Measuring Responsive Style in Parents who use AAC with their Children: Development and Evaluation of a new Instrument

3 authors:

Malin Broberg
University of Gothenburg
40 PUBLICATIONS **2,215** CITATIONS

SEE PROFILE

Ulrika Ferm
Sahlgrenska University Hospital
45 PUBLICATIONS **592** CITATIONS

SEE PROFILE

Gunilla Thunberg
Sahlgrenska University Hospital
45 PUBLICATIONS **486** CITATIONS

SEE PROFILE

informa
healthcare

RESEARCH ARTICLE

Measuring Responsive Style in Parents who use AAC with their Children: Development and Evaluation of a new Instrument

MALIN BROBERG[1], ULRIKA FERM[2] & GUNILLA THUNBERG[2]

[1]University of Gothenburg, Sweden and [2]DART – Centre for AAC and Assistive Technology, Sweden

Abstract
The aim of this study was to develop and evaluate an instrument – the Responsive Augmentative and Alternative Communication Style (RAACS) scale Version 2 – to assess the communicative style of parents as they interact with their children using augmentative and alternative communication (AAC). This scale was used to analyze play interactions between 43 parents and 28 children with different diagnoses (including Down syndrome, autism, cerebral palsy, and intellectual disability), aged between 12 and 60 months. Parent–child interactions were observed both before and after parent participation in ComAlong, a training course on using responsive communication and AAC to support interaction with children. Based on an analysis of the results, Version 3 of the RAACS scale was developed and is recommended for future use. Analyses of Version 3 showed acceptable inter- and intra-coder reliability, and excellent internal consistency.

Keywords: *Responsive communication, Augmentative and alternative communication, Communicative disability, Communicative style, Instrument evaluation*

Introduction

The typical development of communication, in which transactions and mutual responses between the child and the caregiver constitute the most important drives (Sameroff & Fiese, 1990; Tomasello & Farrar, 1986; Vygotsky, 1978), may become problematic when the child has a disability (Simeonsson, Bjorck-Akesson, & Lollar, 2012). The communicative signals may be more difficult to detect and interpret, and parents run the risk of missing communicative initiations from the child (McCollum & Hemmeter, 1997). Parents of children with complex communication needs (CCN) tend to become less responsive and more directive as a consequence of these missed opportunities to develop interaction (Brooks-Gunn & Lewis, 1984; Light, Collier, & Parnes, 1985; Pennington, Goldbart, & Marshall, 2004; Pennington & McConachie, 1999). Studies on older children with CCN have shown that parents introduce most topics in conversation, ask closed questions, and ask for information that is already known (Ferm, 2006; Ferm, Ahlsén, & Björck-Åkesson, 2005; Pennington et al. 2004). Breakdowns in these early interaction patterns between the child with a disability and his or her

parent, and the development of a less responsive communication style in the parent, may, in the long run, restrict social participation and the child's development of important social, cognitive, and communicative skills (Aldred, Green, & Adams, 2004; Brouwer et al., 2011; Delarosa et al., 2012; Finke & Quinn, 2012; Landry, Smith, Miller-Loncar, & Swank, 1997; Mahoney & Perales, 2003).

Parental Responsivity

Parental *responsivity* is related to the concept parental *sensitivity*, which is frequently used in attachment theory (Beijersbergen, Juffer, Bakermans-Kranenburg, & van Ijzendorn, 2012). Parental sensitivity is characterized by the parent's awareness of and readiness to respond to the child's need for warmth, nurturance, and stability, and is related to the parent's internal working model of herself/himself and the child (van Ijzendoorn, 1995; van Ijzendoorn et al., 2007). Responsivity refers to specific parental communicative behaviors, such as contingent positive responses to child initiations (Warren, Brady, Sterling, Fleming, & Marquis, 2010). These communication behaviors may be related to parental

Correspondence: Malin Broberg, Associate professor, Department of Psychology, University of Gothenburg, Box 500, 450 30 Gothenburg, Sweden.
E-mail: Malin.broberg@psy.gu.se

RIGHTSLINK()

sensitivity and the parent's internal working model of the child; however, the focus in the present study is on the actual communication behaviors, not the parent's internal state of mind.

The degree of parental responsiveness has been shown to be strongly associated with a variety of outcomes in children with disabilities (Hauser-Cram, Warfield, Shonkoff, & Krauss, 2001; Siller & Sigman, 2002; Spiker, Boyce, & Boyce, 2002; Warren & Brady, 2007; Warren, Brady, Sterling, Fleming, & Marquis, 2010; Yoder & Warren, 1999a). For example, Hauser-Cram et al. (2001) found that, when mental age was controlled for, the quality and frequency of mother–child interaction was the only significant correlate of communication skills at age 3. By 10 years of age, children whose parents' interaction scores were more positive at age 3 had, on average, an advantage of approximately 10 months in communication skills compared to children of parents who had lower interactions scores. Infants with disabilities whose mothers ignored them for a proportion of free-play observation conducted when their children were 12 months old had significantly lower IQ scores at age 24 months than those who were not ignored during the observation (Wasserman, Allen, & Solomon, 1985). It has been shown (Slonims, Cox, & McConachie, 2006) that, at 8 weeks of age, children with Down syndrome are less communicative and lively compared to infants without disabilities, but their mothers' communication with them is indistinguishable from mothers of typically developing children. By 20 weeks of age, however, these same mothers were significantly less responsive. Thus, the developmental path of these children was already altered at 5 months of age. Maternal responsivity does not function independently of the child's behavior and responsiveness. Either partner in the "dance" between parent and child is capable of disrupting the interaction and altering its nature in ways that can have lifelong consequences. Initiating and maintaining a highly responsive interaction style with a child who has a developmental disability can be highly challenging, even for a parent with the best intentions, but is crucial for positive communication development (Warren et al., 2010).

In this study the term *responsive communication* encompasses such characteristics as being attentive, adjusting one's communication to the communicative level of the child, giving prompt responses to communication signals from the child, and communicating according to the attentional focus of the child (Harwood, Warren, & Yoder, 2002; Landry, Smith, & Swank, 2006). Specific parental behaviors that characterize a responsive communication style involve responding contingently to the child, following the child's lead, and providing input and support that build on the child's focus of attention and activity. Responsive communication can also involve imitation of the child's facial expression or vocalizations (Kasari, Paparella, Freeman, & Jahromi, 2008), verbal responses (Bloom, 1993), and using a language adjusted to the communicative level of the child (Pennington, Thomson, James, Martin, & McNally, 2009); as well as being physically close and showing warmth and engagement with the child (Ainsworth, Blehar, Waters, & Wall, 1978).

