

# Communication difficulties in children identified with psychiatric problems

Wenche Andersen Helland



Dissertation for the degree of philosophiae doctor (PhD)

University of Bergen, Norway

Department of Biological and Medical Psychology

Centre for Child and Adolescent Mental Health

Faculty of Psychology

2010



# **Contents**

<b>Acknowledgements</b>	3
<b>Abbreviations</b>	4
<b>List of publications</b>	5
<b>Abstract</b>	6
<b>1. Introduction</b>	7
<b>2. Different terminology describing communication difficulties</b>	7
<b>3. Pragmatics</b>	9
3.1 Definition and theories	9
3.2 Pragmatic language impairment (PLI)	10
<b>4. Co-morbidity among disorders</b>	12
4.1 Communication difficulties in children with psychiatric problems	12
4.2 Psychiatric problems in children with communication difficulties	13
4.3 Communication difficulties in children with AD/HD	14
4.4 Communication difficulties in children with Asperger syndrome (AS)	16
4.5 Co-morbidity; AS and AD/HD	17
<b>5. Assessing communication</b>	18
<b>6. Aims</b>	19
6.1 Research questions	20
6.2 Hypotheses	20
<b>7. Method</b>	21
7.1 Study 1. Participants and procedures	21
7.2 Study 2. Participants and procedures	21
7.3 Study 3. Participants and procedures	22

7.4 Instruments used: the Children’s Communication Checklist (CCC) and the Children’s Communication Checklist Second Edition (CCC-2)	23
<b>8. Summary of results</b>	27
8.1 Study 1	27
8.2 Study 2	28
8.3 Study 3	29
<b>9. Discussion</b>	30
9.1 Summary of findings	30
9.2 Pragmatic difficulties in children with psychiatric problems	31
9.3 Language profiles on the CCC-2	32
9.4 Trans-cultural adaptation of the CCC-2	34
9.5 Limitations	36
9.6 Conclusions	37
9.7 Clinical implications	38
<b>10. References</b>	40

## **Acknowledgements**

The current thesis would not have been possible without the guidance and support of my supervisor, Professor Mikael Heimann, Linköping University, Sweden / University of Bergen, Norway. Throughout my PhD project, and before that on my master's degree, his professional input, encouragement, care and belief in my skills have been of immense value. I also want to express my gratitude to my co-supervisor, Professor Turid Helland, University of Bergen, Norway, for her guidance, interest, support and professional input in my research work. Further, my appreciations go to Eva Biringer, Head of Section of Mental Health Research, Helse Fonna, HF, co-author on two of my papers, for her valuable comments and statistical guidance. I am grateful to Helse Fonna, HF, for funding the studies reported in this thesis.

Thanks to Aslaug for her special support whenever needed and to Jofrid for being a great colleague and friend. A warm gratitude to my daughter Gjørild and to my sons Magne and Kjetil Johannes for their support and interest in my project. Last, but not least, I want to thank my husband Agnar Jan for his patience, enthusiasm, support and love

## Abbreviations

AD/HD	Attention Deficit/Hyperactivity Disorder
ASD	Autism Spectrum Disorders
AS	Asperger Syndrome
CCC	Children's Communication Checklist
CCC-2	Children's Communication Checklist Second Edition
DSM	Diagnostic and Statistical Manual of Mental Disorders
DSM-IV-TR	Diagnostic and Statistical Manual of Mental Disorders, fourth edition. Text revision
GCC	General Communication Composite
HFA	High Functioning Autism
ICD	International Classification of Diseases and Disorders
ICD-10	International Classification of Diseases and Disorders, tenth edition
LI	Language Impaired
NLI	Non Language Impaired
PDD-NOS	Pervasive Developmental Disorder - Not Otherwise Specified
PLI	Pragmatic Language Impairment
SIDC	Social Interaction Deviance Composite
SLI	Specific Language Impairment
TD	Typically Developing
UK	United Kingdom
US	United States

## List of publications

1. Helland, W. A., & 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. *Logopedics Phoniatrics Vocology*, 32, 23-30.
2. Helland, W. A., Biringer, E., Helland, T., & 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. *Scandinavian Journal of Psychology*, 50,(3), 287-292.
3. Helland, W. A., Biringer, E., Helland, T., & Heimann, M. Exploring language profiles for children with AD/HD and children with Asperger syndrome. Submitted.

## **Abstract**

Several studies have pointed to an overlap between different developmental psychopathological conditions and language impairments, and difficulties with communication have been identified in children of various diagnostic backgrounds. This thesis is based on three empirical studies, and the purposes are to investigate communication difficulties as reported by parents, in children identified with psychiatric problems as well as to evaluate a Norwegian adaptation of the Children's Communication Checklist (CCC) and the Children's Communication Checklist Second Edition (CCC-2), assessment tools, sensitive to various aspects of language.

The first study showed that pragmatic language impairments were more prevalent in a group of children referred to child psychiatric services than in a comparison group of typically developing children (57 % versus 10 %). The second study showed that the Norwegian adaptation of the CCC-2 distinguished language impaired from non-language impaired children, and thus seems to be useful as assessment tool for communication difficulties in Norwegian children. The third study found that communication difficulties were as common in a group of children with attention deficit hyperactivity disorder (AD/HD) as in a group of children with Asperger syndrome (AS). Although almost identical patterns appeared on most CCC-2 scales, children with AD/HD and children with AS differed in terms of their language profiles on the subscales assessing stereotyped language and nonverbal communication.

The results of the present thesis indicate that a majority of children identified with psychiatric problems exhibit communication difficulties. The impact of communication functioning on therapeutic outcomes underline the importance of systematic examination of communication to be performed as part of the assessment procedure.



## **1. Introduction**

Language and communicative competence have an important impact on how children think, learn and develop social relationships. These domains mutually interact with each other and competence in each domain contributes to competence in the others (Im –Bolter & Cohen, 2007). Language plays an important role in children’s emotional and behaviour functioning and children with subtle and unidentified language problems are at risk of developing behaviour problems, which are often more salient and overshadowing the language problems. Studies performed during the last decade have shown that a substantial portion of children referred to psychiatric services have undetected language and communication difficulties (Gallagher, 1999; Goodyear, 2000).

## **2. Different terminology describing communication difficulties**

Different terms are used when referring to children who do not develop speech, language and/or communication skills as expected. There is no consensus as how to define these difficulties, and different terminologies are used by different authors referring more or less to the same impairments. Historically, the terms “developmental dysphasia” or “developmental aphasia” were used, but they are no longer commonly used because of their associations to aphasia and dysphasia, terms referring to language difficulties acquired after brain damage (Leonard, 1998; Norbury, Tomblin, & Bishop, 2008). Developmental language disorder, language learning disability, delayed language, deviant language and specific language impairment (SLI) are other terms used to label these children (Leonard, 1998; Ullman & Pierpont, 2005). The term SLI is currently widely in use, especially in UK and US literature (Norbury et al., 2008).

SLI is commonly diagnosed when a child has significant limitations in his or her language abilities for no known reason, e.g. not due to low intelligence, neurological damage,

hearing impairment or autism. SLI is a developmental communication disorder which is defined largely by exclusion, and the pattern of impairment may change with age (Bishop, 1997; Leonard, 1998). Children with SLI may have problems within several areas of language, but mastering language form is particularly difficult, e.g. they may say “me got doll” instead of “I’ve got a doll” (Conti-Ramsden & Botting, 2008; Ebbels, 2008; Schwartz, 2009). They may show pragmatic deficits as well, suggesting that basic linguistic skills are important in pragmatic functioning (Laws & Bishop, 2004; Norbury, Nash, Baird, & Bishop, 2004). Based on an epidemiological study in the USA, the prevalence of SLI is estimated to approximately 7 % of preschool children (Tomblin et al., 1997). In middle childhood and adolescence an estimate of 3-6 % has been suggested (Goodyear, 2000).

A distinction can be drawn between speech and language, where speech refers to the physical production of sounds while language is the system on which words and grammatical inflections are combined to generate an infinite number of meanings (Lust, 2006; Norbury et al., 2008). Language problems may be classified according to the area of impairment, as receptive (understanding) or expressive. However, no sharp categorical distinction exist, and impairments are most often present in both areas (Baird, 2008).

Communication is an even broader concept in which the three areas of language intersect; content, form and use are equally important (Geurts & Embrechts, 2008; Landa, 2005). Communication, being the ultimate purpose of language, also includes non-linguistic parameters like gesture, eye-contact and turn-taking abilities. Thus communication impairments encompass a wide range of difficulties affecting speech and language as well as verbal and nonverbal pragmatic skills (Lust, 2006; Norbury et al., 2008).

The terms “disorders”, “impairments”, “problems” and “difficulties” are all commonly used and they may refer to overlapping conditions (Norbury et al., 2008). In the present thesis,

the term “difficulties” are most often used when referring to our findings as our results are based upon parental judgement.

### **3. Pragmatics**

#### **3.1 Definition and theories**

Pragmatics may be defined as the use and interpretation of language in different contexts and is traditionally viewed as one of three components of language, the other two being form and content (Blom & Lahey, 1978; Fujiki & Brinton, 2009). Thus similar to syntax and semantics, pragmatics may be considered an area of linguistic behaviour (Fujiki & Brinton, 2009). Pragmatics is commonly divided into three separate domains: (1) discourse management (how to initiate, maintain and end a conversation), (2) communicative intention (how to request, tease or inform), and (3) presupposition (assumptions about the interlocutor and the context) (Fujiki & Brinton, 2009; Geurts et al., 2008; Landa, 2005).

An expanded view of pragmatics, taking into consideration the relationship between cognitive, social and linguistic development, has led to the notion of social communication (Adams, 2008; Fujiki & Brinton, 2009). A social communication perspective on child language disorders places the focus on social interaction rather than on specific speech and language behaviours (Fujiki & Brinton, 2009). Russel (2007) stated, “In social communication, one is less interested in structural aspects of words and sentences and more interested in the contextual meaning they convey and how they function appropriately or inappropriately effectively to meet interpersonal and behavioural goals” (p. 484).

