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Targeting toddlers' communication difficulties at the Swedish child health services – a public health perspective

ANNA FÄLDT



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Abstract

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Communication is fundamental for human interaction. Communication difficulties have a negative impact on children's learning, relations, and quality of life and are regarded as a public health problem. The Swedish child health services have a possibility to prevent communication difficulties and their consequences for the individual through universal interventions and identification of affected children. This thesis investigates interventions at the levels of universal prevention, identification, and indicated intervention for children with communication difficulties.

Study I explored associations between family and child health centre characteristics and exposure to a universal preventive communication intervention. Questionnaires answered by 2326 mothers and 2077 fathers were analysed. Few parents reported that they had been exposed to the intervention. Positive associations were seen to high socioeconomic status and if the child was of low age at the start of the intervention or was oldest among siblings. Study II described the study design employed to investigate the identification and effects of an indicated intervention. Study III used a mixed-methods design to explore child health service nurses' experiences and sense of competence when using the Infant-Toddler Checklist (ITC) at the 18-month health visit. The nurses considered the ITC to be a beneficial tool both in communicating with families and in identifying children with communication difficulties. The ITC seemed to enhance nurses' and parents' awareness of the child's communication.

In study IV, the psychometric properties of the ITC were analysed using data on 679 children. A sensitivity of 86% and specificity of 59% were found. These measures improved when combining the ITC with the child health service nurses' informal developmental surveillance. Study V explored parents' perceptions of the intervention ComAlong Toddler, consisting of five group sessions and two individual home visits. The parental intervention focused on responsive communication, enhanced milieu teaching and augmentative and alternative communication. Qualitative content analysis showed that parents appreciated the intervention and used the strategies taught. Parents described benefits of the combination of home visits and group sessions with peer learning through video recorded home assignments.

In conclusion, the thesis shows that the ITC can be implemented in the child health services as the method identifies children with communication difficulties and seems to have preventive capabilities. ComAlong Toddler may help parents to implement communication-enhancing strategies with their children. When universal interventions are delivered through the child health services, implementation and distribution need to be carefully planned and carried out so that they reach all children.

Keywords: Child, Child Health, Screening, Child Health Service, Augmentative and Alternative Communication

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*But that's not an invitation!
That's all I get
If this is communication
I disconnect
I've seen you, I know you, but I don't
know
How to connect
So I disconnect*

The Cardigans

List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

- I Fäldt A., Durbeej, N., Fabian H. (2020). Characteristics associated with parent's exposure of a universal intervention to prevent language and literacy difficulties. *Manuscript*.
- II Fäldt A., Fabian H., Thunberg G., Lucas, S. (2019). The study design of ComAlong Toddler: a randomised controlled trial of an early communication intervention. *Scandinavian Journal of Public Health 48(4)*.
- III Fäldt, A., Nordlund, H., Holmqvist, U., Lucas, S., & Fabian, H. (2019). Nurses' experiences of screening for communication difficulties at 18 months of age. *Acta Paediatrica, 108(4)*, 662-669.
- IV Fäldt A., Fabian H., Dahlberg, A., Thunberg G., Durbeej, N., Lucas, S. (2020) Infant-Toddler Checklist identifies 18-month-old children with communication difficulties in the Swedish child health care setting. *Acta Paediatrica*, Under revision.
- V Fäldt A., Fabian H., Thunberg G., Lucas, S. (2020) "All of a sudden we noticed a difference at home too". Parents' perception of a parent-focused early communication and AAC intervention for toddlers. *Augmentative and Alternative Communication*. 1-12. [Epub ahead of print].

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Abbreviations

AAC	Augmentative and Alternative Communication
AKKtiv	Swedish abbreviation for AAC Early Intervention in the AKKtiv program
BS	Behavior Sample
CDI	MacArthur Communicative Development Inventories
CHS	Child Health Service
DVD	Digital Video Disc
ITC	Infant-Toddler Checklist
ROC	Receiver operating characteristic curve
SCS-18	Swedish Communication Screening at 18-months
SLP	Speech and Language Pathologist

Introduction

Communication and communication difficulties

Communication is a dynamical, continuous, co-constructed and co-regulated process where meaning is created mutually between communication partners (Bruner, 1983, Fogel, 1993). Communication is fundamental for human interaction and is essential for development, psychosocial health, learning, and well-being (McCormack et al., 2018, McLeod, 2018, Beard, 2018). Communication exists and develops in social interaction with a communication partner (Bakeman and Adamson, 1984, Tomasello and Farrar, 1986, Bruner, 1983).

All people communicate (McLeod, 2018) and communication is a human right described in article 19 of the Universal Declaration of Human Rights (UN General Assembly, 1948) and in Article 12 in the United Nations Convention on the Rights of the Child, which states that:

States Parties shall assure to the child who is capable of forming his or her own views the right to express those views freely in all matters affecting the child, the views of the child being given due weight in accordance with the age and maturity of the child (UN General Assembly, 1989).

The new-born child is geared to be an active participant in communication and is equipped with biological processes to ensure caretaker attachment (Bruner, 1983). The child's communication development starts from pre-intentional communication where the infant's behaviours are communicative only when another person assigns this behaviour a meaning (Yoder et al., 2001). When the child directs eye gaze, vocalisations and gestures towards a communication partner with intent, the intentional communication is developed (Bates, 1979). Initially, the child only engages in a dyadic interaction with the attention on a single aspect at a time. This dyadic interaction develops to a triadic interaction where the child shifts focus back and forth between the object of interest and the communication partner (Bakeman and Adamson, 1984). The child's intentional communication progresses into the use of conventional symbols, and finally, the child develops to an effective linguistic communicator by following grammatical rules and social conventions (Bruner, 1983).

Individuals with communication difficulties comprise a heterogeneous group with difficulties that may be congenital and/or acquired. These

difficulties are prevalent through the lifespan and have a great impact on development, quality of life and health (McCormack et al., 2018, Ronski and Sevcik, 2018). In this thesis, the term “communication difficulties” is used to encompass speech, language and communication difficulties and disorders regardless of aetiology.

This thesis focusses on aspects of prevention of communication difficulties and addresses three stages of prevention: a) universal intervention b) identification of children with communication difficulties and c) indicated intervention for identified children.

Communication difficulties as a public health problem

Children’s communication difficulties have been identified as a public health problem (Law and Levickis, 2018, Law et al., 2017, Law et al., 2013). According to Law et al, in order for a condition to be considered a public health problem, it must place a large burden on society and must be unfairly distributed. In addition, there must be preventive strategies that can substantially reduce the burden of the condition (Law and Levickis, 2018, Law et al., 2017, Law et al., 2013). These criteria for public health problems, together with the concepts of prevention as they relate to communication difficulties, create the framework for this thesis.

Communication difficulties place a large burden on society

The prevalence of communication difficulties among children is difficult to approximate and is dependent on the definition, level of severity, and assessment method used as well as the type of population studied (Tomblin et al., 1997, Lindsay and Strand, 2016, Law et al., 2000). Prevalence rates of 2.2% (Lindsay and Strand, 2016), 20% (Reilly et al., 2010) and 55% have been reported (Locke et al., 2002). One source of variance is that some studies excluded children reared in poverty (Law et al., 2000), where lower prevalence rates were found, while others focusing on children raised in poverty have found very high prevalence rates for communication difficulties as well as severe language delay (9.4%) in the studied population (Locke et al., 2002). Differences in age range among the studies may also contribute to this variation. Lindsay and Strand (2016) studied children aged six to sixteen years, while Locke et al. (2002) studied children three to four years of age.

Communication difficulties may greatly impact children’s development throughout childhood, with enhanced risk of behaviour problems, social withdrawal, internalising and externalising problems (Rescorla et al., 2007). These difficulties can negatively impact children’s, behaviour, and psychological well-being and attitude to school (Van Agt et al., 2011) as well as their ability to learn and apply knowledge, including learning to read and write and

develop mathematical skills (McCormack et al., 2009). Furthermore, quality of life is lower in children with communication difficulties (Eadie et al., 2018, Nicola and Watter, 2015, Heleen et al., 2005, Van Agt et al., 2011). Children with communication difficulties in preschool are more likely to have problems as adults, including problems with peers, lower academic achievements, poorer mental health and psychosocial health and higher rates of unemployment (Mok et al., 2014, Clegg et al., 2004, Durkin et al., 2012, Law et al., 2009). Research has also suggested that a large proportion of young offenders have communication difficulties, which impact the individuals' participation in interventions aiming to reduce the risk of re-offending (Bryan et al., 2007).

Ruben (2000) argued that, as society during the 21 century has entered the age of communication, the individual's capability to communicate effectively determines the course of the individuals' life. Thus, adults with communication difficulties not only become unemployed but even unemployable as manual labour-based jobs are replaced by communication-based trades (Ruben, 2000).

Parental stress

In addition to impacting the individual child, children's communication difficulties also affect parents. Parents whose children have developmental delays or disorders have increased levels of stress, anxiety, and depression (Marquis et al., 2019, Norlin and Broberg, 2012, Zablotsky et al., 2012). Reported stress levels correlate with the child's functional communication. Parents of children with severe communication limitations report significantly more stress than parents whose children have mild to moderate communication limitations (Ello and Donovan, 2005). Mothers of children with communication difficulties report lower quality of life than mothers of children with no communication difficulties (Rudolph et al., 2005). Gender differences have been found regarding parental stress, with mothers reporting higher levels of stress than fathers. This discrepancy has been explained by differences in engagement in early interventions and care of the child (Norlin and Broberg, 2012, Flippin and Crais, 2011). A suggested means to reduce the mothers' stress is through involving fathers in interventions, by which the fathers assume more responsibility (Flippin and Crais, 2011). Marital quality and co-parenting quality predict parental well-being (Norlin and Broberg, 2012). In addition, social support has been shown to reduce the risks of high levels of stress and poor mental health (Zablotsky et al., 2012). The parental stress associated with the child's difficulties is unevenly distributed, such that parents with low income report higher levels of stress, as do mothers with low levels of education (Marquis et al., 2019).

High levels of stress can translate into specific stress regarding the parenting role and parent-child interactions, which threatens the parent-child relationship and may thereby lead to less responsivity (Deater-Deckard, 2004).

Parenting stress is bi-directional as the child affects the parent, and the parent affects the child (Deater-Deckard, 2004).

Health care costs

Communication difficulties place a large burden on health care (Sciberras et al., 2015, Skeat et al., 2011) with increased health care costs (Cronin et al., 2017). There is a substantial cost for speech and language (SLP) services in the health care services even though not all children with language disorders use these services (Le et al., 2017). The costs incurred within the education and employment sectors are mainly unexplored (Le et al., 2020) The indirect costs, including negative health effects among parents, have not been described in the literature to the author's knowledge. The cost of communication difficulties in the United States of America has been estimated at 2.5-3% of the Gross National Product, mainly due to the high rates of unemployment of adults with communication difficulties (Ruben, 2000).

Communication difficulties are unfairly distributed

There is a strong correlation between socioeconomic status and children's communication development (Donkin et al., 2014, McKean et al., 2017, Lindsay and Strand, 2016). Poor receptive or expressive language in children is associated with low levels of education among mothers and a family history of speech or language difficulties (McKean et al., 2017). In a British study, 50% of the children reared in poverty showed a moderate to severe language delay (Locke et al., 2002). In the Swedish setting, autism is related to low family income (Rai et al., 2012). Parents' education, income and occupational status are correlated with children's language abilities and school achievements (Walker et al., 1994).

The interactions between communicative development and socioeconomic status are not easily understood, as there are multiple risk factors for communication difficulties (Romeo et al., 2018, Maggi et al., 2010, Bishop, 2003, Donkin et al., 2014). One example of this complex interaction was reported by Rudolph (2017), who found that maternal education level and the child's birth order, biological sex and five-minute Apgar score at birth were related to the risk of communication difficulties.

According to highly cited studies, communication and language stimulation varies between socioeconomic groups, such that children from lower socioeconomic groups receive less quantitative and qualitative language input than their peers (Hart and Risley, 1992, Rowe, 2018, Rowe, 2008, Hoff, 2003). The results of the Hart and Risely study have been questioned, and replications have given contradictory results (Sperry et al., 2019), with great variations within different socioeconomic groups. A recent reanalysis of the Hart and Risley (1992) and the Hoff (2003) studies shows that the parents' educational behaviours explain the difference in the children's language

development and not the socioeconomic situation per se (Rindermann and Baumeister, 2015). Great variation was found in the parents' communication with the child within the socioeconomic groups, which suggests that classification into high and low socioeconomic status is too wide and non-specific (Rindermann and Baumeister, 2015).

