

RESEARCH REPORT

Language disorder and internalizing mental health problems in youth offenders: A systematic review

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Abstract

Background: The prevalence of language disorder in youth offenders far exceeds rates reported in community samples. Youth involved in the justice system are also at increased risk of a range of psychiatric disorders, including internalizing mental health problems (i.e., anxiety, depression). However, the frequency with which these co-occur in this population is not known. Understanding the co-occurrence of language disorder with anxiety and depression in youth offenders may contribute to more coordinated and targeted support for these vulnerable youth.

Aims: To explore the co-occurrence of language disorder and anxiety and depression in youth offenders.

Methods & Procedures: A systematic literature search of six databases (CINAHL, ERIC, Medline, PsycINFO, PubMed, Scopus) was conducted (September 2021) using key search terms relevant to the systematic review question. Study inclusion criteria were: (1) original research published in English; (2) youth up to 21 years of age involved in the justice system; and (3) reported outcomes on language and anxiety and/or depression. All included studies were appraised using the Joanna Briggs Critical Appraisal tool checklist relevant to study design. Due to the heterogeneity of included studies, data synthesis was narrative.

Main Contribution: Eight studies met the eligibility criteria. A range of measures was used to assess language abilities across samples. Only two studies directly addressed the relationship between language disorder and internalizing mental health problems; both found no significant correlation.

Conclusions & Implications: Although the results did not support a significant relationship between language disorder and internalizing mental health problems in youth offenders, the two appear to occur comorbidly as evidenced by heightened rates of both in the included samples. This review highlights the need for more robust studies aimed to better understand this relationship. Stronger evidence may contribute to increased collaborative speech pathology

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and psychology services which might increase youth offenders' accessibility and engagement in intervention programmes (e.g., cognitive-behaviour therapy; interpersonal skills training; individual counselling).

KEYWORDS

anxiety, depression, language disorder, mental health, youth offenders

WHAT THIS PAPER ADDS

What is already known on this subject

- The markedly high rates of language disorder in youth involved in the justice system have been widely reported. It is also known that externalizing mental health problems often bring youth in contact with the justice system. Though there is some information about the prevalence of internalizing mental health problems in this population, the co-occurrence of language disorder and internalizing mental health problems has not been examined as widely.

What this study adds to existing knowledge

- This study aimed to identify the frequency of co-occurrence of language disorder and anxiety and/or depression in youth offenders. Although the results did not support a significant relationship between language disorder and internalizing mental health problems in this population, results of the review provide evidence of heightened rates of both. This study also provides a summary of the various measures used to assess language and internalizing mental health in youth offenders across the eight studies included in this review.

What are the potential or actual clinical implications of this work?

- It is possible that the tests and sub-tests used to identify language disorders and internalizing mental health problems were not sensitive enough to identify the full extent of youth offenders' needs. Identifying the presence of language disorders and internalizing mental health problems and recognizing the impact these may have on the communication and behaviours of an individual can better inform staff and therapists as they engage and interact with youth in the justice system.

INTRODUCTION

Communication competence is globally recognized as one of five critical life skills as it enables individuals to express their opinions, needs, fears and desires and interact in positive ways to maintain relationships (Bryan et al., 2015; World Health Organisation (WHO), 1997). The WHO (1997) established that effective communication is a skill used by individuals to manage the demands and challenges of everyday life. Language skills form a core component of communication because they comprise the ability to send and receive information during oral exchanges

and through written language (e.g., reading/writing). A range of language difficulties can result in problems with this exchange including poor understanding and use of language, limited or reduced vocabulary and grammar, poor higher level language skills (e.g., problem-solving, sequencing), and difficulty interpreting contextual and non-verbal cues to make inferences about others' thoughts and feelings (Bishop et al., 2017; Blanton & Dagenais, 2007; Gregory & Bryan, 2011; Im-Bolter & Cohen, 2007; Snow & Woodward, 2017). Individuals who show evidence of difficulties that emerged during development with no known acquired or associative cause are said to have a

developmental language disorder (DLD); if an associated condition is present, they are said to have a language disorder associated with 'X' condition (Bishop et al., 2017). The term 'language disorder' will be adopted throughout this article to capture both DLD and language disorders associated with 'X'.¹ Rates of language disorder vary depending on the criteria used for diagnosis, but Tomblin et al.'s (1997) rate of 7.4% from an epidemiologic study in the United States is most commonly cited. A population study conducted in the UK reported nearly the same rate (7.58%) (Norbury et al., 2016).

The range of problems that individuals with language disorder experience can have a significant impact on their ability to engage in everyday interactions with others (Bishop et al., 2017). This is because language disorder can reduce their ability to initiate, and then sustain, social interactions with others (Im-Bolter & Cohen, 2007). Problems with higher level language skills such as narrative discourse, inferencing, and the ability to use and understand figurative language, lead to increased social miscommunications, difficulty coping in social environments, and peer-relationship issues (Anderson et al., 2021; Im-Bolter & Cohen, 2007; Speech Pathology Australia (SPA), 2018). Ongoing communication breakdowns can lead to feelings of isolation and loneliness, as well as increased irritability and aggression (Speech Pathology Australia (SPA), 2018). This puts people at increased risk for comorbidity of psychiatric disorders including both internalizing (e.g., depression, anxiety) and externalizing (e.g., conduct disorder, attention deficit/hyperactivity disorder, substance abuse) mental health problems. In their longitudinal study, Bao et al. (2016) examined the prevalence of psychiatric disorders in a sample of 19-year-olds who had a diagnosed language disorder at 5 years of age. They found that 35.1% of this sample had an identified psychiatric disorder, compared with only 18.6% of 19-year-olds with no history of language disorder. A recent meta-analysis reported that poorer language skills, even in the absence of an identified language disorder, are associated with increased internalizing and externalizing problems (Hentges et al., 2021). A previous meta-analysis also showed an elevated risk for internalizing and externalizing mental health problems in children with language disorder with slightly increased severity for internalizing problems (Yew & O'Kearney, 2013).

Although rates of language disorder are reported to be markedly higher in youth offenders compared with age-matched peers (Anderson et al., 2021; Snow et al., 2012, 2016; Snow & Woodward, 2017), it is not uncommon for youth involved in the justice system to present with undiagnosed language disorder. Hughes et al. (2017) found that nearly 50% of the youth offenders in their study had previously unidentified below average language abilities, 28% of

whom would have met their criteria for language disorder. The rates of language disorder in the youth offender population vary across studies, but regardless of the country in which the study took place, the rates far exceeded those reported in community samples (approximately 7.5%; Norbury et al., 2016; Tomblin et al., 1997), ranging from 19% to over 80% (Bryan et al., 2007, 2015; Hopkins et al., 2018; Hughes et al., 2017; Justice Health & Forensic Mental Health Network, 2017; Lount et al., 2017; Snow, 2019; Snow & Powell, 2011; Winstanley et al., 2021). The majority of youth offenders who presented with language disorder had never received therapy from a speech pathologist (Hughes et al., 2017; Winstanley et al., 2021).

