YOs displayed difficulties in aspects of language that are essential for successful participation in the YJS. To minimise the risk of future offending and disengagement with intervention, professional services that intervene with young people at risk of offending should be aware of the impact and association language has with offending behaviour. Professional services should include those working with parents and families, educational staff such as teachers and SENCO leads, psychologists, and youth justice staff. None of the YOS had received any speech and language therapy prior to their involvement in this study despite displaying high incidences of DLD, yet a large proportion of the group had received statements of emotional behavioural difficulty. It is therefore possible that the language needs of this group were hidden behind the emotional behavioural difficulties that were more overtly displayed and attended to by professional services. It is therefore important that all children and young people who are either in contact with the YJS or are considered at risk of doing so, are screened for DLD and provided with the appropriate support from SLTs. This is to ensure both that intervention is implemented early on as part of preventing future

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offending and also to promote engagement and participation, socially and vocationally, in order to ensure that young people with behaviour difficulties are not socially marginalised (Bryan et al 2015; Gregory & Bryan, 2011; Snow & Powell, 2008).

Table 1: Mean raw scores obtained for youth offenders and non-offenders and their variability from the language subtest norms (SD).

	Young Offenders				Non-Offenders			
Language Assessment	Mean score	Variability from the 16year old subtest norm (Standard Deviation)	Variability from the 14year old subtest norm (Standard Deviation)	Valid N	Mean score	Variability from the 16year old subtest norm (Standard Deviation)	Variability from the 14year old subtest norm (Standard Deviation)	Valid N
*Understanding Paragraphs	7.2	-2.0SD	-1.87SD	45	11	0.3SD	NA	25
*Recalling Sentences	70	-1.0SD	-0.78SD	39	77.5	NA	-0.1SD	25
**Expository Discourse	16.4	-3.7SD	-3.55SD	42	24.2	NA	-1.9SD	25
**Subordination Index	1.3	-1.7SD	-1.56SD	42	1.6	NA	-0.1SD	25
**Mean Length of Utterance	7.7	-2.4SD	-2.4SD	42	10	NA	-0.9SD	25
**Number of Different Words	107	-1.6SD	-1.3SD	42	169	NA	-0.55SD	25
**Total Number of Different Words	173	-1.7SD	-1.55SD	42	401	NA	-0.55SD	25

- *These language items were assessed using the Clinical Evaluation of Language Fundamentals (CELF -4; Semel et al 1995).
- **These items were assessed using the Systematic Analysis of Language Transcripts (SALT; Miller & Chapman, 1985).
- NA: Standard deviation not appropriate

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Examining the association between language, expository discourse and offending behaviour: an investigation of direction, strength and independence.

Table 2: Results obtained from a series of binary logistical regression analyses for each language predictor with offender as the categorical variable.

Language Assessment	Logistic regression reporting	Model correct classification	Effect size	Odds ratio (Confidence Intervals)
Understanding Paragraphs	b=0.42, Wald $X^2(1)$=16.2, p=0.000.	76% (84% YOs 60% non-off).	0.28	1.5 (95% CI,1.2-1.8).
Recalling Sentences	b= 0.057, Wald $X^2(1)$ = 5, p=0.025.	64% (80% YOs, 40% non-off).	0.09	1.06 (95% CI, 1-1.1).
Expository Discourse	b=0.27, Wald $X^2(1)$=16.9, p=0.000	81% (88% YOs, 68% non-off).	0.34	1.31 (95% CI; 1.15-1.5).
*Subordination Index	b=1.58, Wald $X^2(1)$=12.38, p=0.000,	70% (81% YOs, 52% non-off)	0.26	4.89 (95%CI; 2.0-11.8).
Mean Length of Utterance	b= 0.81,Wald $X^2(1)$=15.04, p=0.000	73% (83% YOs, 60% non-off).	0.33	2.25 (95%CI; 1.5-3.4).
Total Number of Words	b=0.45, Wald $X^2(1)$, =17.2, p=0.000	79% (86% YOs, 68% non-off).	0.4	1.57 (95%CI; 1.27-1.94)
Total Number of Different Words	b=0.53,Wald $X^2(1)$-12.9, p=0.000	75% (83% YOs, 60% non-off).	0.24	1.7 (95% CI; 1.27-2.27)

*SI scores were standardized to control for the over inflation of b values and log ratios attributed to measurement differences between the predictor and outcome variable (Weusch, 2016).

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Table 3: The percentage frequency of YOs scoring in accordance with the language subtest norms expected for a 16-year-old.

Language measure	Number and percentage of YOs scoring at least -1SD below the norm for a 16 year old.			Number and percentage of YOs scoring at least -2SD below the norm for a 16 year old.		
	Whole group	Male YOs	Female YOs	Whole group	Male YOs	Female YOs
Understanding Paragraphs (15 year old norm)	35/45 (78%)	30/39 (77%)	5/6 (83%)	26/45 (58%)	22/39 (56%)	4/6 (67%)
Recalling Sentences	17/39 (44%)	15/34 (38%)	2/5 (40%)	5/39 (13%)	5/34 (15%)	0/5 (0%)
Expository Discourse	42/42 (100%)	37/37 (100%)	5/5(100%)	40/42 (95%)	37/37 (100%)	3/5 (60%)
Subordination Index	29/42 (69%)	27/37 (73%)	2/5 (40%)	17/42 (40%)	17/37 (46%)	0/5 (0%)
Mean Length of Utterance	41/42 (98%)	37/37 (100%)	4/5 (80%)	27/42 (64%)	24/37 (65%)	3/5 (60%)
Total Number of Words	39/42 (93%)	35/37 (95%)	4/5 (80%)	0/42 (0%)	0/37 (0%)	0/5 (0%)
Total Number of Different Words	35/42 (83%)	32/37 (86%)	3/5 (60%)	20/42 (48%)	20/37 (54%)	0/5 (0%)

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Table 4: The percentage frequency of non-offenders scoring in accordance with the language subtest norms expected for a 14-year-old.

Language measure	Number and percentage of non-offenders scoring at least -1SD below the norm for a 14 year old.	Number and percentage of non-offenders scoring at least -2SD below the norm for a 14 year old.
Understanding Spoken Paragraphs (15yr old norm)	6/25 (24%)	3/25 (12%)
Recalling Sentences	6/25 (24%)	2/25 (8%)
Expository Discourse	20/25 (80%)	9/25 (36%)
Subordination Index	3/25 (12%)	0/25 (0%)
Mean Length of Utterance	13/25 (52%)	1/25 (4%)
Total number of words	8/25 (32%)	0/25 (0%)
Total number of different words	9/25 (36%)	1/25 (4%)

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