



A Thematic Review on Using the Children's Communication Checklist to Identify and Diagnose Individuals With and Without Communication Disorders

Munassir Alhamami^{1*}, Ahmed Alduais², Fawaz Qasem³ and Muhammad Alasmari³

¹Department of English, King Khalid University, Abha, Kingdom of Saudi Arabia[✉]

²Department of Human Sciences (Psychology), University of Verona, Verona, Italy[✉]

³Department of English Language and Literature, College of Arts and Letters, University of Bisha, Bisha, Kingdom of Saudi Arabia[✉]

Correspondence to:

Munassir Alhamami*, e-mail: munassir7@gmail.com, Mobile: 00966551646008

Received: January 26 2024; Revised: June 8 2024; Accepted: June 9 2024; Published Online: June 26 2024

ABSTRACT

Communication disorders in children are multifaceted and often difficult to diagnose accurately due to their complex nature. The Children's Communication Checklist (CCC) is a widely used diagnostic instrument for identifying and diagnosing children with and without communication disorders. This review aimed to conduct a thematic examination of existing literature that applies the CCC and CCC-2 in the diagnosis of communication disorders. It sought to explore the nuances of CCC's deployment, its diagnostic traits, and its capability to accurately distinguish individuals with or without communication disorders. A comprehensive literature search was conducted across multiple databases, yielding studies that apply the CCC and CCC-2 in diagnosing communication disorders. The 39 selected studies were subjected to a thematic analysis to identify patterns and themes concerning the use of CCC in diagnosing communication disorders. The review identified seven major themes related to the use of the CCC, such as the evolution and development of the CCC, its application and effectiveness, limitations and strengths, use in specific populations, translation and adaptation, use in different formats, and role in identifying pragmatic language impairments (PLIs). The CCC and CCC-2 have proven invaluable in assessing and diagnosing communication disorders in children. Despite some limitations, their strengths, including their versatility across diverse populations, languages, and contexts, and their ability to identify PLIs, make them effective tools in the field of pediatric communication disorders.

KEYWORDS

Children's Communication Checklist, communication disorders, pragmatic language impairments, diagnostic tools, thematic review

INTRODUCTION

Numerous studies have addressed language impairment in individuals of different age groups, including children and adults, with the aim of establishing a comprehensive definition for language deficits and impairments (Paul and Norbury, 2012). Studies have primarily concentrated on pragmatic language difficulties throughout early development, which involve difficulties in expressing and comprehending meaning, organizing conversations, and actively participating in discussions (Laws and Bishop, 2004). Therefore, language impairment refers to the challenges individuals face in understanding or using language that is appropriate for their age (Paul and Norbury, 2012).

The importance of addressing language impairment and pragmatic issues in early childhood stems from the fact that a significant proportion of school-aged children are impacted

by language impairment. Prevalence estimates vary from 2% to 10% depending on the diagnostic criteria used (Lindsay et al., 2016). Children who persist in having language issues after the age of 5 years may encounter challenges in their social and academic language abilities throughout their elementary school years (Tomblin et al., 2003). These issues tend to endure and can have an influence on their social engagements, scholastic achievements, and even their future professional opportunities (Johnson et al., 1999). Also, students who have linguistic difficulties often encounter difficulties in developing literacy abilities as well (Catts et al., 2014).

Within the field of identifying developmental language and communication issues, different categories such as developmental language disorders (DLDs), specific language

impairment (SLI), and primary language impairment are employed to define unknown developmental language difficulties (Bishop, 2014). Although each of these terms corresponds to distinct evaluation instruments, this research will specifically address the Children's Communication Checklist (CCC) and its upgraded version CCC-2, which are instruments used to diagnose language impairment. Nevertheless, due to the widespread availability of assessment tools and methods in this domain, it is essential to conduct additional investigation and gain a comprehensive grasp of the scholarly and scientific impact of each assessment instrument through thematic review studies. Conducting these studies will yield a detailed analysis of current trends and patterns in using these tools, thereby aiding academics and scholars in assessing language impairment. This will be achieved by providing a comprehensive review of the research on the CCC and its revised version, the CCC-2.

Assessment and diagnosis of communication disorders

Language and communication assessments serve multiple purposes, such as initial screening, diagnosing impairments, identifying intervention areas, making decisions about service delivery, measuring outcomes, and conducting research on underlying cognitive skills and neurobiology (Tomblin et al., 1996). Various assessment approaches and guidelines are utilized to identify language disorders in children, including language sampling, standardized assessments, curriculum-based assessments, and caregivers' and parents' reports (Caesar and Kohler, 2007).

Language sampling assessments are formal tests administered by qualified professionals, typically speech-language pathologists (SLPs). An example of a language sampling assessment is the Preschool Language Scale (PLS-5). It consists of two standard scales (Auditory Perception Scale and Expressive Language Scale) and three additional measures (Language Sample Checklist, Articulation Screener Scale, and Home Communication Questionnaire). The PLS-5 provides norm-referenced scores that include standard score, percentage, and age value, and then a norm-referenced total language score can also be calculated (Zimmerman et al., 2001).

Moving to the standardized assessments, one example is the Test of Pragmatic Language (TOPL)-2, which specifically evaluates pragmatic skills in children aged 4-12 years (Phelps-Terasaki and Phelps-Gunn, 2007). The content encompasses domains such as seeking information, sustaining conversation topics, and comprehending figurative language. The TOPL-2, first intended for SLPs, is now employed by a range of professionals such as psychologists, counselors, and specialists in special education and rehabilitation.

In terms of curriculum-based assessments, one approach is the social thinking assessment and training. This framework involves various tasks and activities aimed at evaluating and improving social thinking skills, which promote pragmatic language ability. Winner and Croke (2009) describe the training aspect of social thinking as the ILAUGH model,

which represents how different aspects of the school and home environments require core social knowledge to produce social skills and successfully impact specific academic tasks.

The category of assessments that involve caregivers' and parents' reports on language delay and communication deficiencies is another important aspect to consider. The CCC and its updated version, the CCC-2, are among the tools used in this field to identify children with pragmatic language impairment (PLI) (Bishop, 2003). In order to evaluate children's communicative impairments, Bishop (1998) developed the CCC. According to Adams and Lloyd (2005), the CCC-2 is a parent-caregiver questionnaire that provides an efficient and affordable screening option for serious pragmatic language issues. This instrument can successfully differentiate between children who normally developed and those who have communication difficulties such as high-functioning autism (HFA), PLIs, and particular language impairments (Norbury et al., 2004).

The CCC-2 questionnaire comprises 70 binary questions that evaluate the child's communication skills across several contexts, encompassing the home, school, and social interactions. The questionnaire is completed by parents or caregivers, who base their responses on their observations of the child's daily communication. The questions are categorized into 10 subscales, each dedicated to a distinct aspect of pragmatic language. The subscales are associated with several pragmatic abilities, including communicative intents, presupposition, and the social structuring of speech. The CCC-2 serves the objective of evaluating communication characteristics that might not be measured by conventional language examinations (Bishop, 1998, 2003). Researchers have used it to screen families of autistic children and have found it to be clinically helpful in identifying the broad phenotype of autism in siblings of autistic children (Bishop et al., 2006).

Additional studies have shed light on the metric properties of the CCC and the developed CCC-2 and its applications. Bishop and Baird (2001) conducted a study to examine the application of the CCC in clinical environments. They specifically investigated the viewpoints of parents and teachers on pragmatic communication. Their research yielded valuable evidence supporting the reliability and effectiveness of the CCC as a screening tool for identifying pragmatic language difficulties in children with developmental disorders. However, it also emphasized the significance of considering constraints and using the CCC as a component of a thorough evaluation methodology.

In another study, Norbury et al. (2004) found that the CCC-2 includes a composite score that effectively identifies children with pragmatic language deficiencies, even if they do satisfactorily on other language assessments. In another study, Geurts et al. (2004) investigated the attributes of the CCC-2 in Dutch children who had PLI and autism spectrum disorders (ASD). They argued for the efficacy of the CCC-2 in detecting and describing pragmatic language challenges in children with ASD and PLI. Additionally, they expressed concern about the sensitivity of the CCC-2 to cultural factors and individual variations. In a different study, Volden and Phillips (2010) discovered that the CCC-2 was superior to the TOPL, a commonly used neuropsychological assessment, in identifying pragmatic language problems in

children with autism who had normal language abilities for their age.