Hopkins et al. (2018) reported that the association between language disorder and youth offending is independent of confounding factors such as social disadvantage. However, language disorder puts Dubois et al.'s youth at risk for poorer academic experiences and outcomes which can lead to leaving school prematurely (Dubois et al., 2020; Gubbels et al., 2019; McGregor, 2020); this risk is increased when intervention is delayed (Thomas et al., 2019). When involved in the justice system, there can be further disruptions to education due to relocations/transfers to new schools, lack of access to the full curriculum, and exclusionary discipline (i.e., school suspensions/expulsions) as well as exclusion from mainstream classrooms for actual or perceived risk to others (Lanskey, 2015; Novak & Fagan, 2022; Shepherd et al., 2019). Continued and frequent disruptions to, and exclusions from school, can reduce engagement in prosocial interactions and increase the likelihood of reoffending (Novak & Fagan, 2022). Youth offenders with language disorder are reported to be at least twice as likely to reoffend than those without (Winstanley et al., 2021) which may further exacerbate their difficulties in language because of the lack of conventional schooling in juvenile detention (Snow & Woodward, 2017).

Language disorder is detrimental to young people in the youth justice system because it negatively impacts their ability to understand what they are accused of, provide a clear narrative in statements to the police, understand court procedures and the role of key participants in those procedures, answer questions in court, and interpret information from their legal counsel (Lount et al., 2017; Johnston et al., 2016; Snow et al., 2016). Lount et al. (2017) reported that the youth in their sample described feeling powerless and frustrated throughout the court process because their difficulties in understanding what was happening around them prevented them from participating. Difficulties interpreting legal language continues to impact youth even when released into the community because this release often comes with a number of conditions (Snow et al., 2020a). In addition, their poor social

and pragmatic skills negatively impact conversations with authorities because the youth's poor use of non-verbal communication (e.g., eye contact) and misinterpretation of information and cues produced by the speaker may be mistaken as 'rudeness and wilful noncompliance' (Hughes et al., 2017).

Bryan et al. (2015) found that receptive language skills for youth offenders were more impaired than expressive language. This might explain why language disorder may go undiagnosed and untreated in this population (Sanger et al. 2002; Snow et al., 2016). Receptive language disorder is less observable than expressive language disorder and may manifest in behaviours perceived as rude and uncooperative such as avoidance of eye contact, use of closed body language, poor attention and listening, increased fidgeting, and use of single word responses during communication exchanges (Gregory & Bryan, 2011; Martin, 2019; Snow & Powell, 2011; Snow et al., 2016; Winstanley et al., 2018). Therefore, youth offenders may appear guilty and unremorseful in relation to criminal activity due to their unidentified receptive language disorder. Difficulties with expressive language may further contribute to misperceptions because the youth may be unable to generate narratives that capture their perspective and feelings in a coherent manner due to the complexity of verbal language required for these tasks (Anderson et al., 2016; Snow & Sanger, 2011). Moreover, poor expressive language skills have been found to be associated with difficulties in emotional self-regulation (Ripley & Yuill, 2005) which might manifest in behaviours that reflect disinterest, or aggressive and negative opposition to requests from others (Morrison et al., 2010). These behaviours can overshadow the youth's language needs (Bryan et al., 2015; Hughes et al., 2017; Martin, 2019), leaving the language disorder undiagnosed and/or untreated. A meta-analysis highlighted the prevalence of this issue reporting that 80.6% of children with an identified emotional and behavioural disorder had unidentified language difficulties; 47% of these had deficits substantial enough to be classified as a moderate to severe language disorder (Hollo et al., 2014). This presumably creates a circular issue since unidentified language disorder reduces the youth's ability to effectively negotiate and resolve issues during communication, which increases their general frustration, leading to increased aggression (Winstanley et al., 2018). This, alongside other covariates of criminal behaviour (i.e., criminogenic factors) such as pro-criminal attitudes and antisocial personality factors (e.g., impulsiveness, egocentrism), heighten youth offenders' vulnerability to developing externalizing problems (Andrews & Bonta, 2010; Yew & O'Kearney, 2013). However, language disorder in this population can also be associated with internalizing symptoms such as withdrawal. For instance, Hopkins et al. (2016) reported

that youth offenders who struggled with communication because of their language difficulties, self-reported feeling belittled by others which often led them to avoid communicating with others.

Youth involved in the justice system have heightened rates of psychiatric disorders, with rates ranging from 31% to 83% (Baldwin et al., 2019; Chitsabesan et al., 2006; Justice Health & Forensic Mental Health Network, 2017; Wasserman et al., 2010). These statistics may be even higher than those reported here, as both internalizing and externalizing mental health disorders can often go undiagnosed within this population due to overcrowding and underfunding in the youth justice system (Desai et al., 2006). Using data from a randomized controlled trial, Haney-Caron et al. (2019) examined the rates of externalizing and internalizing mental health disorders in youth involved in the justice system and the relationship between externalizing and/or internalizing mental health on severity of the offence. Of the 165 youth in their study, 17.8% were reported to present with externalizing mental health symptoms only; 13.5% had internalizing symptoms only, and 47.9% of youth had both (Haney-Caron et al., 2019). Contrary to their hypothesis, youth offenders with internalizing mental health problems were found to commit offences of all levels of severity, though they were significantly less likely to be engaged in violent offending than youth with externalizing mental health problems (i.e., conduct disorder; Haney-Caron et al., 2019).

Despite the high prevalence of mental health problems in youth offenders, engagement with mental health services prior to involvement in the justice system was reportedly low (Liebeberg & Ungar, 2014), particularly for youth with conduct disorder. Burke et al. (2015) suggested that families may not be aware that mental health services can be accessed for the behaviours that are associated with conduct disorder (e.g., aggression). It should also be noted that these behaviours may be masking comorbid internalizing mental health problems which are reported to impact 10–25% of youth offenders (Underwood & Washington, 2016); these rates are much higher than those reported for youth in the general community which are reported to range from approximately 2–13% (Odgers et al., 2005).

Many of the risk factors associated with language disorder and internalizing and externalizing mental health problems overlap, including hereditary influences, social disadvantage, and a history of maltreatment (Bao et al., 2016; Hentges et al., 2021; Penner et al., 2011). These same risk factors are also predictors of involvement in a range of child and youth protective services, including youth justice (Baidawi & Piquero, 2021; Hughes et al., 2020; Lansing et al., 2019; Mallett, 2014; Snow, 2019; Snow et al., 2016; Snow & Sanger, 2011). Poor academic achievement and engagement in school, which are also associated with

language disorder, further contribute to risk for involvement in the youth justice system (Brown et al., 2008; Grigorenko et al., 2015; Mallett, 2014; Snow, 2019).