Several studies show that parent-centered intervention can lead to increased responsivity in parents and have positive effects on both parents' and children's communication skills (Girolametto, Sussman, & Weitzman, 2007; Mahoney & Perales, 2003; McConachie, Randle, Hammal, & Le Couteur, 2005; Pennington et al., 2009; Yoder & Warren, 2002). To date, only a few studies have addressed parental responsivity when interacting with children who use AAC. However, studies of interaction between parents and children who use or need to use AAC show that some parents demonstrate appropriate levels of responsivity, which is a requirement for successful interaction with the child (Brouwer et al., 2011; Ferm, Ahlsén, & Björck-Åkesson, 2005; Ferm, Ahlsén, & Björck-Åkesson, 2012).

The results of the few studies of AAC use in home settings indicate that parental responsivity can be positively altered when augmentative and alternative communication is introduced for the child. In Ferm, Andersson, Broberg, Liljegren, and Thunberg (2011) parents reported that the use of aided language stimulation (i.e., modeling the use of AAC while interacting with the child) helped them to be more in pace with the child and made their communication more explicit. In the study by Jonsson, Kristoffersson, Ferm, and Thunberg (2011) it was observed that parents used a wider range of communicative functions and expanded on their children's utterances after the introduction of aided language stimulation in their homes. Following intervention, the parents in the study by Romski et al. (2010) changed their pattern of communication with their children, in that they took shorter but more turns compared to baseline interactions. Finally, Thunberg, Ahlsén, and Dahlgren Sandberg (2009, 2011) noted an increased balance with respect to introduction of conversational topics and increased topic segments (including more responsive contributions from both the child with the disability and the parent) when a speech-generating device was introduced in different activities at home.

Early Intervention and AAC

Recently, some important recommendations concerning early intervention and AAC have been formulated, the most important of which is that AAC intervention should be implemented as soon as communication difficulties are identified. AAC intervention has been regularly demonstrated to support communication (Branson & Demchak, 2009; Preston & Carter, 2009; Schlosser & Sigafoos, 2006), and many studies have shown that AAC seems to facilitate development of both language and speech (Millar, Light, & Schlosser, 2006; Romski et al., 2010, Schlosser & Sigafoos, 2006; Schlosser & Wendt, 2008).

Another factor of importance with respect to early AAC intervention concerns involvement of the family. Providing parents with knowledge and support is imperative because the intervention should be part of daily natural interactions within the home (Granlund, Björck-Åkesson, Wilder, & Ylvén, 2008; Iacono, 1999; Pickl, 2011; Pennington et al., 2004; van der Schuit, Segers, van Balkom, Stoep, & Verhoeven, 2010). Furthermore, it is important that the parent, or any other communication partner who is close to the child, uses multimodal AAC during interactions, in order to both augment understanding and model AAC use (Branson & Demchak, 2009; Drager, 2009; Jonsson et al., 2011; Romski et al., 2010). It is also suggested that AAC intervention is more effective when parents have been educated, as desired, in how to be responsive to their child's communication (Calculator & Black, 2010; Cress, 2002; Iacono, 1999; Pennington et al., 2004). In fact, the use of responsive strategies by the partner is an important part of supporting successful interaction, especially for beginning communicators (Beukelman & Mirenda, 2005).

Parental Communication Training

Providing effective instructional supports for parents constitutes an important part of early intervention for children with complex communication needs (Woods, Wilcox, Friedman, & Murch, 2009). Parental instruction can either be a part of a comprehensive intervention program involving the children or stand by itself as an intervention, depending on parent education. The courses developed within the Hanen program (www.hanen.org) are probably the most widely used and studied parent education programs focusing on communication (Girolametto et al., 2007; McConachie et al., 2005; Pennington et al., 2009). ComAlong, the course examined in the current study, is an eight-session, parent-education training program that addresses communication, communication development, play, responsive communication strategies and AAC. It is typically delivered during an 8-week time period, with one 120-min session each week. It was developed within the Swedish project AKKtiv, Augmentative and Alternative Communication Early Intervention, which develops and evaluates courses for parents of children with communicative disabilities (Ferm et al., 2011; Jonsson et al., 2011). ComAlong targets parents of pre-school children with CCN and, at times, additional disabilities. It differs from other early parental education programs (e.g., Pepper & Weitzman, 2004; Greenspan & Wieder, 2006; Paul, 2007) by considering AAC theory, strategies (e.g., aided language stimulation, aided language modeling), and tools (e.g., manual signs, picture-based communication boards, speech generating devices and computers). All parents are provided with ComAlong-boards to try in their homes, using aided language stimulation approaches (Jonsson et al., 2011). The ComAlong program includes lectures, discussions, planning, and

follow-up of parents' homework assignments, as well as collaborative analyses of video recordings of interactions between the parents and their children at home. Surveys and interviews show that parents and course leaders view the ComAlong course positively (Ferm et al., 2011).

The ComAlong program addresses a variety of communication partner strategies. The responsive strategies that are taught to partners are (a) observing and listening to the child, taking the perspective of the child and using the child's focus of interest; (b) waiting expectantly (while silently counting to 20), giving the child more time to react and initiate; and (c) responding to and confirming all communicative signals. With respect to the last strategy, the parents of the children who are at pre-intentional stages of communication (Cress, 2002; Harwood et al., 2002; Thunberg, Carlstrand, Claesson, & Rensfeldt, 2011) are instructed to confirm signals by using imitation, whilst the parents of the children who are intentional communicators are encouraged to expand on the communicative contributions of the child. The environmental-milieu teaching strategies are (a) to provide opportunities to use AAC, and (b) to create opportunities for communication within the framework of daily activities, mainly by simply appearing more "foolish" (e.g., not always understanding the child or coming up with something unexpected). During the course, parents are also taught three additional strategies identified in a previous study within the AKKtiv project (Brouwer et al., 2011): (a) *incorporation*: incorporating the action of the child in your own subsequent action; (b) *pursuance*: pursuing a relevant action/response that has not yet been delivered by the child; and (c) *go-along*: go along with the trajectory that the action of the child suggests, whether or not it is immediately relevant to the local context.