Families share both genes and environment, and the child's communication influences the parent just as the parent's communication influences the child (Dale et al., 2015, Deater-Deckard, 2004). Robust evidence exists of the influence of hereditary and genetic factors on communication development (Hayiou-Thomas et al., 2014, Dale et al., 2015, Hayiou-Thomas et al., 2012, Tallal et al., 2001, Bishop, 2003, Luyster et al., 2011, Graham and Fisher, 2015). In the Swedish setting, Kalnak et al. (2012) found a high prevalence of communication difficulties, literacy difficulties, attention/hyperactivity problems, and learning difficulties in siblings, parents, and grandparents of children with communication difficulties.

The unequal distribution of communication difficulties may also be related to challenges in reaching all populations in need in an equitable way. Some individuals are medically underserved, including those families with low income that are not able to access healthcare because they lack insurance, as well as those who live in remote areas or are otherwise isolated or marginalised (Marshall et al., 2017). For example, although the Swedish Child Health Services (CHS) reach almost all children, the parents with the highest level of needs seldom receive enhanced services (Wallby and Hjern, 2011). Service utilisation and referral for SLP evaluation and treatment differ according to the children's socioeconomic situation in other countries as well (Broomfield and Dodd, 2004, Wittke and Spaulding, 2018, Skeat et al., 2010). Those children referred for communication difficulties who come from severely deprived circumstances have more severe symptoms than children from affluent backgrounds (Broomfield and Dodd, 2004) and children of mothers with higher levels of education are more likely to receive interventions (Wittke and Spaulding, 2018, Skeat et al., 2010).

Barriers to receiving communication enhancing interventions

A number of barriers exist that limit children from receiving SLP services, including structural, geographical, financial or cultural/linguistic factors (Wylie et al., 2013, Reilly et al., 2016). For example, invitation letters for appointments and information materials may only be written in the country's majority language, and families may not see the relevance or need to attend appointments (Wylie et al., 2013). Immigrants in the USA describe difficulties in accessing interventions. They report a lack of insight into their rights, making it difficult to advocate for their child's needs (Jegatheesan et al., 2010). These barriers can result in late referrals, missed screenings and low identification rates for children with communication difficulties, for example, those

from low income families (Guthrie et al., 2019, Bhasin and Schendel, 2006, Wiefferink et al., 2020)

One additional barrier to equal service utilisation may be that interventions mostly are based on research in which only participants from Western, educated, industrialised and democratic societies have been included (Henrich et al., 2010, Lingwood et al., 2020, Nielsen et al., 2017). Research conducted in Western societies often fails to include individuals from low socioeconomic backgrounds, and these individuals seldom sign up for interventions (Heinrichs et al., 2005, Manz et al., 2010). Families with low socioeconomic status backgrounds more often drop out of interventions (Justice et al., 2015). As much of the research is based on a skewed population, its conclusions may not be applicable for all, for example, ethnic minorities (Lingwood et al., 2020, Manz et al., 2010).

The Swedish child health services

The Swedish CHS reach almost 97% of children 0-5 years of age (Wallby and Hjern, 2011). Through a 16 visit general child health program, the CHS aims to promote and monitor child health and development through regular growth and developmental assessments, vaccinations and parental support (Tell, 2019). During these visits, CHS nurses have many aspects of attend to (Reuter and Lindblom, 2017). The CHS nurses have expressed concerns regarding the implementation of time-consuming assessments due to time constraints (Johansen et al., 2016). The developmental assessments are mostly performed through informal developmental surveillance, and at present, there is a lack of structured, evidence-based methods to identify children with developmental delays (The National Board of Health and Welfare, 2014).

The Swedish national CHS-programme is structured in a three-tiered system (Reuter, 2018, Tell, 2019). The first tier consists of universal interventions that target the whole population. The second tier comprises selective preventive interventions targeting individuals and groups with an increased need or risk of poor health or developmental outcomes. The third tier includes children and families with still greater needs, who should be offered interventions from, for example, the social welfare system, physiotherapists, psychologists or SLPs.

Preventive strategies for communication difficulties may reduce the burden of communication difficulties

Prevention is described in the terms of a) universal interventions which target the whole population, b) selective interventions targeting groups or individuals with elevated risk, and finally c) indicated interventions targeting individuals with early signs of a disorder (O'Connell et al., 2009, Greenberg and

Abenavoli, 2016). These levels of preventive medicine corresponds to the three tiers used in Swedish CHS (Reuter, 2018, Tell, 2019) (*Figure 1*).

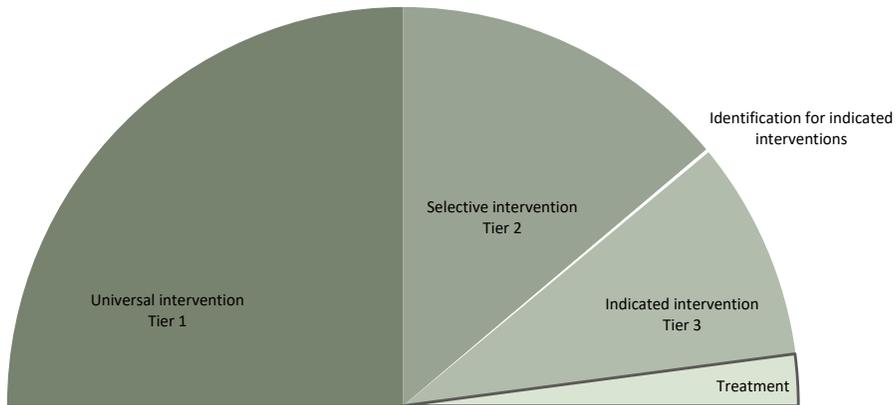


Figure 1. The three levels of preventive medicine in relation to treatment and the corresponding tiers used in the Swedish child CHS.

Universal interventions aim to stop communication difficulties from occurring and may benefit all children. One focus in universal communication enhancing interventions is to raise awareness regarding communication difficulties in the public (Law et al., 2013). The research on universal preventive strategies for communication disorders is sparse (Smith et al., 2017) and often focuses on literacy promotion and book distribution (Goldfeld et al., 2012). Children whose parents report that they read to their child from an early age, read to the child at least three times a week, and have many books in the home often get better school results (Needlman and Silverstein, 2004, Duursma et al., 2008). A causality between reading books to the child and later literacy development has, therefore, been assumed and has resulted in several story-book interventions (Goldfeld et al., 2012). These interventions have a substantial cost when they are provided to the entire population (Goldfeld et al., 2012), and studies on their effect show inconsistent outcomes (Needlman and Silverstein, 2004).

In most regions of Sweden, the CHS collaborate with local libraries and donate a book to every infant (Kulturrådet, 2020). A comprehensive book-reading intervention targeting relatively disadvantaged areas was appreciated by parents and nurses, but no effects were seen on literacy or language (Wake et al., 2015, Goldfeld et al., 2012). Literacy interventions have shown less effect on children at risk than those not at risk (Mol, Bus, de Jong, & Smeets, 2008). Parents' fidelity to the intervention may be one explanation for this finding. Book-reading intervention studies often have a high dropout rate, and the dropouts reported a history of reading difficulties more often than the completers (Justice et al., 2015).

Several parental interventions focus on the parents' sensitivity and responsiveness (Bergström et al., 2020, Nugent et al., 2017, Magill-Evans et al., 2007). In short, sensitivity refers to how a parent detects the child's signals and responsiveness refers to parents' way of contingently responding to these signals (Warren and Brady, 2007, Masur et al., 2005). As the parent's sensitivity and responsiveness are of great importance for a child's communication development, preventive strategies that promote parents' sensitivity and responsiveness can possibly reduce the burden of communication difficulties. Sensitivity interventions are seldomly offered universally (Bergström et al., 2020, Nugent et al., 2017). However, selectively offered interventions, to families with low socioeconomic status, have shown an effect on the parents' sensitivity and responsiveness to the child's communication which in turn effect the child's communication abilities (Bergström et al., 2020, Magill-Evans and Harrison, 1999).

Identification of communication difficulties

Screening

One of the most basic tools in preventive medicine is screening (Institute of Medicine National Research Council, 1999). Screening can focus on population risks, on group or individual-level risks or on identifying individuals in need of indicated prevention (O'Connell et al., 2009). There are several important principles in public health screening. One is that the screening test should distinguish between individuals who are likely to have the disease or disorder from those who are unlikely to have it. A screening tool's ability to identify individuals is often described in terms of sensitivity and specificity. Sensitivity refers to the proportion of positives that are correctly identified, while specificity refers to the proportion of negatives that are correctly identified (Institute of Medicine National Research Council, 1999). When implementing a screening there should be adequate facilities to treat the disease or disorder identified, and the treatment should be adequate for the individuals with the disease or disorder. Case-finding should be a continuing process and not a "once and for all" project (Wilson and Jungner, 1968).

Debate regarding screening for communication difficulties

There is an ongoing debate regarding screening for communication difficulties (van Agt et al., 2007, van der Ploeg et al., 2008, Siu et al., 2015). Screening instruments have difficulties differentiating between delays and disorders, and some children can outgrow their communication delay (Siu et al., 2015). Screening for language delay has shown a positive, but small, effect on children's language development (van Agt et al., 2007, van der Ploeg et al., 2008), but these findings have been regarded as inadequate by the US Preventive

Services Task Force (Siu et al., 2015). Some studies argue that the sensitivity and specificity of screening instruments, using expressive vocabulary, are too low even when combined with genetics and risk factors (Dale et al., 2020), while other studies show excellent predictive validity through parent-report (Sim et al., 2019).

Although there are difficulties in screening for disorders with low prevalence, screening for disabilities such as autism spectrum disorder (hereafter autism) has a broad consensus (Zwaigenbaum et al., 2015b). Criticism has been directed at what some regard as the pathologising of certain neurobehavioral traits, including those related to autism. The term neurodiversity has been introduced to describe variations in neurocognitive functioning as neurodivergence rather than as disorders. Although such viewpoints could be seen as advocating resistance to identifying children with variations in neurocognitive functioning at an early age, neurodiversity advocates emphasise the importance of communication and adapting the environment to match the individual's needs (Pellicano and Stears, 2011, Kapp et al., 2013, Ne'eman, 2010). Indeed, communication difficulties are often the first sign of developmental delay, intellectual disorders or autism, and are a key symptom of autism (Johnson and Myers, 2007). Hence, screening methods used to identify children that could benefit from indicated communication interventions may be in line with the neurodiversity paradigm, especially if the intervention focuses on altering the child's environment (Pellicano and Stears, 2011, Kapp et al., 2013, Ne'eman, 2010).

Screening tools identify children in need of intervention earlier than developmental surveillance. In areas where health literacy and socioeconomic status are low, parents have difficulties advocating for their child's needs making this even more evident (Guevara et al., 2013, Cox et al., 2010). Screened children were referred timelier than children who received developmental surveillance (Guevara et al., 2013). One universal screening study using the Modified Checklist for Autism in Toddlers missed few children. The missed children were more often from lower-income households, black or Asian children¹ and children exposed to a language other than English. Children with the same characteristics were more often false positive (Guthrie et al., 2019). The referral rate was lower than expected and differed with the child's sex, race, family's language and income (Wallis et al., 2020). Disparities in diagnostic data may also have impacted the results (Mandell et al., 2002).

Screening methods for communication and language difficulties

There are several screening instruments for detecting communication difficulties in toddlers (Wallace et al., 2015), most of which focus on identifying autism (Zwaigenbaum et al., 2015b, Oosterling et al., 2009). At present, two screening methods are in use in the Swedish CHS to screen for language

¹ Wording as in referenced article.

problems at two-and-a-half to three years of age. One was first developed in the Region of Västra Götaland (Mattsson et al., 2001) and one in the region of Uppsala (Westerlund and Sundelin, 2000, Nayeb et al., 2019).

One of the most widely used screening methods internationally is the MacArthur Communicative Development Inventories (CDI) (Fenson et al., 1994). There are two versions of the CDI, the Infant CDI, consisting of a 396-item vocabulary list and the Toddler CDI containing a 680-word vocabulary production checklist. Even though these two versions of the CDI are comprehensive, they are seen as screening methods (Wallace et al., 2015). A short version of the CDI, the Swedish Communication Screening at 18-months (SCS-18) has been tested in Sweden (Westerlund et al., 2006). The SCS-18 had low sensitivity (50%) when tested at the 18-month health visit. According to the National Guide for the Child Health Services the surveillance method used at the 18-month health visit is to ask the parents if the child speaks eight to ten words and understand more than these eight to ten words (Fäldt, 2019). This method has even lower sensitivity (32%) than the SCS-18 (Westerlund et al., 2006).

Communication and Symbolic Behavior Scales Developmental Profile

The Communication and Symbolic Behavior Scales Developmental Profile (CSBS-DP) is a broadband evaluation tool used to identify children aged six to 24 months with language, communication, or developmental disorders (Wetherby and Prizant, 2002). The CSBS-DP consists of three parts, a screening instrument called the Infant-Toddler Checklist (ITC), a comprehensive Caregiver Questionnaire and the Behavior Sample clinical assessment (BS).