As outlined, there is much overlap between language disorder, internalizing and externalizing mental health problems, and involvement in the youth justice system. However, the evidence for a relationship across these constructs has not been systematically reviewed. The purpose of this systematic review was to investigate and synthesize the evidence on the relationship between language disorder and internalizing mental health problems (i.e., anxiety, depression) in the youth offender population. Specifically, we aimed to address the following question: what is the frequency of co-occurrence of language disorder and anxiety and/or depression in youth offenders? Internalizing problems are directly linked to language disorder and both contribute to, and stem from, repeated unsuccessful interactions with others (Beitchman et al., 2001; Bornstein et al., 2013; Helland et al., 2018). In addition, both can be harder to detect and are easily masked by the more overt behavioural issues associated with externalizing problems. A better understanding of the co-occurrence of language disorder and anxiety and/or depression may contribute to improved identification of these problems in youth involved across all points of the justice system. This may support a reduction in the risk of offending (Cronin & Addo, 2021; Mallett, 2014; Winstanley et al., 2018). As part of this review, a secondary aim was to assess the homogeneity of the measures being used across the literature to assess language abilities and internalizing mental health problems in youth offenders.

METHODS

Sources of information and search strategy

Systematic searches were conducted in September 2021 in six databases: CINAHL, ERIC, Medline, PsycINFO, PubMed and Scopus. No filters were used. Additional hand searching was conducted via Google Scholar and via reference lists of identified articles. Search terms related to youth offending, language disorder, and internalizing mental health problems were combined with Boolean operators 'OR' and 'AND' (see Table 1 for a comprehensive list).

Eligibility criteria

Studies identified through the systematic database search were included if they were peer-reviewed, original studies published in English. In addition, studies needed to focus

on youth offenders and report on participants' language abilities as well as internalizing mental health problems (anxiety and/or depression). Since our question is not specific to incarceration, studies could include youth at any stage of juvenile justice involvement including charged to appear in court, intake, incarceration, residential treatment centres, and community-based orders. Based on practices in some countries which continue to include people aged 20 in the youth justice system (Snow, 2019), the upper age range of the target sample could not exceed 21. Studies comprising a mixed sample of youth participants and adults over 21 years of age were only included if the data of youth participants could be separated from data of adults in the study. Studies were included if they reported on any component of oral language (e.g., receptive/expressive language, vocabulary, syntax). Studies that focused on literacy and/or speech sound production skills with no separate reporting of oral language abilities were excluded. Although the focus of this review was language disorder, we did include studies in which participants had co-occurring conditions (e.g., autism spectrum disorder; traumatic brain injury) since the term language disorder is applied with and without co-occurring problems (Bishop et al., 2017). Only studies that included a measure of participants' current internalizing symptoms (depression and/or anxiety) were retained for this review. Given that the prevalence rates of externalizing mental health (e.g., conduct disorder, attention deficit/hyperactivity disorder) problems are high in this population and have been shown to be predictive of more severe offending (Cohn et al., 2012; Colins et al., 2010), we included studies with participants with co-occurring externalizing mental health problems due to difficulty in separating the complex interrelationship between them (Haney-Caron et al., 2019; Wasserman et al., 2010). Articles were further excluded based on full-text availability though best efforts to retrieve full texts were made.

Study selection

Author BZ uploaded search results to the reference management software Zotero and removed duplicate records. After removing duplicates ($n = 189$), search results were uploaded to the systematic review web application, Rayyan, for screening. Using the inclusion and exclusion criteria outlined above, author BZ screened records by title and abstract; 10% of these were screened by two additional independent reviewers (SH, LE) to check the reliability of the selection process and application of eligibility criteria. Where conflicts arose, discussion was held between the three parties to reach consensus. In cases where discrepancies could not be resolved or the abstract did not

TABLE 1 Search terms for systematic review

Search area	Search terms included
Youth offender	youth offender, young offender, juvenile offender, youth offending, juvenile offending, juvenile delinquent, juvenile delinquency, youth justice, youth incarceration, juvenile incarceration, youth detention, juvenile detention, youth justice, juvenile justice, juvenile court
Language disorder	language disorder, language delay, language impairment, specific language impairment, language problem, language problems, language difficulty, language difficulties, language disability, communication disorder, communication difficulty, communication impairment, communication problems
Mental health	mental health, mental disorder, mental health disorder, anxiety, depression, mood disorder, internalizing, internalizing, internalizing disorder, internalizing disorder

include sufficient information to fully assess eligibility, the article was maintained for more thorough consideration of the full-text. A similar process was applied in the full-text stage of the process. Author BZ reviewed all full texts against eligibility criteria with additional independent review by authors SH (50%) and LE (40%), with follow-up discussion to reach consensus for any conflicts that arose.

Data extraction and synthesis

Data were independently extracted by two reviewers (SH, LE) for 50% of articles, and then reviewed by author BZ. For the final 50% of articles, data were extracted by either author SH or LE and reviewed by author BZ. There were minimal discrepancies across reviewers during the data extraction process. Where discrepancies did occur, all reviewers discussed the content to reach a resolution. To address our secondary question about measures used, study measures was a key characteristic extracted. Additionally, characteristics in the data extraction table included: (1) study (authors, date, location, design); (2) participants (number, age, co-occurring conditions; control group information); (3) study aim; (4) results (relevant to the systematic review question); and (5) Joanna Briggs Institute (JBI) (2014) checklist score (Table 2).

A meta-analysis was not possible due to the heterogeneity of study aims, methods, and outcome measures used. A narrative synthesis of results of selected studies was conducted to answer the research question of this review.

Methodological evaluation and quality appraisal

To assess the quality of the studies, two reviewers (SH, LE) independently completed the Joanna Briggs Institute Critical Appraisal Tool checklists (JBI-CAT; Joanna Briggs Institute, 2014) relevant to the study designs for 50% of the included studies. Author CG reviewed this assessment, and any discrepancies were discussed to ensure consensus.

Author CG then completed assessment of the final 50% of selected studies. As shown in Appendix 1 in the additional supporting information, the checklists assessed selection bias, study design, confounders, collection method and other relevant questions regarding the quality of the study. The checklist criteria contain 'yes', 'no', 'unclear' and 'not applicable' responses to questions aimed to assess credibility of the studies and validity of study results. Scores for the JBI-CAT checklists are provided in Table 2. As per recommended guidelines (Munn et al., 2020), the authors identified their own system of classification for methodological quality. Studies with percentage scores of < 49% were classified as weak, studies between 50% and 79% were moderate, and studies $\geq 80\%$ were classified as high in quality with reduced bias. This classification has been used in prior systematic reviews (e.g., Roberts & Cooper, 2019).

RESULTS

Search results

The following records were identified via electronic databases: CINAHL ($n = 42$); ERIC ($n = 7$), Medline ($n = 225$), PsycINFO ($n = 278$), PubMed ($n = 446$) and Scopus ($n = 186$), which yielded 994 unique records. Two additional records were identified via manual searching. The flow diagram in Figure 1 shows the records remaining at each stage and the reasons for exclusion for articles reviewed at the full-text stage. Six full-text articles could not be sourced for review and were excluded at the full-text stage; all were published between 1976 and 2004. A total of eight articles met the inclusion criteria for this study.