Grice’s theory of Conversational Implicature (1975) proposed that all interlocutors follow a “cooperative principle” obliging them to be truthful, relevant, clear and providing sufficient information. Building on these principles pragmatics may be considered as an interface between cognitive, social and linguistic abilities (Adams, 2002). Relevance Theory

(Sperber & Wilson, 1995) focuses on the principle of relevance, claiming that what people say in any context is relevant. According to Relevance Theory the ability to infer is inherent and an increasing ability to use the given context to construct meaning characterises the development of pragmatic comprehension (Ryder, Leinonen, & Schulz, 2008). Speech act theory focuses on the communicative function of what is said by the speaker and the effect this utterance may have on the addressee. The distinction between direct and indirect speech acts is central. A direct speech act refers to the literal meaning of an utterance as opposed to an indirect speech act in which the meaning has to be inferred (Perkins, 2007, Sveen, 2005). According to Adams (2008), the focus was on identifiable speech acts when pragmatics was first applied to child language disorders. Recently, Perkins (2007) proposed a model which has a more clinical approach, the emergentist model of pragmatic ability and disability, where he suggested that the study of pragmatic impairment is useful for the understanding of pragmatics. Within this model pragmatics is defined as "...the emergent consequence of interactions between cognitive, semiotic and sensorimotor systems within, and between, communicating individuals" (Perkins, 2007, p 5).

### **3.2 Pragmatic language impairment (PLI)**

For some children, difficulties with the appropriate use and interpretation of language in social contexts are the most overt part of their communicative problems, this being referred to as pragmatic language impairment (PLI) (Adams, 2008; Bishop, 2000; Gilmour, Hill, Place, & Skuse, 2004; Leyfer, Tager-Flusberg, Dowd, Tomblin, & Folstein, 2008 ). Pragmatic difficulties are reported in children within a broad range of different diagnostic backgrounds (e.g., language impairments: Bishop, 1998; autism spectrum disorders: Geurts & Embrechts, 2008; cerebral palsy: Holck, Nettelblatt, & Dahlgren Sandberg, 2009; Williams syndrome: Laws & Bishop, 2004).

However, no clear criteria for diagnosing pragmatic impairment exist (Letts & Leinonen, 2001; Norbury et al., 2004) and a considerable variety of clinical pictures is found within the population (Adams, 2008). Sometimes PLI is categorised as a subgroup of SLI, although this classification is disputed (Baird, 2008; Ketelaars, Cuperus, Jansonius, & Verhoeven, 2009; Schwartz, 2009).

Children with PLI have been described as having difficulties understanding implied meaning, initiating conversation, narrating events coherently, they may interrupt the conversational partner inappropriately and provide the listener with too much or too little information. Furthermore, they may interpret language in an over-literal manner, find it difficult to repair communication that has broken down, have difficulties taking turns or have problems conveying information through facial expression, gesture or prosody (Fujiki & Brinton, 2009; Im- Bolter & Cohen, 2007; Merrison & Merrison, 2005; Ruser et al., 2007; Ryder et al., 2008).

Children with PLI have been described as having intact structural language skills, containing appropriate vocabulary and grammar, but poor communication skills (Bishop, 1997, Merrison & Merrison, 2005). However, a study by Bishop and Norbury (2002) found that the majority of children with PLI also presented with some structural language difficulties and later Botting and Conti-Ramsden (2003) identified a group of children with PLI characterized by severe pragmatic difficulties as well as structural difficulties. Furthermore, children with PLI may share some characteristics with groups within the autism spectrum (Adams, 2008; Adams, Baxendale, Lloyd, & Aldred, 2005; Adams & Lloyd, 2005; Ketelaars et al., 2009). However, rather than describing PLI as a discrete category, recent research suggests an alternative interpretation adopting a more dimensional view. Accordingly, one may observe a spectrum of impairments without any clear boundaries with PLI as a profile

literally intermediate between SLI and autism (Adams, Lloyd, Aldred, & Baxendale, 2006; Bishop, 2000; Norbury et al., 2004; Whitehouse, Watt, Line, & Bishop, 2009).

## **4. Co-morbidity among disorders**

### **4.1 Communication difficulties in children with psychiatric problems**

In the present thesis the term psychiatric problems is used instead of psychiatric disorder. This is due to the fact that for the majority of our samples we do not have any confirmed diagnosis according to the DSM or ICD systems of classification (APA, 2000; WHO, 1992), our information is based on parental reports.

The existence of a substantial overlap between different developmental psychopathological conditions and language impairments has become evident over the years, and children of various diagnostic backgrounds have been found to experience difficulties with communication (Adams, 2008; Beichmann et al., 1991; Bishop & Baird, 2001; Im – Bolter & Cohen, 2007). Among children seen in mental health clinics and in special classrooms for children with social-emotional problems, language impairments have been revealed in more than 50 %, with estimates as high as 70 % (Camarata, Hughes, & Ruhl; 1988; Cohen, Barwick, Horodezky, Vallance, & Im, 1998; Im- Bolter & Cohen, 2007; Toppelberg & Shapiro, 2000). Cohen and colleagues (1998) found undiagnosed language impairments in 40 % of their sample of psychiatrically disturbed children. The children in their sample who had previously been identified as language impaired were characterised by more severe expressive problems compared to those not identified. However, regarding their receptive language skills, no differences were found. Furthermore, Cohen (1996) held that whereas the prevalence of language impairments in the general population declines from preschool years and onwards, their results indicated that it remains consistent into adolescence in a psychiatric sample. In their 10 years update review, Toppelberg and Shapiro (2000)

concluded that language disorders are often undiagnosed by child mental health and community psychiatric teams unless systematic language assessments are carried out, which is rarely done.

The existing literature on communication difficulties in children with psychiatric problems are mainly on Canadian, US and UK populations and to my knowledge no studies on this topic are reported in Norway so far.

#### **4.2 Psychiatric problems in children with communication difficulties**

Language impaired children have been found to present with increased rates of psychiatric disorders compared to typically developing children (Beitchman, Brownlie, & Wilson, 1996; Beitchman et al., 2001; Im-Bolter & Cohen, 2007; Ottem, Thorseng, Duna, & Green, 2002). Beitchman and colleagues (1996) argued that psychiatric disorders are as common in a language impaired sample as language impairments are in a psychiatric sample. Regarding the nature of the association between language impairments and psychiatric disorders, one may question whether language impairments cause psychiatric disorders or vice versa, whether they arise independently or whether they both are caused by similar underlying processes. Most likely the association is complex and can not be explained by any single process, rather it seems to act through a number of causal pathways (Beitchman et al., 1996; Cohen, 2001; Im-Bolter & Cohen, 2007).

Beitchman and colleagues (2001) found that in a group of young Canadian adults diagnosed with language impairment in early childhood, 40 % was diagnosed with a psychiatric disorder at age 19. Recently, in the UK, Whitehouse et al. (2009) compared adult psychosocial outcomes of children diagnosed with SLI, PLI and autism spectrum disorders (ASD) compared to a group of typical developing children. They found that in the SLI group 26 % had received a psychiatric referral due to co- morbid conditions (mainly major

depressive disorder and anxiety disorder). Comparative figures for the PLI group were 14 %, 36 % in the ASD group and 16 % among the typical children. In a sample of 17 male individuals diagnosed with severe receptive developmental language disorder in childhood, Clegg, Hollis, Mawhood and Rutter (2005) reported that four individuals had an increased risk of psychiatric disorder in adult life (23 %). Recently, Conti-Ramsden and Botting (2008) investigated the occurrence of emotional symptoms at age 16 in a sample of children with a history of SLI. They found an increased risk of mental health problems, especially anxiety and depression, in adolescents with SLI compared to typically developing peers. In a mixed sample of adolescents with a history of SLI, Snowling, Bishop, Stothard, Chipchase and Kaplan (2006) found that those presenting with persisting language difficulties after 5.5 years of age showed a higher risk of psychiatric problems, mostly restricted to AD/HD, in adolescence.

#### **4.3 Communication difficulties in children with AD/HD**

AD/HD is the most commonly diagnosed psychiatric disorder in childhood affecting approximately 3 -7 % of the school aged population (Jitendra, DuPaul, Someki, & Tresco, 2008; Sciuotto & Eisenberg, 2007; Thompson et al., 2004). It is characterised by a degree of inattention, hyperactivity and impulsivity that is inconsistent with the developmental level of the child. Although language related problems are not among the cardinal features or required to fulfil current diagnostic criteria of AD/HD according to DSM-IV-TR (APA, 2000), several studies have revealed a high prevalence of communication difficulties among these children. Tirosh and Cohen (1998) identified, out of a cohort of 3208 children aged 6-11 years, a substantial overlap between language deficits and attention deficit disorder, which is consistent with previous findings from clinical samples. Forty-five percent of the children fulfilled the criteria for both diagnoses. In line with this, more recently Bruce, Thernlund and



Nettelbladt (2006) found that 67 % of a clinical sample of 76 Swedish children diagnosed with AD/HD showed language impairments.