The ITC is a parental questionnaire consisting of 24 items in three composites – social, speech and symbolic – and a single question regarding parental concerns (Wetherby and Prizant, 2002). The questionnaire can be filled out in five minutes and is scored in less than two minutes (Pierce et al., 2011). Studies of the psychometric properties of the ITC have shown different sensitivity and specificity depending on child age and the standard instrument against which it was compared to assess the child's communication and language (Wetherby et al., 2008, Vehkavuori and Stolt, 2018). The internal consistency has been high using alpha coefficients (Wetherby et al., 2008). In a recent study on infants with enhanced risk of communication difficulties, the instrument showed a longitudinal sensitivity ranging from 57% to 62%, and a specificity ranging from 42% to 85% depending on screening age (Parikh et al., 2020). In a European study, the sensitivity for 18-month old children was 67% and specificity 98% (Devescovi et al., 2020).

The BS assessment is a systematic naturalistic sampling procedure that encourages spontaneous social communication. It consists of communicative temptations, shared book reading, a play probe, and a language comprehension probe. There are twenty items which are summed into the same three composites as the ITC. The BS is standardised and norm-referenced

(Wetherby and Prizant, 2002) and has shown good psychometric properties (Gridley et al., 2019). When used at 18-21 months, the BS predicts language developmental outcome at age three (Morgan et al., 2020) as well as communication development one year later when assessing one to two-year-olds (Delehanty et al., 2018). The BS takes about 30 minutes to conduct.

Indicated interventions to promote communication development

There are many effective interventions designed for infants and toddlers with suspected, identified and diagnosed communication difficulties (Zwaigenbaum et al., 2015a, Iacono, 1999, Warren et al., 2011, Roberts et al., 2019, Roberts and Kaiser, 2011, Dubin and Lieberman-Betz, 2020, Binns and Oram Cardy, 2019). Many of these interventions include responsive communication (Kaiser and Roberts, 2013, Pickles et al., 2016, Roberts and Kaiser, 2011, Landry et al., 2006, Baxendale and Hesketh, 2003, Brown and Woods, 2015) and enhanced milieu teaching (Fey et al., 2013, McCathren, 2010, Hatcher and Page, 2020, Hampton et al., 2020, Iacono et al., 1998). Responsive interventions include sensitivity and contingent response to the child's communication. Enhanced milieu teaching facilitates communication through environmental arrangement and expansions. Different interventions include and focus on various dimensions of responsive communication and enhanced milieu teaching and therefore the terms used to describe the interventions may vary somewhat (Mahoney et al., 2006, McCathren, 2010, McCathren, 2000, Fey et al., 2006). Both responsive communication and enhanced milieu teaching have shown positive effects on the children's communication and can be applied in the families' everyday life (Kaiser and Roberts, 2013, Roberts and Kaiser, 2011, Mahoney et al., 2006, Pickles et al., 2016). These interventions are not diagnosis-specific and can, therefore, serve as an indicated intervention before a definitive diagnosis is made (Brown and Woods, 2015).

Another way to facilitate and support communication (Millar et al., 2006, Branson and Demchak, 2009) and speech (Schlosser and Wendt, 2008) is through augmentative and alternative communication (AAC). Examples of AAC tools include pictures, manual signing, objects, and speech-generating devices (most commonly tablets or smartphones). AAC interventions are effective for infants and toddlers (Branson and Demchak, 2009). Multimodal AAC is recommended to be implemented as soon as possible when communication problems are suspected (Branson and Demchak, 2009).

When implementing AAC, the child's communication partners need to adapt their communicative behaviours towards the child. This adaptation can be achieved through partner instructions (Wright and Kaiser, 2016, Wright et al., 2013, Iacono et al., 1998, Kent-Walsh et al., 2015, Light et al., 2019).

Interventions often focus on the parents, as they are usually the child's primary communication partners. Interventions focusing on coaching parents in their use of AAC have shown improvements in children's communication and speech (Adamson, Ronski, Bakeman, & Sevcik, 2010; Ronski et al., 2011; Ronski et al., 2010). However, there are barriers to the implementation and use of AAC. Parents have described that using AAC requires a conscious effort. Introduction of AAC before the parents have processed the child's disability emotionally has been stated as another barrier (Moorcroft, Scarinci, & Meyer, 2019).

ComAlong

One intervention combining responsive communication, enhanced milieu teaching and AAC is the AKKtiv program. The AKKtiv program consists of several courses for parents and professionals and has been disseminated to a number of countries. The most widely disseminated and evaluated intervention in the AKKtiv program is the AKKtiv ComAlong (hereafter ComAlong) which targets parents of preschool-aged children. The intervention is parent-mediated and aims to promote parent-child communication and AAC-supported communication within the context of everyday activities and routines (Jonsson et al., 2011, Ferm et al., 2011, Rensfeldt Flink et al., 2020). ComAlong is based on a) the definition of communication as a co-constructed and co-regulated process where meaning is created mutually, dynamically and continuously (Bruner, 1983, Fogel, 1993) and b) a theory that proposes children's understanding of communicative intentionality as a cornerstone in their acquisition of language (Tomasello, 2001, Bruner, 1983).

ComAlong consists of seven group sessions with lectures, home assignments, and collaborative analyses of pre-recorded video clips. Theory regarding communication, communication development, responsive communication, play, and AAC are presented in combination with discussions regarding parents' experiences. During the sessions, there is an in-depth description of responsive communication, enhanced milieu teaching and AAC. Each strategy and AAC method is labelled with a symbol and a descriptive word. For example, an attentive owl with excellent vision and hearing symbolises responsive communication and a clever and shrewd fox symbolises enhanced milieu teaching. During the group sessions, parents are given situational- and activity-based communication boards to use during aided language input in the home environment. The parents' and course leaders' experiences of ComAlong have been reported in previous research where the parents describe the benefits of the intervention and that communication had improved (Ferm et al., 2011, Rensfeldt Flink et al., 2020). Parents reported that they used the communication boards in ComAlong, and described that their child was interested and also used the boards (Jonsson et al., 2011).

The ComAlong Toddler

ComAlong Toddler (*Figure 2*) is an adaption of ComAlong. It targets parents of children aged approximately one to three years, with varying communication abilities. The children are early in the diagnostic process, and most have screened positive for communication difficulties through the CHS.

During the development of ComAlong Toddler two home-visits by an SLP were embedded into the intervention, to initiate and finalise the intervention, respectively. This enabled assessment of the child in the home setting and implementation of the methods in the environment where the changes would occur. During both home-visits, the child is assessed using the ITC and the BS. During the first visit, the SLP can get to know the child and the family and is decide if the child belongs to the target group for ComAlong Toddler. Three components form the base for individualised coaching and modelling regarding responsive communication, enhanced milieu teaching, and AAC during both visits: the SLP assessment; the parents' description of the child's communication difficulties; and the SLP's observation of the communication between the child and the parents. To individualise the intervention further, modelling is performed with the family's objects and is based on the child's interest. The second home visit also focuses on the parents' description of what they learned and which barriers they see for implementing the tools presented. It also provides parents with guidance and advice for further intervention.

The five group sessions are held with parents of six to 12 children in a clinical environment and have the same content as ComAlong, but are tailored to parents of young children. In the group sessions, the communication enhancing strategies presented are labelled as tools and AAC is presented throughout the group sessions.

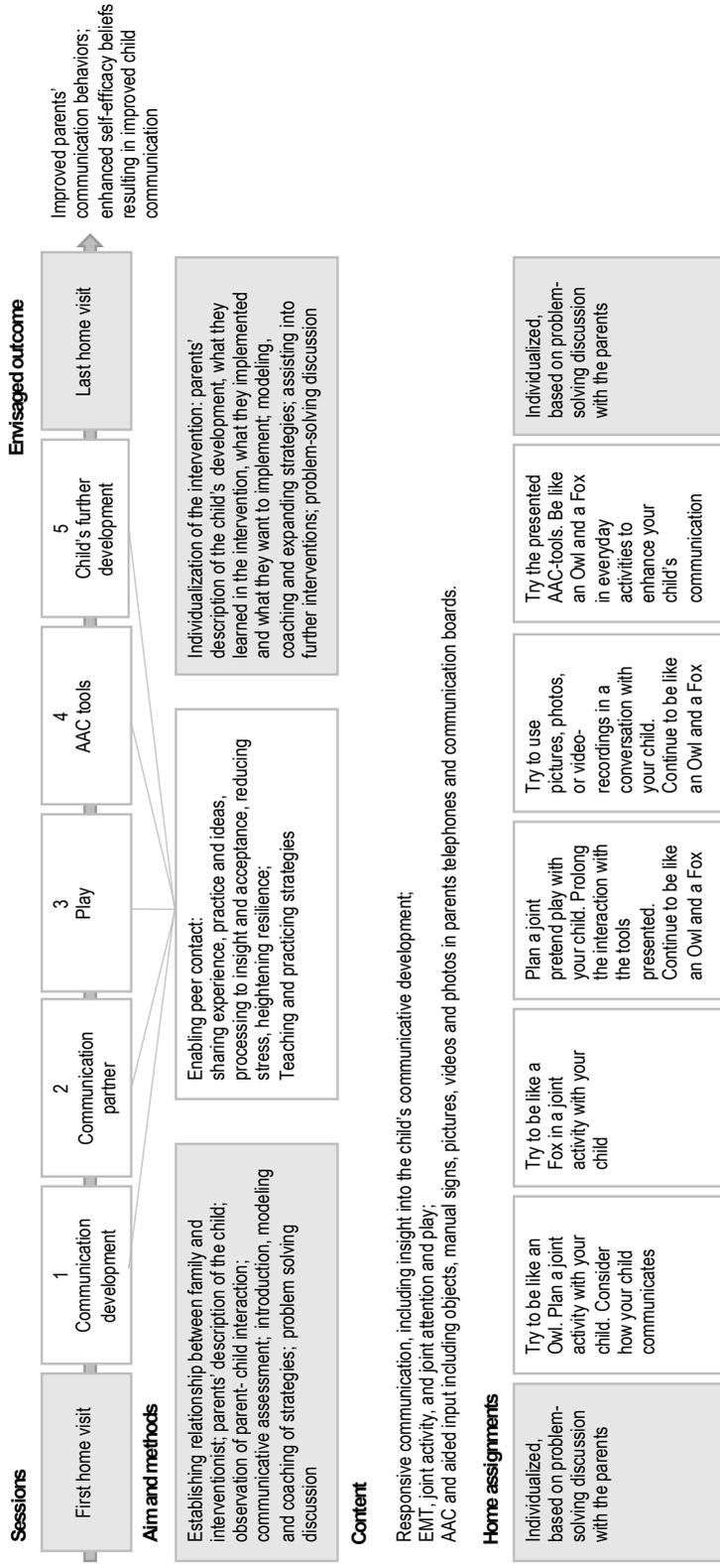


Figure 2. Description of the ComAlong Toddler Intervention. AAC = Augmentative and alternative communication, EMT= Enhanced milieu teaching. (Fäldt et al., 2020)

In ComAlong Toddler, responsive communication includes a) matching the child's development level, temper, interest, and behaviour style b) prompting and contingent reaction to the child's behaviour and communicative attempts, c) expanding the child's communication, d) matched turn-taking and e) expectant waiting. The enhanced milieu teaching includes a) increased interaction and eye contact by positioning; moving a desired object to the communication partners face; the communication partner moving his/her face in the child's line of attention b) establishing communication interactions and joint activities in everyday situations c) imitating the child d) performing actions that the child can react to, such as actions the child sees as funny e) time delay strategies to encourage the child to request verbally or nonverbally such as needing help, giving a choice, paus in a routine and f) modelling new skills.

The AAC included in the intervention focuses on aided language input using ComAlong communication boards and photos or videos of the child's natural environment in preschool and at home. The parents' smartphones are an important resource. At every group session, parents receive written and illustrated material (see *figure 3* for example of illustrations) and home assignments, which they are encouraged to video-record. At the following group sessions, these video recorded home assignments are used for video self-reflection, positive performance-based feedback, peer learning, and problem-solving discussions (Barton and Fettig, 2013, Dunst and Trivette, 2012). All the child's parents and other main caregivers are encouraged to attend the intervention. If this is unachievable, co-parent families are motivated to do the home-assignments together.



Figure 3. Illustration from ComAlong Toddler. The attentive owl with excellent vision and hearing symbolises responsive communication. The clever and shrewd fox symbolises enhanced milieu teaching. AAC is exemplified by the communication boards and objects.

Rationale of the thesis

Communication difficulties are highly prevalent and may cause adverse development for the child, with a negative effect on quality of life, abilities to learn and poor mental health as adults. The child's difficulties may also have an adverse impact on the parent's health and result in elevated health care costs. A child with communication difficulties may not be able to fulfil their human rights to take part in education and express their opinions (UN General Assembly, 1948, UN General Assembly, 1989). The prevalence of communication difficulties is also unfairly distributed, affecting children with low socioeconomic status to a greater extent even though the associations are complex.