In comparison, the CCC and its updated version, the CCC-2, are valuable tools for assessing communication difficulties in children. The original CCC consists of nine subscales that evaluate various aspects of communicative ability, including speech, syntax, initiation, coherence, conversation, context, rapport, social behavior, and restricted interests. The CCC has demonstrated adequate inter-rater reliability and validity in identifying children with primary PLI. The CCC-2, an extension of the original checklist, is designed to screen for communication problems in children aged 4-16 years. It provides standard scores and percentiles for 10 scales, covering speech, syntax, semantics, coherence, inappropriate initiation, stereotyped language, use of context, nonverbal communication, social relations, and interests. Additionally, the CCC-2 yields two composite scores: the General Communication Composite (GCC) and the Social Interaction Deviance Composite (SIDC). The GCC helps identify children with clinically significant communication problems, while the SIDC assists in identifying children with a communicative profile characteristic of autism. Together, the CCC and CCC-2 serve as valuable tools for professionals to screen for language impairments, identify pragmatic difficulties, and guide further assessment for ASDs (Bishop, 1998, 2003).

Purpose of the present study

The objective of this review is to conduct a thematic examination of existing literature that applies the CCC and CCC-2 in the diagnosis of communication disorders. The study aims to delve into the nuances of CCC's deployment, its diagnostic traits, and its capability to accurately distinguish individuals with or without communication disorders in English and non-English contexts. This review aspires to augment the wider discourse on the diagnosis and identification of communication disorders.

METHODS

Sample

The present study conducted a comprehensive literature search to select relevant studies that apply the CCC and CCC-2 in diagnosing communication disorders. We used the search string: (TS = ("Learning Disabilities Diagnostic Inventory")) OR TS = ("LDDI"). The initial search yielded 237 articles from multiple databases, including Web of Science, Scopus, ProQuest Dissertations & Theses Global, PsycINFO, PubMed, and Google Scholar. After removing duplicates using Mendeley (Elsevier B.V., Amsterdam, Netherlands), 83 articles were retrieved for title screening. Abstract screening and full-text screening further narrowed down the pool to 39 studies, which included research papers, theses, and dissertations. The final sample included studies in various languages, including German, Korean,

Portuguese, Persian, and French. However, each of these studies included abstracts and summaries in English, facilitating thematic analysis. Moreover, translation for some paragraphs was conducted using Google Translate to ensure the accurate interpretation of non-English sources.

Instrument

The primary instrument used in this research study was the CCC (including both CCC and CCC-2). The CCC is a widely utilized diagnostic tool that is designed to assess the communication abilities of children aged 4-16 years. This tool provides a comprehensive measure of both structural and pragmatic aspects of communication, including syntax, semantics, coherence, initiation, scripted language, context, nonverbal communication, and social relations (Bishop, 2003).

Design

The design of the study involved a thematic analysis of existing literature using the CCC for diagnosing communication disorders. The study used a systematic approach to search, screen, and select relevant studies from various databases. The selected studies were then subjected to a thematic analysis to identify and analyze patterns and themes concerning the use of CCC in diagnosing communication disorders.

Procedures

The research process began with a systematic literature search using specific search terms related to the CCC across multiple databases. Following the removal of duplicates, the remaining articles were subjected to title screening, abstract screening, and full-text screening to select studies relevant to the research topic.

The selected studies were then subjected to a thematic analysis, a technique used for analyzing qualitative data. This procedure involved several steps:

1. **Reading and re-reading the data:** Each study was read carefully to understand the meaning communicated and the perspective of the authors.
2. **Breaking the data into meaningful units:** The text from each study was broken down into meaningful units of text relevant to the research topic. These units of text could be sentences or phrases independently able to convey meaning.
3. **Assigning a name or code to each unit:** Each unit of text was assigned a name or code, which represented the initial themes identified by the researchers.
4. **Grouping similar units into themes:** Units of text dealing with the same issue were grouped together into categories or themes. The same unit of text could be included in more than one category.
5. **Reviewing the data:** The data were systematically reviewed to ensure that there was a name, definition, and data excerpt for each theme.

6. Establishing coherence and replicability of themes:

The coherence and replicability of the themes (i.e. the likelihood that the same set of data would be reproduced) were established by a second researcher.

7. Drawing conclusions:

Finally, conclusions were drawn based on the identified themes, which may include new theories.

This comprehensive procedure allowed for an in-depth exploration of the nuances of CCC's deployment, its diagnostic traits, and its capability to accurately distinguish individuals with or without communication disorders.

RESULTS

Table 1 provides a comprehensive overview of studies conducted across various languages using the CCC. It reflects the tool's evolution, its application in different contexts, and its translation and adaptation across diverse linguistic and cultural settings. The first four studies demonstrate the initial development and application of the CCC in an English-speaking context. Subsequent entries indicate the CCC's translation into Dutch, German, Norwegian, Finnish, French, Serbian, Brazilian-Portuguese, Spanish, Persian, Kannada, and Galician. These studies collectively demonstrate the CCC's ability to evaluate pragmatic abnormalities in social communication, identify communication problems, and differentiate between children with different communication disorders. They also highlight the CCC's strengths, such as its inter-rater reliability, its systematic approach to information gathering, its ability to complement information from standardized language tests, and its capacity to distinguish children with communication impairments from non-impaired peers. Despite some limitations, such as the risk of subjective bias, the CCC has proven to be a valuable tool across various languages and contexts.

Table 2 presents a summary of seven important themes related to the CCC. These themes encompass the evolution and development of the CCC, its application and effectiveness in different contexts, and an assessment of its limitations and strengths. The table also outlines the CCC's application in studying specific populations, including children with attention deficit hyperactivity disorder (ADHD), ASD, and other specific conditions, along with the translation and adaptation of the CCC into various languages. The exploration of different formats of CCC use, such as parent reports and teacher ratings, is also detailed, as well as the role of the CCC in identifying PLIs. Each theme is supported by evidence from various studies, providing comprehensive insights into the CCC's utility in the diagnosis of communication disorders.

The evolution and development of the CCC

The CCC was first developed by Bishop in 1998 as a tool to assess the qualitative aspects of communicative impairment

in children (Bishop, 1998). This initial version of the CCC was designed specifically to evaluate pragmatic abnormalities in social communication and other qualitative aspects of speech and language. Its deployment involved a study of 76 children aged 7-9 years with special education for language impairment. Despite its potential for subjective bias risk due to checklist ratings, limited sample age range, and scarcity of data on psychiatric diagnoses, the CCC showed promising results, particularly in its ability to discriminate between children with semantic-pragmatic disorder and other types of SLI (Bishop, 1998).

In 2001, Bishop and Baird conducted a subsequent study to evaluate the validity and reliability of the CCC when completed by parents and explore its usefulness in a clinical context. This study involved a larger sample size of 151 children aged 5-17 years with pervasive or specific developmental disorders. The CCC's use in this context was aimed at providing an objective assessment of pragmatic aspects of communication difficulties. While the study acknowledged that the CCC could not be used to assign a specific diagnosis due to the wide range of pragmatic deficits in children without ASD, it highlighted the tool's systematic approach to information gathering about pragmatic difficulties as a strength. This version of the CCC, validated by both parents and professionals, was noted for its ability to complement information from standardized language tests (Bishop and Baird, 2001).

By 2004, the CCC had evolved further as researchers explored how different subgroups of children with communication disorders scored on the checklist. In a study by Botting (2004), the CCC was deployed as a tool to establish whether pragmatic impairments were part of a child's communication difficulty. Despite the study's conclusion that the CCC was not reliable enough to use alone at an individual case level, it was acknowledged as a useful tool in clinical settings as a descriptive tool when used in conjunction with other measures (Botting, 2004).

These studies mark significant milestones in the evolution and development of the CCC. From its inception to its multiple iterations, the CCC has proven to be a valuable tool in the assessment of communicative impairment in children. Its development over time has been driven by a commitment to improving the understanding and diagnosis of communication disorders in the pediatric population. As such, the CCC's ongoing evolution reflects the broader progression of research and clinical practice in the field of pediatric communication disorders.

The application and effectiveness of the CCC

The CCC has been extensively applied in a variety of research and clinical settings to assess and diagnose communication disorders in children. Its effectiveness in identifying and distinguishing individuals with communication disorders has been proven in numerous studies.

One of the early studies that applied the CCC in a clinical context was conducted by Bishop and Baird (2001). The study evaluated the validity and reliability of the CCC when

Table 1: Characteristics of included studies on CCC application across languages.