Results of methodological evaluation and quality appraisal

Of the eight studies that met inclusion criteria, one study was a cohort design [4], two studies were case series [3,

TABLE 2 Characteristics of studies included in the systematic review

Study	Participants	Study aim	Measures	Results	JBI score
[1] Chitsabesan et al. (2015) Location: UK Design: Cross-sectional study	93 males aged 15–18 years (mean = 16.5 years) All currently (86%) or previously detained in secure youth offender institution Co-occurring conditions Attention Deficit Hyperactivity Disorder (ADHD) ($n = 4$) Language Disorder ($n = 5$) Intellectual disability ($n = 1$) Depression ($n = 1$)	To describe the profile of youth offenders with traumatic brain injury (TBI) and associated comorbidity with neurodevelopmental disorders, mental health needs and offending behaviour	<i>Test of Word Knowledge (TWOK)</i> (Wiig & Secord 1989): Subtests assess word definitions, synonyms, multiple contexts, figurative language use <i>Comprehensive Health Assessment Tool (CHAT)</i> (Chitsabesan et al. 2014): Screens for physical health, mental health (depression), substance misuse and neurodisability <i>Rivermead Post-Concussion Symptoms Questionnaire</i> (King et al. 1995): Identifies presence of TBI	No TBI-mild TBI ($n = 62$) 33 (41%) had scores indicative of impairment on TWOK CHAT: Depression ($n = 5$) Moderate to severe TBI ($n = 24$) 5 (36%) had scores indicative of impairment on TWOK CHAT: Depression ($n = 1$)	4/8 (Mod)
[2] Hughes et al. (2017) Location: UK Design: Cross-sectional study	93 males aged 15–18 years (mean = 16.9 years) 86% serving a custodial sentence; 14% on remand	(1) To describe language difficulties among youth offenders in a secure facility; (2) to examine comorbidities; and (3) to identify prior service use for language disorder and comorbidities	TWOK (Wiig & Secord 1989): Subtests assess word definitions, synonyms, multiple contexts, figurative language use <i>Social Responsiveness Scale (SRS)</i> (Constantino 2002): Subscales targeting social communication and social cognition <i>Comprehensive Health Assessment Tool (CHAT)</i> (Chitsabesan et al. 2014): Screens for physical health, mental health (depression), substance misuse and neurodisability	TWOK: 70 participants had significantly below average ($n = 44$) or impaired language ($n = 26$) 22 participants had impaired receptive language compared with 10 with impaired expressive language SRS: No extractable data CHAT: Depression ($n = 3$) for participants with language impairment and also without	5/8 (Mod)

(Continues)

TABLE 2 (Continued)

Study	Participants	Study aim	Measures	Results	JBI score
[3] Johnston et al. (2016)	20 males aged 10–20 years (mean = 16.1 years)	To develop a computerized tool to assess participation in and understanding of trial proceedings in youth offenders	<i>Wechsler Individual Achievement Test—2nd Edition (WIAT-II)</i> (Wechsler 2005): Oral Expression and Listening subtests <i>Mood and Feelings Questionnaire (MFQ)</i> (Angold et al. 1995): 13 items that measure depressive symptoms <i>Screen for Child Anxiety-Related Emotional Disorders (SCARED)</i> (Birmaher et al. 1999): 41 items to screen for anxiety-related emotional disorders	<i>WIAT—Oral Expression</i> (mean score = 93; SD = 24.99; range = 58–139). Mean age equivalent = 9 years, 10 months <i>WIAT—Listening Comprehension</i> (mean score = 72; SD = 22.81; range = 40–124). Mean age equivalent = 9 years, 1 month MFQ: Depression ($n = 6$) SCARED: Anxiety ($n = 3$)	3/8 (Weak)
[4] Manninen et al. (2013)	53 participants (33 males; 20 females between 15 and 18 years (mean = 16.6)	To predict if reform school students with neuropsychological differences, language difficulties and psychiatric symptoms predict later involvement in crimes as an adult	<i>Wechsler Adult Intelligence Scale—Revised (WAIS-R)</i> (Wechsler 1981): Verbal fluency, vocabulary <i>Youth Self-Report for Ages (YSR)</i> (Arcenbach & Rescorla 2001): Used to assess psychiatric symptoms. Administered for reform school participants only <i>Child Behaviour Checklist (CBCL)</i> (Arcenbach & Rescorla 2001): Used to assess psychiatric symptoms as reported by reform school foster parents. Administered for reform school participants only	Males with a criminal record (CR) had lower vocabulary scores than those without YSR/CBCL: No difference in anxiety or depression for reform students with or without CRs Within-group: Youth with CRs: YSR scores significantly exceeded CBCL scores for anxiety and depression	7/9 (Mod)
Location: Finland					
Design: Cohort study	All were in reform school which is integrated in social welfare system. Authors state this is equivalent to youth correctional facilities in the US. Half had a history of criminal offences				
	Comparison group: 72 age-matched via cognitive test measures				

(Continues)



TABLE 2 (Continued)

Study	Participants	Study aim	Measures	Results	JBI score
[5] Olvera et al. (2005)	36 repeat offenders (26 males) aged 13–17 years.	To compare neuropsychological deficits for youth offenders with conduct disorder with and without bipolar disorder	<i>Clinical Evaluation of Language Fundamentals 3rd Ed. (CELF-3)</i> (Semel et al. 1995): Formulated Sentences (expressive language) and Concepts and Directions (receptive language) subtests	<i>CELF-3—Formulated Sentences and Concepts and Directions</i> : Youth offenders scored significantly lower than comparison group, $p < 0.05$	5/7 (Mod)
Location: USA	All participants were repeat offenders in a juvenile correctional facility				
Design: Cross-sectional study					
	Co-occurring conditions Conduct disorder ($n = 28$; 22 males). Mean age = 15.2 Conduct disorder + bipolar ($n = 8$; 4 males). Mean age = 15.8		<i>Schedule for Affective Disorders and Schizophrenia for School-Aged Children, Present and Lifetime Version (K-SADS-PL)</i> (Kaufman et al. 1997) and <i>Diagnostic and Statistical Manual, 4th edition (DSM-IV)</i> (American Psychiatric Association 1994): Used to identify mood disorders	K-SADS-PL/DSM-IV: Youth offenders were diagnosed with major depressive disorder significantly more than the comparison group, $p < 0.05$	
	Comparison group: 16 participants (10 males) matched for age, sex, ethnicity and socioeconomic status				
	Co-occurring conditions ADHD ($n = 4$) Depression ($n = 2$)				

(Continues)

TABLE 2 (Continued)