Preventive communication enhancing interventions may alter the negative developmental trajectory and screening methods with good psychometric properties may reduce the disparities in identification. As the Swedish child health services (CHS) are free of charge and reach almost all children and families, they have a unique opportunity to enhance health as well as identify children in need of indicated interventions equitably.

Universal interventions target all children, are positively framed, and are provided independent of risk factors and are therefore non-stigmatizing, but they may be costly as they are provided to a large population. However, little is known regarding how universal language and communication-promoting interventions delivered through the CHS reach parents.

Screening methods need to have favourable psychometrics in order to distinguish individuals who are likely to have the disorder from those who do not. In evidence-based medicine, it is also clear that clinical and professional experiences of applied methods are also of great importance. Thus, when implementing screening methods, it is essential to assess the users, in this case, CHS nurses', perspective of barriers and incentives to implement a screening method.

Finally, indicated interventions may be appropriate either if universal interventions are not effective, or if additional services are needed for children with greater problems. The indicated interventions need to be appropriate for a range of communication abilities as they are often given before the difficulties are diagnosed. Such an indicated intervention for children identified as having communication difficulties is the ComAlong Toddler program, which combines two individual home visits with group sessions for parents. In

family-centred interventions, it is vital to investigate how parents perceive the intervention in order to develop and adapt the interventions to meet their needs.

Overall and specific aims

The overall aim of this thesis was to investigate a three-level public health process targeting children with communication difficulties: universal preventive communication intervention, identification of children with possible communication difficulties and indicated communication enhancing intervention for children with communication difficulties.

The specific aims of the studies included were to:

- I. Analyse characteristics associated with the exposure to a universal intervention to prevent language and literacy difficulties.
- II. Describe the design of a study including identification and indicated intervention.
- III. Investigate the child health service nurses' experiences and sense of competence when using the Infant-Toddler Checklist communication screening at the 18-month health visit.
- IV. Study the psychometric properties of the Infant-Toddler Checklist used in the Swedish child health service to identify children in need of indicated interventions.
- V. Describe parents' perceptions of the indicated intervention Com-Along Toddler, targeting parents of toddlers with communication difficulties.

Methods and result

Both qualitative and quantitative methods were used in this thesis. An overview of the studies and methodology used is presented in Table 1.

Table 1. *An overview of the study design, participants, data collection and data analysis.*

	Design	Participants	Data collection	Data analysis
I	Cross-sectional	2326 mothers, 2077 fathers	Questionnaire	Descriptive statistics, multi-level Binomial Generalized Linear Mixed Models
II	Description of the study design of the identification and the indicated intervention			
III	Mixed methods study	14 and 22 CHS nurses	Focus group interviews, web-based questionnaire	Systematic text condensation, descriptive statistics, Mann-Whitney
IV	Consecutive sample design	679 children	ITC, questionnaire, video recorded assessments	Sensitivity, specificity, ROC, confirmatory factor analysis and descriptive statistics
V	Qualitative study	16 parents	Semi structured telephone interviews	Qualitative content analysis

Setting

All studies were conducted in the county of Uppsala, Sweden. Studies I, III and IV were conducted in the CHS. Study II included the description of procedures in the CHS and possible outcome measures. Study V included parents

of children who were identified through the CHS as having possible communication difficulties.

Procedure for studies II, III and IV

The procedure for the studies evaluating the use of the ITC (II, III and IV) was to a great extent mutual for all three studies and is therefore described collectively here. The procedures for studies I and V are described in the specific descriptions of each respective study.

The ITC was implemented at 11 child health centres in Uppsala and Knivsta municipalities, Sweden (population: 215,762, and 17,533, respectively). One child health centre withdrew due to staffing problems. The centres comprised a representative sample of rural and urban areas with different sociodemographic characteristics.

Three weeks before the regular 18-month child health visit, an invitation letter, the ITC, an information sheet, and a consent form were sent to the legal custodians of children enlisted in the centres using the ITC. Parents were encouraged to bring the documents to the CHS visit. During the visit, the CHS nurse summarised the ITC score and checked if the screen was positive or negative based on American norms. Children with a positive screening result on the speech composite were rescreened at the age of 21 months. Children who had a positive screen on the social or symbolic composite or the total score were referred to a SLP for further assessment, as were children whose parent or CHS nurse was concerned about the child's communicative development regardless of the result of the ITC. Children younger than 30 months of age who were referred from other health providers due to parental or professional concern were also included in the ComAlong Toddler intervention. All referred children were assessed using the BS, and children with communication difficulties were randomised between the two different intervention arms described in study II.

Ethical approval and consent

All the studies were conducted according to the ethical guidelines described in the Helsinki Declaration. The regional ethical review board in Uppsala had granted ethical approval for study I (Dnr 2013/377), the described data collection in study II, data collection in study IV and V (Dnr 2015/124). Study III was based on CHS nurses' description of their professional role, and was therefore exempt from formal application for ethical approval. For studies I, III and IV, written consent was collected from the child's caregivers. The interviews in study V started with information regarding withdrawal, that

participation was voluntary and would not influence further interventions and consent. All material in studies I, III, IV and V was anonymised.

Study I

Aim

The aim of study I was to explore family and child health centre characteristics associated with parent's reported receiving a universal intervention to prevent language and literacy difficulties, delivered on a Digital Video Disc (DVD). The child's potential exposure to the intervention DVD was explored through analysing if the parents' reported that they had watched the intervention DVD and finally if they tried any activity presented in the DVD.

Methods

A universal preventive intervention aiming to enhance parents' awareness of the importance of early language stimulation was produced by the non-profit organisation Kodknäckarna (English translation "The Codebreakers"). The intervention was developed with examples of language and literacy-enhancing activities. The intervention was made available through a DVD and on a website to reach parents with low literacy. The material was accessible in Swedish, English, Arabic, Sorani, Persian, and Somali.

The DVD was to be delivered universally to all families visiting the CHS in Uppsala County, Sweden. Information to the CHS nurses was given at each CHS centre on one occasion by the central child health services unit, and at voluntary group meetings. Written information about the project was sent to the CHS nurses by e-mail and repeatedly through monthly information letters distributed by post and e-mail. The intervention DVDs were distributed to the child health centres in August 2014. The CHS nurses were instructed to give an intervention DVD to all families who visited the centre and to show the DVD in parenting groups. The CHS nurses were encouraged to show parts of the material as an indicated intervention when they detected an increased need for parental support. Families of new-born children were to be offered the DVD at the three-month child health visit.

Self-reported cross-sectional data from 2466 mothers and 2209 fathers were collected through the Children and Parents in Focus study (Salari et al., 2013). Family characteristics including parental country of birth (Sweden or other), parental marital status (married/cohabiting vs not cohabiting), level of parental education (university vs lower education), child age at the start of the

intervention and if the child was oldest or youngest amongst siblings were analysed, as was information regarding the child health centre (specific centre, number of children enlisted and Care need index).

The main dependent variables were if the mother or father had received the intervention DVD, if they had watched the intervention DVD and if they had tried any of the activities presented in the DVD, respectively. Data were presented through descriptive statistics. The relation between family and child health centre characteristics and exposure to a language and the intervention DVD were analysed using multi-level Binomial Generalized Linear Mixed Models, with mothers and fathers analysed separately.

Results

Few parents reported that they received or watched the DVD or tried an activity presented in the intervention (Table 2).

Table 2. *Number and proportion of parent who received, watched, or tried any activity from the intervention DVD. Reported in number and per cent of yes, no and missing answers.*

	Received n (%)			Watched n (%)			Tried an activity n (%)		
	Yes	No	Miss.	Yes	No	Miss.	Yes	No	Miss.
Mothers	901 (30.4)	1449 (61.7)	523 (18.2)	362 (12.6)	1990 (69.3)	521 (18.1)	281 (9.8)	735 (25.6)	1857 (64.6)
Fathers	618 (21.5)	1479 (51.5)	776 (27)	172 (6.0)	1924 (91.8)	77 (27)	133 (4.6)	864 (86.7)	1876 (65.3)

Receiving the intervention DVD was positively associated with mothers born in Sweden, the parents' marital status, university education and younger age of the child at the start of the intervention and if the child was oldest among siblings and for fathers the specific child health centre. The child health centre characteristics were not associated with the odds of parents having received the intervention DVD.

Conclusion

Few parents of three-year-old children were exposed to the universal language intervention. The results suggested that the intervention DVD to a larger extent reached more socioeconomically advantaged parents. The results show that both delivery methods and implementation methods must be chosen with care.

Study II

Aim

Study II aimed to describe the design of a research study using the screening tool Infant-Toddler Checklist to identify children with early communication difficulties and the evaluation of the ComAlong Toddler intervention for parents to support their child's communication development.

Methods

Study II describes a prospective cohort design for recruitment of children and parents to:

- a) Screen for communication difficulties using the Infant-Toddler Checklist (ITC) during the routine 18-month child health visit
- b) Assess the child during a home visit through the communication assessment Behavior Sample (BS)
- c) Randomly compare the ComAlong Toddler intervention to a telephone consultation by a speech and language pathologist.

Conclusion

This study can give information on methods to identify, assess, and treat children with communication difficulties. Published study designs or published study protocols can provide enhanced accountability for the studies. The research community can also evaluate if the studies are consistent with the outlined plan (Ohtake and Childs, 2014).

Study III

Aim

The aim of study III was to investigate child health service (CHS) nurses' experiences and sense of competence regarding language and communication screening after the introduction of ITC at the 18-month child health visit.

Methods

A mixed-methods design was used combining focus-group interviews and a web-survey. Three semi-structured focus group interviews were performed with 14 CHS nurses from four centres. The web-survey was sent to all 36 CHS nurses who used the ITC and 33 CHS nurses who used the standard method. The web-survey was answered by 11 CHS nurses who used the ITC and by 11 CHS nurses who used the standard method. In the standard method the CHS nurse asked the parents if the child was able to speak eight to ten words and understand more than eight to ten words. There was also a supplementary question regarding if the child was able to point out body parts and retrieve objects when asked to do so.

The qualitative data retrieved through focus-group interviews were analysed using systematic text condensation, and the quantitative data were described through descriptive statistics. To test the differences between the two groups, Mann-Whitney tests were used and effect size was calculated using Point biserial correlation (r).

Results

Survey result

CHS Nurses who used the ITC reported more often that they used a structured method to assess the child's communication compared to CHS nurses using standard method ($p = 0.003$, $r = 0.9$). The CHS nurses who used the ITC reported a higher sense of security when describing the child's communication to the parents than the CHS nurses who used the standard method ($p = 0.006$, $r = 0.8$).

Interviews

Three themes, each of which consisted of two to four categories, were identified in the qualitative analysis, and (Figure 4).

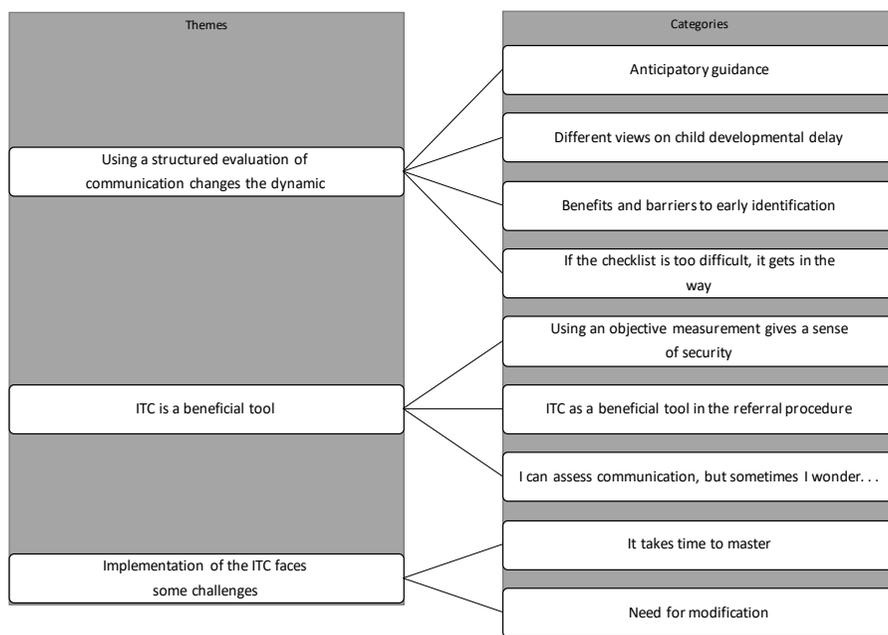


Figure 4. Overview of themes and categories.