No.	Authors and date of publication	Aim of the study	Characteristics of participants	Characteristics of CCC for identification or diagnosis	Limitations or weaknesses of CCC	Main strengths of CCC	Translation version of CCC	Version of CCC
1	Bishop, 1998	Develop the CCC as a tool for assessing the qualitative aspects of communicative impairment in children.	76 children aged 7-9 years with special education for language impairment.	Evaluate pragmatic abnormalities in social communication and other qualitative aspects of speech and language.	Subjective bias risk due to checklist ratings; limited sample age range; there is not enough information about psychiatric diagnoses to draw clear conclusions.	Ability to evaluate pragmatic abnormalities in social communication; inter-rater reliability; discriminates between children with semantic-pragmatic disorder and other types of SLI.	English	CCC
2	Bishop and Baird, 2001	Evaluate the validity and reliability of the CCC when completed by parents; explore its usefulness in a clinical context.	151 children aged 5-17 years with pervasive or specific developmental disorders.	Objective assessment of pragmatic aspects of communication difficulties.	Cannot be used to assign a specific diagnosis due to the wide range of pragmatic deficits in children without ASD.	Provides systematic information about pragmatic difficulties; complements information from standardized language tests; validated by parents and professionals.	English	CCC
3	Nathan, 2002	Measure the effects of a significant speech difficulty on wider social communication using the CCC.	Not specified.	Used to rate children on a range of communication skills and aspects of social communication.	Not specified.	Effective in identifying difficulties in social communication in children with speech difficulties.	English	CCC
4	Botting, 2004	Explore how different subgroups of children with communication disorders score on the CCC.	161 11-year-old children with a history of communication disorders.	Establishes whether pragmatic impairments are part of a child's communication difficulty.	Not reliable enough to use alone at an individual case level.	Identifies group differences; useful in clinical settings as a descriptive tool in conjunction with other measures.	English	CCC
5	Geurts et al., 2004	Investigate whether the CCC can differentiate between children with ADHD, children with HFA, and normal controls.	50 children with ADHD, 50 with HFA, and 50 normal controls in the clinical sample; 23 children with ADHD, 42 with HFA, and 35 normal controls in the research sample.	Measures pragmatic language use.	Overlap in pragmatic problems between ADHD and HFA.	Identifies pragmatic deficits in children with ADHD and HFA; useful in both clinical and research settings.	Dutch	CCC-2
6	Norbury et al., 2004	Validate the use of the CCC-2 in identifying diagnostic groups in children with communication impairment.	87 children attending full-time special education for SLI, PLI, or ASD.	Provides a general screening for communication disorder and identifies pragmatic/social interaction deficits.	Substantial overlap among groups with "distinct" diagnoses.	Distinguishes children with communication impairments from non-impaired peers; identifies children who show clear pragmatic deficits despite normal scores on language measures.	English	CCC-2
7	Britton, 2005	Examine the prevalence and type of language and communication problems in children attending community pediatric clinics.	80 school-aged children attending community pediatric clinics for the first time; 40 age- and gender-matched controls.	Identifies children with language problems and communication impairments.	Might fail to identify receptive language problems.	Identifies new language problems in 25% of cases; strong relationship between language problems as shown by the CCC-2 and emotional and behavioral problems.	English	CCC-2

Table 1: Continued.

No.	Authors and date of publication	Aim of the study	Characteristics of participants	Characteristics of CCC for identification or diagnosis	Limitations or weaknesses of CCC	Main strengths of CCC	Translation version of CCC	Version of CCC
8	Bishop et al., 2006	Examine the prevalence of the "broad phenotype" in non-autistic siblings of children with autism using the CCC-2.	29 siblings of 20 children with autism, 13 siblings of 9 children with ASD-NOS, and 46 TD control children.	Identifies siblings with disproportionate pragmatic and social difficulties in relation to their structural language impairments.	Not specified.	Identifies siblings with pragmatic and social difficulties; shows promise as a quick screening device for the broad phenotype in non-autistic siblings.	English	CCC-2
9	Verté et al., 2006	Explore whether the CCC can differentiate between children with HFA, AS, and ASD-NOS.	57 children with HFA, 47 with AS, 31 with ASD-NOS, and 47 normal control children.	Identifies pragmatic communication deficits.	Less useful for differentiation between subtypes within the autism spectrum, possibly because these subtypes are not valid or reliable.	Identifies pragmatic communication deficits in children with ASD; useful for obtaining a global inventory of deficits in the domain of language.	Dutch	CCC
10	Sarimski, 2006	Assess the reliability and validity of the German version of the CCC in children with intellectual disabilities.	98 children with intellectual disabilities.	Assesses pragmatic competence, formal language competence, social relationships, and interests.	Not specified.	Confirms the reliability and validity of the pragmatic subscales for the clinical assessment of children with intellectual disabilities.	German	CCC
11	Eadie, 2007	Examine the prevalence of PLIs in children referred to psychiatric services using the CCC.	21 children referred to psychiatric services and 29 TD children aged 8-10 years.	Identifies children with PLIs.	Norwegian version of the CCC used in the study is still in the research stage; procedures for translating the original instrument were not fully described.	Identifies language problems in children referred to psychiatric services for whom language has not previously been a primary concern.	Norwegian	CCC
12	Helland and Heumann, 2007	Evaluate the usability of a Norwegian adaptation of the CCC-2 in differentiating between language-impaired and non-language-impaired children.	45 language-impaired and 108 non-language-impaired children aged 6-12 years.	Distinguishes language-impaired from non-language-impaired children.	Not specified.	Provides a useful screening tool for communication impairments in Norwegian children; reasonable reliability with internal consistency values ranging from 0.73 to 0.89.	Norwegian	CCC-2
13	Geurts et al., 2009	Study the construct validity of a pragmatic language questionnaire using the Dutch version of the CCC.	1589 TD children and 481 children with a clinical diagnosis.	Assesses pragmatic, speech, and syntactic performance.	Nine scales of the original CCC do not reflect the underlying factor structure; scale composition may be improved on.	Identifies language and communication impairments in Dutch children; useful for obtaining a global inventory of deficits in the domain of language.	Dutch	CCC
14	Helland et al., 2009	Evaluate the usability of a Norwegian adaptation of the CCC-2 in differentiating between language-impaired and non-language-impaired children.	153 children aged 6-12 years (45 language-impaired and 108 non-language-impaired).	Distinguishes language-impaired from non-language-impaired children.	Not specified.	Distinguishes between children with symptoms of PLIs and those with no symptoms; reasonable reliability with internal consistency values ranging from 0.73 to 0.89.	Norwegian	CCC-2

Table 1: Continued.

No.	Authors and date of publication	Aim of the study	Characteristics of participants	Characteristics of CCC for identification or diagnosis	Limitations or weaknesses of CCC	Main strengths of CCC	Translation version of CCC	Version of CCC
15	Ketelaars et al., 2009	Evaluate the usability of a Norwegian adaptation of the CCC-2 in differentiating between language-impaired and non-language-impaired children.	153 children aged 6-12 years (45 language-impaired and 108 non-language-impaired).	Distinguishes language-impaired from non-language-impaired children.	Not specified.	Provides a useful screening tool for communication impairments in Norwegian children; reasonable reliability with internal consistency values ranging from 0.73 to 0.89.	Norwegian	CCC-2
16	Yliherva et al., 2009	Examine the development of communication skills in Finnish preschool children and investigate gender differences using the CCC.	TD Finnish-speaking children between 3 and 6 years of age.	Assesses pragmatic competence, speech, syntax, coherence, use of context, and interests.	Not specified.	Effective in evaluating typical communication skills in preschool children; can be used to investigate pragmatic skills in children as young as 3 years of age.	Finnish	CCC
17	Bussy et al., 2010	Assess the interest of using the CCC in the Fragile X syndrome by examining the pragmatic skills of children with Fragile X syndrome.	92 individuals with Fragile X.	Identifies pragmatic impairments.	Not specified.	Identifies pragmatic impairments in children with Fragile X syndrome; useful for language assessment in Fragile X syndrome.	French	CCC
18	Volden and Phillips, 2010	Compare the CCC-2 with the TOPL in identifying PLI in speakers with ASD who had age-appropriate structural language skills.	16 rigorously diagnosed children with ASD and 16 TD children.	Identifies children with PLIs.	Not specified.	Identifies PLIs in children with ASD who have age-appropriate structural language skills.	English	CCC-2
19	Glumbić and Brojčin, 2012	Determine the factor structure of the CCC-2 in the Serbian adaptation.	1344 TD, monolingual participants of both sexes, aged from 4 to 17 years.	Assesses pragmatic, speech, and syntactic performance.	Nine scales of the original CCC do not reflect the underlying factor structure; scale composition may be improved on.	Identifies language and communication impairments in Serbian children; useful for obtaining a global inventory of deficits in the domain of language.	Serbian	CCC-2
20	Vézina et al., 2013	Evaluate the validity of the Dutch CCC for children in kindergarten in a community sample.	1396 TD children at kindergarten level.	Identifies children with PLIs.	Not specified.	Differentiates between TD children and those with PLIs; useful for the early detection of problems in communication.	Dutch	CCC
21	da Costa et al., 2013	Translate the CCC-2 into Brazilian-Portuguese, make its cross-cultural adaptation, and assess its internal reliability.	20 parents or caregivers of individuals with autism.	Provides a general screen for communication disorder and identifies pragmatic/social interaction deficits.	Not specified.	Distinguishes children with communication impairments from non-impaired peers; identifies children who show clear pragmatic deficits despite normal scores on language measures.	Brazilian-Portuguese	CCC-2
22	Hoffmann et al., 2013	Ascertain the validity and reliability of the CCC-2 in Spanish.	Parents of 32 children with ADHD and 12 TD peers.	Identifies children with PLI.	Not specified.	Identifies children with ADHD who are at elevated risk for LI and need referral for comprehensive assessment.	Spanish	CCC-2

Table 1: Continued.