Cohen and colleagues (2000) reported that almost 64 % of 7 -14 year old children who were child psychiatric outpatients, fulfilled criteria for language impairment, and a diagnosis of AD/HD was given to 46 % of these children. They suggest that the social difficulties experienced by many children with AD/HD may be caused by language difficulties. They claim that systematic clinical language assessment is rarely completed in children with AD/HD, and argue that a possible reason for this is that the potential language deficits lies primarily in the area of pragmatics, which is not so readily assessed by standardized tests. The lack of studies assessing pragmatic language skills in children with AD/HD is also underlined by Camarata and Gibson (1999), pointing to the fact that this aspect of language may be especially vulnerable to disruption in these children. In the study by Bishop and Baird (2001), children with AD/HD were found to perform as low as children with Asperger syndrome (AS) on the Children's Communication Checklist, a measure of pragmatic competence (Bishop, 1998). Im-Bolter and Cohen (2007) argued that potential overlap with pragmatic language and language processing exists when looking at the specific psychiatric symptoms of AD/HD. For example symptoms of hyperactivity include pragmatic problems like "talking incessantly" and "interrupting others", and symptoms of inattention include pragmatic problems like "not listening when spoken to" and "not following through on instructions". In the Netherlands, Ketalaars and colleagues (2009), in a community sample of 4 year old children, found a high negative correlation between pragmatic competence and hyperactivity, claiming that early assessment of pragmatic competence may lead to early detection of AD/HD.

Several theoretical models posit relations between pragmatic language abilities, inattention and hyperactivity (Bignell & Cain, 2007). According to these models children with AD/HD may experience pragmatic difficulties for, at least, two reasons. First, pragmatic

language taps executive skills like planning and monitoring behaviours. Consequently, pragmatic deficits may arise from the cognitive deficits causing the behavioural symptoms of AD/HD. Second, the behavioural characteristics of children with AD/HD may influence both quality and frequency of their interactions with caregivers and thus adversely affecting their pragmatic development. Poor attention may for example lead to children missing important conversational and contextual cues, limiting their possibility to learn that words may have multiple meanings according to the context in which they are used. Bignell and Cain (2007) investigated pragmatic aspects of language in a nondiagnosed sample of 7 to 11 year old children in the UK, identified by their teachers as showing poor attention and/or high hyperactivity. Their results showed that poor attention and high hyperactivity were associated with impairments in pragmatic aspects of communication, these findings extending work with clinical populations of children with AD/HD. They also found some evidence that children with only hyperactivity performed slightly better than children with poor attention. According to Thompson et al. (2004) expressive language disorder associated with AD/HD has become an increasingly common finding. Loucas and colleagues (2008) suggested the possibility, that when language impairments and AD/HD co-occur, the disorders may interact leading to more severe inattentive AD/HD symptoms.

In a recent Swedish study, Hagberg, Miniscalco, and Gillberg (2010) found that of clinic referred children with AD/HD, ASD or the combination of the two, 60 % had been in contact with speech and language therapists during their preschool years.

#### **4.4 Communication difficulties in children with Asperger syndrome (AS)**

AS constitutes a subgroup within the autism spectrum. Although being included as a distinct category in the DSM and ICD systems of classification (APA, 2000; WHO, 1992) more than a decade ago, there is still divergence about the diagnostic features of the syndrome

(Ehlers, Gillberg, & Wing, 1999; Ghaziuddin, 2008). AS is characterised by restricted interests and social deficits in the absence of clinically significant delay in language development or cognitive abilities (Ghaziuddin, 2008; Vertè et al., 2006). However, deficits in pragmatic aspects of communication, like using and understanding literal and non-literal language appropriately in various social contexts, are described as universal symptoms in children as well as adults with AS by many research teams (Loucas et al., 2008; Loukusa et al., 2007; Rapin & Dunn, 2003; Ruser et al., 2007; Tager-Flusberg, 2006), thus indicating that a mismatch might exist between current diagnostic criteria and the definitions used by some clinicians. Loukusa and colleagues (2007) investigated if children with AS or high-functioning autism (HFA), showed impaired ability to use context in comprehension (pragmatic comprehension) and found clear signs of an impaired ability to answer contextually demanding questions, thus supporting the hypothesis that pragmatic impairment may be evident in children with AS /HFA even in the presence of normal linguistic abilities. In the Netherlands, Vertè et al. (2006) investigated different subtypes within the autism spectrum; children with HFA, children with AS, children with pervasive developmental disorder not otherwise classified (PDD-NOS) and typically developing controls, using the Children's Communication Checklist (CCC) (Bishop, 1998). The pragmatic composite showed deficits in all clinical groups compared to controls, with 72 % of the HFA, 70 % of the children with AS, and 55 % of the children with PDD-NOS scoring below cut off. These findings suggest that irrespectively of subgroup, children with ASD show pragmatic communication problems.

#### **4.5 Co-morbidity; AS and AD/HD**

Although a controversy exists regarding the diagnosis of AD/HD in children with ASD, symptoms of AD/HD and symptoms of ASD are reported to co-exist (Geurts et al.,

2004; Geurts, Vertè, Oosterlaan, Roeyers, & Sergeant, 2004; Sinzig, Walter, & Doepfner, 2009). Nydén, Gillberg, Hjelmqvist and Heimann (1999) stated that AS, AD/HD and autism tend to overlap with respect to certain functional deficits, and that attention problems are a common finding in all these syndromes. Gillberg (1989) reported that 21 % of children with ASD met the diagnostic criteria for both AD/HD and AS, and Holtmann, Bölte, and Poustaka (2005) reported attention problems above clinical cut off on the Child Behaviour Checklist for 65 % of children and adolescents with AS or HFA. Although contrary to current diagnostic criteria (APA, 2000) stating that AD/HD should not be diagnosed if the symptoms of inattention and hyperactivity occur exclusively during the course of an autism spectrum disorder, Holtman, Bölte, and Poustka (2007) argue that for some children a dual diagnosis of AD/HD and ASD need be considered in order to promote effective treatment.

## **5. Assessing communication**

Language and communication may be formally assessed by the use of various standardized tests measuring receptive and expressive skills. Additional information may be obtained by testing cognitive skills, by observation, by talking to parents or other caregivers and by the use of questionnaires. Formal assessment of children's language competence, as well as research, has largely focused on structural aspects, while less attention has been paid to the social use of language or pragmatics (Cohen et al., 1998, Im-Bolter & Cohen, 2007; Russel, 2007). Pragmatic function is by definition context dependent and pragmatic difficulties are more often observed in everyday life than in structured test settings (Botting, 2004; Farmer & Oliver, 2005). Different methods have been developed for the assessment of pragmatics e.g. coding systems of naturalistic assessment of interaction, standardized tests and checklists or questionnaires (Adams, 2002; Geurts et al., 2008). According to Adams (2002) checklists or questionnaires are more often preferred by practitioners than tests.

Several checklists are available e.g. Pragmatic Protocol (Prutting & Kirchner, 1987), Pragmatic Profile of Communication Skills in Children (Dewart & Summers, 1997), the Children's Communication Checklist (CCC) (Bishop, 1998) and the revised version the Children's Communication Checklist Second Edition (CCC-2) (Bishop, 2003).

Bishop developed the CCC and the CCC-2 within the UK and these questionnaires have been shown to provide valuable information of a child's communicative skills (Bishop, Maybery, Wong, Maley, & Hallmayer, 2006, Bishop & Norbury, 2005) and they are also known for sufficient discriminant validity as well as for satisfactory inter-rater reliability and internal consistency. Both the CCC and the CCC-2 are widely used in research contexts and by clinicians (Bishop, 2003; Geurts et al., 2008) and a closer description of these questionnaires and their psychometric qualities is provided in section 7.4.

So far, there has been a lack of assessment materials for the evaluation of language and communication skills in Norwegian, and the present thesis aims at taking the first steps in making a new instrument available for both clinical and research purposes.

In the present thesis neither formal tests nor observations in naturalistic settings were carried out, our findings are all based on information obtained by the questionnaires.

## **6. Aims**

The main aim of study 1 was to investigate pragmatic language impairments, as reported by parents, in children referred to child psychiatric services. A second and minor aim was to evaluate the usability of a Norwegian translation of the CCC. The aims of study 2 were firstly, to evaluate the ability of a Norwegian adaptation of the CCC-2 to differentiate between a language impaired and a non-language impaired population and secondly, to make a first evaluation of the instrument's psychometric qualities. The first aim of study 3 was to investigate communication difficulties, as reported by parents, in children in two clinical

groups, children with AD/HD and children with AS, compared to typically developing children. The second aim was to explore whether the clinical groups could be differentiated from each other in terms of their language profiles on the CCC-2.

## **6.1 Research questions**

The following research questions were addressed in the thesis:

- Is pragmatic language impairment measured with the CCC more prevalent in a child psychiatric population than among typically developing children?
- Does the Norwegian adaptation of the CCC-2 differentiate between Norwegian language impaired and non-language impaired children?
- What are the internal consistency values and the interrater agreement of the Norwegian adaptation of the CCC-2?
- Should the same cut-off for communication difficulties be used for Norwegian children as is used in the UK standardization sample?
- To what extent do children with AD/HD and children with AS have communication difficulties, and can these two groups be differentiated from each other based on their language profiles on the CCC-2?

## **6.2 Hypotheses**

Our hypothesis in study 1 and 3 was that communication difficulties would be more prevalent in the clinical group(s) than among typically developing children. Furthermore, we hypothesized that children with AD/HD would be distinguishable from children with AS regarding their language profile on the CCC-2 (study 3). In study 2 we hypothesized that the Norwegian adaptation of the CCC-2 would differentiate Norwegian language impaired from non- language impaired children.

## **7. Method**

### **7.1 Study 1. Participants and procedures**

In study 1 a total of 50 children (aged 8-10 years) participated. Pragmatic language abilities of a clinical group consisting of 21 children (16 boys, 5 girls) registered at a child psychiatric outpatient clinic and a comparison group consisting of 29 (17 boys, 12 girls) typically developing children in the same age range attending a primary school were compared. All children in the clinical group displayed a significant level of impairment as judged by parents, teachers or clinicians, although only 14 out of 21 children had received a clinical diagnosis according to ICD -10 at the time of the study. None of the children in the comparison group were, or had ever been, referred to child psychiatric services. Regarding the clinical group, 50 families with children in the target age range registered at the child outpatient clinic received a letter with information about the study and an invitation to participate together with the questionnaire CCC, 21 (42 %) parents accepted the invitation and returned the completed checklist. In the comparison group, all 66 families with pupils in 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> grade at a primary school received a similar letter and 29 parents (48.5%) agreed to participate and returned completed checklists.