Using a structured evaluation of communication changes the dynamic

The theme “Using a structured evaluation of communication changes the dynamic” consisted of the four categories: Anticipatory guidance, Different views on child developmental delay, Benefits and barriers to early identification, and If the checklist is too difficult it gets in the way.

The CHS nurses described that the parents who, prior to the visit had completed the ITC had reflected over their child’s communicative abilities and obtained insight into what their child should be able to communicate, resulting in enhanced parental responsivity to the child’s communication. Through the ITC result, the CHS nurses could relieve parents’ unfounded worries. The CHS nurses continued describing difficulties in the referral process as parents could react with nonacceptance. Through use of the ITC, this process could be initiated earlier. One CHS nurse problematised early identification as children must be allowed to be different. CHS nurses described a concern that the parents in greatest need would not fill out the ITC as it could be too complex. One CHS nurse described that the use of written material in CHS could endanger parents’ self-efficacy beliefs.

The ITC is a beneficial tool

The Theme “The ITC is a beneficial tool” consisted of the three categories: Using an objective measurement gives a sense of security, ITC as a beneficial tool in the referral procedure, and I can assess communication, but sometimes I wonder...

The CHS nurses described the ITC as relevant, detailed, and standardised and that it made the CHS nurse feel more secure in their developmental surveillance. Further, the CHS nurses described that they combined their knowledge regarding the child and the family with the ITC result in their developmental surveillance. The ITC helped the CHS nurses to describe the child’s communication to the parent and was thereby beneficial in the referral process.

Implementation of the ITC faces some challenges

The third theme consisted of two categories: It takes time to master and Need of modification. The CHS nurses expressed that it took time to understand the scoring template, but after sufficient experience, the scoring process was fast. The CHS nurses described a need for a short version and version of the ITC in different languages.

Conclusion

The result indicated that the ITC was perceived as a reliable and relevant screening instrument at the 18-month child health visit. CHS nurses who used ITC reported a higher sense of competence both in the assessment of the child’s communication and the communication with the parents. Implementation of ITC can be time-consuming, and adaptations of the instrument can be needed to reach parents with low literacy.

Study IV

Aim

Study IV aimed to investigate the psychometric properties of the ITC used in the Swedish child health service during the 18-month health visit.

Methods

A total of 679 children aged 16 to 20 months were assessed using the ITC at the 18-month health visit at ten child health centres in the region of Uppsala. Developmental assessments of 78 children were used to calculate the psychometric properties of ITC. Of the assessed children, 44 were referred after a positive ITC result and 34 randomly selected from the children with a negative ITC result.

Sensitivity, specificity and Receiver operating characteristic curve (ROC) were calculated for the ITC. Internal consistency was based on polychoric alpha (Gadernann et al., 2012). Comparative Fit Index, Tucker-Lewis Index, and Root Mean Square Error of Approximation were used to assess the model fit and polychoric correlation matrixes were calculated to assess the fit of the theoretical model of subscales on the ITC (Bowen and Masa, 2015, Hu and Bentler, 1999). Interrater reliability of the Behaviour Sample was calculated using generalizability coefficients.

Results

Regarding the ITCs abilities to identify children, the sensitivity was 86%, and the specificity was 59%. When considering the referrals based on clinical assessment, parental worries, or the CHS nurse's comments regarding a discrepancy in ITC result and the CHS nurse's assessment, the sensitivity reached 87% and specificity 63%.

The fit indices for the five-factor model were satisfactory, and the internal consistency was good for Communication ($\alpha=0.84$) and Total scores ($\alpha=0.87$), and somewhat lower for the Speech ($\alpha=0.66$) and Symbolic ($\alpha=0.70$) composites.

Conclusion

In study IV, the result showed that the ITC identifies children with communication difficulties with acceptable specificity and good sensitivity. The sensitivity and specificity were increased when the ITC were combined with the CHS nurses' prior knowledge about the child and the family and informal developmental surveillance. In the Swedish setting, the ITC showed adequate internal consistency and factor structure.

Study V

Aim

The aim of study V was to investigate how parents perceived the ComAlong Toddler intervention including home visits and group sessions, regarding their own and their child’s communication, as well as their views on the content, format, and learning strategies of the intervention.

Methods

Semi-structured telephone interviews were performed with 16 parents of 13 children. The parents had participated in two sequential ComAlong Toddler courses. Recruitment was performed through purposive sampling. The interviews were inductively analysed using qualitative content analysis (Elo and Kyngäs, 2008, Graneheim and Lundman, 2004).

Table 3. *Overview of the categories and subcategories*

Categories	Development for us and the child	Acquiring useful tools	Useful learning strategies	Benefits and challenges regarding intervention structure
Sub-categories	Insight gained	Applying the Owl and Fox in everyday life	Peer learning through home assignments	Sharing knowledge with co-parents
	The child’s communication development	Use of AAC	Model learning and validation during the home visit	Structure of the intervention
	Strengthening relations			Obstacles and potential improvements

Results

Four categories were identified, with two or three subcategories, respectively (Table 3). In the category “Development for us and the child” the parents described the intervention as a process to insight, through which the parents could match the child’s communicative development. During the intervention, the parents understood the importance of language comprehension and communication. The parents described that their children showed an increased

interest in communication, a development that had started after the first home-visit, before the first course session. According to the parents, the use of AAC increased the children's comprehension, and the children's behaviours changed through this increased comprehension.

The intervention had a positive effect on others than the child. Two parents described that they felt more prepared as communication partners when expecting a sibling to the child with communication difficulties. The parents also mentioned that they used responsive communication, enhanced milieu teaching and AAC with siblings. The invention gave parents means to articulate the child's needs and development to relatives. According to the parents, the home assignments enhanced the relations in the family, both between siblings and the child and between the parents in co-parenting families. The parents described an enhanced sense of competence in relation to later interventions.

In the category "Acquiring useful tools" parents described that they received easily applied specific tools. These tools were described in the same way they were labelled in the intervention: An owl symbolising responsive communication and a fox symbolising enhanced milieu teaching. The tools were described as ingrained in the parents' thoughts. Some parents mentioned difficulties applying the tools in everyday life.

All parents described that they had tried some form of AAC. The most commonly used AAC form was photos and graphical pictures. The parents described that it was evident how AAC could enhance the child's communication and understanding.

In the category "Useful learning strategies" the parents described the benefits of peer-learning through home assignments and the value of model learning during the home visit. The home-assignments were described as difficult to plan and time-consuming, but on the other hand, they learned from observing themselves and from other parent's recordings. The video recordings also enabled individual feedback. The parents described a feeling of unease seeing their child's difficulties more clearly on the video recordings. The benefits of peer learning were described despite a great diversity of the children's communicative abilities. The parents described that the SLP tried to obtain an overall picture of the child and gave prompt positive feedback during the home visit. The model-learning was mentioned to help the parents to proceed in their own communication and in activities with the child.

In the final category "Benefits and challenges regarding intervention structure" the parents described the difficulties in sharing the intervention among co-parents if one of the parents did not participate in the intervention. They described that it was of importance to perform the home-assignments together and to share the knowledge obtained. The importance of sharing the intervention with co-parents was described independently if both parents or one parent attended the intervention in co-parent families.

The parents emphasised the importance of early intervention and assessment in the home-environment. Some parents described that the home visit

contributed more than the group sessions, while two parents described the first home-visit as merely an assessment session for the SLP.

Parents described obstacles for the intervention such as sibling's health and parents' occupation but also alternative explanations for the child's communication difficulties. A more heightened awareness of these obstacles and a more forgiving attitude toward parents who perceived obstacles was desired.

Conclusion

Parents' descriptions suggest that they appreciated and learned from Com-Along Toddler. As parents described different gains from the home visit and the group sessions, the combination of individual and group-based components seemed important. Based on the parents' descriptions, it was feasible for parents of children with different communication abilities to participate in the same groups. The result shows the importance of involving all the child's parents and other main caregivers and to have a family-centred approach in early interventions.

Discussion

For the child's human rights to be fulfilled, the best possible conditions are necessary. The Swedish Child Health Service (CHS) has a unique position to enhance and monitor child health and development, including communication development. Communication difficulties are a public health problem. The prevalence is high among young children. Communication difficulties have a considerable impact on the child's life and on the possibilities to fulfil the rights of the child. We should, therefore, offer preventive communication interventions through the CHS. We need indicated interventions that target children with communication difficulties; these indicated interventions should be preceded by identification methods with good psychometric properties.

Universal preventive communication intervention

Universal interventions target a whole population group and shall be desirable for everyone in the target group (O'Connell et al., 2009). For preventive communication interventions delivered through CHS, the target group is children from new-born to five years of age and the children's parents. The universal interventions correspond with the first tier in the Swedish CHS three-tier system (Reuter, 2018), which target the whole population (*Figure 1*).

The first study focused on exposure of a universal language preventive intervention aiming at all children from the age of three months to five years visiting the child health service in the region of Uppsala. The exposure of the intervention in the studied cohort was low; one-third of mothers and one-fourth of the fathers reported that they received the intervention DVD. The child being of a younger age at the start of the intervention and if the child had younger siblings were positively associated with receiving the intervention DVD. One reason of the low exposure and the association between age of the child and younger siblings could be that the exposure and intensity of the intervention was low. Both younger age at the interventions start and having younger siblings may result in more visits to the CHS during the intervention period and thereby a higher exposure. The importance of exposure and intensity in preventive interventions is shown in Friend and Levy (2002). One other reason for the low exposure and the mentioned associations can be that implementation takes time.

Even though the cohort in the study were predominately parents born in Sweden, cohabiting and highly educated (Fält et al., 2018) the study showed an association between socioeconomic parameters and reported exposure. The exposure seemed higher in more advantaged parents, for example, co-living or married parents, parents with a university education and in mothers born in Sweden. The difficulties reaching parents with low education corresponds with prior research where the effect of preventive interventions often are lower in disadvantaged groups (Mol et al., 2008, Justice et al., 2015). The lower effect can be explained by the fact that research on this topic often is based on advantaged groups (Heinrichs et al., 2005, Lingwood et al., 2020, Manz et al., 2010) and may not be applicable for less advantaged groups (Lingwood et al., 2020). The intervention delivery method and the implementation directed to the CHS in study I seemed to result in a very low reach to the parents. As the child only was exposed to the intervention if the parents tried an activity presented in the intervention, the children's exposure for the intervention were minimal. Moreover, the exposure was even lower for children with less advantaged parents. This is the exact opposite of universal interventions. The result highlights the barriers for universal interventions.

The Infant Toddler Checklist as a universal preventive intervention

The screening method ITC was implemented as a universal screening method, as described in study II, and studied in study III and IV. The ITC was chosen due to its favourable psychometrics, as demonstrated in prior international research, and as the ITC identifies communication difficulties as opposed to more diagnosis-specific screening methods (Devescovi et al., 2020, Pierce et al., 2011, Wetherby et al., 2002). ITC has been used in several countries (Devescovi et al., 2020, Lin et al., 2015, Lin and Chiu, 2014) but not in the Swedish CHS prior to this study.

In study III, the CHS nurses described that completing the ITC seemed to enhance the parents' knowledge regarding communication and responsiveness as they reflected on their child's communicative abilities. To the author's knowledge, there are no preventive interventions offered in CHS focusing on responsivity aiming to enhance child communication. The term used for describing interventions with responsivity elements in CHS is sensitivity, which refers to the detection of the child's signals while responsivity refers to parents' way of contingently responding to these signals (Warren and Brady, 2007, Masur et al., 2005). There are interventions targeting sensitivity offered selectively internationally, and the effects of the interventions are often measured by the parents' responsivity and gains in child communication and language (Magill-Evans et al., 2007, Nugent et al., 2017). Responsivity cannot exist without sensitivity, and the sensitivity does not affect the child without the responsive communication; hence responsivity is the contingent response to the child's signals (Masur et al., 2005). Despite the close interconnection between sensitivity and responsivity, there are different goals presented in the

studies focusing on the two ingrained terms. Studies foremost using the term sensitivity aim at enhanced attachment (Benzies et al., 2008, Magill-Evans et al., 2007). In studies aiming at enhanced child communication and language, the term used is responsivity (Kaiser and Roberts, 2013, Roberts and Kaiser, 2011, Pickles et al., 2016). There may be a need to emphasise the relationship between sensitivity, responsivity, and its effect on the child's communication and language development for clinicians in the CHS.

One concern described by the CHS nurses in study III was that the use of literacy demanding material. Child health information is often given as written information that is too difficult for one third of adults to comprehend (Sanders et al., 2009). This can have a negative effect on the child's health as the parents can have difficulties following preventive health tasks such as follow a dosage chart or recommendations in preventive health brochures. One of the nurses also mentioned a risk of lowered self-efficacy if the parents could not fill out the ITC. Self-efficacy is closely related to health behaviour change (Strecher et al., 1986). It is therefore important to develop alternative methods for the parents to complete the ITC such as an audio survey.