Tools to Measure Communicative Style

In order to evaluate the effectiveness of the ComAlong course, we reviewed other methods for assessing parents' communication styles when interacting with their children. For example, in a study by Warren et al. (2010) a total of 25 min of four different interaction contexts (book reading, making and eating snack, unstructured play and naturalistic context) were video recorded. All maternal behaviors and communication directed toward the child were coded using seven predefined behaviors: gestures, request for verbal compliance, comment, recode, request for behavioral compliance, redirect, and zap (restricting child's behavior in some way, but not always negatively). Landry et al. (2006) measured maternal responsivity in mothers of preterm babies aged 6–10 months. They observed mother and child in a 15-min, naturalistic living-room situation and a 10-min, toy-play situation. Observational measures, quantified by either frequencies or global ratings, were obtained in four areas: contingent responsiveness (i.e., goal directed play, following requests), emotional-affective support

(including both responsive and non-responsive behaviors), support of infant attention foci or maintaining of infant attention, and quality of language input (i.e., verbal scaffolding or labeling of objects). The Maternal Behavior Rating scale (Mahoney, Powell, & Finger, 1986) is another scale in which maternal interaction is coded, in this case, according to 12 categories: enjoyment, expressiveness, warmth, sensitivity to interest, responsiveness, achievement orientation, inventiveness, effectiveness at gaining child's cooperation, acceptance, directiveness, pace, and praise. McConachie et al. (2005) developed the Joy and Fun Assessment (JAFA), an observational checklist of the extent to which parents use the positive communication strategies taught within the Hanen More Than Words course. Finally, we also examined The Teacher Interaction and Language Rating Scale (Girolametto, Weitzmann, & Greenberg, 2000), which includes 11 domains and covers many of the strategies that are discussed with parents during the ComAlong course.

To the best of our knowledge, there is no coding-scheme for measuring the responsivity of parents while interacting with a child who uses AAC, and we identified a need for a coding scheme that would address the unique challenges associated with these interactions, including specific recognition of the importance of modeling (Drager, 2009; Romski et al., 2010). We decided that the scale and associated assessment activities should meet seven criteria: (a) interactions should be ecologically valid and perceived as fun for the child and the parent, (b) interaction times should be short (because the attention span for preschool children with disabilities is often very short), (c) assessment should be of parent use of responsive communication style behaviors identified as important in the AAC research literature, (d) there should be assessment of parental strategies for using and facilitating AAC identified as important in the AAC research literature, (e) there should be a component to assess the affective tone in the interaction, (f) the scale must have good psychometric qualities, and (g) the coding scheme must be easily comprehensible by laypersons and not require extensive training to be used reliably.

Aims

The aim of this study was to develop and evaluate an instrument to assess the responsive communication style of parents who use AAC with their children. The psychometric properties of the scale were to be assessed by analyzing (a) inter- and intra-rater reliability, (b) internal consistency, and (c) sensitivity to change.

Methods

Participants

During a period of 3 years, parents who registered for the ComAlong course in the Gothenburg region were asked to take part in research being conducted into the course. In all, 37 parents[1] (20 mothers and 17 fathers) consented to participate in the study. Another six parents who did not attend the course, but whose partners did, also agreed to take part in the study and served as a comparison group. The average age of all parents was 35 years (range = 22–50 years), and the educational level ranged from completion of vocational school (8) to university degrees (14). Most parents (32) had Swedish as their first language; other languages were Russian, Finnish, Polish, Kurdish, Tigrena, Wollof, Serbian, and Bosnian. The ComAlong course was offered to the parents as part of the habilitation services provided for their child. The children, 15 girls and 13 boys, all received services from habilitation centers in western Sweden, and had been identified by their habilitation team as having a communication disability. The majority had ongoing contact with a speech-language pathologist at the start of the course. A variety of medical diagnoses were reported: Down syndrome (9), intellectual disability (6), autism (2), cerebral palsy, (3) and unspecified (3). In five cases, information on age and diagnosis was missing. The children's mean age was 48 months, with the youngest child being 12 months old and the oldest 60 months old.

The children differed considerably in terms of their communication development. For some of the children, scores were available via the Swedish version (Berglund & Eriksson, 2000) of the MacArthur Communicative Developmental Inventory (SECDI), including information on the Words and Gestures inventory ($M = 343, n = 23$), and the Words and Sentences inventory ($M = 124, n = 19$). It is important to note that the SECDI instructions were modified in this study in accordance with the aims of the intervention, so that the parents were told not only to acknowledge orally spoken words as communication, but also to count words or sentences expressed through other modes, including objects, pictures/symbols (with or without SGD), or manual signs. In terms of AAC, 19 of the children used manual signs, 5 used objects, 17 used photos and pictures, and 2 used speech-generating devices. Most of the children used several forms of AAC.

Data collection was based on experiences from previous research focusing on interaction between parents and children with complex communication needs at home (Ferm, 2006; Thunberg et al., 2009). The researcher came to the family's home at a time decided by the parents. In most cases, the researcher mounted the camera and left the room while the parent and the child played in a single location; in those cases in which parents and their children were more physically active, the researcher stayed in the room and followed the interaction with the camera. Parents were filmed individually and were instructed to play with their child in an activity they liked doing together, resulting in a number of different play activities, ranging from physical play (e.g., tickling) to building towers and role playing. Recordings were obtained at three time-points: before the ComAlong intervention, within 3 months

after the intervention started (in close connection to the last session of the course), and at follow-up 9 months after the intervention started (see Table I for an overview of number of observed interactions at the different time-points). Our goal was to create a 10-min video recording of each parent-child dyad at home, at each time-point; this was achieved for most dyads. However, for a few dyads, 10 minutes was too long, and shorter recordings were made.

Procedure

The development of the RAACS scale has been a step-by-step process over a period of 7 years, from 2005–2012, and was part of a larger evaluation of the ComAlong parental course, developed as part of the Swedish project AKKtiv: Augmentative and Alternative Communication Early Intervention. Eight masters theses in speech-language pathology at the University of Gothenburg have been related to the evaluation of the ComAlong course, with three focusing on the assessment and measurement of parents' communication styles (Almsenius & Karlsson, 2008; Karlsson & Melltorp, 2006; Lennartson & Sörensson, 2010). The development of the various versions of RAACS was carried out by Almsenius and Karlsson (2008) and Lennartson and Sörensson (2010), under the supervision of and in close collaboration with the authors of the current study.

In early work, Karlsson and Melltorp (2006) used The Teacher Interaction and Language Rating Scale (Girolametto et al., 2000) to assess six recordings of interaction between children and three parents who had participated in a pilot version of the ComAlong course. There were two main problems with the 7-point scale: it did not focus on parent responsivity to a child and their use of AAC, and it proved problematic with regard to inter-coder agreement. It was determined that the Teacher Interaction and Language Rating Scale was not suitable for the assessment of communicative style of the ComAlong parents.

Almsenius and Karlsson (2008) considered the experiences of Karlsson and Melltorp (2006) in developing the first version of the RAACS. The development and validation of the scale was based on the literature, descriptions of existing scales, recordings of interaction between parents and children with communication difficulties, and the content of the ComAlong course. The reliability and validity of the first version of the RAACS was evaluated using 15 video recordings of 10 parents. Furthermore, three external coders were asked about their views of the instrument. One of the participating parents was also asked to take part in this procedure in

order to test the social validity of the instrument. This parent coded the video recording of himself and his son and took part in a discussion of this experience with the two researchers. Overall, he was very positive about the instrument. His codings overall were in agreement with the results of the other coders (from 71–100% agreement on the included items).