### **7.2 Study 2. Participants and procedures**

In Study 2, 153 children aged 6-12 years participated (45 language impaired; 31 boys and 14 girls and 108 non-language impaired; 60 boys and 48 girls). The children were grouped into two age spans: 6-9 and 10-12 years. To be included in the study the children had to speak in sentences, Norwegian had to be the first language spoken at home, they should not suffer any permanent hearing loss and the questionnaires should be consistently completed. Children were defined as language impaired (LI) if judged so by their parents as well as by professionals at the School Psychology Services or by speech and language therapists. The

children were defined as non-language impaired (NLI) if they were judged so by their parents and not referred to School Psychology Services or speech and language therapists. School Psychology Services and speech and language therapists representing eight rural municipalities and one city district were contacted and asked to summarize how many of their referred children in the actual age range were identified as language impaired. This produced a list of 263 possible subjects whose parents were sent a letter of invitation to participate in the study. Attached to the letter were two copies of the CCC-2, one for the parents to fill out and one for the respective teachers. Completed CCC-2 were returned by 64 parents (24.3 %) and out of these 45 (31 boys; 14 girls) children aged 6-12 years fulfilled the above mentioned inclusion criteria thus making up the LI group. A sub-sample of 26 children in the LI group had complete CCC-2 questionnaires returned by both a parent and a teacher. Furthermore, an invitation to participate in the study together with a copy of the CCC-2 was sent to the parents of the total population (n=328) of children attending regular schools in a small municipality in Western Norway. Completed CCC-2's were returned by 127 parents (38.7 %). A total of 108 (60 boys, 48 girls) typically developing children within the same age range as the LI group filled the inclusion criteria, making up the NLI group.

### **7.3 Study 3. Participants and procedures**

Study 3 builds on data from two clinical groups, children with AD/HD and children with AS, and one group of typically developing children (TD), all in the age range 6-15 years. The participants in the clinical groups were recruited from a child psychiatric outpatient clinic, a Norwegian support system for special education and from two different parent support groups, one for AD/HD and one for autism. An information letter including an informed consent form and a copy of the CCC-2 was sent to parents of 173 children. A total of 67 (39 %) of the forms of consent and questionnaires were returned, and out of these 52



were included in the study meeting the following criteria: a diagnosis of AD/HD or AS and no intellectual disability according to parental reports, Norwegian as their first language, being able to speak in sentences, no permanent hearing loss and consistently completed questionnaires. The AD/HD group consisted of 29 children (22 males, 7 females) and the AS group consisted of 23 children (19 males, 4 females). From a previous sample of typically developing children (n=108) 19 children aged 6 to 12 years were selected to serve as a comparison group. None of these children had any known learning disabilities or specific language problems, nor had they any problems with communication according to their parents. In addition, 42 children in the age span 12 to 15 years were recruited from regular schools and from this sample 10 additional children were selected. Thus, the TD group consisted of 29 children of similar mean age and similar distribution of boys and girls matched on group level with the AD/HD group.

#### **7.4 Instruments used: the Children's Communication Checklist (CCC) and the Children's Communication Checklist Second Edition (CCC-2)**

In study 1, the CCC (Bishop, 1998), translated into Norwegian by Schjølberg and Thorkildsen (1998) was used to assess pragmatic language difficulties in the participating children. The development of this questionnaire was motivated by the lack of assessment tools sensitive to pragmatic language impairment. It was originally designed to be used within a population of children already identified as language impaired, to see whether evidence could be found for a subgroup with difficulties mainly affecting pragmatics. Teachers or speech and language therapist completed the checklists. Bishop (1998) reported internal consistency values (alpha) between 0.73 and 0.88 and interrater reliability (Pearson's correlations) between two professionals on the pragmatic composite of 0.80. In a further study by Bishop and Baird (2001) data were collected from children with psychiatric disorders aged

5-16 years as well as from typically developing children, using parents and teachers as informants. This study confirmed the usability of the CCC in a broader context than was initially intended. The scores for typically developing children showed almost no overlap with the clinical sample, thus suggesting that CCC might be used as a screening tool for language impairments as well as for identifying pragmatic impairments in children with psychiatric disorders. Furthermore, the study confirmed that the CCC provided useful information completed by parents (Bishop, 2003; Bishop & Baird, 2001). In this study internal consistency values between 0.54 and 0.91 were reported for the parent ratings and between 0.65 and 0.92 for professionals. Interrater reliability for the pragmatic composite was 0.46 (Bishop & Baird, 2001).

The questionnaire consists of 70 items and the rater has to decide whether the statement does not apply, applies somewhat, definitely applies or whether he is unable to judge. The items are divided into nine subscales measuring A. Speech, B. Syntax, C. Inappropriate initiation, D. Coherence, E. Stereotyped language, F. Context, G. Rapport, H. Social relations and I. Interests. A pragmatic composite is formed by combining subscales C to G. This score is calculated according to a special algorithm with a maximum score of 162 and 132 is recommended as a cut off in order to identify children with pragmatic problems within a population of language impaired children (Bishop, 1998). However, in line with Bishop and Baird's (2001) findings, cut off 140 might be used to distinguish between typically developing children and children with pragmatic problems. This is in line with a Swedish version of the CCC (Anderson & Westman, 2002) in which cut-off 140 is reported. In this Swedish version reported internal consistency value for the pragmatic composite was 0.92 and interrater reliability for the same composite was 0.59. Furthermore, Anderson and Westman (2002) reported that the corresponding values in a Danish sample were 0.91 and 0.64, respectively. Recently, Holck et al. (2009) suggested a division of pragmatically related

problems into socially versus linguistically related, and they found the CCC mainly to capture socially related pragmatic problems.

Users of the CCC reported problems with the multiple choice format regarding subjectivity of judgement as what one person judged as “somewhat” might be judged as “definitely” by another person. The use of double negative statements was also reported confusing (Bishop, 2003). Based on experiences with the CCC, a revised and new version, the CCC-2, has been developed. This revised version has been shown effective distinguishing children with communication impairments from typically developing children (Bishop, 2003).

In the CCC-2 negatives are avoided and ratings of frequency of given behaviours are made on a 4 point scale. The higher the raw score the poorer performance. The raw scores are converted into standardized scores, scaled with a normative mean of 10 and standard deviation of 3 (by an automated scoring program that comes with the CCC-2, higher scaled scores indicating better performance). In the original CCC “strengths” and “difficulties” items interspersed, while in the CCC-2 all “difficulties” items are grouped together at the beginning of the questionnaire and the “strengths” items are placed at the end. Another difference between the two versions is that contrary to the CCC, in the CCC-2 the scale measuring coherence (scale D), is not treated as a pragmatic but as a structural scale. The original CCC covered only briefly language form and content (aspects of language that are included in traditional language assessments). In order to allow the revised version, the CCC-2, to function as a more general screen for language impairments, a semantic scale was included and the syntax scale was extended from four to seven items (Bishop, 2003). Thus the CCC-2 assesses broader aspects of a child’s communicative ability, language structure as well as pragmatics. It aims at discriminating children with language impairments from typically developing children, to identify pragmatic impairment in children who are language impaired

and to assist in identifying children who may need further assessment for an autism spectrum disorder (Bishop, 2003).

The CCC-2 was standardized on a sample of 542 typically developing 4 to 16 year old children across the United Kingdom (Norbury et al., 2004). It is designed to be filled out by parents or any adult who has had regular contact with the child for at least 3 months. Interrater correlations between ratings by parents and professionals varied between 0.16 and 0.79. Relatively low correlations among parents and professionals are not rare and may be due to the fact that the raters observe the children in different contexts, and as pragmatic function is context dependent this finding is not unexpected. Internal consistency (alpha) values varied between 0.66 and 0.80. The CCC-2 was found to distinguish children with communication impairments from typically developing children, almost no overlap existed between the scores of the two populations (Bishop, 2003; Norbury et al., 2004).

The CCC-2 consists of 70 items grouped into 10 subscales: A. Speech, B. Syntax, C. Semantics, D. Coherence, E. Inappropriate initiation, F. Stereotyped language, G. Use of context, H. Non-verbal communication, I. Social relations and J. Interests. Scales A - D assess structural aspects of language while scale E-H assess pragmatic aspects. Scale I and J assess behavioural domains relevant to autism. Furthermore, two summary measures are computed. The General Communication Composite (GCC) is formed by summing the scaled scores of the eight first subscales (A-H). A high score on this measure indicates communicative competence. According to the UK manual (Bishop, 2003), a cut-off at or below 54 on the GCC (10<sup>th</sup> percentile in relation to norms) identifies clinically significant communication problems. The Social Interaction Deviance Composite (SIDC) is formed by subtracting the sum of scales A, B, C, D (tapping structural deficits) from the sum of scales E, H, I, J (tapping pragmatics and social interaction). A positive scaled score indicates that the child has predominantly structural language difficulties (SLI), while a negative score is indicative of a

child with pragmatic/social difficulties disproportionate to structural language impairments (pragmatic language impairment, autism or Asperger syndrome) (Bishop, 2003; Bishop et al., 2006; Glennen & Bright, 2005; Whitehouse, Barry, & Bishop, 2008). According to the manual, the SIDC should only be interpreted when a child obtains a score below cut-off on the GCC with the exception of children scoring extremely low ( $\leq -15$ ). A score that extreme is expected to be of clinical significance even with the GCC within normal limits. The correlation between parents and professionals were 0.79 on this composite which was found to separate children with SLI from other clinical groups in a coherent fashion (Bishop, 2003).