In study III, CHS nurses described that parents with excessive or unfounded worries could be relieved when ITC showed sufficient communication despite lack of speech. These decreased worries could, in turn, enhance parental health, a factor positively affecting child health. When parenting stress decreases, parenting improves, and so does the child's well-being (Deater-Deckard, 2004). Parental stress correspond to children's communication difficulties (Ello and Donovan, 2005). Parents of children with communication difficulties may, therefore, require indicated intervention to alleviate their stress.

Selective prevention

Selective prevention targets subpopulations identified as being at elevated risk for a disorder or difficulties (O'Connell et al., 2009). The selective prevention does somewhat correspond with the second tier in the Swedish CHS three tier-system. In the Swedish system, this is described as children with elevated needs such as children in enhanced risk of ill health, children from other countries or children with suspected developmental difficulties (Reuter, 2018, Tell, 2019). Selective interventions are often aimed at specific socioeconomic groups (O'Connell et al., 2009, Law and Levickis, 2018). This may not be feasible regarding communication difficulties as socioeconomic classification may be too wide and non-specific (Rindermann and Baumeister, 2015). No study in this thesis focuses on selective interventions, and selective interventions are seldom implemented nationally in the Swedish context. One reason for this is the risk that specific populations could feel singled out (Gronholm et al., 2018). Based on these difficulties to identify population in increased

risk one possible method could be to use the actual risk factors for communication difficulties as an indicator for the need of selective interventions. One method to identify risk factors is the Edinburgh Postnatal Depression Scale which is used nationally in the CHS when the child is six to eight weeks old to identify postpartum depression (Wickberg, 2020). The parental depression is a risk factor for future communication difficulties in the child as well as cognitive developmental delays (Hardie and Landale, 2013, Maggi et al., 2010).

One additional method to detect children with elevated risks of communication difficulties is through measuring the parent-child interaction. One instrument for CHS nurses to assess parent child interaction is under development and has shown promising results (Levickis et al., 2019). Such an instrument could be used universally, selectively or at indication to identify parents and children in need of indicated interventions.

Identification

There is a need to identify individuals with behavioural symptoms of difficulties and disorders as these may need indicated interventions (O'Connell et al., 2009). The identification should be performed with screening instruments that are well constructed and accurate (Glascoe, 2005). In study IV, the psychometrics of the ITC was shown to be sufficient, with a higher sensitivity than the standard method for detection of language and communication difficulties used in Sweden (Westerlund et al., 2006). Furthermore, the CHS nurses in study III describe the ITC as more comprehensive than their former assessment questions. Therefore, the questionnaire may capture parental concerns to a greater extent, even excessive worries. In all screening, there is a risk of exceeding worries if the instrument has low specificity (Maxim et al., 2014). Based on the CHS nurses' description of how they combine ITC with their own assessment of the child, the risk with exceeding worries can be minimised. Excessive worries may, according to the CHS nurses in study III, be eased through the use of the ITC.

The screening yielded more positive screens than in other studies, which lowered the specificity. These studies are performed in other contexts than the Swedish CHS and mostly on children in other ages (Vehkavuori and Stolt, 2018, Parikh et al., 2020). One explanation for the elevated positive screen is that each composite of the ITC has few questions and the cut-off points can, therefore, yield a large difference in the number of positive screens. The specificity increased when the ITC result was combined with the CHS nurse's information in the referral. In study III the CHS nurses described how they combined the ITC result with their prior knowledge about the child and the family. They further described that they performed a continuous identification process. Wilson and Jungner described this combined and continuous

identification process as “Case-finding should be a continuing process and not a ‘once and for all’ project” (Wilson and Jungner, 1968). The case-finding process is also recommended to be “a repeated process that is combined with developmental surveillance, observations of children and families, knowledge of medical history, family strength and weakness, and awareness of psychosocial risk factors” (Glascoe, 2005).

There are differences in the identification of children with developmental difficulties in the United States of America as Latino, African American, Asian and immigrant children¹ are diagnosed later and with more severe symptoms than white American children (Zuckerman et al., 2014a, Mandell et al., 2002). One explanation for this is the discrepancies in parents’ abilities to express their concerns regarding their child’s development (Zuckerman et al., 2014b, Jegatheesan et al., 2010). The same patterns may exist in Sweden, as there is a positive association between maternal birth outside of the Nordic countries and autism but a negative association regarding Asperger syndrome and mothers born outside the Nordic countries (Haglund and Källén, 2011). A Finnish study showed that children with two immigrant parents had a lower likelihood of being diagnosed with Asperger’s syndrome than when both parents were born in Finland (Lehti et al., 2015), but the prevalence of autism were higher in children with one or two immigrant parents (Lehti et al., 2013). These differences in prevalence could be a result of difference in diagnostics, where children with more symptoms (or autistic traits) are diagnosed independent of maternal factors, whereas children with milder symptomology (fewer autistic traits) are more dependent of their parents’ abilities to express their concerns regarding the child’s development. In study III, one of the CHS nurses described a concern that parents with low literacy would not complete the ITC, which could lead to a lower identification of children with greater needs. They further explained that they changed their developmental surveillance during the 18-month health visit after implementation of the ITC. They had shifted focus from speech to communication.

Parents in low-income areas are more likely to report that they discussed their concerns when a screening method is used than when developmental surveillance is used (Schonwald et al., 2009). As communication difficulties are distributed unfairly in the population, it is important to ensure that children are identified independently of their parent’s literacy abilities. Cox et al. (2010) suggest a combination of screening instruments and patient-provider communication. This communication should be responsive, reciprocal, and respectful. The use of screening methods identifies children in poor populations more timely than developmental surveillance (Guevara et al., 2013). However, later studies performed in United States of America have shown that screening methods do not eliminate the disparities in identification rates, as children from lower-income households, Asian and black¹ children and children exposed to another language than English more often are missed in screenings (Guthrie et al., 2019). This is also one of the major limitations of

study II and study IV as one inclusion criteria for participation was that the parents could complete the ITC in Swedish, which is further discussed in the limitations section of the thesis. Apart from these differences in identification through the screening, there is also a variation in the paediatricians' adherence to guidelines in relation to the child's sex, socioeconomic status and if the child is white, or black/African American¹ (Wallis et al., 2020). The differences in identification and adherence to guidelines may aggregate considerable disparity. The disparities can exist in the Swedish context as CHS nurses report that they postpone referrals and simplify the screening for bilingual children (Nayeb et al., 2015). The CHS nurses' description of how they changed focus in the developmental surveillance in combination with the continuous identification process could overarch the risk of disparities. The clear guidelines of the three-tier system in CHS guide can also serve as support for equal identification (Reuter, 2018). There may also be a need to increase the CHS nurses' knowledge of the discrepancies in identification.

In study III, one of the CHS nurses described that children must be allowed to be different from one another. This description relates to the ongoing critique regarding the pathologising of diverse behaviours or personal traits in individuals with neurodiversity. The focus should be on adjusting the environment for the individual with neurodiversity (Ne'eman, 2010). Due to this critique, it could be beneficial to identify children with communication difficulties, independently of the underlying disorder, instead of focusing on specific diagnoses, or rather diversities. When a difficulty is identified, the child can be referred to interventions that can assist the adjusting of the environment for the child. In regards to communication these adjustments, such as heighten responsivity and AAC, may enhance the child's communication abilities. In study III, the CHS nurses mentioned that the referral process to indicated interventions can be initiated earlier as ITC, with its cut-off values, structure, and more objective measurement, eased the communication with the parents. The early referral was described as beneficial for the child and parent.

Indicated interventions

The third and final part of preventive medicine is indicated intervention. There is a difference between indicated interventions and treatment. Indicated interventions target individuals who have early signs of a disorder, but the disorder is not yet diagnosable. Treatment is intended to cure or reduce the symptoms of a diagnosable disorder (O'Connell et al., 2009). In study II and study V ComAlong Toddler was delivered as an indicated intervention.

The ITC was implemented as a method to identify children in need of the indicated intervention, ComAlong Toddler. The CHS nurses had knowledge regarding both the ITC and the intervention for the identified children. In study III, a CHS nurse described how she motivated parents to referral by

explaining that the SLP contact could give the parents tools to improve the child's communication. This was probably affected by their increased knowledge regarding the intervention. Previous studies have shown that parents regard the professional's knowledge of next step in the referral process as very important (Luinge et al., 2019). The CHS nurses described that the referral process before the implementation of the ITC could be drawn-out, through the ITC the motivation process could be initiated timelier. As so the use of the ITC in combination with an indicated intervention may result in a decreased workload for the CHS nurses.

In study V, one year after the ComAlong Toddler intervention was delivered, the parents described an ongoing use of responsive communication, enhanced milieu teaching and AAC as well as development for the child and themselves. The intervention was described as a process of insight, and that they through this process became more attuned to their child's level of development. The process of insight began at different time points in the intervention. Some described worries before the initial contact, and others came to insight during the first home visit or the group sessions. According to the CHS nurses' description in study III, the process to insight may have been initiated through use of the ITC during the 18-month health visit.

The parents in study V described the gains of meeting other parents of children with communication difficulties and that the video-recorded home assignments enabled peer learning. Through face to face parent meetings, the group setting in ComAlong Toddler may provide a supportive community, as suggested in prior research (Moorcroft et al., 2020, Marshall and Goldbart, 2008).

Furthermore, parents described how AAC enhanced the child's communication and understanding. All parents mentioned that they had tried some form of AAC even though the children's communicative abilities differed considerably. The benefits of AAC described by parents correspond with the findings of Ronski et al. (2011), where parents' perception of their child's language difficulties decreased after an AAC intervention but increased after a spoken language intervention. The use of AAC can help the parents to successfully communicate with the child, as described by Ronski et al. (2011) and Jonsson et al. (2011).

The structure of ComAlong Toddler was based on research on methods for effective adult learning in interventions targeting children with communication difficulties. In a previous studies (Moorcroft et al., 2019, Moorcroft et al., 2020), parents described several barriers to implementation of AAC, such as SLPs who signalled that the use of AAC could prevent speech development and SLPs that appeared to believe that they were the experts on the child and disregarded the parents' input. In the study the parents also described a lack of training in AAC use, a perceived lack of family-centred service delivery and emotional barriers (Moorcroft et al., 2020). The differences between the parents' descriptions in the studies by Moorcroft et al. (2019 & 2020) and the

results in study V may have several explanations. Some of the described barriers in Moorcroft et al. (2019 & 2020) were inherently avoided in the Com-Along Toddler intervention. For example, in ComAlong Toddler AAC was described as a tool to enhance speech, and the parents were seen as experts on their child and the child's communication. In ComAlong Toddler, AAC was presented early in the identification process for both infants and toddlers, and alongside responsive communication and enhanced milieu teaching. Responsive communication and enhanced milieu teaching have been shown to facilitate the implementation of AAC (Kent-Walsh et al., 2015). Through responsive communication, the parents' awareness of the child's communicative abilities are increased (Shire et al., 2016). The parents' awareness could, in turn, expose situations where the child is impeded by the difficulties to communicate and thereby clarify the need for AAC.

In study V, the parents explained that the child's interest in communication had increased. The parents described improvements in intentional communication, for example that the children approached their parents with their needs and used communicative pointing. Through use of AAC, this enhanced interest and intentional communication could be transferred to symbolic behaviours that were more easily understood by the communication partner. Enhanced milieu teaching has been shown to increase opportunities for the child to interact through AAC (Wright and Kaiser, 2016, Wright et al., 2013, Iacono et al., 2016). These methods could serve as the earlier described need for training on how to use AAC (Moorcroft et al., 2019).

An additional explanation for differences in parents' perceptions of the implementation of AAC compared to previous studies could be the diversity of the target group included in the ComAlong Toddler intervention. As Com-Along Toddler was offered as an indicated intervention early in the diagnostic process, parents of children with severe persistent difficulties and a presumably lifelong need for AAC attended the same group intervention as parents of children with minor and transient difficulties. The diversity in the target group may have signalled to the parents that AAC is beneficial for all children. Parents described these benefits in the interviews after the intervention. They also stated that they used AAC with the child's siblings and that the preschool used AAC with all children. The signal that AAC is beneficial for all children may have decreased the need for emotional readiness described in previous research (Moorcroft et al., 2019).

The home visit was described to be vital by several of the parents in study V. Through the home visit, they learned and came to insight regarding the child's communicative abilities. Several parents mentioned the benefits of individualised affirmation, both regarding the child's development and the parents' own behaviour. Coaching in the home environment and the importance of home visits in the process of getting to know the child and family are well described in studies as a means of enhancing and maintaining the family-centred practice (Woods et al., 2011, Marshall et al., 2017). Through home visits,

interventions may be individualised and overarch culture differences that can be intricate to identify and manage in group-settings (Mandak et al., 2017).