Almsenius and Karlsson's (2008) first version of the RAACS was comprised of a manual and a coding scheme involving statements about 13 communicative behaviours. Each statement was coded minute-by-minute according to a 2-point scale, ranging from 0 (*does not exist*) to 1 (*exists*), which turned out to be too insensitive to important differences in parent behaviour. One statement concerned the parent's use of open-ended questions, and another two statements concerned the coder's overall impression of the parent's communicative style: "The parent shows warmth and interest in the child and the activity" and "The parent adapts to the child's developmental level and communicative ability." When the use of the scale was reviewed, raters identified difficulty in scoring parent's use of open-ended questions. In addition, the concept of "warmth" was difficult to score reliably, while the meaning of "developmental level" was unclear. We determined that communicative developmental level, rather than developmental level in general, was the most important factor to assess, and changes to this effect were incorporated into Version 2 of the RAACS, which was developed by Lennartson and Sörensson (2010). This is also the version that was tested and used for the current study (see Appendix A: RAACS Version 2 manual – online only), and was subsequently modified to become Version 3[2] (Table V shows the 9-item scale used in Version 3).

The second version of the RAACS was comprised of 12 statements, the first 10 of which were identical to those in the first version developed by Almsenius and Karlsson (2008). The statement about open-ended questions from Version 1 was removed, and the two statements from Version 1 that concerned the coder's overall impression were changed to "The parent adapts and is engaged" and "The parent adjusts to the communicative level of the child."

For the current study, 105 recordings of children and parents from the ComAlong course were coded. Given that the 2-point scale in the first version of the RAACS had been found to be too insensitive, we decided that a more nuanced scale should be used. Hence, statements 1 to 10 were rated minute-by-minute according to a 3-point scale (0, 1, 2) depending on the extent to which the parent displayed a behavior or a combination of behaviors during the minute. A behavior was always coded as 0 if it was not observed. The rules for scoring an item with a 1 or 2 varied for each behavior. For statements 1, 4, 5, 8 and 10, a 1 was given if the behavior was observed on a very small number of occasions (e.g., 1–2 occasions, depending on the behavior), and a 2 was given if a behavior was observed on multiple occasions (e.g., 2, 3 or more, again depending on the behavior). The coding of statements 2,

Table I. Number of Interactions Recorded at Pre-test, Post-test and Follow-up.

Pre test	Post test		Follow-up	
	Participants	Non-participants	Participants	Non-participants
43	33	6	19	4

RIGHTSLINK

3, 6, 7 and 9 depended on a qualitative analysis for which scores of 1 or 2 were given according to specific criteria that varied for each behavior. See Appendix A (the Version 2 coding manual – online only) for detailed scoring information for each behavior. Nine statements (1, 2, 3, 5, 6, 7, 8, 11 and 12) targeted responsive behaviors identified as important supports for parent–child interaction in the AAC research literature. Three statements (4, 9, and 10) did not address responsive parent behaviors, but concerned behaviors (identified in the AAC research literature) that the ComAlong parents are encouraged to use with their children (e.g., prompting communication, modeling the use of AAC).

In the coding manual, each statement is described and Statements 1–10 are illustrated with examples (see Appendix). For example, the statement, "The parent attends to and confirms the child's communication," is accompanied by the examples, "using facial gestures and body communication"; "imitating vocalizations, larger body movements, gestures, and facial expressions;" and "repeating signed, spoken, and digitized utterances." The coders (two speech-language pathology students in their final year of graduate study) spent approximately 15 hours learning to use RAACS Version 2. The coders practiced on videos of parent–child interactions not included in the study. Based on their feedback, a number of guidelines for the assessment of statements 1 to 10 were formulated, and are provided in the RAACS manual. No guidelines were necessary for statements 11 and 12, which concerned a global rating of the communication in each recording.

In using RAACS Version 2 to code the ComAlong videos, the order of the recorded observations was random, and all recordings were coded blind (i.e., the coders did not know if the parent had participated in the intervention or if it was a pre-, post- or follow-up interaction). Each parent's communication was coded minute-by-minute for a maximum of 10 min. Codes were summed and divided by coded minutes to obtain a mean, because some recordings were shorter than 10 min. Fifty-one percent ($n = 54$) of the recordings were double-coded separately by both coders, and point-by-point, minute-by-minute inter-coder agreement was calculated. The coding was then compared; interactions with disagreements were re-analyzed and discussed until consensus was reached. The remaining 51 recordings were divided between the two coders. Each coder also viewed 10 recordings on two occasions in order to calculate intra-coder reliability.

Analyses

For calculations of the overall psychometric properties of the scale, all observations were coded and used regardless of whether they were pre-test, post-test or follow-up, yielding a total of 105 coded interactions. Inter- and intra-coder reliability was analyzed by percentage of exact agreements. The internal consistency of the scale was calculated using Cronbachs's alpha. Initial informa-

tion on sensitivity to change was obtained by the use of a paired-samples *t*-test comparing parents who did and did not participate in the ComAlong course. There was an expectation of positive change (i.e., higher scores) in responsive communicative style for the parents who participated in the ComAlong course. All analyses were performed with SPSS/PASW statistics, Version 18.

Results

Reliability

Analysis of inter- and intra-coder reliability was calculated by percentage of exact agreements (see Table II). The percentages of exact agreements between the two raters varied by statement, from 76% ("Adjusts to the communicative level of the child") to 99% ("Facilitates the use of communication aids and uses AAC"). Agreements of 80% and above were considered to be acceptable and 9 of the 12 items passed this threshold, and the other 3 were close to it. The average percentage of inter-coder agreement for the 12 statements was 89%. The intra-coder agreement (i.e., a coder rated the same interaction twice, 2 weeks apart) varied across the two raters, with an average for both raters of above 80%. Neither of the coders found any statement problematic with respect to reliability. Taken together, the inter- and intra-coder reliability could be considered acceptable.

The mean for observed parent performance on the individual items on the scale varied between 0.09 ("Tempts the child to communicate by challenging the child") and 1.8 ("Adjusts physically to the child") (Table III). Three items were observed on very few

Table II. Inter- and Intra-coder Reliability for the 12-item scale (RAACS Version 2).

Parent behavior scale items	Inter-coder	Intra-coder Coder 1	Intra-coder Coder 2
1. Attends to and confirms child's communications	.84★	.77	.83★
2. Adjusts physically to the child	.92★	.86★	.91★
3. Gives the child space to communicate	.80★	.74	.80★
4. Tempts the child to communicate by challenging the child	.96★	.94★	.98★
5. Imitates the child	.95★	.95★	.93★
6. Clarifies his or her own communication	.82★	.78	.82★
7. Communicates according to child's focus of interest or conversational topic	.77	.65	.80★
8. Expands on the child's communication	.80★	.68	.86★
9. Facilitates the use of (AAC)	.99★	.99★	.99★
10. Uses AAC	.99★	.87★	.94★
11. Adapts and is engaged	.78	.80★	.80★
12. Adjusts to the communicative level of child	.76	1.00★	.80★
Total	.89★	.83★	.87★

Note. Values of .80 and above are marked with an asterisk (★) and are considered to have acceptable reliability.

occasions and had very low means ("Tempts the child to communicate"), ("Imitates the child"), and ("Facilitates the use of AAC").