Study	Participants	Study aim	Measures	Results	JBI score
[6] Snow and Powell (2011)	100 males aged 17–21 years (mean = 19.03)	(1) To describe the nature and extent of oral language impairment in incarcerated young male offenders; and (2) to explore the relationship between oral language competence and the nature and severity of offending histories	<i>Test of Language Competence—Expanded (TLC-E)</i> (Wiig & Secord 1989); Ambiguous Sentences, Listening Comprehension/Making Inferences, and Figurative Language subtests	TLC-E: 59 participants scored 2 SD below the mean on at least two subtests	5/8 (Mod)
Location: Australia	All were incarcerated youth offenders			CELF-4: 50 participants had Core Language scores 2 SD below the mean	
Design: Cross-sectional study	Co-occurring conditions (based on self-report) ADHD ($n = 33$) TBI ($n = 6$) Hearing impairment ($n = 4$)		<i>Clinical Evaluation of Language Functioning 4th edition (CELF-4)</i> (Semel et al. 2003): Core Language Score comprised of Recalling Sentences, Formulated Sentences, Words Classes and Word Definitions subtests	Using combined TLC-E and CELF-4 results, 46 participants were identified with language disorder	
			<i>Depression Anxiety Stress Scale (DASS)</i> (Lovibond & Lovibond 1995) for mental health	DASS: No significant difference between participants with and without language disorder. Mean depression score (9.9) and mean anxiety (score (7.8) just above the normal range	

(Continues)



TABLE 2 (Continued)

Study	Participants	Study aim	Measures	Results	JBI score
[7] Snow et al. (2016) Location: Australia Design: Cross-sectional study	100 participants (85 males) aged 15–20 years (mean = 17.1) All were incarcerated youth offenders Co-occurring conditions (based on self-report) Hearing impairment ($n = 3$) Autism spectrum disorder ($n = 1$) Blow to head/loss of consciousness ($n = 32$) Depression ($n = 17$) Anxiety ($n = 18$) History of speech, language and communication needs ($n = 8$)	To study the prevalence and impact of mental health and alexithymia in youth offenders with language disorders	CELF-4 (Semel et al. 2003): Core Language Score comprised of Recalling Sentences, Formulated Sentences, Words Classes and Word Definitions subtests TLC-E (Wiig & Secord 1999): Ambiguous Sentences, Listening Comprehension/ Making Inferences, and Figurative Language subtests DASS (Lovibond & Lovibond 1995) to assess mental health	CELF-4: 40 participants showed a severe language disorder; 34 had mild to moderate impairments; 26 in expected range Using combined TLC-E and CELF-4 results, 46 participants were identified with language disorder DASS: 31 participants had depression scores in clinical range, 26 scored in clinical range for anxiety Composite language scores were not significantly correlated with DASS total score	5/8 (Mod)

(Continues)

TABLE 2 (Continued)

Study	Participants	Study aim	Measures	Results	JBI score
[8] Swain et al. (2020)	4 males aged between 13 and 18 years (mean age = 16:9)	To evaluate the extent to which intensive, one-to-one language intervention improved the communication skills of incarcerated adolescents with below-average (> 1 SD below the mean) language and/or literacy skills	CELF-4 (Wiig & Secord 1989): Core Language Score comprised of Recalling Sentences, Formulated Sentences, Words Classes and Word Definitions subtests <i>La Trobe Communication Questionnaire (LCQ)</i> (Douglas et al. 2007) to assess discourse/pragmatic skills	CELF-4: 2 participants showed a severe language disorder, 1 participant showed mild to moderate impairment; 1 had below average scores LCQ: WNL ($n = 1$); Below average/mild impairment ($n = 2$); Severe impairment ($n = 1$) DASS: Depression: 3 participants had depression scores in normal range, 1 identified as mild 25% for depression DASS: Anxiety: 1 participant had scores in normal range, 1 mild, 1 moderate and 1 severe	8/8 (High)
Location: Australia	All youth offenders were detained in a youth justice centre				
Design: Case series	Co-occurring conditions DASS (Lovibond & Lovibond 1995) to assess mental health Depression ($n = 4$) Anxiety ($n = 1$) Co-occurring conditions (based on self-report) ADHD ($n = 4$) History of speech, language and communication needs ($n = 3$)				