Permission to translate and adapt the CCC-2 into Norwegian was obtained from the copyright holders (Harcourt Assessment, The Psychological Corporation). The adaptation was developed using a two-way translation procedure. Linguists as well as clinicians (speech and language therapists, psychologists, neuropsychologists), all with long time experience in working with children with communication impairments, took part in the process in order to ensure quality of the trans-cultural adaptation. The CCC-2 was first translated into Norwegian, and some examples were altered due to differences between the English and the Norwegian language. A speech and language therapist, who has English as her mother tongue, but who also speaks Norwegian fluently, performed the back translation. This translation was submitted to Dorothy Bishop who commented upon seven items. The changes were made in accordance with her suggestions.

## **8. Summary of results**

### **8.1 Study 1**

This study investigated whether pragmatic language impairment was more prevalent among a group of children referred to a child psychiatric outpatient clinic ( $n=21$ ) than among a comparison group of typically developing children ( $n=29$ ). The study also aimed to assess

the usability of a Norwegian translation of the CCC. Pragmatic language impairment was defined as a pragmatic composite score of 140 or less. Based on parental reports on the CCC, pragmatic language impairment was identified in 57 % of the clinical group compared to 10 % of the comparison group. The two groups differed significantly, the observed mean of the pragmatic composite in the clinical group was more than two standard deviations below that of the comparison group. The mean pragmatic composite score observed in our comparison group was almost identical to that reported by Bishop and Baird (2001). The results suggest that the Norwegian translation of the CCC distinguishes between children with and without symptoms of pragmatic language impairment, as does the English version. The CCC might be valuable as part of an assessment battery and asking parents to complete the questionnaire before visiting a child psychiatric outpatient clinic may be a simple and cost-effective method for obtaining systematic information about communication problems. Furthermore, it may help to detect pragmatic impairment in children for whom language has not been a major concern. These findings seem to be in line with the growing body of research indicating co-occurrence of psychiatric disorders and communication disorders. This should lead to a more systematic examination of language functioning and evaluation of the impact of language and communication functioning on therapeutic outcome.

## **8.2 Study 2**

The aims of study 2 was to evaluate if the Norwegian adaptation of the CCC-2 differentiated between a language impaired and a non-language impaired population and to carry out a first evaluation of the psychometric qualities of the questionnaire on a Norwegian sample. A total of 153 children aged 6-12 years participated in the study, 45 language impaired and 108 non-language impaired. CCC-2 data were collected from parents, and for a subset of the language impaired group, also from teachers. The main results were that the

Norwegian adaptation of the questionnaire differentiated between language impaired and non-language impaired children, the two groups differed significantly on all subscales. The internal consistency of the Norwegian CCC-2 appeared to be reasonable with Cronbach's alpha values of 0.73 or higher for the different subscales, indicating that the ratings on each item cluster coherently within each scale. Moreover, the agreement between parents and teachers ranged from .44 to .76, which is in line with the correlations reported for the UK standardization sample. Based on the cut-off used in the UK version, 30 out of 43 language impaired children were correctly identified as cases, giving the instrument a sensitivity of 69.8 %. Altogether 106 out of 108 children in the non-language impaired group were correctly identified as non-cases, resulting in a sensitivity of 98.1 %. However, based on the findings in our sample, a higher cut-off on the General Communication Composite is recommended, as a score of 64 roughly corresponded to the 10<sup>th</sup> percentile in the Norwegian sample compared to 54 in the UK sample. Selecting cut-off 64 increased the sensitivity of the instrument to 86.0 %, while the specificity decreased to 90.7 %.

### **8.3 Study 3**

The study investigated communication impairments in children with AD/HD and children with AS compared to typically developing children and explored whether the clinical groups could be distinguished from each other based on their language profiles. The CCC-2 was completed by parents, and a total of 81 children aged 6-15 years took part in the study. The main results were that the vast majority of children with AD/HD (82.8 %) as well as those with AS (91.3 %) encountered communication impairments as measured by the CCC-2. In the typically developing group 3.45 % of the children were identified as language impaired. The AD/HD group and the AS group could not be differentiated from each other on an overall measure of communication (the GCC), but both groups scored significantly lower than the

typically developing children. On the composite measuring pragmatic difficulties disproportionate to structural aspects of language (the SIDC), the AS group and the AD/HD group differed significantly from each other, the AS children being more impaired than the AD/HD children. Furthermore, the AS group, not unexpectedly, differed from the typically developing group (more impaired). The children in the AD/HD group could not be differentiated from the children in the typically developing group on this composite. Although the scores of the AD/HD children were descriptively higher than those of the typically developing children, this difference did not reach statistical significance.

Based on their language profiles on the CCC-2, children with AD/HD could be differentiated from children with AS on two scales, the stereotyped language and the nonverbal communication scale. On these scales the AD/HD group performed better than the AS group. It is possible that these scales highlights problems specific to children with AS and that they therefore may be used diagnostically when identifying children with AS within clinical contexts. These findings underscore the importance of taking communication abilities into account when standard assessments of AD/HD and AS are performed during a clinical work-up and also when therapies are initiated.

## **9. Discussion**

### **9.1 Summary of findings**

The main findings in our studies (study 1 and study 3) are that communication difficulties are more prevalent among children with psychiatric problems than among typically developing children. This is consistent with results reported in previous studies (Cohen et al., 1998; Im-Bolter & Cohen, 2007; Ketalaars et al., 2009). Furthermore, the results from study 2 indicate that the Norwegian adaptation of the CCC-2 provides a reliable instrument for identifying communication difficulties in Norwegian children. The



questionnaire clearly differentiated between a group of language impaired and a group of non-language impaired children, the two groups differed significantly on all subscales as well as on the GCC. By selecting a cut-off at the GCC corresponding to the 10<sup>th</sup> percentile in the Norwegian sample, the sensitivity of the instrument was 86.0 % and the specificity 90.7 %. Internal consistency values and interrater reliability appeared to be reasonable and comparable to those reported in the UK standardization sample. When comparing two clinical groups (AS and AD/HD) and one group of typically developing children (study 3), communication difficulties of clinical significance were identified in 91.3 % of the AS group and in 82.8 % of the AD/HD group. Both clinical groups differed significantly (more impaired) from typically developing children. Although common in both groups, pragmatic difficulties are more common among children with AS than among children with AD/HD. On their language profiles on the CCC-2, children with AD/HD and children with AS could be distinguished from each other on the subscales assessing stereotyped language and nonverbal communication.

## **9.2 Pragmatic language impairments in children with psychiatric problems**

In study 1 pragmatic language impairments, as measured by the pragmatic composite of the CCC, was identified in a majority (57 %) of children of different diagnostic backgrounds registered at a child psychiatric outpatient clinic. The corresponding number in a typically developing comparison group was 10 %. In study 3, children with AS, children with AD/HD and a comparison group of TD children were investigated and compared. Pragmatic difficulties, as measured by the SIDC of the CCC-2, although common in both clinical groups, were more common among children with AS than among children with AD/HD. This finding is in line with previous research showing that this composite tend to be unusually low in children with AS (Bishop et al., 2006, Norbury et al., 2004). Thus it is possible that the

SIDC may be used diagnostically when differentiating children with AS and children with AD/HD. The AD/HD group could not be differentiated from the TD group on this measure, although the scores of the AD/HD children were descriptively higher than those of the TD children, this difference failed to reach statistical significance.

A third composite, the general pragmatic composite, formed by summing the scores on scale D-H, may also be calculated but it is not included as part of the CCC-2 because it did not discriminate satisfactory between subgroups of children with communication difficulties especially when based on parental report (Bishop, 2003). However, several studies have reported this general pragmatic composite (Bignell & Cain, 2007; Geurts & Embrechts, 2008; Norbury et al., 2004) which is comparable to the pragmatic composite of the original CCC and gives an overall impression of pragmatic abilities. Although not reported in study 3, additional analyses were performed where this score was calculated. On this measure the scores of the children with AD/HD fell in between those of the AS group and the TD group. The AD/HD group and the AS group differed significantly from each other, the AS group being most impaired. Both clinical groups differed significantly (more impaired) from the TD group as well. Our findings of the AD/HD performing better than the AS group on this composite are contrasting to the results reported by Bishop and Baird (2001) who found no differences between these two groups using the pragmatic composite of the original CCC. This may of course reflect underlying differences between the two samples or differences between the two versions of the questionnaire.

### **9.3 Language profiles on the CCC-2**

The communication problems encountered by the clinical groups (in study 3) were not restricted to pragmatics. Problems within three out of four scales measuring language structure and content; speech output, semantics and coherence were evident compared to TD

children. These findings are somewhat contradictory to those of Geurts and Embrechts (2008) who found no group differences on speech output, syntax and semantics in a comparable Dutch study. In our study the clinical groups differed from the TD group on nine out of ten scales, it was only on the scale measuring syntax that no difference was found. The clinical groups performed comparable to the TD children on this measure. The finding of relatively unimpaired syntax is in line with the results of study 1, where the clinical group differed significantly from the comparison group on all subscales of the original CCC, except the one measuring syntax, and also with the results of Geurts and Embrechts (2008).

When inspecting the language profiles on the CCC-2, no differences were found between the clinical groups on the scales measuring semantics, coherence, inappropriate initiation, use of context, social relations and interests. They could only be differentiated on the stereotyped language scale and the nonverbal communication scale. On these two scales the AD/HD group outperformed the AS group. These scales probably highlight problems that are especially prominent in AS, like use of favourite phrases, over-precise pronunciation of word, echolalia, poor eye contact and lack of facial expression. Thus it is possible that the CCC-2 may give additional diagnostic information when identifying children with AS within a clinical context. Considering the fact that children with AD/HD may show autistic symptoms and children with AS may encounter problems regarding attention and hyperactivity, it is possible that the stereotyped language and nonverbal communication scales of the CCC-2 may help assist in differentiating between these children.