No.	Authors and date of publication	Aim of the study	Characteristics of participants	Characteristics of CCC for identification or diagnosis	Limitations or weaknesses of CCC	Main strengths of CCC	Translation version of CCC	Version of CCC
23	Mahmoodi et al., 2014	Translate the CCC-2 into Persian and validate it for use in identifying children with PLI.	Not specified.	Provides a general screen for communication disorder and identifies pragmatic/social interaction deficits.	Not specified.	Potential to identify children with PLI; useful for research purposes and clinical use.	Persian	CCC-2
24	Timler, 2014	Explore whether children with ADHD have language and/or pragmatic difficulties compared to TD children using CCC-2.	19 children with ADHD and 19 TD children aged 4-6 years.	Identifies children with PLI.	Not specified.	Distinguishes children with ADHD who have language and/or pragmatic difficulties; useful for clinical evaluation of children with ADHD.	English	CCC-2
25	Vaisänen et al., 2014	Examine the communication skills of Finnish-speaking children between 3 and 6 years of age using the CCC.	Not specified.	Assesses pragmatic competence, formal language competence, and social relationships, and interests.	Not specified.	Evaluates typical communication skills in preschool children; can be used to investigate pragmatic skills in children as young as 3 years of age.	Finnish	CCC
26	Vaisänen et al., 2014	The aim of this study was to explore whether children with ADHD have language and/or pragmatic difficulties compared to typically developing children.	Nineteen children with ADHD (age 5-12 years) and nineteen typically developing children (age 5-8 years)	According to the CCC-2 questionnaire, differences between the groups were found in linguistic abilities, pragmatics skills, and social interaction.	There were some difficulties in translating the CCC-2 because of the differences between English and Finnish languages. The main problem was translating question number one: 'gets mixed up between he and she so might say "he" when talking about a girl or "she" when talking about a boy' because there is no gender in Finnish grammar.	The present study showed that the CCC-2 is a valid method to find these difficulties for further assessment and proper intervention.	Finnish	CCC-2
27	Crespo Egulaz et al., 2016	Translate the CCC-2 into Spanish and validate it for use in identifying children with PLI.	80 young Spanish-speaking children with a language disorder.	Provides a general screen for communication disorder and identifies pragmatic/social interaction deficits.	Not specified.	Distinguishes children with communication impairments from non-impaired peers; useful for clinical evaluation of children with PLIs.	Spanish	CCC-2
28	Song et al., 2016	A meta-analysis of CCC for children and adolescents with PLI.	14 studies were selected from three electronic databases: PsycINFO, Academic Search Complete, and ERIC.	Identifies children with PLIs.	Not specified.	Useful for identifying children with PLIs; useful for research purposes and clinical use.	Different languages	CCC
29	Tanaka et al., 2017	Investigate whether the CCC-2 could identify subtypes in relation to communication impairments in Japanese children with ASD.	160 control children, 68 children with ADHD, 77 with procedural nonverbal disorder, 25 children with social communication disorder, and 30 with ASD.	Identifies children with PLI.	Not specified.	Identifies children with ASD who have language and/or pragmatic difficulties; useful for clinical evaluation of children with ASD.	Japanese	CCC-2

Table 1: Continued.

No.	Authors and date of publication	Aim of the study	Characteristics of participants	Characteristics of CCC for identification or diagnosis	Limitations or weaknesses of CCC	Main strengths of CCC	Translation version of CCC	Version of CCC
30	McGownd, 2018	Explore parent perceptions of their children's communication skills using the CCC-2.	32 children previously diagnosed with different disorders: ASD, DLD, ADHD, Down syndrome children, and TD children.	Identifies children with PLI.	Not specified.	Identifies children with PLI; useful for research purposes and clinical use.	English	CCC-2
31	Hammond, 2019	To investigate the agreement between parent and teacher ratings on the CCC-2.	Children with a DLD with specific impairment in social communication (12 parent-teacher pairs).	The CCC-2 is a behavior-rating scale developed to address difficulties in assessing social communication in children.	Poor to fair agreement between parents and teachers on the exact nature of a child's social communication strengths and weaknesses.	It can provide a holistic assessment of a child's social communication profile and is particularly useful to detect when a social communication problem exists.	English	CCC-2
32	Lane et al., 2019	To investigate the communicative abilities of children with Sotos syndrome using the CCC-2.	Children with Sotos syndrome ($n = 31$), with children with Williams syndrome as a comparison group.	The CCC-2 was used to identify communicative impairment, uneven pragmatic language profile, and social relations impairment.	Not stated.	Can identify specific communicative difficulties in a syndrome-specific manner.	English	CCC-2
33	Ferrara et al., 2020	To assess and compare language competences in children with different neurodevelopmental conditions using the CCC-2.	Italian children (aged 8-10) with typical development ($n = 26$) and children with different neurodevelopmental conditions.	The CCC-2 was used as a screening measure to distinguish children with communication impairments from non-impaired peers.	Small sample size; use solely of a parent report; subjective interpretations and biases of informants.	Can describe pragmatic and language skills in children with different neurodevelopmental disorders.	Italian	CCC-2
34	Andrés-Roqueta et al., 2021	To examine parents' reports using the Spanish version of the CCC-2 questionnaire and its association with different formal assessments related to communication.	Children with DLD (3; 9-10 years old) and age-matched children with typical development.	The CCC-2 covers aspects of a child's communication related to structural language and pragmatic skills.	The information provided by the parents seems to be precise in structural language aspects but they do not seem to be aware of the actual pragmatic implications/difficulties.	The CCC-2 answered by parents was consistent with formal assessments in children with DLD, and structural language seemed to be the best predictor of all the subscales.	Spanish	CCC-2
35	De La Torre Carril et al., 2021	Adapt the CCC-2 to Galician and evaluate it for use in identifying children with PLI.	30 children with different neurodevelopmental conditions: high-functioning ASD ($n = 19$), language disorder with associated developmental dyslexia ($n = 23$), and developmental dyslexia without linguistic impairments ($n = 21$).	Identifies children with PLI.	Not specified.	Identifies children with PLI; useful for research purposes and clinical use.	Galician	CCC-2
36	Fisher et al., 2022	Assess the clinical utility of the CCC-2 in children with early childhood TBI.	20 children who sustained TBI or orthopedic injuries between the ages of 36 and 83 months were recruited.	Identifies children with PLI.	Not specified.	Identifies children with TBI who have PLI; useful for research purposes and clinical use.	English	CCC-2
37	Nowell et al., 2022	Investigate the clinical utility of the CCC-2 in children with early childhood TBI.	20 children who sustained TBI or orthopedic injuries between the ages of 36 and 83 months were recruited.	Identifies children with PLI.	Not specified.	Identifies children with TBI who have PLI; useful for research purposes and clinical use.	English	CCC-2

Table 1: Continued.