Internal Consistency

Cronbachs's alpha for the full scale was .85, which is usually considered a good indication of internal consistency for a scale (Gliem & Gliem, 2003). However, three items had item-total correlations below or close to 0.3 ("Imitates the child"), ("Tempts the child to communicate"), and ("Facilitates the use of AAC") (Table IV); the accepted standard is that item-total correlations should be at least 0.5 (Gliem & Gliem, 2003). The three items were therefore removed from the scale and a new reliability analysis was performed, based on the remaining nine statements. The 9-item scale had a Cronbach alpha of .88, a mean of 13.3 and a standard deviation of 3.18. All items had means between .8 and 1.8 and item total-correlations well above .4, which indicates excellent internal consistency. Thus, we decided to use these nine items for Version 3 of the scale (Table V).

Sensitivity to Change

Initial information on the scale's sensitivity to change was assessed by pair-wise comparisons of pre- and post-intervention scores on the RAACS (Version 3) in parents who did and did not participate in the intervention. The RAACS-scores were significantly higher after the intervention for the parents who had participated in the ComAlong course, and were unchanged for those who had not participated (see Table VI).

Discussion

To date, while a wide variety of instruments are available to assess parent–child interaction (Girolametto

et al., 2000; Landry et al., 2006; Mahoney et al., 1986; McConachie et al., 2005; Warren et al., 2010), there have been no tools designed to assess the unique communication patterns observed when a parent interacts with

Table IV. Item-total Statistics for the 12-item Scale (RAACS Version 2).

Parent behavior scale items	Mean item if deleted	Item total correlation	Cronbach's alpha if item deleted
1. Attends to and confirms the child's communication	12.18	.76	.83
2. Adjusts physically to the child	12.06	.58	.84
3. Gives the child space to communicate	12.27	.50	.83
4. Tempts the child to communicate by challenging the child	13.78	.01	.86
5. Imitates the child	13.54	.34	.85
6. Clarifies his or her own communication	12.24	.78	.82
7. Communicates according to the child's focus of interest or communication topic	12.29	.82	.82
8. Expands on the child's communication	12.74	.61	.82
9. Facilitates the use of AAC	13.76	.13	.86
10. Uses AAC	13.03	.45	.85
11. Adapts and is engaged	12.32	.82	.83
12. Adjusts to communicative level of child	12.39	.82	.82

Table V. Item-total Statistics for the 9-item Scale used for RAACS Version 3.

Parent behavior scale items	Mean item if deleted	Item total correlation	Cronbach's alpha if item deleted
1. Attends to and confirms the child's communication	11.65	.76	.86
2. Adjusts physically to the child	11.52	.57	.88
3. Gives the child space to communicate	11.73	.51	.87
4. Clarifies his or her own communication	11.70	.79	.86
5. Communicates according to child's focus of interest or conversational topic	11.76	.81	.86
6. Expands on the child's communication	12.20	.60	.86
7. Uses AAC	12.50	.46	.90
8. Adapts and is engaged	11.79	.82	.87
9. Adjusts to communicative level of child	11.86	.84	.86

Note. This version excludes three statements that appeared in Version 2: "imitates the child", "tempts the child" and "facilitates use of AAC."

Table III. Descriptive Statistics for the 12-item Scale (RAACS Version 2).

Parent behavior scale items	M	SD	n
1. Attends to and confirms the child's communications	1.69	.37	105
2. Adjusts physically to the child	1.81	.29	105
3. Gives the child space to communicate	1.60	.40	105
4. Tempts the child to communicate by challenging the child	.09	.23	105
5. Imitates the child	.33	.39	105
6. Clarifies his or her own communication	1.64	.44	105
7. Communicates according to the child's focus of interest or communication topic	1.58	.45	105
8. Expands on the child's communication	1.14	.53	105
9. Facilitates the use of AAC	.12	.43	105
10. Uses AAC	.84	.78	105
11. Adapts and is engaged	1.56	.50	105
12. Adjusts to communicative level of child	1.49	.50	105

Table VI. Pre- and Post-test RAACS–scores (Version 3) for Participants and Non-participants in ComAlong.

	n	Pre		Post		t	df	Sig
		M	SD	M	SD			
Participants	33	12.56	3.14	14.20	3.07	−4.10	32	.01
Non-participants	6	13.42	2.79	13.37	1.71	.09	5	.93

a child who uses AAC. In the present study we developed and evaluated a scale to assess parent behaviors identified in the AAC research literature as associated with a responsive communicative style. The psychometric evaluation of the 12-item scale (Version 2) showed that 3 items – ("Imitates the child"), ("Tempts the child"), and ("Facilitates the use of AAC") – correlated less than 0.35 with the total scale. These items were removed from the scale, and the final 9-item scale, which showed excellent internal consistency, was named the Responsive Augmentative and Alternative Communication Style scale – RAACS Version 3.

Given that the focus of the scale was on parent communicative style in the context of AAC, we were at first reluctant to remove the items, which have been suggested both theoretically and practically to be important for responsivity and learning to use AAC (Brouwer et al., 2011; Ferm et al., 2011; Iacono, 1999; Jonsson et al., 2011; Pennington et al., 2004; Romski et al., 2010; Thunberg et al., 2009, 2011). We were surprised that these items were so infrequently observed and were found to have low item-total correlation in the present sample. One explanation could be that the items were not distinct enough from other items on the scale. A careful review of the manual made it clear that item 5 ("Imitates child") seems redundant with one of the behaviors described in item 1 ("Attends to and confirms child's communication"), item 4 ("Tempts the child") can be seen as an expansion of item 3 ("Gives child space to communicate"), and item 9 ("Facilitates the use of AAC") has a clear overlap with item 10 ("Uses AAC"), as the only difference in the wording is "facilitates" as opposed to "uses". Another explanation, at least with respect to item 5 ("Imitates the child"), might be that it concerns a parental behavior that is more sensitive to development. The parents of children at earlier communicative stages are encouraged to use imitation of their child's behavior as the main responsive strategy, while parents of independent communicators are guided to focus on the use of expansion, that is, to use speech, symbols, or signs to respond and develop the interaction (Thunberg, Carlstrand, Claesson, & Rensfeldt Flink, 2011). The majority of the children belonged to the later group and, accordingly, the parents were less focused on imitation.