The finding that the AD/HD group was as impaired as the AS group on the scales measuring social relations and interests was unexpected as these scales are reported to be especially sensitive to autistic type behaviours (Bishop, 2003). As a consequence one might speculate that some children with AD/HD may have difficulties in social understanding and reciprocity comparable to children with AS. Focusing on the similarities found between the

AD/HD group and the AS group on most CCC-2 scales, one possible interpretation could be that a considerable continuity exists between disorders that have traditionally been regarded as rather distinct from one another and that there are no sharp division between pervasive and specific developmental disorders (Bishop & Baird, 2001; Bishop & Norbury, 2002; Gilmour et al., 2004). An alternative interpretation would of course be that the CCC-2 simply lacks symptoms specificity when it comes to tapping into the communicative behaviours that may distinguish AD/HD from AS.

The differential diagnosis between children with AS and children with AD/HD may be problematic. In our sample (study 3) two children in the AS group had a co-morbid diagnosis of AD/HD and one child in the AD/HD group had a co-morbid diagnosis of atypical autism. In order to investigate if these co-morbid cases had any influence on our results, the analyses were recomputed with these children excluded. However, the exclusion did not influence the findings reported. The fact that we do not have confirmed diagnosis for the children in these clinical groups may of course be problematic as the children were assigned to the AD/HD group or the AS group based on parental information. Thus we can not completely exclude the possibility that there might be other children having co-morbid disorders unknown to us.

#### **9.4 Trans-cultural adaptation of the CCC-2**

Due to the shortage of assessment tools for the evaluation of communication in Norwegian, parts of this thesis (study 2) aimed at evaluating a Norwegian adaptation of the CCC-2. At present, the original CCC as well as the revised version, the CCC-2, are both available. However, the revised version is expected to become the one most commonly used. A major strength of the CCC-2 compared to the original CCC, is the ability to screen for children with communication impairments as well as to identify children who should be

further assessed for an autism spectrum disorder. Furthermore, the wording of the items and the examples provided makes it easier to complete than the original CCC.

It has been stated that a diagnostic instrument developed in one culture does not guarantee its reliability or validity in a different culture and that a comprehensive adaptation process is required (Canino & Algeira, 2008). A simple “single forward and back” translation procedure would be an insufficient method for cross-cultural adaptation of an assessment instrument and competent bilingual translators who are familiar with the local culture as well as having knowledge of the subject matter are required, according to Dalen, Jellestad and Kamaloodien (2007). Our translation procedure of the CCC-2 aims at being in accordance with these requirements.

However, in our Norwegian sample only approximately 2/3 of the children in the language impaired group, who were all judged by parents and professionals as having problems with communication, were identified by the recommended cut-off used in the UK (scoring at or below 54 on the General Communication Composite corresponds to the 10<sup>th</sup> percentile in the UK standardization sample). Calculating the 10<sup>th</sup> percentile in the NLI group in our sample suggests that in order to function as a valid screening for Norwegian children a higher cut-off should be used. It is possible that differences in the selection procedure may have contributed to the difference in cut-off scores between the Norwegian and the UK version. In the UK standardization sample children were excluded if they had a statement of special education. In our Norwegian NLI group children were also excluded if they were judged by their parents as having communication difficulties although not having special education needs. This may have led to our NLI group being “more healthy” than the British sample, resulting in a higher cut-off for Norwegian children. Another possible reason may be different standards of pronunciation in the two populations. Contrary to English conventions the use of dialects are cultivated and appreciated in Norway. This may have led to the

Norwegian parents reporting fewer difficulties than the UK parents. Another explanation may be that in spite of the efforts made to ensure the quality of the adaptation process, one has not completely succeeded in the trans-cultural adaptation of the questionnaire. It should be noted though, that the present study (study 2) was not intended as a final Norwegian standardization of the CCC-2, and collecting data from a sufficient number of children in order to create Norwegian norms continues a challenge for future research.

### **9. 5 Limitations**

Some methodological limitations should be considered when evaluating the results of the studies constituting the present thesis. Data collection was performed by use of parental reports and one has to be aware of information bias in all the studies presented, since misinterpreting some items as well as mistakenly selecting an incorrect response option are obvious possibilities. In study 1, using the original CCC, it should be noted that some parents reported problems understanding the wording of the items as well as the response options. Children with communication difficulties are more likely to have parents with similar problems, and might be underrepresented in the studies because completing a questionnaire might be linguistically demanding for these parents. However, parents do have the best knowledge about their children and they also have the possibility to observe them in various situations, this being in favour of parental reports for the evaluation of communication.

The low response rate in the language impaired group in study 2 may raise problems regarding the generalizability of our findings. However, Stormark, Heiervang, Heimann, Lundervold, & Gillberg. (2008) found in a total population study of mental health problems in Norwegian children, that children identified with mental health problems by teachers were less likely to take part in the study than children without such signs. Thus it is possible that the burden of having an impaired child may be reflected in reluctance of participation. If so, it

might be that the most impaired children are underrepresented, which may again have led to an underestimation of the differences between the language impaired group and the typically developing children. As teacher ratings were not included in our non-language impaired group, more research is needed to provide additional reliability data for the Norwegian adaptation of the CCC-2.

Taking into consideration the heterogeneity of children diagnosed with AD/HD, the percentage of children in the AD/HD group identified with communication difficulties in study 3 was unexpectedly high. It might be that these results are influenced by selection bias reflecting an overrepresentation of parents who were worried about their children's communicative abilities. Furthermore, the fact that we do not have the children's diagnoses confirmed by professionals affect our findings as we have to rely on the information presented by the parents. The lack of information about whether the children were on medication or not when the questionnaires were completed is another limitation.

In the present thesis, communication difficulties are identified only based on results of the CCC or the CCC-2. A more comprehensive assessment battery, measuring language and communication as well as cognitive abilities, would have been desirable. Designing a study like that is a challenge for future research.

## **9.6 Conclusions**

The results of the present thesis have demonstrated that a majority of children identified with psychiatric problems exhibit communication difficulties as measured by the CCC or the CCC-2. These findings are in line with a growing body of research indicating co-occurrence of psychiatric disorders and communication disorders. The main findings were that the majority of children with AD/HD as well as children with AS exhibited communication difficulties. Although common in both groups, children with AS seemed to

have more pragmatic difficulties than children with AD/HD. The two clinical groups showed a similar language profile on the CCC-2. However, they were distinguishable on the scales assessing stereotyped language and nonverbal communication, the AS group being the most impaired. Overall, our findings support the usability of the Norwegian adaptation of the CCC-2 as a reliable instrument for identifying children with communication impairments.

### **9.7 Clinical implications**

The results presented here underline the importance of systematic routine screening of communication to be performed as part of the assessment procedure in children referred to psychiatric services. At present no such standard procedure exists in Norway. The area of language and communication is generally not assessed at all, and whether or not an evaluation is performed seems to depend on the interests of each individual professional. The lack of easily administrable assessment tools may have contributed to this situation. We suggest that the Norwegian adaptation of the CCC-2 presents as a valuable instrument for clinicians in assessing children's language and communication abilities. Based on our results a higher cut-off should be used for Norwegian children. Furthermore, we suggest that the CCC-2 profile may aid therapists (or teachers) developing and monitoring successful treatment plans addressing the language area of concern for each individual child. For example if the CCC-2 profile indicates problems related to the use of context but not to nonverbal communication, interventions should be targeted to the first (Philofsky, Fidler, & Hepburn, 2007).

The existence of a relationship between pragmatic competence and behaviour problems and possible underlying disorders like AD/HD or autism has been proposed in previous studies (Ketelaars, et al., 2009). Thus, it is possible that the CCC-2 may contribute to an increased attention towards pragmatics, which may in turn lead to an early detection of these disorders.



Children referred to child psychiatric services due to language impairments are not considered eligible for “secured medical help” according to guidelines given by the Health Directorate (Helsedirektoratet, 2009) and thus the referrals are most often rejected. As a consequence these children might be relabelled as children with anxiety, behaviour problems or emotional problems when evaluated clinically. Mental health professionals might attribute the children’s difficulties with expressing thoughts, with talking coherently about events or with answering questions to social-emotional disturbances, while communication impairments at least in some cases should be considered as an alternative explanation (Im –Bolter & Cohen, 2007).

The fact that most therapies, including social skills training techniques used with children with AD/HD, are verbally based underscores the importance of systematically evaluating communication competence in children with psychiatric disorders (Cohen et al., 2000). Not taking deficits within communication into consideration might adversely affect both therapeutic outcome and school achievements. Children with AD/HD are at risk for developing behaviour problems that are often more salient and thus overshadowing less apparent communication problems. If communication problems are identified, these children may be better understood and their relationships with teachers as well as parents may improve, thus preventing even more serious problems to develop. Interventions might be initiated in which children are explicitly taught how to use communicative alternatives to replace socially penalizing behaviours as well as developing broader vocabularies referring to emotions (Gallagher, 1999). Furthermore, the pervasive role language and communication plays in regulating children’s behaviour emphasize the need for speech and language therapists to act as members of multidisciplinary teams in mental health settings.

## References

- Adams, C. (2002). Practitioner Review: The assessment of language pragmatics. *Journal of Child Psychology and Psychiatry*, 43(8), 973-987.
- Adams, C. (2008). Intervention for children with pragmatic language impairments. In C. F. Norbury, J. B. Tomblin & D.V. M. Bishop (Eds.), *Understanding developmental language disorders. From theory to practice* (pp. 189-204). Hove: Psychology Press.
- Adams, C., Baxendale, J., Lloyd, J., & Aldred, C. (2005). Pragmatic language impairment: case studies of social and pragmatic language therapy. *Child Language Teaching and Therapy*, 21(3), 227-250.
- Adams, C., & Lloyd, J. (2005). Elicited and spontaneous communicative functions and stability of conversational measures with children who have pragmatic language impairments. *International Journal of Language and Communication Disorders*, 40(3), 333-347.
- Adams, C., Lloyd, J., Aldred, C., & Baxendale, J. (2006). Exploring the effects of communication intervention for developmental pragmatic language impairments: a signal-generation study. *International Journal of Language and Communication Disorders*, 41(1), 41-65.
- American Psychiatric Association (2000). *Diagnostic and Statistical Manual of Mental Disorders* (4<sup>th</sup> ed). Text revision. Washington, DC.
- Anderson, K., & Westman, K. (2002). Svenska CCC- Children's Communication Checklist. Enkät för bedömning av språklig och kommunikativ förmåga hos skolbarn [Swedish CCC: A checklist for assessing language and communicative ability among schoolchildren]. Lund: Department of Logopedics and Phoniatrics, Lund University, Sweden.