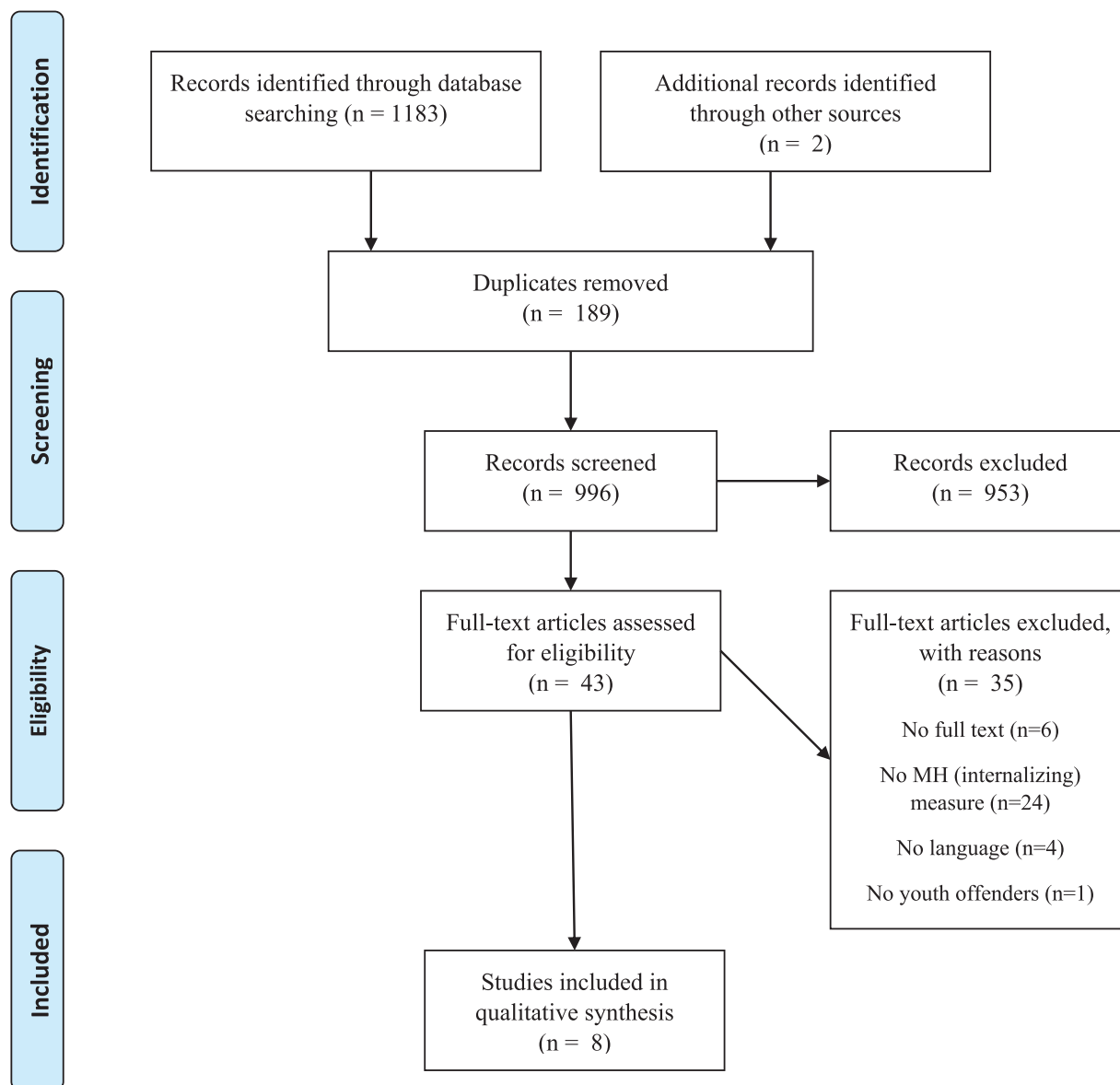


FIGURE 1 PRISMA flow chart outlining search and selection process. [Colour figure can be viewed at wileyonlinelibrary.com]

Source: Moher et al. (2009).

8], and five studies [1, 2, 5, 6, 7] were cross-sectional; one of these five studies included a comparison group [5]. JBI-CAT checklists were used to assess the quality of these studies (see Appendix 1 in the additional supporting information). Using this system of classification and the associated JBI-CAT checklist, one study was deemed to be weak in quality [3], six studies were moderate in quality [1, 2, 4–7] and one was high in quality [8]. The quality rating for Johnston et al. (2016) [3] was the only one that fell below 50%; its weak quality rating (3/8) was due to a lack of detail on participant inclusion and exclusion criteria, study setting, and statistical analysis methodology.

Participant characteristics

As shown in Table 2, all but one of the included studies [5] were conducted over the previous 10 years. Three of these studies [1–3] were conducted in the UK, three in Australia [6–8], one in the United States [5], and one in Finland [4].

Across the eight included studies, there were a total of 484 youth offender participants. The same participants were included in two studies [1, 2], leaving 391 unique participants. Of the 391 unique participants, 361 (92%) were male. Participants ranged in age from 10 to 21 years, but were most commonly 16-years-old [1–4, 8]. A total of 20

participants had been charged to appear in court [3], 358 were serving a custodial sentence in some form of correctional facility [1, 2, 4–8], and 13 were on remand [1, 2]. Over half of the participants ($n = 203$; 52%) had a co-occurring condition. Conduct disorder was most common ($n = 56$; 14%), followed by attention deficit hyperactivity disorder (ADHD; $n = 50$; 13%) and traumatic brain injury ($n = 38$; 10%). A total of 22 participants identified with a history of depression [7, 8] and 22 with a history of anxiety [7, 8].

Two [4, 5] of the eight studies included a comparison group. Manninen et al. (2013) [4] included 72 participants who were age-matched on the basis of cognitive measures with no co-occurring conditions. Olvera et al. (2005) [5] included a comparison group of 16 participants closely matched for age, sex, ethnicity, and socioeconomic status, six of whom had co-occurring conditions (ADHD, depression).

Outcome measures

Language measures

The measures used to assess language abilities in youth offenders varied across the eight studies. Four studies [5–8] evaluated receptive and expressive language using a version of the *Clinical Evaluation of Language Fundamentals* (CELF; Semel et al., 1995, 2003), two studies [1, 2] used the *Test of Word Knowledge* (TOWK; Wiig & Secord 1992) to assess semantic abilities, including figurative language use. One study [6] used the *Test of Language Competence—Expanded* (TLC-E; Wiig & Secord, 1989) to measure higher level language abilities. Two studies [3, 4] measured language using subtests of a cognitive battery. Johnston et al. (2016) [3] measured oral expression and listening comprehension using the *Wechsler Individual Achievement Test—Second Edition* (WIAT-II; Wechsler, 2005) and Manninen et al. (2013) [4] measured verbal fluency and vocabulary using the *Wechsler Adult Intelligence Scale—Revised* (WAIS-R; Wechsler, 1981). Pragmatic abilities were assessed using the *Social Responsiveness Scale* (SRS; Constantino, 2002) [2] and the *LaTrobe Communication Questionnaire* (LCQ; Douglas et al., 2007) [8].

Anxiety and depression measures

Only four studies [3, 6–8] used an assessment tool focused almost solely on anxiety and/or depression. Two studies [3, 5] used more generalized mood-based tools. Two studies [1, 2] used a comprehensive health assessment tool developed specifically for youth offenders; mental health is measured

in one section of this tool. The final study [4] used two separate tools to assess psychiatric symptoms. One was a self-report measure; the second was an other-report measure (completed by reform school foster parents) used as comparison to the self-report. Both measures provide indication of anxiety and depression.

Language abilities of youth offenders

Overall, the data from the seven included studies showed that youth offenders are likely to have below average language abilities when compared with standardized test norms [1, 2, 6–8] or to a comparison group [4, 5] with mixed strengths and needs shown across receptive and expressive language. For the five studies that compared with test norms [1, 2, 6–8], scores were reported as significantly below average for 40 [7] to 59% [6] of the youth offender samples, with 25 [8] to 54% [1] identified as falling below to moderately below average. Two studies [6, 7] created a composite score that combined scores on the CELF and the TLC-E. Using this composite score, they reported the prevalence of language disorder as 46%. It is important to note that there are no set criteria used to identify language disorder across the literature (Bishop et al., 2017), but Hopkins et al. (2018) suggested that a language disorder can be identified for scores that fall 1 SD below the mean. Using this less conservative cut-off, 187 of 290 (64%) participants had language disorder based on the reported standard scores [1, 2, 7, 8]. The final study [3] did not specify if the reported scores were raw scores or standard scores, but did provide mean age equivalency. These results showed a mean age equivalency of nine years of age, which was approximately 7 years below the mean age of the youth offender sample.

Anxiety and depression in youth offenders

Five studies [3, 4, 6–8] reported on anxiety status. Of these, only three [3, 7, 8] identified the number of participants presenting with this internalizing mental health problem. Johnston et al. (2016) [3] identified three participants (15%), Snow et al. (2016) [7] identified 26 (25%), and Swain et al. (2020) [8] reported that three of their four cases (75%) presented with varying degrees of anxiety. All eight studies [1–8] reported on depression. Rates of depression were reported to fall below 10% of the youth offender sample in two studies [1, 2], impacting six or fewer participants in the samples. Although higher proportionally (25%), Swain et al. (2020) [8] also reported depression in only one participant. The remaining two studies both reported a prevalence rate for depression of about 30%,

impacting six participants in Johnston et al. (2016) [3] and 31 in Snow et al. (2016) [7].