For children with severe disabilities, parent facilitation and modeling of communication and AAC is as important as responsive behaviors, because AAC is often the only possibility for supporting comprehension and independent expression for these children (Drager, 2009). But the fact remains that these behaviors, as defined for this version of the scale, showed weak correlations with the other items on the scale. Future

research and development should address the identification of items that more precisely capture the behaviors of interest and demonstrate a stronger correlation with the other items on the scale.

After training, the two coders showed acceptable inter- and intra-coder reliability. It is yet to be determined if acceptable inter-coder reliability could be reached with less training (i.e., simply reading the coding manual).

The study also provided some preliminary evidence that Version 3 of the scale demonstrates sensitivity to anticipated change. The parents who had participated in ComAlong showed a significant increase in RAACS-scores, while the scores of those parents who did not participate in the course were unchanged. We acknowledge the limitation in validating an instrument without having a "golden standard" or some other measure with which the RAACS can be compared. However, we have developed a scale intended to assess parental communication style. We hypothesized that the parental education program (ComAlong) would, following the intervention, result in an improved and more responsive communication style and modelling of AAC use by the parents. If the RAACS was sensitive to change in parents' communication styles, then those who participated in the intervention should have increased their RAACS-score, while those in the comparison group should not have. The term *style* can refer to both observed behaviors as well as internal beliefs about a situation. We are aware that change in parental communication behavior following an educational intervention may not be the result of actual internalized changes, because the RAACS is an instrument to assess observed communication behaviors, not the parent's internal representations or psychological state of mind. It would be interesting if future research were to focus on components of instrument validity. One way of doing this might be to compare if changes in communicative style, as measured by RAACS, correspond to changes in a parent's description of his or her child.

It should be noted that the present study relies on a relatively small sample, especially with regard to the analysis of sensitivity to change, which was based on only six parents from the group for which no change was expected (i.e., the no-training group). It remains to be seen if similar results will be observed when larger groups of participants are examined. There was also great variability in type of diagnosis, age, and communicative level of the children – all of which makes interpretation more difficult. The attrition rate was high, and at second follow-up, almost half of the original sample was lost. There are several reasons for this loss, including the fact that families were very busy caring for their

children and declined further participation, and that some families took a second course and therefore were not comparable with the original sample. Neither did we have the resources to follow up with all parents during what was a limited time period, because they lived within a wide geographical range.

Despite these challenges, our conclusions are that RAACS (Version 3) meets most of the criteria originally identified for this instrument and, accordingly, is recommended for future use. The scale addresses parent behaviors identified as important in the AAC research literature. The interaction situation was ecologically valid because the video recordings were collected in the homes of the parents, during a play activity of their choice. The activity was perceived as fun for the child and the parent, and the required interaction time was short (10 min or less). The RAACS can be used to assess responsive communication style behaviors as well as parental strategies for using and facilitating AAC with their children; the psychometric properties of the scale were found to be satisfactory. We believe that the work presented here provides evidence that the coding scheme is acceptably comprehensible and can be used reliably without extensive training.

With respect to future research and development of the RAACS scale, additional work to investigate the validity of this instrument for a variety of applications would be of interest (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999). Current research to identify important communication-partner behaviors could be used to inform the items used in future versions of this scale. Finally, although this instrument was developed and validated with parents and their children, we believe that it may hold promise as a clinical and research tool for examining interactions between a variety of adults (e.g., educational staff, care providers) and beginning communicators of a variety of ages. A promising pilot study of this kind has already been done: RAACS was used to evaluate an intervention where physical therapists were trained in the use of responsive strategies and AAC in interactions with their patients with complex communication needs (Tegler, 2011). Future research should continue to investigate the usefulness of this instrument, not only with its original target population (parents and their children who use AAC), but also in relation to the wide range of interactions that take place between communication partners and beginning communicators (Bruce, Trief, & Cascella, 2010; Thirumanickam, Raghavendra, & Olsson, 2011).

Notes

1. In some cases both parents for a child attended training; in other cases only one parent attended.
2. Versions 2 and 3 of the RAACS are available online at http://www.dart-gbg.org/tips_material/bedomningsinstrument.

References

Ainsworth, M. D. S., Blehar, M., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation.* Hillsdale, NJ: Erlbaum.

Aldred, C., Green, J., & Adams, C. (2004). A new social communication intervention for children with autism: Pilot randomized controlled treatment study suggesting effectiveness. *Journal of Child Psychology and Psychiatry*, *45*, 1420–1430.

Almsenius, E., & Karlsson, L. (2008). *EFFEKTIV – Ett instrument for bedomning av kommunikativ stil hos foraldrar till barn med omfattande kommunikationssvarigheter. [EFFECTIVE – an instrument for evaluation of communicative style in parents of children with communicative disability].* Unpublished master's thesis. Gothenburg, Sweden: University of Gothenburg, Institute of Neuroscience and Physiology, Division of Speech and Language Pathology.

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (1999) *Standards for educational and psychological testing.* Washington, DC: American Educational Research Association.

Beijersbergen, M. D., Juffer, F., Bakermans-Kranenburg, M. J., & van Ijzendorn, M. H. (2012). Remaining or becoming secure: Parental sensitive support predicts attachment continuity from infancy to adolescence in a longitudinal adoption study. *Developmental Psychology*, *48*, 1277–1282.

Berglund, E., & Eriksson, M. (2000). Reliability and content validity of a new instrument for assessment of communicative skills and language abilities in young Swedish children. *Logopedics, Phoniatrics and Vocology*, *25*, 176–185.

Beukelman, D. R., & Mirenda, P. (2005). *Augmentative and Alternative Communication: Supporting children and adults with complex communication needs* (3rd ed.). Baltimore, MD: Paul H. Brookes Publishing

Bloom, L. (1993). *The transition from infancy to language: Acquiring the power of expression.* Cambridge: Cambridge University Press.

Branson, D., & Demchak, M. (2009). The use of augmentative and alternative communication methods with infants and toddlers with disabilities: A research review. *Augmentative and Alternative Communication*, *25*, 274–286.

Brooks-Gunn, J., & Lewis, M. (1984). Maternal responsiveness in interactions with handicapped infants. *Child Development*, *55*, 782–793.

Brouwer, C. E., Day, D., Ferm, U., Hougaard, A. R., Rasmussen, G. R., & Thunberg, G. (2011). Treating the actions of children as sensible: Investigating structures in interactions between children with disabilities and their parents. *Journal of Interactional Research in Communication Disorders*, *2*, 153–182.

Bruce, S. M., Trief, E., & Cascella, P. W. (2011). Teachers' and speech-language pathologists' perceptions about a tangible symbols intervention: Efficacy, generalization, and recommendations. *Augmentative and Alternative Communication*, *27*, 172–182.

Calculator, S., & Black, T. (2010). Parents' priorities for AAC and related instruction for their children with Angelman Syndrome. *Augmentative and Alternative Communication*, *26*, 30–40.