- Baird, G. (2008). Assessment and investigation of children with developmental language disorder. In C. F. Norbury, J. B. Tomblin & D.V.M. Bishop (Eds.), *Understanding developmental language disorders. From theory to practice* (pp. 1-22). Hove: Psychology Press.
- Beitchman, J. H., Brownlie, E. B., & Wilson, B. (1996). Linguistic impairment and psychiatric disorder: pathways to outcome. In J. H. Beitchman, N. J. Cohen, M. M. Konstantareas & R. Tannock (Eds.), *Language, learning, and behavior disorder. Developmental, Biological, and Clinical Perspectives* (pp. 493-514). Cambridge: University Press.
- Beitchman, J. H., Wilson, B., Johnson, C. J., Atkinson, L., Young, A., Adlaf, E., et al. (2001). Fourteen-year follow-up of speech/language-impaired and control children: psychiatric outcome. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*, 75-82.
- Bignell, S., & Cain, K. (2007). Pragmatic aspects of communication and language comprehension in groups of children differentiated by teacher ratings of inattention and hyperactivity. *British Journal of Developmental Psychology, 25*, 499-512.
- Bishop, D. V. M. (1997). *Uncommon Understanding. Development and Disorders of Language Comprehension in Children*. Hove: Psychology Press.
- Bishop, D. V. M. (1998). Development of the Children's Communication Checklist (CCC): A method for assessing qualitative aspects of communicative impairment in children. *Journal of Child Psychology and Psychiatry, 39*(6), 879-891.
- Bishop, D. V. M. (2000). Pragmatic language impairment: A correlate of SLI, a distinct subgroup, or part of the autistic continuum? In D. V. M. Bishop & L. B. Leonard (Eds.), *Speech and language impairment in children: Causes, characteristics, intervention and outcome* (pp. 99-113). Hove: Psychology Press Ltd.

- Bishop, D. V. M. (2003). *The Children's Communication Checklist Second Edition (CCC-2)*. London: The Psychological Corporation.
- Bishop, D. V. M., & Baird, G. (2001). Parent and teacher report of pragmatic aspects of communication: use of the Children's Communication Checklist in a clinical setting. *Developmental Medicine & Child Neurology*, 43, 809-818.
- Bishop, D. V. M., Maybery, M., Wong, D., Maley, A., & Hallmayer, J. (2006). Characteristics of the broader phenotype in autism: A study of siblings using the Children's Communication Checklist-2. *American Journal of Medical Genetics 141B*, 117-122.
- Bishop, D. V. M., & Norbury, C. F. (2002). Exploring the borderlands of autistic disorder and specific language impairment: a study using standardised diagnostic instruments. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 43, 917-931.
- Bishop, D. V. M., & Norbury, C. F. (2005). Executive functions in children with communication impairments, in relation to autistic symptomatology. I: Generativity. *Autism*, 9(1), 7-27.
- Bloom, L., & Lahey, M. (1978). *Language development and language disorders*. New York: Wiley.
- Botting, N. (2004). Children's Communication Checklist (CCC) scores in 11-year-old children with communication impairments. *International Journal of Language and Communication Disorders*, 39(2), 215-227.
- Botting, N., & Conti-Ramsden, G. (2003). Autism, primary pragmatic difficulties, and specific language impairment: can we distinguish them using psycholinguistic markers? *Developmental Medicine and Child Neurology*, 45(8), 515-524.

- Bruce, B., Thernlund, G., & Nettelblatt, U. (2006). ADHD and language impairment. A study of parent questionnaire FTF (Five to Fifteen). *European Child and Adolescent Psychiatry, 15*, 52-60.
- Camarata, S., Hughes, C., & Ruhl, K. (1988). Mild/moderate behaviorally disordered students: A population at risk for language disorders. *Language Speech and Hearing Services in Schools, 19*, 191-200.
- Camarata, S. M., & Gibson, T. (1999). Pragmatic language deficits in attention-deficit hyperactivity disorder (ADHD). *Mental Retardation and Developmental Disabilities Research Reviews, 5*, 207-214.
- Canino, G., & Alegria, M. (2008). Psychiatric diagnosis-is it universal or relative to culture? *Journal of Child Psychology and Psychiatry, 49*(3), 237-250.
- Clegg, J., Hollis, C., Mawhood, L., & Rutter, M. (2005). Developmental language disorders- a follow-up in later adult life. Cognitive, language and psychosocial outcomes. *Journal of Child Psychology and Psychiatry, 46*(2), 128-149.
- Cohen, N. J. (1996). Unsuspected language impairments in psychiatrically disturbed children: developmental issues and associated conditions. In J. H. Beitchman, N. J. Cohen, M. M. Konstantareas, & R. Tannock (Eds.), *Language, learning and behavior disorders. Developmental, biological, and clinical perspectives* (pp. 105-127). Cambridge: University Press
- Cohen, N. J. (2001). *Language impairment and psychopathology in infants, children and adolescents* (Vol. 45). Thousand Oaks: Sage publications.
- Cohen, N. J., Barwick, M., Horodezky, N., Vallance, D., & Im, N. (1998). Language, achievement and cognitive processing in psychiatrically disturbed children with previously identified and unsuspected language impairments. *Journal of Child Psychology and Psychiatry, 37*, 865-877.

- Cohen, N. J., Vallance, D. D., Barwick, M., Im, N., Menna, R., Horodezky, N. B., et al. (2000). The interface between ADHD and language impairment: An examination of language, achievement, and cognitive processing. *Journal of Child Psychology and Psychiatry*, 41(3), 353-362.
- Conti-Ramsden, G., & Botting, N. (2008). Emotional health in adolescents with and without a history of specific language impairment (SLI). *Journal of Child Psychology and Psychiatry*, 49(5), 516-525.
- Dalen, K., Jellestad, F., & Kamaloodien, K. (2007). The translation of the NEPSY-II to Afrikaans, some ethical reflections. *Cognition, Brain, Behavior*, 11, 608-620.
- Dewart, H., & Summers, S. (1997). *The pragmatics profile of communication skills in childhood*. Windsor: NFER- Nelson.
- Ebbels, S. (2008). Improving grammatical skills in children with specific language impairment. In C. F. Norbury, J. B. Tomblin & D. V. M. Bishop (Eds), *Understanding developmental language disorders. From theory to practice* (pp. 149-174). Hove: Psychology Press.
- Ehlers, S., Gillberg, G., & Wing, L. (1999). A screening questionnaire for Asperger syndrome and other high-functioning autism spectrum disorders in school age children. *Journal of Autism and Developmental Disorders*, 29(2), 129-141.
- Farmer, M., & Oliver, A. (2005). Assessment of pragmatic difficulties and socioemotional adjustment in practice. *International Journal of Language and Communication Disorders*, 40(4), 403-429.
- Fujiki, M., & Brinton, B. (2009). Pragmatics and social communication in child language disorders. In R. G. Schwartz (Ed.), *Handbook of child language disorders*. (pp. 406-423). Hove: Psychology Press.

- Gallagher, T. (1999). Interrelationships among children with language, behaviour, and emotional problems. *Topics in Language Disorders, 19*(2), 1-15.
- Geurts, H. M., Hartman, C., Vertè, S., Oosterlaan, J., Roeyers, H., & Sergeant, J. A. (2008). Pragmatics fragmented: the factor structure of the Dutch Children's Communication Checklist (CCC). *International Journal of Language and Communication Disorders, iFirst Article*, 1-26. Retrived 14.01.2009 from <http://dx.doi.org/10.1080/13682820802243344>
- Geurts, H. M., Vertè, 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? *Journal of Child Psychology and Psychiatry, 45*(8), 1437-1453.
- Geurts, H. M., Vertè, S., Oosterlaan, J., Royers, H., & Sergeant, J. A. (2004). How specific are executive functioning deficits in attention deficit hyperactivity disorder and autism? *Journal of Child Psychology and Psychiatry, 45*(4), 836-854.
- Geurts, M., & Embrechts, M. (2008). Language Profiles in ASD, SLI and ADHD. *Journal of Autism and Developmental Disorders, 38*, 1931-1943.
- Ghaziuddin, M. (2008). Defining the behavioural phenotype of Asperger syndrome. *Journal of Autism Developmental Disorder, 38*, 138-142.
- Gillberg, C. (1989). Asperger-syndrome in 23 Swedish children. *Developmental Medicine & Child Neurology, 31*, 520-531.
- Gilmour, J., Hill, B., Place, M., & Skuse, D. H. (2004). Social communication deficits in conduct disorder: a clinical and community survey. *Journal of Child Psychology and Psychiatry, 45*(5), 967-978.
- Glennen, S., & Bright, B. J. (2005). Five years later: language in school-age internationally adopted children. *Seminars in speech and language, 26*(1), 86-101.