In our study, the parents' description of the need for enhanced insight into the burden parents bear underscores the importance of a family focus mentioned by Moorcroft (2020). In family-centred care, the SLP acknowledges the expertise of the parents and remains sensitive to the family's needs and priorities as well as parental stressors (Mandak et al., 2017). Family-centred care can also alleviate feelings of guilt about not using AAC as often as desired, which was described by one of the parents in study V.

The parents described that teamwork in two-parent families was enhanced during the intervention and that the intervention gave the parents a means of articulating the child's needs to relatives (study V). The enhanced teamwork and insight among relatives could, in turn, increase co-parenting, which has been suggested to reduce stress and to support child development (Flippin and Crais, 2011). Social support from friends and relatives can also lead to decreased parental stress (Flippin and Crais, 2011, Zablotzky et al., 2012). Parents emphasised the importance of having all the child's parents or main caregivers attend the group sessions, as it was difficult to share knowledge with a co-parent who had not participated. Earlier findings by other researchers have indicated that failing to involve all the child's parents may result in poorer outcomes and decreased family cohesion (Flippin and Crais, 2011, Moorcroft et al., 2019).

In the initial study design (study II), we planned to explore the effect of the intervention on parents' use of responsive communication, enhanced milieu teaching and AAC. The plan was to video record interaction between the child and the parent during the first and the second home visit to investigate the effect of ComAlong Toddler on the parents' interaction with the child. This data collection was not possible because parents, when describing the child's communication difficulties, often mentioned that they found it very difficult to play with their child.

Parents in study V described that subsequent interventions e.g. through the habilitation services or SLP services, were merely repetitions of what they had learned in ComAlong Toddler. The parents' description may signal a heightened sense of competence and confidence. On the other hand, the description may signal organisational difficulties in meeting parents' needs in forthcoming interventions. The interventions that follow an indicated intervention need to match the parents' skills and knowledge.

Two parents in study V described negative reactions to the term autism, a term they did not acknowledge about their child. One mother described that she gained an understanding of her child's communicative needs when the child's behaviours were described. A stronger neurodiversity focus in the family-centred intervention may be beneficial.

Regarding the aspects of neurodiversity, especially for the individuals with autism (or autistic individuals), it is problematic and possibly unethical to aim

at curing a disorders or traits when this often may be unattainable (Ne'eman, 2010). Instead, the focus should be adjusting the environment for the individual and to enhance communication as communication is one of the abilities highlighted by neurodiversity advocates (Ne'eman, 2010). AAC is described as a method to enhance the quality of life for individuals with autism (autistic individuals) (Robertson, 2010). Through the use of AAC, individuals with communication difficulties can exercise their human rights to communication declared in article 19 of the Universal Declaration of Human Rights (UN General Assembly, 1948) and Article 12 of the UN Convention on the Rights of the Child (UN General Assembly, 1989, McLeod, 2018).

This is true not only for the population with autism (autistic population) but for a great variety of individuals with communication difficulties of all ages and underlying disorders. An extensive focus on universal prevention and early identification at an early age may reduce the burden of communication difficulties for the individual and for society.

Conclusion and clinical implications

Given the central role of communication in human interaction and the profound consequences that communication difficulties may have for the child, as well as later in adulthood, it is of utmost importance to find ways to prevent communication difficulties, to identify children in need of indicated interventions and to provide indicated interventions that correspond with the needs of the child and the child's parents. This thesis has attempted to address these issues in a child public health perspective.

When an intervention has a universal aim, all individuals in the target group should be exposed, and the intervention, implementation and delivery methods must be chosen and planned with care. Study I showed an unexpectedly low level of exposure as well as an inequitable distribution with respect to parental characteristics, such that exposure to the universal communication-enhancing intervention was even lower for individuals without a university education and those who were not married or cohabiting. Interventions need to be developed to overarch the identified barriers reaching less advantaged groups.

Through use of the ITC, the CHS nurses could identify children in need of indicated interventions, and the instrument showed good psychometric properties, particularly when combined with the CHS-nurse's prior knowledge of the child and family. Nurses described that the ITC facilitated timelier referrals and enhanced both their own and the parents' knowledge and awareness of the child's communication. The results suggest that the ITC may be suitable as an integrated component in the national CHS program to identify children in need of indicated communication interventions. Although use of the ITC increased the CHS-nurses' workload initially, it also assisted them in the referral process. This may eventually result in a reduced workload over-time.

Based on parents' descriptions, ComAlong Toddler was found to be an acceptable intervention for children with communication difficulties. When combined with responsive communication and enhanced milieu teaching, AAC can be introduced early in the diagnostic process among children with diverse communication abilities. Many parents continued to apply these methods one year after the intervention. The shared group setting in combination with home visits and the group sessions and home assignments enabled peer learning and model learning, which may have been vital in the delivery of the intervention.

Through its nearly universal coverage of the zero-six-year-old population, the CHS is uniquely positioned to offer preventive services to enhance child communication. Use of the ITC appears to be promising, and the screening method can offer multiple advantages for the child, the parent, and the CHS-nurse. The initial observations reported here suggest that ComAlong Toddler is well received by parents, who feel that their children and the parents themselves have benefitted. Further research should examine the effects of these methods more extensively.

Methodological considerations

The studies in this thesis contribute to previous knowledge regarding universal interventions delivered through the CHS, methods of identification for indicated intervention performed in the CHS and indicated interventions. There are several methodological approaches in this thesis, with different strengths and limitations.

The studies were embedded in the clinical settings of the regular health service. This can be seen as a strength as the results reflect the use of the methods in a real-life setting.

The centres in studies I, II, III and IV were included to reach a demographically diverse population. Study I invited all parents who were enlisted in the participating centres, studies II and IV included all parents who could fill out the form in Swedish, and study V included parents who could speak and understand Swedish. Despite the efforts in study I to include a diverse population, parents were predominantly born in Sweden. Parents in study IV were born in Sweden to the same extent as in study I, although parents who could not fill out the ITC in Swedish were excluded. Few foreign-born parents participated in studies I and IV, which may affect generalizability to different cultural groups, although the study populations were large in both studies.

In study IV, not all children with a positive screen were assessed by a SLP, and it was therefore not possible to investigate the screening methods predictive capabilities.

Study I used descriptive data and generalised mixed models to investigate different levels of associations between the dependent and independent variables. The sample in the study was large, and both fathers and mothers were included. The data were collected through recalled self-report, which can lead to bias. No conclusions of causality can be drawn from the study due to the cross-sectional design. Interpretations of the results could have been enhanced if the parent's reported exposure had been analysed in relation to data regarding delivery of the DVD to the CHS centres and the CHS nurses' perception of distribution to the families.

Study II described the design of an intervention to identify communication difficulties using the ITC at CHS centres and a randomised evaluation of the ComAlong Toddler intervention. This description enhances the accountability for future studies as there are expectations of eventually finding the results in the literature when a study design article or study protocol is published. Reporting of the planned analysis in advance allows the research community to

evaluate if the resulting studies are consistent with the initial plan (Ohtake and Childs, 2014). There is also an increased propensity for negative results to be published when studies are described in advance. Few studies describe negative results, and the number of articles reporting negative results are decreasing (Fanelli, 2011).

The importance of basing interventions on evidence is unquestionable, but what to include in the evidence is debated (Rycroft-Malone et al., 2004). The client's perspective can be incorporated as a vital part of evidence-based health-care (Rycroft-Malone et al., 2004, Kitson et al., 2008). Patient-centred care is vital to avoid paternalism and leads to better outcomes (Robinson et al., 2008) as does the family-centred approach (Woods et al., 2011, Iacono et al., 1998). The family-centred approach can change the child's abilities and behaviour through development of the parents' skills, self-efficacy beliefs and functioning (Dunst and Trivette, 2012, Moorcroft et al., 2020, Woods et al., 2011). In patient-centred care and family-centred care, one of the most important aspects is the facilitation of shared decision making (Siminoff, 2013, Granlund et al., 2008). Parents' perspectives regarding interventions are essential for both the development and the adaptation of communication interventions (Ronski and Sevcik, 2018, Balandin and Goldbart, 2011). In addition, clinical experience and professional judgments are integral parts of evidence-based health-care (Rycroft-Malone et al., 2004). Qualitative studies can give insight into under-researched areas (Balandin and Goldbart, 2011) and provide crucial information about the experiences of clients and clinicians.

In qualitative studies, trustworthiness is used to consider the quality of the knowledge obtained and encompasses the terms credibility, dependability, conformability, and transferability. Credibility refers to how well the process and the data address the intended focus in the paper (Graneheim and Lundman, 2004). To achieve credibility in studies II and V, the interviews followed an interview guide. Participants with a wide range of experience were invited to participate, including CHS nurses with a variety of work experience and exposure to the ITC. Participating CHS centres represented different sociodemographic areas. In study V, all participating parents from two ComAlong Toddler courses were invited regardless of how many sessions the parents had attended. Group interviews were chosen in study II as this may help the participants to clarify and explore their experiences (Kitzinger, 1995). Telephone interviews were chosen in study V to facilitate the participation of as many parents as possible.

To optimise dependability, the interviews with the CHS nurses were performed over a two-week period and the parents within a two-month timeframe. In both studies, one question was added to the interview guide during the interview process. In study II, one of the observers was present at all interviews. One interviewer performed all telephone interviews with the parents. As the interviews were performed one year after the intervention,

interventions given after the ComAlong Toddler may have influenced the parents' experience and the time may have led to a risk of recall bias.

With regard to conformability, the interview guide in study II was developed by one of the authors in cooperation with a senior researcher with extensive experience in qualitative research and no prior knowledge regarding the ITC. The interview guide in study V was developed by the research group in collaboration with an external group of SLP researchers. Both analyses were performed by research teams with a range of knowledge and preconception regarding the method and setting. The steps in the analysis have been described, and the main findings are illustrated with one or several quotes. A sample of the analysis in study V was audited by an external researcher with no affiliation to the research group or prior knowledge regarding ComAlong Toddler.

In relation to transferability, the CHS nurses in study II had varied levels of experience and worked at centres that were sociodemographic diverse. All CHS nurses from the centre with the lowest parental socio-economic status declined participation in the interviews, and this may have affected the transferability of the results. The CHS nurses participating in the survey were representative of the CHS nurses working in the county of Uppsala. As parents who could not fill out the ITC in Swedish were excluded in studies II and IV, the CHS-nurses' perceptions of the ITC in study III may have been skewed.

The parents interviewed in study V were diverse in terms of the child's communicative abilities, relation to the child, the number of the attended session and cultural background. The transferability of the study may be limited as data regarding language spoken in the family, parents' educational level and economic situation were not collected.

Svensk sammanfattning (Summary in Swedish)

Kommunikation är grunden i mänsklig interaktion och är nödvändig för utveckling, lärande och hälsa. Kommunikationssvårigheter kan påverka hela barnets liv och leda till lägre livskvalitet med exempelvis psykisk ohälsa, skolsvårigheter och utanförskap.

Kommunikationssvårigheter anses vara ett folkhälsoproblem på grund av att de är vanligt förekommande, ger en hög samhällskostnad, till viss del går att förebygga och drabbar vissa grupper mer, så som barn till föräldrar med låg utbildningsnivå. Det är därför av stor vikt att studera interventioner som kan ges universellt, metoder att identifiera barn med misstänkta kommunikationssvårigheter samt indikerade insatser för de barn som identifieras ha kommunikationssvårigheter.

Den svenska barnhälsovården arbetar utifrån ett nationellt barnhälsovårdsprogram som beskriver tre nivåer av insatser: a) insatser som ska ges till alla barn b) insatser som ska ges till alla barn vid behov och c) ytterligare insatser till barn och föräldrar vid behov, genom vidareremittering, kontakt med socialtjänst eller förskola. Dessa tre nivåer kan jämföras med folkhälsointerventionerna: a) universella insatser, som ges till alla: b) selektiva insatser som ges till dem som har en ökad risk för en svårighet: c) indikerade insatser som ges till dem som visar tidiga tecken på en svårighet. Indikerade insatser kräver identifiering genom exempelvis screening.

De vanligaste universella insatserna gällande kommunikations- och språkstimulans är bokinterventioner. Bokinterventioner ger dock inte förväntad effekt och når sällan de barnen som har en ökad risk för kommunikations- och språksvårigheter. Selektiva insatser ges ofta till de som lever i socialt utsatta situationer, till exempel ekonomisk utsatthet. Tidigare amerikanska studier har dragit slutsatsen att barn till föräldrar i ekonomisk utsatthet eller annan härkomst än amerikansk får mindre språkstimulans i vardagen och att det leder till en sämre språkutveckling. Nya studier har dock visat att föräldrarnas förmåga att samspela och lära barnet är kopplat till barnets språkutveckling och inte föräldrarnas härkomst eller ekonomi, som tidigare studier har visat. Flera studier har också visat att det finns stora variationer i barnens kommunikations- och språkstimulans inom olika socioekonomiska grupper. Det gör att de grupperingar som vanligtvis används för att ge selektiva insatser inte fungerar vad gäller kommunikations- och språkfrämjande interventioner.