Cress, C. (2002). Enhancing children's early augmented behaviors to support symbolic development. In J. Reichle, D. R. Beukelman, & J. C. Light (Eds.), *Exemplary practices for beginning communicators: Implications for AAC* (pp. 219–272). Baltimore, MD: Paul H Brookes Publishing.

Delarosa, E., Horner, S., Eisenberg, C., Ball, L., Renzoni, A. M., & Ryan, S. E. (2012). Family Impact of Assistive Technology Scale: Development of a measurement scale for parents of children with complex communication needs. *Augmentative and Alternative Communication*, *28*, 171–180.

Gliem, J. A., & Gliem, R. R. (2003) Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. Paper presented at 2003 Midwest Research to Practice Conference in Adult, Continuing, and Community Education

Drager, K. (2009). Aided modeling interventions for children with autism spectrum disorders who require AAC. *Perspectives on Augmentative and Alternative Communication*, *18*, 114–120.

Ferm, U. (2006). Using language in social activities at home: A study of interaction between caregivers and children with and without disabilities. *Gothenburg Monographs in Linguistics*, 31. Gothenburg, Sweden: University of Gothenburg, Department of Linguistics.

Ferm, U., Ahlsén, E., & Björck-Åkesson, E. (2005). Conversational topics between a child with complex communication needs and her caregiver at mealtime. *Augmentative and Alternative Communication*, *21*, 19–40.

Ferm, U., Ahlsén, E., & Björck-Åkesson, E. (2012). Patterns of communicative interaction between a child with severe speech and physical impairments and her caregiver during a mealtime activity. *Journal of Intellectual and Developmental Disability*, *37*(1), 27–34.

Ferm, U., Andersson, M., Broberg, M., Liljegren, T., & Thunberg, G. (2011). Parents and course leaders' experiences of the ComAlong augmentative and alternative communication early intervention course. *Disability Studies Quarterly: Mediated Communication*, 31(4). http://dsq-sds.org/article/view/1718/1768

Finke, E. H., & Quinn, E. (2012). Perceptions of communication style and influences on itervention practices for young children with AAC needs. *Augmentative and Alternative Communication*, *28*, 117–126.

Girolametto, L., Sussman, F., & Weitzman, E. (2007). Using case study methods to investigate the effects of interactive intervention for children with autism spectrum disorder. *Journal of Communication Disorders*, *40*, 470–492.

Girolametto, L., Weitzmann, E., & Greenberg, J. (2000). *Teacher interaction and language rating scale*. Canada, Toronto: The Hanen Centre.

Granlund, M., Björck-Åkesson, E., Wilder, J., & Ylvén, R. (2008). AAC interventions for children in a family environment: Implementing evidence in practice. *Augmentative and Alternative Communication*, *24*, 207–219.

Greenspan, S. I., & Wieder, S. (2006). *Infant and early childhood mental health: A comprehensive developmental approach to assessment and intervention*. Washington, DC: American Psychiatric Publishing.

Harwood, K., Warren, W. F., & Yoder, P. (2002). The importance of responsivity in developing contingent exchanges with beginning communicators. In J. Reichle, D. R. Beukelman, & J. C. Light (Eds.), *Exemplary practices for beginning communicators: Implications for AAC* (pp. 59–93). Baltimore, MD: Paul H. Brooks.

Hauser-Cram, P., Warfield, M. E., Shonkoff, J. P., & Krauss, M. W. (2001). Children with disabilities: A longitudinal study of child development and parental well-being. *Monographs of the Society for Research in Child Development* (Serial No. 266), 66(3).

Iacono, T. (1999). Language intervention in early childhood. *International Journal of Disability, Development and Education*, *46*, 383–420.

Jonsson, A., Kristoffersson, L., Ferm, U., & Thunberg, G. (2011). The ComAlong communication boards: Parents' use and experiences of aided language stimulation. *Augmentative and Alternative Communication*, *27*, 103–116.

Karlsson, E., & Melltorp, M. (2006). *Utvärdering av AKKTIV - Tidig intervention till föräldrar som har barn med omfattande kommunikationssvårigheter [Evaluation of AKKtiv – Early intervention for parents of children with severe communication difficulties]*. Unpublished master's thesis. Gothenburg, Sweden: University of Gothenburg, Institute of Neuroscience and Physiology, Division of Speech and Language Pathology.

Kasari, C., Paparella, T., Freeman, S., & Jahromi, L. B. (2008). Language outcome in autism: Randomized comparison of joint attention and play interventions. *Journal of Consulting and Clinical Psychology*, *76*(1), 125–137.

Landry, S. H., Smith, K. E., Miller-Loncar, C. L., & Swank, P. R. (1997). The relation of change in maternal interaction styles to the developing social competence of full-term and preterm children. *Child Development*, *69*, 105–123.

Landry, S. H., Smith, K. E., & Swank, P. R. (2006). Responsive parenting: Establishing foundations for social communication, and independent problem-solving skills. *Developmental Psychology*, *42*, 627–642.

Lennartson, E., & Sörensson, K. (2010). *Föräldrars sätt att kommunicera med sina barn före och efter KomIgång kommunikationskurs [Parents' way of communicating with their children before and after ComAlong communication course]*. Unpublished master's thesis. Gothenburg, Sweden: University of Gothenburg, Institute of Neuroscience and Physiology, Division of Speech and Language Pathology.

Light, J., Collier, B., & Parnes, P. (1985). Communicative interaction between young nonspeaking physically disabled children and their caregivers: Part I – Discourse patterns. *Augmentative and Alternative Communication*, *1*, 74–83.

Mahoney, G., & Perales, F. (2003). Using relationship-focused intervention to enhance the social-emotional functioning of young children with autism spectrum disorders. *Topics in Early Childhood Special Education*, *23*(2), 74–86.

Mahoney, G., Powell, A., & Finger, I. (1986). The maternal behavior rating scale. *Topics in Early Childhood Special Education*, *6*(2), 44–56.

McCollum, J., & Hemmeter, M. L. (1997). Parent and child interaction intervention when children have disabilities. In M. J. Guralnick (Ed.), *The effectiveness of early intervention* (pp. 549–576). Baltimore, MD: Paul H. Brooks.

McConachie, H., Randle, V., Hammal, D., & Le Couteur, A. (2005). A controlled trial of a training course for parents of children with suspected autism spectrum disorder. *Journal of Pediatrics*, *147*, 335–340.

Millar, D. C., Light, J. C., & Schlosser, R. W. (2006). The impact of augmentative and alternative communication intervention on the speech production of individuals with developmental disabilities: A research review. *Journal of Speech, Language and Hearing Research*, *49*, 248–264.

Paul, R. (2007). *Language disorders from infancy through adolescence. Assessment and intervention*. St. Louis, MS: Mosby Elsevier.