No.	Authors and date of publication	Aim of the study	Characteristics of participants	Characteristics of CCC for identification or diagnosis	Limitations or weaknesses of CCC	Main strengths of CCC	Translation version of CCC	Version of CCC
38	Aghaz et al., 2022	Investigate the diagnostic accuracy of the CCC-Persian in differentiating children with ASD from TD children.	47 children with ASD and 104 TD children.	Identifies children with PLI.	Not specified.	CCC-Persian has the potential to be used as a valid clinical tool for diagnosing PLI or screening ASD in Persian-speaking children.	Persian	CCC-2
39	Girimaji et al., 2023	Identify communication problems in Kannada-speaking preschool children with ADHD using CCC-2.	Small group of Kannada-speaking ADHD preschool children.	Identifies children with communication problems.	The sample was small and included only Kannada speakers; the CCC-2 is normed for the UK population, must not be used as a standalone tool, and must be validated against appropriate language-appropriate tools.	CCC-2 helped in identifying and differentiating communication problems in ADHD preschool children; can help in developing domain-specific speech-language intervention goals.	Kannada	CCC-2

Note: Psychiatric services refer to healthcare services that diagnose and treat mental health conditions, including the identification of language impairments among children. Abbreviations: ADHD, attention deficit hyperactivity disorder; AS, Asperger syndrome; ASD, autism spectrum disorder; CCC, Children's Communication Checklist; CCC-Persian, CCC-Persian version; DLD, developmental language disorder; ERIC, educational resources information center; HFA, high-functioning autism; LI, language impairment; PLI, pragmatic language impairment; ASD-NOS, autism spectrum disorders not otherwise specified; SLI, specific language impairment; TBI, traumatic brain injury; TD, typically developing; TOPL, Test of Pragmatic Language.

Table 2: Generated themes for using the CCC to diagnose and assess communication disorders.

Theme	Evidence
Evolution and development of the CCC	Development of the CCC for assessing qualitative aspects of communicative impairment in children.
Application and effectiveness of the CCC	Use of the CCC for objective assessment of pragmatic aspects of communication difficulties. Evaluation of different CCC versions in various research and clinical contexts.
Limitations and strengths of the CCC	Identification of certain limitations of the CCC such as subjective bias risk and overlap in pragmatic problems between different disorders. Recognition of strengths like inter-rater reliability, systematic identification of pragmatic difficulties, and distinguishing children with communication impairments from non-impaired peers.
The CCC and specific populations	Extensive application of the CCC in studying specific populations, including children with ADHD, ASD, and other specific conditions.
Translation and adaptation of the CCC	Translation and adaptation of the CCC into various languages such as Dutch, German, Norwegian, Finnish, French, Serbian, Brazilian-Portuguese, Spanish, Persian, Kannada, and Galician.
Use of the CCC in different formats	Exploration of different formats of CCC use, such as parent reports and teacher ratings. Identification of agreement and disparities between different informants.
Role of the CCC in identifying PLIs	Use of the CCC in identifying PLIs across different populations. Examination of the tools utility in both clinical and research settings.

Abbreviations: ADHD, attention deficit hyperactivity disorder; ASD, autism spectrum disorder; CCC, Children's Communication Checklist; PLI, pragmatic language impairment.

completed by parents and explored its usefulness in a clinical setting. The study concluded that the CCC provides a systematic approach to gathering information about pragmatic difficulties and complements information from standardized language tests. Despite the wide range of pragmatic deficits in children without ASD, the CCC was still seen as a useful tool.

In a subsequent study, Nathan (2002) highlighted the CCC's effectiveness in identifying difficulties in social communication in children with speech difficulties. While the characteristics of participants were not specified, the use of the CCC in this context further underscored its applicability in different clinical scenarios (Nathan, 2002).

The CCC has also been effective in identifying group differences in communication disorders. In a study by Botting (2004), the CCC was used to explore how different subgroups of children with communication disorders scored on the checklist. The CCC was found to be effective in identifying group differences and was deemed useful in clinical settings as a descriptive tool when used in conjunction with other measures.

Further demonstrating the CCC's effectiveness, a study by Geurts et al. (2004) investigated whether the CCC could differentiate between children with ADHD, children with HFA, and normal controls. The study concluded that the CCC effectively identifies pragmatic deficits in children with ADHD and HFA, making it a valuable tool in both clinical and research settings.

Moreover, Bishop et al. (2006) used the CCC-2 to examine the prevalence of the "broad phenotype" in non-autistic siblings of children with autism. The study found that the CCC-2 is effective in identifying siblings with disproportionate pragmatic and social difficulties in relation to their structural language impairments, showing its value as a quick screening device.

In short, the CCC has been applied effectively in various contexts to assess and diagnose communication disorders in children. Its proven effectiveness in differentiating individuals with communication disorders and its versatility in various clinical and research settings make it a valuable tool in the field. These studies provide strong evidence in support of the CCC's application and effectiveness, thereby contributing to its continued use and development.

Limitations and strengths of the CCC

The CCC has been widely recognized for its pivotal role in the field of pediatric communication disorders. However, like any diagnostic tool, it comes with its share of limitations and strengths. Understanding these aspects can aid in its effective deployment and further refinement.

One of the early identified limitations of the CCC was the risk of subjective bias due to checklist ratings, as noted by Bishop (1998). This initial study also pointed out the limited sample age range and the scarcity of data on psychiatric diagnoses as potential weaknesses. Yet, despite these limitations, the CCC demonstrated significant strengths, including its ability to evaluate pragmatic abnormalities in social communication, high inter-rater reliability, and its prowess

in discriminating between children with semantic-pragmatic disorder and other types of SLI (Bishop, 1998).

In a subsequent study by Bishop and Baird (2001), the CCC was critiqued for its inability to assign a specific diagnosis due to the wide range of pragmatic deficits in children without ASD. However, the study also emphasized the systematic approach of the CCC in gathering information about pragmatic difficulties, its complementary role alongside standardized language tests, and its validation by parents and professionals, underscoring the tool's strengths. The utility of the CCC was further demonstrated in a study by Botting (2004), which suggested that while the CCC might not be reliable enough to use alone at an individual case level, it is effective in identifying group differences and serves as a useful descriptive tool in clinical settings when used with other measures. Geurts et al. (2004) highlighted a specific limitation of the CCC in distinguishing between pragmatic problems in ADHD and HFA. Despite this, they also emphasized the CCC's effectiveness in identifying pragmatic deficits in these groups, thus showcasing its utility in both clinical and research settings.

In essence, while the CCC has certain limitations, its strengths make it a widely accepted and valuable tool in the identification and diagnosis of communication disorders in children. The continuous exploration of its strengths and limitations in different studies not only underscores its importance in the field but also paves the way for its ongoing refinement and development.

The CCC and specific populations: a tool for diverse communication disorders

The CCC has been extensively utilized in studies assessing specific populations, particularly children with varying communication disorders. This has allowed for a broader understanding of the unique communication challenges faced by these groups and the CCC's role in their assessment and diagnosis.

One of the notable applications of the CCC involved children with ADHD. Geurts et al. (2004) investigated whether the CCC could differentiate between children with ADHD, children with HFA, and normal controls. The study revealed that the CCC effectively identified pragmatic deficits in children with ADHD and HFA, providing a useful tool in both clinical and research settings. This finding was reiterated by Timler (2014), who used the CCC-2 to explore whether children with ADHD have language and/or pragmatic difficulties compared to typically developing (TD) children. The study concluded that the CCC-2 can distinguish children with ADHD who have these difficulties, further emphasizing its value in clinical evaluation of children with ADHD.

The CCC's utility extends to children with ASD. Tanaka et al. (2017) investigated whether the CCC-2 could identify subtypes in relation to communication impairments in Japanese children with ASD. Their findings indicated that the CCC-2 could identify children with ASD who have language and/or pragmatic difficulties, underlining its usefulness in the clinical evaluation of children with ASD.

Beyond ADHD and ASD, the CCC has also been applied to children with other specific conditions such as Fragile X syndrome and Sotos syndrome. Bussy et al. (2010) assessed the pragmatic skills of children with Fragile X syndrome using the CCC, finding that it effectively identifies pragmatic impairments in this population. Similarly, Lane et al. (2019) utilized the CCC-2 to investigate the communicative abilities of children with Sotos syndrome, demonstrating the tool's capacity to identify specific communicative difficulties in a syndrome-specific manner.

These studies illustrate the CCC's versatility and reliability in assessing diverse populations of children with varying communication disorders. By applying the CCC across different populations, researchers have been able to gain valuable insights into the unique communication challenges faced by these groups. This has not only expanded the understanding of these disorders but also highlighted the CCC's role in their assessment and diagnosis. As such, the CCC remains a pivotal tool in the ongoing study and treatment of pediatric communication disorders.

The translation and adaptation of the CCC

The CCC has undergone significant transformation through translation and adaptation, allowing for its application in various linguistic and cultural contexts across the globe.

One of the early translations of the CCC resulted in the Dutch version, implemented by Geurts et al. (2004). This translated version was used to investigate whether the CCC could differentiate between children with ADHD, children with HFA, and normal controls. The study found that the Dutch version of the CCC effectively identifies pragmatic deficits in children with ADHD and HFA, proving its utility in both clinical and research settings.