Det finns interventioner som kan hjälpa barn med kommunikationssvårigheter. Dessa interventioner kan ges som behandling för diagnostiserade svårigheter men också som indikerade interventioner innan barnets svårigheter är utredda och diagnostiserade. För små barn är interventionerna oftast riktade till föräldrar och innehåller en eller flera av följande komponenter: a) responsiv kommunikationsstil vilket innebär att vara lyhörd för och snabbt besvara barnets kommunikation b) miljömodifierande strategier vilket betyder att vardagen ordnas så att många tillfällen att kommunicera ges samt att barnet lockas att kommunicera mer samt c) alternativ och kompletterade kommunikation (AKK). AKK kan bestå av bilder, objekt, tecken som AKK och högteknologiska hjälpmedel så som exempelvis I pads. I AKKtiv programmet, som består av flera olika kurser till föräldrar och barn, kombineras responsiv kommunikationsstil, miljömodifierande strategier och AKK. Responsiv kommunikationsstil benämns i AKKtiv som att ”Ugglar”, och miljömodifierande strategiers benämns som att ”Räva”. En av AKKtiv programmets kurser är AKKtiv KOMiTID som är anpassad till föräldrar med barn yngre än tre år, tidigt i diagnosprocessen. KOMiTID består av två hembesök och däremellan fem gruppträffar. Vid varje gruppstillfälle får föräldrarna illustrerat textmaterial och hemuppgifter som de uppmanas att filma och ta med till nästkommande kurstillfälle. Genom dessa filmade hemuppgifter ges möjlighet till att föräldrarna lär av varandra, individuell positiv feedback och stöd i självreflektion.

Syfte

Det övergripande syftet med denna avhandling var att undersöka tre delar av den hälsofrämjande processen: Universella kommunikationsfrämjande insatser, identifikation och indikerade kommunikationsfrämjande insatser.

Metod

Avhandlingen består av fem delarbeten. I den första studien studerades vilka föräldrar som nåddes av en universell intervention, en DVD-film som skulle ges till alla som besökte barnhälsovården. DVD-filmen, som utvecklades av organisationen Kodknäckarna, innehöll tips på kommunikations- och språkutvecklande aktiviteter. Data om huruvida föräldrarna hade fått och sett DVD-filmen och om de hade provat någon av aktiviteterna som presenterades i DVD-filmen insamlades genom självrapporterade tvärsnittsdata, tillsammans med sociodemografiska data. Datainsamlingen skedde genom studien Fokus barn och föräldrar. Totalt ingick 2566 mammor och 2209 pappor i analyserna. I studien användes metoden generalized linear mixed model.

Studie II är en beskrivning av de studier som utvärderar användandet av screeninginstrumentet Symbolic Behavior Scales Developmental Profile Infant-Toddler Checklist (ITC) för att identifiera barn med kommunikationssvårigheter och randomiserat utvärderar föräldrainerventionen KOMiTID.

I studie III undersöktes barnhälsovårdssjuksköterskors uppfattning om ITC och deras självupplevda kompetens för att bedöma kommunikationssvårigheter. Fjorton barnhälsovårdssjuksköterskor intervjuades i tre gruppintervjuer och 22 barnhälsovårdssjuksköterskor fyllde i en enkät. Av de som fyllde i enkäten hade 11 använt ITC och 11 hade använt den tidigare metoden där föräldrar tillfrågas om barnet talar och förstår mer än åtta till tio ord. Gruppintervjuerna analyserades genom systematisk textkondensering, och enkäterna genom ickeparametrisk statistik, och helheten kombinerades i det som kallas en mixed-methods-analys.

I studie IV studerades de psykometriska egenskaper hos ITC. Den logopediska bedömningen av barnets kommunikationsförmåga gjordes genom Symbolic Behavior Scales Developmental Profile Behavior Sample (BS). ITC och BS används ofta tillsammans och de fungerar för att bedöma barn upp till 24 månader.

ITC-resultat för 679 barn (16-20 månader) analyserades, tillsammans med BS-bedömningar för 78 barn. ITC:s validitet och struktur bedömdes. Sensitivitet och specificitet studerades både gällande ITC-resultatet samt ITC-resultatet i kombination med barnhälsovårdssjuksköterskans kommentarer i remissen till logoped.

I Studie V insamlades föräldrars uppfattning om KOMiTID ett år efter interventionen. Sexton föräldrar till nio pojkar och fyra flickor medverkade i 15 telefonintervjuer (en intervju utfördes med två föräldrar till ett barn samtidigt). Materialet analyserades med kvalitativ innehållsanalys.

Resultat

I studie I var de flesta föräldrar som besvarade frågorna samboende eller gifta och hade universitetsutbildning. Nära en tredjedel av mödrarna och drygt en femtedel av fäderna rapporterade att de hade fått DVD-filmen. Tretton procent av mödrarna och 6% av fäderna rapporterade att de hade sett filmen. Av samtliga föräldrar var det 10% mödrarna och 5% av fäderna som provat någon av aktiviteterna som presenterades i DVD-filmen.

Att föräldrarna hade fått filmen var kopplat till lägre ålder hos barnet vid interventionsstart, likaså om barnet var äldst i en syskonskara och om föräldern var gift eller samboende. Det fanns även en positiv association om mamman var född i Sverige och för pappor fanns en association med den barnhälsovårdsenhet som familjen besökt.

Studie II är en beskrivning en randomiserad utvärdering av KOMiTID och identifieringen av barn i behov KOMiTID.

I studie III beskrev barnhälsovårdssjuksköterskorna att de föräldrar som fyllt i ITC inför 18-månadersbesöket hade reflekterat över barnets kommunikativa förmåga, vilket ökade deras responsiva förmågan. Obefogad föräldraoro kunde lindras med hjälp av ITC. Barnhälsovårdssjuksköterskorna oroade sig för att de med störst behov inte skulle nås av ITC då föräldrar med lässvårigheter inte fyllde i ITC, vilket kunde vara ett hinder i det hälsofrämjande arbetet. ITC beskrevs som relevant, detaljerat och standardiserat. Barnhälsovårdssjuksköterskorna berättade hur de kombinerade ITC med sin kunskap och informella bedömning av barnet. Genom ITC fick barnhälsovårdssjuksköterskan en metod att beskriva barnets kommunikationsförmåga för föräldrarna vilket, underlättade i motivationen för vidare remittering. De barnhälsovårdssjuksköterskor som använde ITC angav i högre utsträckning att de använde en strukturerad metod, och att de var säkra när de beskrev barnets kommunikation för föräldrarna jämfört med de barnhälsovårdssjuksköterskor som använde standardmetoden.

I studie IV visade ITC med svenska normer en sensitivitet på 85% och specificitet på 59%. När ITC kombinerades med barnhälsovårdssjuksköterskans kommentar i remissen ökade sensitiviteten till 88% och specificiteten till 63%. Den interna stabiliteten var god för delskalorna social förmåga och total poäng med något lägre för tal och symbolisk förståelse. Passformen för tre-faktormodellen var godtagbar.

I analysen av föräldrarnas upplevelser av KOMiTID (studie V) framkom fyra kategorier: a) Utveckling för oss och för barnet, b) Få hjälpsamma verktyg, c) Användbara lärstrategier, d) Fördelar och utmaningar med interventionens upplägg. Föräldrar beskrev att interventionen ledde till insikt kring barnets kommunikationsförmåga och barnets intresse för kommunikation ökade. I föräldrarnas berättande framkom att de fick användbara verktyg och att metoderna Uggla och Råva användes naturligt i vardagen. AKK ökade barnets kommunikation och förståelse. Föräldrarna berättade att de hade lärt sig genom att titta på sina egna filmade hemuppgifter likväl som de andra kursdeltagarnas filmer men att det var krävande att utföra hemuppgifterna. Enligt föräldrarna var det en stor spridning på barnens kommunikationsförmåga och att det var en lättnad att möta andra föräldrar vars barn hade en annorlunda utveckling. Logopedens modellinlärning och coaching i hemmiljön beskrevs underlätta i deras egen kommunikation och aktivitet med barnet. I familjer med två föräldrar poängterades vikten av att alla barnets föräldrar medverkar i KOMiTID. Interventionen beskrevs av flera föräldrar med starkt positiva termer, men att den var krävande och intensiv. Det fanns hinder för interventionen, vilket beskrevs av en förälder som att "livet kom i vägen" för interventionen.

Slutsats

Den universella preventiva metoden nådde föräldrar i låg utsträckning. De föräldrar som inte hade universitetsutbildning och var ensamstående nåddes i lägre utsträckning av interventionen jämfört med de föräldrar som hade universitetsutbildning och de som var gifta eller samboende föräldrar. Barnhälsovårdssjuksköterskornas känsla av kompetens och förmåga att beskriva barnets kommunikation för föräldern var högre hos de barnhälsovårdssjuksköterskor som använde ITC än de som använde standardmetoden. ITC kan fungera hälsofrämjande eftersom remittering till indikerade insatser underlättas och föräldrar med obefogad oro kan lugnas. Barnhälsovårdssjuksköterskornas beskrivning av att ITC ökar föräldrarnas medvetenhet om barnets kommunikationsförmåga vilket i höjer föräldrarnas responsiva förmåga tyder på att användandet av ITC kan fungera som en universell preventiv intervention parallellt med att ITC identifierar barn i behov av indikerade insatser. Ett hinder för användandet av ITC är att det kräver läsförmåga hos föräldern, vilket kan leda till att de föräldrar som inte kan fylla i formuläret upplever minskad kompetens. Det kan också resultera i att barn vars föräldrar inte kan fylla i ITC-formuläret identifieras senare. Detta resulterar i motsatsen till selektiva insatser där de med ökade risker ska erhålla mer hälsofrämjande interventioner.

ITC bedöms fungera som ett instrument för att identifiera barn i behov av indikerade insatser särskilt om ITC kombineras med barnhälsovårdssjuksköterskans kännedom om barnet och den informella bedömning som sker under besöket. Den informella bedömningen kan öka i kvalitet då barnhälsovårdssjuksköterskan genom ITC upplever en större kunskap om barns kommunikation. Den ökade kvalitén kan i sin tur gynna de barn vars föräldrar har svårt att fylla i ITC-formuläret.

Den indikerade insatsen AKKtiv KOMiTID uppskattades av föräldrar och de beskrev att de hade lärt sig strategier att använda i kommunikationen med barnet. Hembesöket och gruppssessionerna gav olika vinster vilket tyder på att de båda komponenterna är väsentliga. Trots att det var en stor spridning mellan barnens kommunikativa förmågor betonade föräldrarna vikten av att möta varandra och lära av varandras filmade hemuppgifter. Vikten av att engagera alla barnets vårdnadsgivare belystes i föräldrarnas berättande.

Future research

There is a need to develop, and evaluate universal interventions targeting parents' sensitivity and responsivity with the aim to enhance attachment and child communication as well as language development. Some parents may have difficulties engaging in methods that are based on research conducted on white, highly educated parents with excellent literacy. It is therefore vital to study if there are group differences in identification rates as well as perception of interventions and effects of interventions. In study II, the authors described the gathering of socioeconomic data in association with the collection of the ITC. This socioeconomic data will be used in future studies on the topic, to study if there are any differences in identification rates in terms of the parents' economic situations, living arrangements or country of birth. Socioeconomic data and the result on the ITC and the BS will be combined with data collected from the child's medical record.

A quantitative study of the parents' perception of ComAlong Toddler could provide information regarding subgroups' perceptions of the intervention. In study V, parents who participated in the intervention were interviewed. The study, therefore, does not give any information regarding the perception of those who did not participate in the intervention. One possible barrier to group interventions is that communication difficulties to a great extent are influenced by hereditary factors, and parents may, therefore, experience participation barriers due to their own communication difficulties. Interviewing non-participants would provide further information regarding parents' perceived obstacles and needs in order to adapt the ComAlong Toddler intervention.

Several analyses described in study II have yet to be performed. The long-term effect of ComAlong Toddler needs to be evaluated, which can be done through the child's medical records. A cost-effectiveness study could enhance our knowledge of the intervention. The parents' perception of how ComAlong Toddler affected the child's communication regarding words understood, words spoken and words communicated using AAC could give vital information about the child's potential benefit from the intervention in everyday life. An analysis of the child's communication during the BS assessment may provide objective information regarding the impact of the intervention.

Few selective interventions are provided in the CHS. There is a need to investigate how parents and children in need of selective interventions could be identified as well as a need to develop and evaluate these methods. There is also a need to investigate if children with increased needs actually get more

services from the CHS. As communication difficulties should be identified through use of a continuous identification process, there is a need to investigate the psychometrics of all steps in the identification process described in the national CHS program.

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