Pennington, L., Goldbart, J., & Marshall, J. (2004). Interaction training for conversational partners of children with cerebral palsy: A systematic review. *International Journal of Language and Communication Disorders*, *39*, 151–170.

Pennington, L., & McConachie, H. (1999). Mother-child interaction revisited: Communication with non-speaking physically disabled children. *International Journal of Language and Communication Disorders*, *34*, 391–416.

Pennington, L., Thomson, K., James, P., Martin, L., & McNally, R. (2009). Effects of 'It Takes Two to Talk' – The Hanen program for parents of preschool children with cerebral palsy: Findings from an exploratory study. *Journal of Speech, Language, and Hearing Research*, *52*, 1121–1138.

Pepper, J., & Weitzman, E. (2004). *It takes two to talk*. Toronto: The Hanen Centre.

Pickl, G. (2011). Communication intervention in children with severe disabilities and multilingual backgrounds: Perceptions of pedagogues and parents. *Augmentative and Alternative Communication*, *27*, 229–244.

Preston, D., & Carter, M. (2009). A review of the efficacy of the Picture Exchange Communication System Intervention. *Journal of Autism and Developmental Disorders*, *39*, 1471–1486.

Romski, M., Sevcik, R. A., Adamson, L. B., Cheslock, M., Smith, A., Barker, R. M., & Bakeman, R. (2010). Randomized comparison of augmented and nonaugmented language interventions for toddlers with developmental delays and their parents. *Journal of Speech, Language, and Hearing Research*, *53*, 350–364.

Sameroff, A. J., & Fiese, B. H. (1990). Transactional regulation and early intervention. In S. J. Meisels & J. P. Shonkoff (Eds.), *Handbook of early childhood intervention* (pp. 119–149). New York, NY: Cambridge University Press.

Schlosser, R., & Sigafoos, J. (2006). Augmentative and alternative communication interventions for persons with developmental disabilities: Narrative review of comparative single-subject experimental studies. *Research in Developmental Disabilities*, *27*, 1–29.

Schlosser, R., & Wendt, O. (2008). Effects of augmentative and alternative communication intervention on speech production in children with autism: A systematic review. *American Journal of Speech-Language Pathology*, *17*, 212–230.

Siller, M., & Sigman, M. (2002). The behaviors of parents of children with autism predict the subsequent development of their children's communication. *Journal of Autism and Developmental Disorders*, *32*(2), 77–89.

Simeonsson, R. J., Bjorck-Akesson, E., & Lollar, D. J. (2012). Communication, disability, and the ICF-CY. *Augmentative and Alternative Communication*, *28*, 3–10.

Slonims, V., Cox, A., & McConachie, H. (2006). Analysis of mother-infant interaction in infants with Down syndrome and typically developing infants. *American Journal of Mental Retardation*, *111*, 273–289.

Spiker, D., Boyce, G., & Boyce, L. (2002). Parent-child interactions when young children have disabilities. *International Review of Research in Mental Retardation*, *25*, 35–70.

Tegler, H. (2011). *Användbara strategier för habiliteringspersonal i samtal med AKK: En interventionsstudie av sjukgymnasters kommunikation [Communicative strategies applicable to habilation staff using AAC: An intervention study of the communication of Physical Therapists]*. Unpublished master's thesis. Uppsala, Sweden: University of Uppsala, Institute of Neuroscience, Division of Speech and Language Pathology.

Thunberg, G., Ahlsén, E., & Dahlgren Sandberg, A. (2009). Interaction and use of speech-generating devices in the homes of children with autism spectrum disorders – an analysis of conversational topics. *Journal of Special Education Technology*, *24*(2), 1–16.

Thunberg, G., Ahlsén, E., & Dahlgren Sandberg, A. (2011). Autism, communication and use of a speech-generating device in different environments – a case study. *Journal of Assistive Technologies*, *5*, 181–198.

Thunberg, G., Carlstrand, A., Claesson, B., & Rensfeldt Flink, A. (2011). *KomIgång – en föräldrakurs om kommunikation och kommunikationsstöd: kursbok. [ComAlong – a parental course about communication and augmentative strategies: course book]*. Vänersborg: Habilitering och Hälsa.

Tomasello, M., & Farrar, M. J. (1986). Joint attention and early language. *Child Development*, *57*, 1454–1463.

Thirumanickam, A., Raghavendra, P., & Olsson, C. (2011). Participation and social networks of school-age children with complex communication needs: A descriptive study. *Augmentative and Alternative Communication*, *27*, 195–204.

van der Schuit, M., Segers, E., van Balkom, H., Stoep, J., & Verhoeven, L. (2010). Immersive communication intervention for speaking and non-speaking children with intellectual disabilities. *Augmentative and Alternative Communication*, *26*, 203–220.

van Ijzendoorn, M. H. (1995). Adult attachment representations, parental responsiveness, and infant attachment: A meta-analysis on the predictive validity of the Adult Attachment Interview. *Psychological Bulletin, 117*, 387–403.

van Ijzendoorn, M. H., Rutgers, A. H., Bakermans-Kranenburg, M. J., van Daalen, E., Dietz, C., Buitelaar, J. K., Swinkels, S., Naber, F., Van Engeland, H. (2007). Parental sensitivity and attachment in children with autism spectrum disorder: Comparison with children with mental retardation, with language delays, and with typical development. *Child Development*, *78*, 597–608.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* [M. Cole, V. John-Steiner, S. Scribner, E. Souberman, Eds.]. Cambridge, MA: Harvard University Press.

Warren, S., & Brady, N. (2007). The role of maternal responsivity in the development of children with intellectual disabilities. *Mental Retardation and Developmental Disabilities Research Reviews*, *13*, 330–338.

Warren, S., Brady, N., Sterling, A., Fleming, K., & Marquis, J. (2010). Maternal responsivity predicts language development in young children with fragile X syndrome. *American Journal on Intellectual and Developmental Disabilities*, *115*(1), 54–75.

Wasserman, G. A., Allen, R., & Solomon, C. (1985). At-risk toddlers and their mothers: The special case of physical handicap. *Child Development*, *56*, 73–83.

Woods, J. J., Wilcox, M. J., Friedman, M., & Murch, T. (2011). Collaborative consultation in natural environments; strategies to enhance family-centered supports and services. *Language, Speech and Hearing Services in Schools*, *42*, 379–392.

Yoder, P. J., & Warren, S. F. (1999a). Maternal responsivity mediates the relationship between prelinguistic intentional communication and later language. *Journal of Early Intervention*, *22*, 126–136.

Yoder, P. J., & Warren, S. F. (2002). Effects of prelinguistic milieu teaching and parent responsivity education on dyads involving children with intellectual disabilities. *Journal of Speech, Language, and Hearing Research*, *45*, 1297–1310.