The CCC has also been translated into German by Sarimski (2006), who assessed its reliability and validity in children with intellectual disabilities. The study confirmed the reliability and validity of the pragmatic subscales for the clinical assessment of children with intellectual disabilities, demonstrating the successful adaptation of the CCC in a different linguistic and cultural context.

The translation and adaptation process of the CCC continued, resulting in versions in Norwegian (Helland and Heimann, 2007; Ketelaars et al., 2009), Finnish (Yliherva et al., 2009; Väisänen et al., 2014), French (Bussy et al., 2010), Serbian (Glumbić and Brojčin, 2012), Brazilian-Portuguese (da Costa et al., 2013), Spanish (Hoffmann et al., 2013; Crespo Eguílaz et al., 2016), Persian (Mahmoodi et al., 2014; Aghaz et al., 2022), Kannada (Girimaji et al., 2023), and Galician (De La Torre Carril et al., 2021). These studies confirmed the CCC's capability in identifying and diagnosing communication disorders across diverse linguistic and cultural environments.

In summary, the translation and adaptation of the CCC into various languages have broadened its scope and applicability, facilitating more comprehensive and inclusive research on pediatric communication disorders. These translated versions have not only upheld the original intent

and effectiveness of the CCC but also expanded its reach, reinforcing its global relevance in the field of communication disorders.

The use of the CCC in different formats: diverse perspectives of communication disorders

The CCC has been effectively utilized in diverse formats, ranging from parent reports to teacher ratings, providing holistic insights into children's communication skills.

One of the prominent studies involving parent reports was conducted by Hammond (2019). The study involved 32 children previously diagnosed with various disorders such as ASD, DLD, ADHD, Down syndrome, and TD children. The study found that the CCC-2, through parent reports, effectively identified children with PLI, thus demonstrating its utility in both research and clinical use.

In addition to parent reports, the CCC has also been used in teacher ratings. Hammond (2019) examined the agreement between parent and teacher ratings on the CCC-2. The study involved children with a DLD with specific impairment in social communication. The findings suggested that while there was poor to fair agreement between parents and teachers on the exact nature of a child's social communication strengths and weaknesses, the CCC-2 was effective in providing a holistic assessment of a child's social communication profile. This showcased the CCC-2's utility in detecting when a social communication problem exists, regardless of the respondent's perspective.

A subsequent study by Andrés-Roqueta et al. (2021) also examined parents' reports using the Spanish version of the CCC-2 questionnaire. The study revealed that the information provided by the parents was precise in structural language aspects, but they did not seem to be aware of the actual pragmatic implications or difficulties. Nonetheless, the CCC-2 answered by parents was consistent with formal assessments in children with DLD, and structural language seemed to be the best predictor of all the subscales.

These studies highlight the robustness and versatility of the CCC in different formats. Whether it is parents or teachers providing the data, the CCC continues to prove its effectiveness in identifying communication disorders, offering diverse perspectives in understanding and diagnosing such disorders. This versatility not only enables a more comprehensive understanding of children's communication skills but also contributes to the ongoing refinement and development of the CCC as an indispensable tool in the field of pediatric communication disorders.

The role of the CCC in identifying PLIs

PLI is a common feature in many communication disorders. The CCC has played a crucial role in identifying these impairments across various populations and clinical contexts.

The early application of the CCC for this purpose was evident in a study by Eadie (2007), which examined the

prevalence of PLIs in children referred to psychiatric services using the CCC. The study revealed that the CCC identifies language problems in children referred to psychiatric services for whom language had not previously been a primary concern.

Similarly, Sarimski (2006) used the CCC to assess the reliability and validity of the German version of the CCC in children with intellectual disabilities. The study confirmed the reliability and validity of the pragmatic subscales for the clinical assessment of children with intellectual disabilities.

A meta-analysis conducted by Song et al. (2016) took a broader view, analyzing multiple studies using the CCC to identify children and adolescents with PLI. Their findings reinforced the usefulness of the CCC for identifying this impairment, showcasing the tool's effectiveness for both research purposes and clinical use.

The CCC's role in identifying PLIs was further evidenced in studies focusing on specific disorders. For example, Volden and Phillips (2010) used the CCC-2 to compare it with the TOPL in identifying PLI in speakers with ASD who had age-appropriate structural language skills. They found that the CCC-2 effectively identifies such impairments in this population. Finally, studies by Fisher et al. (2022) and Nowell et al. (2022) have highlighted the clinical utility of the CCC-2 in children with early childhood traumatic brain injury, demonstrating the tool's potential to identify children with PLI in this specific population.

In sum, the CCC has proven to be a valuable tool in identifying PLIs across various populations and clinical contexts. Its consistent effectiveness in this role contributes to a better understanding of these impairments and informs the development of targeted intervention strategies, reinforcing the CCC's importance in the field of pediatric communication disorders.

DISCUSSION

The main aim of this study was to present the thematic examination of existing literature that covered the CCC and CCC-2 in the diagnosis of communication skills and communication language development in several languages and settings exploring the nuances of CCC's deployment, its diagnostic traits, and its capability to accurately identify individuals with or without communication disorders.

The analysis of the scale's review history of several research papers demonstrated the initial development and application of the CCC in English-speaking settings (Bishop, 1998; Bishop and Baird, 2001; Nathan, 2002; Botting, 2004). The focus of these studies was to develop the scales and to explore the assessment of pragmatic aspects of communication difficulties and identify the children with language problems and communication impairments. The study reported important subsequent studies from several languages that the CCC and CCC-2 were translated into either to validate the scales in the targeted non-English settings or identify the development of communication skills of children with language disorder as in Dutch (Geurts et al., 2009), German

(Sarimski, 2006), Japanese (Tanaka et al., 2017), Spanish (Hoffmann et al., 2013), and Kannada (Girimaji et al., 2023). The research highlighted the CCC's strengths in its inter-rater consistency, its organized approach to information gathering, its ability to match information from standardized language tests, and its usability and ability to differentiate children with communication impairments from non-impaired peers (da Costa et al., 2013; Väisänen et al., 2014). The reported content analysis of previous studies revealed that though some limitations have been found in the scales, such as the risk of subjective bias (Bishop, 1998) and lack of the ability to assign a specific diagnosis due to the wide range of pragmatic deficits in children without ASD (Bishop and Baird, 2001), the CCCs' scales have been demonstrated to be an effective tool across various languages and contexts.

Based on the review record, this research highlighted a summary of six important themes related to the CCC and CCC's scales. These themes include (i) the evolution and development of the CCC, its application and (ii) its effectiveness in different contexts, and the assessment of its limitations and strengths. The study also summarized (iii) the CCC's application in studying specific populations, including children with ADHD, ASD, and other specific conditions, and (iv) the translation and adaptation of the CCC into various languages. (v) The exploration of different formats of CCC use, such as parent reports and teacher ratings, was also reported, in addition to (vi) the role of the CCC in identifying PLIs. All the themes gave supportive evidence from the previous studies, providing detailed perceptions into the CCC's utility in the diagnosis of communication disorder. This research reported how the CCC was designed specifically to evaluate pragmatic abnormalities in social communication and other qualitative aspects of speech and language and found to be good to discriminate between children with semantic-pragmatic disorder and other types of SLI (Bishop, 1998).

The CCC tool has been validated by several studies. It was reported that the CCC was useful in clinical settings as a descriptive tool when used in conjunction with other measures. Botting (2004) deployed the CCC as a tool to establish whether pragmatic impairments were part of a child's communication difficulty too. The effectiveness of the CCC in identifying and distinguishing individuals with communication disorders and social communication problems has been proven in numerous studies (Bishop and Baird, 2001; Nathan, 2002). It was also found that the CCC has the potential to differentiate between children with ADHD, children with HFA, and normal controls (Geurts et al., 2004). One of the remarkable applications of the CCC was involving children with ADHD where the CCC was found to be effective in the assessment of children with ADHD, children with HFA, and normal controls (Geurts et al., 2004). Though the CCC has been found to be productive in several studies and research on child development and language disorder, the risk of subjective bias in checklist rating, the limited sample age ranking, the scarcity of data on psychiatric diagnoses, and the inability to give a specific diagnosis due to the wide range of pragmatic deficits were among the common limitations (Bishop, 1998; Bishop and Baird, 2001).

The translation and adaptation of the CCC made the scale common in several languages and settings with various linguistic and cultural contexts. The usability of the translated versions of the scale confirmed the CCC's ability in identifying and diagnosing communication disorders across varied linguistic and cultural environments, such as in French (Bussy et al., 2010), Serbian (Glumbić and Brojčin, 2012), Brazilian-Portuguese (da Costa et al., 2013), and Persian (Mahmoodi et al., 2014; Aghaz et al., 2022). This translation and adaptation of the CCC into various languages have extended the scope and applicability of the CCC bringing more inclusive and wide-ranging research on pediatric communication disorders. The CCC has been utilized in diverse formats, ranging from parent reports to teacher ratings, providing holistic insights into children's communication skills (Andrés-Roqueta et al., 2021).