The two [4, 5] studies that included a comparison group showed mixed results regarding the prevalence of anxiety and depression in the comparison group versus youth offenders. One study reported that youth offenders had higher rates of major depressive disorders than the comparison group [5]. The other study [4] reported no difference between groups for depression or anxiety. However, the youth offenders in that study were found to self-report higher degrees of anxiety and depression symptoms than reported by carers. The authors concluded that this result likely indicated that behavioural issues such as aggression and antisocial behaviour may have been masking signs of anxiety and depression [4].

Language disorder and internalizing mental health problems in youth offenders

Two studies were identified that directly analysed the relationship between language disorders and internalizing mental health problems in youth offenders [6, 7]. Using a composite score from two separate language tests, Snow and Powell (2011) [6] identified language disorders in 46 participants; they found no difference in scores on the *Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond 1995)* for anxiety or depression for youth offenders with or without a language disorder. Using the same method of identification, Snow et al. (2016) [7] found no correlation between language scores for participants with language disorder ($n = 46$) and anxiety and depression scores from the DASS.

Two additional studies [2, 8] did not statistically analyse the co-occurrence of language disorders and internalizing mental health problems, but reported the frequency of each. One study [2] reported depression in the same number of participants with ($n = 3$) and without ($n = 3$) below average language scores. Analysis of the cases presented by Swain et al. (2020) [8] did not yield any pattern between the presence of language disorders and internalizing mental health problems.

The remaining studies [1, 3–5] did not report the occurrence of internalizing mental health problems according to the language abilities of youth offenders, precluding any conclusions regarding this relationship. For instance, Olvera et al. (2005) [5] reported that youth offenders had a significantly higher prevalence of language disorder than the comparison group. Frequency tables also showed that 69% of youth offenders had depression compared with only 19% of the comparison group. However, it was not clear which proportion of youth offenders with language disorders also had depression.

DISCUSSION

The primary question of this systematic review was: what is the frequency of co-occurrence of language disorder and anxiety and/or depression in youth offenders? Unfortunately, identifying the overall frequency of co-occurrence of language disorders and internalizing mental health problems was not possible in half of the studies identified for this review. In two of the remaining studies, the authors reported that the general relationship between language disorders and internalizing mental health problems (i.e., anxiety, depression) in youth offenders was not significant (Snow & Powell, 2011; Snow et al., 2016). The final two studies (Hughes et al., 2017; Swain et al., 2020) did not directly analyse the co-occurrence of these two constructs but reported data that allowed for analysis of the presence of language disorder alongside the presence of anxiety and/or depression for specific participants. One study was a case series that included a small number of participants ($n = 4$; Swain et al., 2020) with no identifiable pattern in results. The other study reported no difference in presence of depression for youth with and without language disorders (Hughes et al., 2017). There was much heterogeneity amongst the measures used to assess language disorders amongst the reviewed studies. It is possible that the combination of tests used to identify language disorders and internalizing mental health problems within each study did not provide a complete picture. For instance, some studies assessed a limited set of language components to determine language abilities alongside broader scales of which internalizing mental health problems formed only a small part (Chitsabesan et al., 2015; Hughes et al., 2017; Olvera et al., 2005). These tools may not have been complete or sensitive enough to identify the full extent of language needs or internalizing mental health problems.

Results of this review may also have been impacted by the inclusion criterion that studies needed to measure anxiety and/or depression in their participant sample. This criterion ensured that mental health would be measured in some way, at the same point in time as measures of language, rather than relying on self-identification of previous mental health concerns. However, it is possible that some youth offenders may have had prior periods of heightened symptoms. Rating scales are designed to be time-efficient and tend to focus on one's current (or recent) mental state (Whelan-Goodinson et al., 2009). Therefore, they may not fully capture the severity or complexity of internalizing mental health problems nor accurately reflect changing symptomology in the face of various stressors (Vidal Bustamante et al., 2020; Whelan-Goodinson et al., 2009). Moreover, youth offenders have been reported to mask their difficulties in order to appear less vulnerable (Bryan et al., 2007) so it is possible that the internalizing mental

health problems in these samples were underestimated. This may at least partially explain the lack of significant correlation found in the three studies that included a more complete assessment of general language ability alongside a scale specifically designed to identify depression and anxiety (Snow & Powell, 2011; Snow et al., 2016; Swain et al., 2020). Carer reports and ratings of internalizing mental health problems might add additional insight in future studies, but may only be beneficial for youth who do not have additional externalizing mental health problems since externalizing behaviours can mask comorbid internalizing mental health problems (Underwood & Washington, 2016). Implementing a comprehensive structured clinical interview when assessing mental health, rather than reliance on rating scales alone, may yield a more thorough and accurate picture. In addition, further consideration of the gender of youth offenders and co-occurring anxiety and depression is needed since there is some evidence to suggest that female youth offenders are more likely than males to experience internalizing mental health problems (Penner et al., 2011).

Results of this review indicated that language disorders and internalizing mental health problems tend to occur comorbidly in youth offenders. There was an over-representation of language disorder in the youth offender samples, with heightened rates of anxiety and/or depression also reported across most studies. However, it is important to note that the majority of included studies included some participants who also had co-occurring neurodevelopmental disabilities (e.g., attention deficit hyperactivity disorder, autism spectrum disorder, traumatic brain injury). This was not surprising given the known over-representation of neurodevelopmental disabilities in this population (Snow et al., 2020a). Though it makes fully assessing the relationship between language disorders and internalizing mental health problems complicated, it further highlights the need for more targeted language support for vulnerable youth (Snow et al., 2020b).

Intervention programmes for youth involved in the justice system (e.g., cognitive-behaviour therapy; interpersonal skills training; individual counselling) tend to rely heavily on verbal language (Snow & Powell, 2012). Lack of engagement and/or progress in these intervention programmes may be related to language-based difficulties, but may also be due to internalizing mental health problems. Both need to be evaluated when the youth first enters the system to allow for earlier intervention and a more individualized intervention plan. Establishing assessment of language abilities and mental health at intake as standard practice is also more likely to lead to integrated collaboration between psychology and speech pathology in justice system. Addressing language disorder via speech pathology services may have additional positive

impact on youth offenders' engagement in language-based rehabilitation programmes, including counselling, victim empathy programmes, life skills programmes, and programmes focused on conflict resolution and changing behaviour (SPA, 2019). For instance, speech pathologists can help youth develop the vocabulary they need to express how they are feeling. They can also assist in developing cognitive communication and executive functioning abilities such as sequencing, planning, and reasoning, which are integral to building narratives and supporting decision-making (SPA, 2019). Targeting language abilities such as conversational management, inferencing, and narrative discourse are particularly important for facilitating successful participation in restorative justice conferences which require youth offenders to: (1) share a coherent account of the event, including a description of the reasons for their actions; (2) actively listen to the victim's account of how the event has impacted them including interpretation of non-verbal (emotion) cues; and (3) appropriately respond to the victim's story (Hayes & Snow, 2013; Sanger et al., 2002; Snow & Sanger, 2011).