- Goodyer, I. M. (2000). Language difficulties and psychopathology. In D. V. M. Bishop & L. B. Leonard (Eds.), *Speech and language impairments in children. Causes, characteristics, intervention and outcome* (pp. 227-244). Hove: Psychological Press Ltd.
- Grice, H. P. (1975). Logic and conversation. In F. Cole & J. L. Morgan (Eds.) *Syntax and Semantics* (Vol. III Speech Acts, pp. 41-58). New York: Academic Press.
- Hagberg, B. S., Miniscalco, C., & Gillberg, C. (2010). Clinic attenders with autism or attention-deficit/hyperactivity disorder: cognitive profile at school age and its relationship too preschool indicators of language delay. *Research in Developmental Disabilities, 31*, 1-8
- Helsedirektoratet (2009). *Prioriteringsveileder. Psykisk helsevern for barn og unge.*
- Holck, P., Nettelblatt, U., & Dahlgren Sandberg, A. (2009). Children with cerebral palsy, spina bifida and pragmatic language impairment: Differences and similarities in pragmatic ability. *Research in Developmental Disabilities, 30*, 942-951.
- Holtman, M., Bölte, S., & Poustka, F. (2005). ADHD, Asperger syndrome and high-functioning autism. *Journal of American Academy of Child and Adolescent Psychiatry, 44*(11), 1101.
- Holtman, M., Bölte, S., & Poustka, F. (2007). Attention Deficit Hyperactivity Disorder symptoms in Pervasive Developmental Disorders: Association with autistic behavior domains and coexisting psychopathology. *Psychopathology 40*, 172-177.
- Im-Bolter, N., & Cohen, N. J. (2007). Language impairment and psychiatric comorbidities. *Pediatric Clinics of North America, 54*, 525-542.
- Jitendra, A. K., DuPaul, G. J., Someki, F., & Tresco, K. E. (2008). Enhancing academic achievement for children with attention-deficit hyperactivity disorder: Evidence from



- school-based intervention research. *Developmental Disabilities Research Reviews*, 14, 325-330.
- Ketalaars, M. P., Cuperus, J., Jansonius, K., & Verhoeven, L. (2009). Pragmatic language impairment and associated behavioural problems [Electronic Version]. *International Journal of Language and Communication Disorders*, 28, 1-17 Retrieved July 13, 2009, [from http:// www.catchword.com/nw=1/rpsv/cw/tandf/13682822/contpl.htm](http://www.catchword.com/nw=1/rpsv/cw/tandf/13682822/contpl.htm).
- Landa, R. J. (2005). Assessment of social communication skills in preschoolers. *Mental Retardation and Developmental Disabilities Research Reviews*, 11, 247-252.
- Laws, G., & Bishop, D. V. M. (2004). Pragmatic language impairment and social deficits in Williams syndrome: a comparison with Down's syndrome and specific language impairment. *International Journal of Language and Communication Disorders*, 39(1), 45-64.
- Leonard, L. B. (1998). *Children with specific language impairment*. Cambridge: The MIT Press.
- Letts, C., & Leinonen, E. (2001). Comprehension of inferential meaning in language-impaired and language normal children *International Journal of Language and Communication Disorders*, 36, 307-328.
- Leyfer, O. T., Tager-Flusberg, H., Dowd, M., Tomblin, B., & Folstein, S. E. (2008). Overlap between autism and specific language impairment: comparison of autism diagnostic interview and autism diagnostic observation schedule scores. *Autism Research*, 1, 284-296.
- Loucas, T., Charman, T., Pickles, A., Simonoff, E., Chandler, S., Meldrum, D., et al. (2008). Autistic symptomatology and language ability in autism spectrum disorder and specific language impairment. *Journal of Child Psychology and Psychiatry*, 49(11), 1184-1192.

- Loukusa, S., Leinonen, E., Kuusikko, S., Jussila, K., Mattila, M. J., Ryder, N., et al. (2007). Use of context in pragmatic language comprehension by children with Asperger syndrome or high-functioning autism. *Journal of Autism Developmental Disorder* 37, 1049-1059.
- Lust, B. (2006). *Child language. Acquisition and growth*. Cambridge: Cambridge University Press.
- Merrison, S., & Merrison, A. J. (2005). Repair in speech and language therapy interaction: Investigating pragmatic language impairment of children. *Child Language Teaching and Therapy*, 21(2), 191-211.
- Norbury, C. F., Nash, M., Baird, G., & 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. *International Journal of Language and Communication Disorders*, 39(3), 345-364.
- Norbury, C. F., Tomblin, J. B., & Bishop, D. V. M. (2008). A note on terminology. In C. F. Norbury, J. B. Tomblin & D. V. M. Bishop (Eds.), *Understanding language disorders. From theory to practice* (pp. xiii-xv). Hove: Psychology press.
- Nydén, A., Gillberg, C., Hjelmqvist, E., & Heiman, M. (1999). Executive function/attention deficits in boys with Asperger syndrome, attention disorder and reading/writing disorder. *Autism*, 3(3), 213-228.
- Ottem, E., Thorseng, L. A., Duna, K. E., & Green, T. (2002). Språkvansker og psykisk helse. [Language impairment and mental health]. *Nordisk tidsskrift for spesialpedagogikk*, 2-3, 114-124.
- Perkins, M. (2007). *Pragmatic Impairment*. Cambridge: Cambridge University Press.

- Philofsky, A., Fidler, D. J., & Hepburn, S. (2007). Pragmatic language profiles of school-age children with autism spectrum disorders and Williams syndrome. *American Journal of Speech-Language Pathology, 16*, 368-380.
- Prutting, C. A., & Kirchner, D. M. (1987). A clinical appraisal of the pragmatic aspects of language. *Journal of Speech and Hearing Disorders, 52*, 105-119.
- Rapin, I., & Dunn, M. (2003). Update on the language disorders of individuals on the autistic spectrum. *Brain & Development, 25*, 166-172.
- Ruser, T. F., Arin, D., Dowd, M., Putnam, S., Winklosky, B., Rosen-Sheidley, B., et al. (2007). Communicative competence in parents of children with autism and parents of children with specific language impairment. *Journal of Autism and Developmental Disorders, 37*, 1323-1336.
- Russell, R. L. (2007). Social communication impairments: Pragmatics. *Pediatric Clinics of North America, 54*, 483-506.
- Ryder, N., Leinonen, E., & Schulz, J. (2008). Cognitive approach to assessing pragmatic language comprehension in children with specific language impairment. *International Journal of Language and Communication Disorders, 43*(4), 427-447.
- Schjølberg, S., & Thorkildsen, N. P. (1998). Sjekklister for barns kommunikasjon (CCC). Til forskning. Av D.V.M. Bishop. [Checklist for children's communication. Research version by D.V. M. Bishop]. Oslo: Centre for Child and Adolescent Psychiatry.
- Schwartz, R. G. (2009). Specific Language Impairment. In R. S. Schwartz (Ed.), *Handbook of child language disorders* (pp. 4-43). New York: Psychology Press.
- Scituito, M. J., & Eisenberg, M. (2007). Evaluating the evidence for and against the overdiagnosis of ADHD. *Journal of Attention Disorders, 11*(2), 106-113.

- Sinzig, J., Walter, D., & Doepfner, M. (2009). Attention deficit /hyperactivity disorder in children and adolescents with autism spectrum disorder. Symptom or syndrome? *Journal of Attention Disorders, 13*(2), 117-126.
- Snowling, M. J., Bishop, D. V. M., Stothard, S. E., Chipchase, B., & Kaplan, C. (2006). Psychosocial outcomes at 15 years of children with a preschool history of speech-language impairment. *Journal of Child Psychology and Psychiatry, 47*(8), 759-765.
- Sperber, D., & Wilson, D. (1995). *Relevance: Communication and Cognition, 2nd edition*. Oxford: Blackwell.
- Stormark, K. M., Heiervang, E., Heimann, M., Lundervold, A., & Gillberg, C. (2008). Predicting nonresponse bias from teacher ratings of mental health problems in primary school children. *Journal of Abnormal Child Psychology, 36*(411-419).
- Sveen, A. (2005). Pragmatikk.[Pragmatics]. In E. Kristoffersen, H. G. Simonsen & A. Sveen (Eds.), *Språk. En grunnbok* (pp. 95-120). Oslo: Universitetsforlaget.
- Tager-Flusberg. (2006). Defining language phenotypes in autism. *Clinical Neuroscience Research, 6*, 219-224.
- Thompson, M. J. J., Brooke, X. M., West, C. A., Johnson, H. R., Bumby, E. J., Brodrick, P., et al. (2004). Profiles, co-morbidity and their relationship to treatment of 191 children with AD/HD and their families. *European Child & Adolescent Psychiatry, 13*(4), 234-242.
- Tirosh, E., & Cohen, A. (1998). Language deficit with attention -deficit disorder: a prevalent comorbidity. *Journal of Clinical Neurology, 13*(10), 493-497.
- Tomblin, J. B., Records, N. L., Buckwalter, P., Zhang, X., Smith, E., & O'Brien, M. (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language, and Hearing Research, 40*, 1245-1260.

- Toppelberg, C. O., & Shapiro, T. (2000). Language disorders: A 10-year research update review. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39(2), 143-152.
- Ullman, M. T., & Pierpont, E. I. (2005). Specific language impairment is not specific to language: The procedural deficit hypothesis. *Cortex*, 41, 399-433.
- Vertè, S., Geurts, H. M., Roeyers, H., Rosseel, Y., Oosterlaan, J., & Sergeant, J. A. (2006). Can the Children's Communication Checklist differentiate autism spectrum subtypes? *Autism*, 10(3), 266-287.
- Whitehouse, A. J., Barry, J. G., & Bishop, D. V. M. (2008). Further defining the language impairment of autism: Is there a specific language impairment subtype? *Journal of Communication Disorders*, 41, 319-336.
- Whitehouse, A. J., Watt, H. J., Line, E. A., & Bishop, D. V. M. (2009). Adult psychosocial outcomes of children with specific language impairment, pragmatic language impairment and autism. *International Journal of Language and Communication Disorders*, 44(4), 511-528.
- World Health Organization. (1992). *International classification of diseases* (10<sup>th</sup> ed.). Geneva, Switzerland: World Health Organization.