This research supports the fact that the CCC has demonstrated to be a valuable tool in identifying PLIs across various populations and clinical contexts. The CCC acted as an important starting point in understanding the impairments and paving a way for the development of targeted intervention strategies and reinforcing the CCC's importance in the field of pediatric communication disorders.

For clinicians, the findings from this review are instrumental in refining the assessment of communication disorders. They provide a richer understanding of the CCC and CCC-2's diagnostic strengths and their contextual limitations. Clinicians are encouraged to adopt a more holistic evaluation approach, integrating the CCC with other assessment tools to capture a full spectrum of language abilities and impairments. Specifically, the CCC's adeptness at identifying PLIs should be harnessed to inform and improve diagnostic processes. By emphasizing these implications, this review galvanizes a forward momentum in both research and practice. For academics, it delineates a pathway for research that not only probes the depths of existing tools but also contributes to the evolution of diagnostic standards. For practitioners, it offers a blueprint for leveraging the CCC and CCC-2's insights to optimize assessment strategies, ultimately enhancing the care and support provided to children with communication disorders. This dual focus promises to foster significant advancements in the understanding, identification, and treatment of pediatric

communication disorders, supporting a trajectory of continued innovation and improved outcomes in the field.

CONCLUSION

This thematic review has provided an in-depth examination of the literature regarding the use of the CCC and its revised version, CCC-2, in the diagnosis of communication disorders. Through a comprehensive analysis of 39 selected studies, we have identified seven key themes that capture the progression, efficacy, and versatility of the CCC and CCC-2, as well as their capacity to detect PLIs—factors that render them invaluable in pediatric communication disorder diagnosis. The implications of this study extend into both future research and practical application. For researchers, there is a clear directive to pursue the development of more sophisticated diagnostic criteria that account for the nuanced capabilities of the CCC and CCC-2. Further investigations should aim to integrate the insights derived from CCC applications into clinical practice, thereby enhancing diagnostic precision and intervention methods.

FUNDING

This research was supported by the King Salman Centre for Disability Research, Saudi Arabia, Research Group no. KSRG-2023-291 (funder ID: <https://www.kscdr.org.sa/en>).

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGMENTS

The authors extend their appreciation to the King Salman Centre for Disability Research, Saudi Arabia, for funding this work through Research Group no. KSRG-2023-291.

REFERENCES

- Adams C. and Lloyd J.T. (2005). Elicited and spontaneous communicative functions and stability of conversational measures with children who have pragmatic language impairments. *Int. J. Lang. Commun. Dis.*, 40(3), 333-347. 10.1080/13682820400027768.
- Aghaz A., Kazemi Y., Karbasi-Amel A. and Nakhshab M. (2022). Diagnostic accuracy of the Children's Communication Checklist-Persian in identifying children with autism spectrum disorder. *Int. J. Pediatr.*, 10(2), 15482-15494. 10.22038/IJP.2022.61564.4736.
- Andrés-Roqueta C., Garcia-Molina I. and Flores-Buils R. (2021). Association between CCC-2 and structural language, pragmatics, social cognition, and executive functions in children with developmental language disorder. *Children*, 8(2), 123. 10.3390/children8020123.
- Bishop D.V.M. (1998). Development of the Children's Communication Checklist (CCC): a method for assessing qualitative aspects of communicative impairment in children. *J. Child Psychol. Psychiatry Allied Discip.*, 39(6), 879-891.
- Bishop D. (2003). *Children's Communication Checklist (CCC-2)* (2nd ed.), Pearson Education Ltd, London, UK.
- Bishop D.V.M. (2014). Ten questions about terminology for children with unexplained language problems. *Int. J. Lang. Commun. Disord.*, 49, 381-415.
- Bishop D.V.M. and Baird G. (2001). Parent and teacher report of pragmatic aspects of communication: use of the Children's Communication Checklist in a clinical setting. *Dev. Med. Child Neurol.*, 43(12), 809. 10.1017/S0012162201001475.