Although a definitive answer to the research question could not be established with this review, the review should contribute to increasing awareness of the potential comorbidity between language disorders and internalizing mental health problems which may help to improve services for youth. Consistent implementation of speech pathology services could help to mitigate the challenges youth offenders with language disorder and internalizing mental health disorders experience. Access to speech pathology services is still limited in youth justice (Martin, 2019; Snow, 2019), but some form of mental health service or counselling is generally available (Penner et al., 2011). Until speech pathology services become common practice in the youth justice system, training for staff that is focused on how to modify the language they use during counselling/mental health services as well as everyday interactions with vulnerable youth may increase the youth's accessibility and engagement in interventions and programmes (Gregory & Bryan, 2011; SPA, 2018).

LIMITATIONS

In this systematic review we have identified that youth offenders with language disorder may also often experience internalizing mental health problems but evidence regarding the degree to which these co-occur was inconclusive. Many of the included studies did not fully describe the language abilities of the youth offenders in their sample (Chitsabesan et al., 2015; Johnston et al., 2016; Manninen et al., 2013; Olvera et al., 2005). In at least two studies, this was directly related to the use of a language-based

subtest of a cognitive battery to assess language (Johnston et al., 2016; Manninen et al., 2013). The lack of comprehensive information regarding the language abilities of youth offenders limited the ability to make comparisons across studies. It also challenged the capacity to draw conclusions regarding the co-occurrence of language disorders with internalizing mental health problems. Similarly, limited diagnostic health information was available across the included studies. A range of measures were used to identify anxiety and depression, not all of which were specific to assessing mental health. The language demands of the mental health measures, which were reliant on self-report, were also not addressed. In addition, these measures were all reliant on self-report which may not have yielded an accurate assessment of the degree of the youth's internalizing mental health problems. Self-report may also have been impacted by alexithymia which can compromise an individual's ability to think about, identify and describe emotions (Taylor et al., 1997) and has been reported to impact 30% of youth offenders (Snow et al., 2016).

Another important consideration in the interpretation of results of this review is the representativeness of the participants included across studies. Youth from Indigenous or culturally and linguistically diverse (CALD) backgrounds are over-represented in the justice systems of English-speaking countries (Chitsabesan et al., 2015; Snow, 2019; SPA, 2019; Thampapillai, 2018) but only one study (Snow et al., 2016) used targeted recruitment to ensure a culturally representative sample of participants. Acknowledgement of potential language differences on results of language measures and self-report mental health measures was also limited. One study, conducted in the UK (Johnston et al., 2016), inferred this link in its confirmation that all participants were fluent in standard English. A second study (Snow et al., 2016), conducted in Australia, specifically recruited Aboriginal and Torres Strait Islander youth but all of these youth had grown up in urban settings and identified Standard Australian English as their first language. None of the remaining studies identified language difference as a consideration. Linguistic and cultural differences impact discourse, information exchange, and language-based assessments (Zupan et al., 2021). Given the over-representation of Indigenous and CALD youth in the justice system, it is possible that the Western cultural orientation of the included language and mental health measures, including the way in which those measures were implemented, impacted overall results (Cross & Bloomer, 2010; Zupan et al., 2021).

Results must be also be considered in the context of the small number of studies identified for this review. Overall, there appears to be a dearth of studies investigating language abilities and internalizing mental health problems in youth offenders. Another limitation to this review is

the potential presence of language bias since only English language studies were included. Also, though the authors followed high methodological standards in conducting the review, the systematic review protocol was not registered. Finally, this review was limited in the lack of convincing evidence across these eight studies. The studies included in this review were deemed primarily moderate in the quality of their methodological design, limiting generalizability of their results. Given that only eight studies were identified to meet inclusion criteria for this research question, and that the majority of these studies were published in the past ten years, it appears that this topic is only beginning to be explored. Overall, the results of this review highlight the need for more (rigorous) research to fully explore the relationship between language disorder and internalizing mental health problems in this population.

CONCLUSIONS

Despite the inconclusive results, this systematic review of the literature has contributed to raising awareness that youth offenders are at risk of comorbidly experiencing both language disorder and internalizing mental health problems. The relationship between these constructs needs to be more rigorously studied to provide the evidence needed to lobby for consistent access to speech pathology services in the youth justice system, and greater collaboration between speech pathologists and other service providers (e.g., psychologists, programme staff). Early identification is key to positive intervention outcomes. Recognizing the impact that language disorders and internalizing mental health problems may have on the communication and behaviours of an individual can better inform staff and therapists as they engage and interact with youth in the justice system.

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NOTE

¹DLD and 'Language disorder associated with X' were only recently identified as the preferred terms (Bishop et al., 2017). As such, the literature uses a range of terms including (specific) language impairment, language delay, language problems and language disorder. The term language disorder is used in this paper regardless of the term used in the identified literature.

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APPENDIX A: Questions in Joanna Briggs Institute Checklists (JBI-CAT; Joanna Briggs Institute, 2014)

Checklist Type	Questions	Study
Analytical Cross-Sectional Study	<ol style="list-style-type: none"> 1. Were the criteria for inclusion in the sample clearly defined? 2. Were the study subjects and the setting described in detail? 3. Was the exposure measure in a valid and reliable way? 4. Were objective, standard criteria used for measurement of the condition? 5. Were confounding factors identified? 6. Were strategies to deal with confounding factors stated? 7. Were the outcomes measure in a valid and reliable way? 8. Was appropriate statistical analysis used? 	[1, 2, 5-7]
Cohort Study	<ol style="list-style-type: none"> 1. Were the two groups similar and recruited from the same population? 2. Were the exposures measured similarly to assign people to both exposed and unexposed groups? 3. Was the exposure measured in a valid and reliable way? 4. Were confounding factors identified? 5. Were strategies to deal with confounding factors stated? 6. Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)? 7. Were the outcomes measured in a valid and reliable way? 8. Was the follow up time reported and sufficient to be long enough for outcome to occur? 9. Was follow up complete, and if not, were the reasons to loss to follow up described and explored? 10. Were strategies to address incomplete follow up utilised? 11. Was appropriate statistical analysis used? 	[4]
Case series	<ol style="list-style-type: none"> 1. Were there clear criteria for inclusion in the case series? 2. Was the condition measured in a standard, reliable way for all participants included in the case series? 3. Were valid methods used for identification of the condition for all participants included in the case series? 4. Did the case series have consecutive inclusion of participants? Did the case series have complete inclusion of participants? 5. Was there clear reporting of the demographics of the participants in the study? 6. Was there clear reporting of clinical information of the participants? 7. Were outcomes or follow up results of cases clearly reported? 8. Was there clear reporting of the presenting site(s)/clinic(s) demographic information? 9. Was statistical analysis appropriate? 	[3, 8]