- Bishop D.V.M., Maybery M., Wong D., Maley A. and Hallmayer J. (2006). Characteristics of the broader phenotype in autism: a study of siblings using the Children's Communication Checklist-2. *Am. J. Med. Genet. B Neuropsychiatr. Genet.*, 141B(2), 117-122. 10.1002/ajmg.b.30267.
- Botting N. (2004). Children's Communication Checklist (CCC) scores in 11-year-old children with communication impairments. *Int. J. Lang. Commun. Disord.*, 39(2), 215-227. 10.1080/13682820310001617001.
- Britton C. (2005). The prevalence and type of language problems in school age children seen by community pediatricians: an analysis using the Children's Communication Checklist - 2 [Doctoral dissertation, University College London]. ProQuest Dissertations and Theses. <https://www.proquest.com/openview/d2d8be813c474f0a66dce90e6bf07ade/1?pq-origsite=gscholar&cbl=2026366&diss=y>.
- Bussy G., Curie A., Delange K., Brun A. and Des Portes V. (2010). Étude de la pragmatique dans le syndrome de l'X-Fragile: intérêt de l'échelle Children's Communication Checklist. *ANAE Approche Neuropsychologique Des Apprentissages Chez l'Enfant*, 22(1), 47-52.
- Caesar L.G. and Kohler P.D. (2007). The state of school-based bilingual assessment: actual practice versus recommended guidelines. *Lang. Speech Hear. Serv. Sch.*, 38(3), 190-200. 10.1044/0161-1461007/020.
- Catts H.W., Fey M.E., Weismer S.E., Bridges M.S., Tomblin J.B. and Nippold M.A. (2014). The relationship between language and reading abilities. In: *Understanding Individual Differences in Language Development across the School Years* (Tomblin B. and Nippold N.A., eds.) pp. 144-165, Psychology Press, New York, USA.
- Crespo Eguílaz N., Magallón Recalde S., Sánchez-Carpintero Abad R. and Narbona García J. (2016). La adaptación al castellano de la Children's Communication Checklist permite detectar las dificultades en el uso pragmático del lenguaje y diferenciar subtipos clínicos [The Spanish adapted version of the Children's Communication Checklist identifies disorders of pragmatic use of language and differentiates between clinical subtypes]. *Rev. Neurología*, 62(Suppl 1), S49-S57. 10.33588/rn.62S01.2015526.
- da Costa V.B.S., Harsányi E., de Oliveira Martins-Reis V. and Kummer A. (2013). Tradução e adaptação transcultural para o português brasileiro do teste Children's Communication Checklist-2 [Translation and cross-cultural adaptation into Brazilian Portuguese of the Children's Communication Checklist-2]. *CoDAS*, 25(2), 115-119. 10.1590/S2317-17822013000200005.
- De La Torre Carril A., Durán-Bouza M. and Pérez-Pereira M. (2021). Capacity of the CCC-2 to discriminate ASD from other neurodevelopmental disorders. *Children*, 8(8), 640. 10.3390/children8080640.
- Eadie P. (2007). Pragmatic language impairment, diagnosed using the children's communication checklist, occurs more frequently in a sample of children referred to psychiatric services. *Evid. Based Commun. Assess. Interv.*, 1(4), 197-198. 10.1080/17489530701776544.
- Ferrara M., Camia M., Cecere V., Villata V., Vivencio N., Scorza M., et al. (2020). Language and Pragmatics across neurodevelopmental disorders: an investigation using the Italian version of CCC-2. *J. Autism Dev. Disord.*, 50(4), 1295-1309. 10.1007/s10803-019-04358-6.
- Fisher A.P., Gies L.M., Chapman L., Aguilar J.M., Yeates K.O., Taylor H.G., et al. (2022). The clinical utility of the Children's Communication Checklist-2 in children with early childhood traumatic brain injury. *Clin. Neuropsychol.*, 36(7), 1728-1745. 10.1080/13854046.2020.1866675.
- Geurts H.M., Verté S., Oosterlaan J., Roeyers H., Hartman C.A., Mulder E.J., et al. (2004). Can the Children's Communication Checklist differentiate between children with autism, children with ADHD, and normal controls? *J. Child Psychol. Psychiatry*, 45(8), 1437-1453. 10.1111/j.1469-7610.2004.00326.x.
- Geurts H.M., Hartman C.A., Vert S., Oosterlaan J., Roeyers H. and Sergeant J.A. (2009). Pragmatics fragmented: the factor structure of the Dutch children's communication checklist CCC. *Int. J. Lang. Commun. Disord.*, 44(5), 549-574. 10.1080/13682820802243344.
- Girimaji A.S., Meera S.S., Keshavaprasad Y.B., Jacob P., Philip M. and Rajgopal H. (2023). Use of Children's Communication Checklist-2 to identify communication problems in Kannada speaking preschool children with attention deficit hyperactivity disorder: a preliminary study. *Indian J. Psychol. Med.*, 45(5), 539-541. 10.1177/02537176231165180.
- Glumbić N. and Brojčin B. (2012). Factor structure of the Serbian version of the Children's Communication Checklist-2. *Res. Dev. Disabil.*, 33(5), 1352-1359. 10.1016/j.ridd.2012.03.010.
- Hammond C.L. (2019). *Agreement between Parent and Teacher Ratings of Social Communication Abilities on the Children's Communication Checklist-Second Edition* [Master's thesis, Brigham Young University]. Scholars Archive at Brigham Young University. <https://scholar.archive.byu.edu/etd/7485>.
- Helland W.A. and Heimann M. (2007). Assessment of pragmatic language impairment in children referred to psychiatric services: a pilot study of the Children's Communication Checklist in a Norwegian sample. *Logoped. Phoniatr. Vocol.*, 32(1), 23-30. 10.1080/14015430600712056.
- Helland W.A., Biringer E., Helland T. and Heimann M. (2009). The usability of a Norwegian adaptation of the Children's Communication Checklist Second Edition (CCC-2) in differentiating between language impaired and non-language impaired 6- to 12-year-olds. *Scand. J. Psychol.*, 50(3), 287-292. 10.1111/j.1467-9450.2009.00718.x.
- Hoffmann A., Martens M.A., Fox R., Rabidoux P. and Andridge R. (2013). Pragmatic language assessment in Williams syndrome: a comparison of the test of pragmatic language-2 and the children's communication checklist-2. *Am. J. Speech Lang. Pathol.*, 22(2), 198-204. 10.1044/1058-0360(2012/11-0131).
- Johnson C.J., Beitchman J.H., Young A., Escobar M., Atkinson L., Wilson B., et al. (1999). Fourteen-year follow-up of children with and without speech/language impairments: speech/language stability and outcomes. *JSLHR*, 42(3), 744-760. 10.1044/jslhr.4203.744.
- Ketelaars M.P., Cuperus J.M., van Daal J., Jansonius K. and Verhoeven L. (2009). Screening for pragmatic language impairment: the potential of the children's communication checklist. *Res. Dev. Disabil.*, 30(5), 952-960. 10.1016/j.ridd.2009.01.006.
- Lane C., Van Herwegen J. and Freeth M. (2019). Parent-reported communication abilities of children with Sotos syndrome: evidence from the Children's Communication Checklist-2. *J. Autism Dev. Disord.*, 49(4), 1475-1483. 10.1007/s10803-018-3842-0.
- Laws G. and Bishop D. (2004). Pragmatic language impairment and social deficits in Williams syndrome: a comparison with Down's syndrome and specific language impairment. *Int. J. Lang. Commun. Disord.*, 39, 45-64.
- Lindsay G., Ricketts J., Peacey L.V., Dockrell J.E. and Charman T. (2016). Meeting the educational and social needs of children with language impairment or autism spectrum disorder: the parents' perspectives. *Int. J. Lang. Commun. Disord.*, 51, 495-507.
- Mahmoodi F., Zarifiyan T., Kazemi Y. and SimaShirazi T. (2014). Cultural adaptation and validation of the Persian version of the children's communication checklist - second edition (CCC-2). *J. Res. Rehabil. Sci.*, 10(2), 281-291.
- Mcgownd C. (2018). *CCC-2 Measurements at Ages 6 and 8: Children Adopted Internationally*. Unpublished Master Thesis, Saint Louis University, St. Louis, MO. <https://www.proquest.com/openview/12d4f9eb53a5692f71f9dc7309c24895/1?pq-origsite=gscholar&cbl=18750>.
- Nathan L. (2002). Functional communication skills of children with speech difficulties: performance on Bishop's Children's Communication Checklist. *Child Lang. Teach. Ther.*, 18(3), 213-231. 10.1191/0265659002ct2360a.
- Norbury C.F., Nash M., Baird G. and Bishop D.V.M. (2004). Using a parental checklist to identify diagnostic groups in children with communication impairment: a validation of the Children's Communication Checklist - 2. *Int. J. Lang. Commun. Disord.*, 39(3), 345-364. 10.1080/13682820410001654883.
- Nowell S.W., Tomaszewski B., Steinbrenner J.R., Sam A.M. and Odom S.L. (2022). Use of the Children's Communication Checklist-2 in school-aged students with autism: a psychometric analysis. *J. Autism Dev. Disord.*, 52(9), 4089-4099. 10.1007/s10803-021-05284-2.
- Paul R. and Norbury C. (2012). *Language Disorders from Infancy through Adolescence: Listening, Speaking, Reading, Writing and Communicating* (4th ed.), Elsevier Mosby, St Louis, MI.
- Phelps-Terasaki D. and Phelps-Gunn T. (2007). *Test of Pragmatic Language*, Pro-Ed, Austin, TX.
- Sarimski K. (2006). Assessment of Pragmatic aspects of communication in children with intellectual disability: using the "Children's Communication Checklist". *Sprache Stimme Gehör*, 30(1), 29-35. 10.1055/s-2006-931530.

- Song S., Yang Y., Kim Y.T. and Yim D. (2016). A meta-analysis of Children's Communication Checklist (CCC) for children & adolescents with pragmatic language impairment. *Commun. Sci. Disord.*, 21(3), 436-450. 10.12963/csd.16302.
- Tanaka S., Oi M., Fujino H., Kikuchi M., Yoshimura Y., Miura Y., et al. (2017). Characteristics of communication among Japanese children with autism spectrum disorder: a cluster analysis using the Children's Communication Checklist-2. *Clin. Linguist. Phon.*, 31(3), 234-249. 10.1080/02699206.2016.1238509.
- Timler G.R. (2014). Use of the children's communication checklist-2 for classification of language impairment risk in young school-age children with attention-deficit/hyperactivity disorder. *Am. J. Speech Lang. Pathol.*, 23(1), 73-83. 10.1044/1058-0360(2013/12-0164).
- Tomblin J.B., Records N.L. and Zhang X. (1996). A system for the diagnosis of specific language impairment in kindergarten children. *J. Speech Hear. Res.*, 39, 1284-1294.
- Tomblin J.B., Zhang X., Buckwalter P. and O'Brien M. (2003). The stability of primary language disorder: four years after kindergarten diagnosis. *J. Speech Lang. Hear. Res.*, 46(6), 1283-1296. 10.1044/1092-43882003/100.
- Väisänen R., Loukusa S., Moilanen I. and Yliherva A. (2014). Language and pragmatic profile in children with ADHD measured by children's communication checklist 2nd edition. *Logoped. Phoniatr. Vocol.*, 39(4), 179-187. 10.3109/14015439.2013.784802.
- Verté S., Geurts H.M., Roeyers H., Rosseel Y., Oosterlaan J. and Sergeant J.A. (2006). Can the children's communication checklist differentiate autism spectrum subtypes? *Autism*, 10(3), 266-287. 10.1177/1362361306063299.
- Vézina M., Sylvestre A. and Fossard M. (2013). Development of a Quebec French version of the Children's Communication Checklist-2 (CCC-2): normalisation and metric equivalence. *Can. J. Speech Lang. Pathol. Audiol.*, 37(2), 154-166.
- Volden J. and Phillips L. (2010). Measuring pragmatic language in speakers with autism spectrum disorders: comparing the Children's Communication Checklist-2 and the test of pragmatic language. *Am. J. Speech Lang. Pathol.*, 19(3), 204-212. 10.1044/1058-0360(2010/09-0011).
- Winner M.G. and Crooke P.J. (2009). Social thinking: a training paradigm for professionals and treatment approach for individuals with social learning/social pragmatic challenges. *Perspect. Lang. Learn. Educ.*, 16(2), 62-69.
- Yliherva A., Loukusa S., Väisänen R., Pyper A. and Moilanen I. (2009). Development of communication skills in Finnish pre-school children examined by the Children's Communication Checklist (CCC). *Child Lang. Teach. Ther.*, 25(2), 235-249. 10.1177/0265659009102978.
- Zimmerman I.L., Steiner V.G. and Pond R.E. (2001). *Preschool Language Scale* (4th ed.), The Psychology Corporation, San Antonio, TX.