Beyond hearing : social-emotional outcomes following cochlear implantation in young children

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General discussion

The overall aim of this thesis was to expand our current knowledge of the social-emotional well-being of young (1- to 5-year-old) hearing-impaired (HI) children who have received a cochlear implant (CI) before the age of 3 years old. The participants were children with CI and a comparison group of children with NH from all over the Netherlands and the Dutch-speaking part of Belgium. All children were born to hearing parents and had no apparent (additional) disabilities. Various key aspects of social-emotional functioning (i.e., theory of mind, empathy, and moral emotions) were studied by means of a combination of tasks, behavior observations, and parent questionnaires. Children with CI were compared with NH children regarding their level of functioning on each individual aspect of social-emotional development. In addition, relations between various social-emotional skills were examined in each group separately. Moreover, the role of factors that potentially influenced children's social-emotional functioning was studied. These included CI-related variables such as experience with the device and age at implantation, but also language skills and parenting styles.

First, an overview of the main findings from this thesis will be provided in an effort to tie these outcomes together and paint a comprehensive picture of the strengths and weaknesses in the social-emotional functioning of children with CI. Subsequently, these findings will be compared to findings from other studies with children with CI, in order to shed some light on the influence of current trends in the field of cochlear implantation on children's development. Implications for clinical practice are discussed next. The chapter is concluded with some directions for future research.

Main Findings

HI children (without CI) are known to experience social-emotional difficulties. For example, in comparison to NH children, their Theory-of-Mind (ToM) development is delayed, they exhibit elevated levels of behavior problems, and have problems interacting with peers (e.g., Barker et al., 2009; Kouwenberg et al., 2012; Moeller & Schick, 2006; Peterson & Siegal, 2000; Theunissen et al., in press; Van Eldik et al., 2004; Woolfe et al., 2002). The picture that emerged from the various studies included in this thesis is that HI children who have been fitted with a CI were delayed on some, but not all, aspects of social-emotional functioning

compared to NH peers. Children with CI showed no delays regarding aspects of social-emotional functioning that require no or very little language, and which typically develop during infancy in NH children. Additionally, social behavior of children with CI turned out to be on a par with their NH peers. However, those aspects of social-emotional functioning that require more complex reasoning, and which are acquired through communication and socialization, were found to be impaired in children with CI. In sum, an important conclusion that can be drawn from these outcomes is that, at least to some extent, CIs appear to benefit HI children's functioning in other areas than merely the auditory and language domain.

Social-Emotional Functioning of Children with CI

Some social-emotional skills of children with CI were on a par with their NH peers, whereas other skills were less well-developed. Here, these will be discussed in more detail, starting with those aspects of social-emotional functioning that were intact, before turning to those that appear to be impaired in children with CI.

No differences were observed between children with CI and NH children regarding empathy (chapter 3). Empathy denotes the capacity to experience the other person's emotion, and is a key factor in promoting appropriate (pro) social behavior (Baron-Cohen & Wheelwright, 2004; Eisenberg & Miller, 1987; Jolliffe & Farrington, 2006). Parents filled in questionnaires about their children's empathic behavior in everyday situations, towards peers as well as adults. Children's empathic reactions were also observed in an experimental setting, where the experimenter simulated an emotion (happiness, pain/sadness, and anger) and scored the children's responses. Parents as well as experimenters reported similar levels of empathic behavior in both groups of children. Moreover, higher levels of empathy were associated with higher levels of social competence in both groups of children alike.

It should be noted that the empathic behaviors measured in this study were mostly indicative of children's underlying capacity for affective empathy. This component of empathy, reflecting the ability to vicariously experience the other person's emotion (McDonald & Messinger, 2011), is assumed to be inborn and can typically already be observed in infancy (Decety & Meyer, 2008). As the affective part of empathy appears to be hard-wired, we did not expect any delays or impairments to arise in children with CI. Whether children actually understood the emotion and its antecedents, which makes up the cognitive

component of empathy (Baron-Cohen & Wheelwright, 2004; Jolliffe & Farrington, 2006), could not be inferred from the findings of this study. However, we have reason to assume that cognitive empathy will be impaired in children with CI. A study by Wiefferink and colleagues (Wiefferink et al., 2013) on largely the same sample of children demonstrates that the capacity for understanding emotions is impaired in children with CI. Children with CI were less likely than NH children to attribute emotions correctly to a protagonist in a prototypical emotion-evoking situation. Moreover, certain components of ToM understanding are also impaired in children with CI, as will be discussed in more detail later. ToM is assumed to be crucial to the development of cognitive empathy. In fact, Blair (2005, p. 699) claims that "cognitive empathy is effectively Theory of Mind". Together, this could be indicative of corresponding impairments in cognitive empathy in these children, but future studies should confirm this.

Like empathy, the ability to acknowledge that other people's actions are intentional develops at an early age. This capacity for intention understanding is regarded as a component of ToM. Children with a well-developed ToM understand that people's mental states are subjective, and that these mental states govern people's behavior (Wellman, 1990), which is very helpful in making social situations more predictable. Toward the end of their first year of life, typically-developing children understand that other people's pointing gestures toward an object (or event) during social interactions are an attempt to direct their attention to that object. Children will respond to this bid by alternating their gaze between the object and the person who pointed to it, thereby establishing joint attention (Tomasello et al., 2007). Around the same age, typically-developing children start to infer a person's desired goal from their failed attempts to reach this goal (Meltzoff, 1995). Children with CI performed equally well as NH children on tasks measuring these abilities (chapter 4). Because intention understanding typically develops in infancy, observing similar levels of intention understanding in these 1-to-5-year-old children may not necessarily imply that children with CI develop intention understanding along the same timeline as NH children. It may merely mean that they have caught up by this age. Nonetheless, we also observed similar levels of intention understanding in a subsample of children under 30 months of age.

Regarding children's social functioning, parents of children with CI in our studies reported equal levels of social competence and behavior problems compared to parents of NH children (chapters 3 and 5). Also, no differences were

found regarding the extent to which children in each group displayed negative emotions, which was taken as an index of emotion (dys)regulation (chapter 6). It should however be noted that, using largely the same sample of children with CI, Wiefferink and colleagues (2012a) did find a difference between children with CI and NH children on negative emotionality, but only as reported by parents. The study included in the current thesis combined different measures (i.e., an observation task and a parent report) to calculate an overall index for children's negative emotionality, whereas Wiefferink and colleagues examined outcomes on these measures separately.

In sum, some very positive outcomes were noted for children with CI, particularly if we take into account that prior studies consistently indicated higher levels of behavior problems and problematic social functioning for (older) HI children without CI (Barker et al., 2009; Kouwenberg et al., 2012; Theunissen et al., in press; Van Eldik et al., 2004). Notwithstanding these positive outcomes for children with CI, impairments were detected in some areas of social-emotional functioning. Revisiting ToM, children with CI had impaired understanding of two other, more complex components of ToM: desires and false beliefs. Children were asked to predict the behavior of protagonists in short stories, taking into account the protagonists' desires and false beliefs. These tasks were administered in signed or spoken language, and were accompanied by pictures. Understanding of desires and beliefs starts to develop from the age of 2 or 3 years old in typically developing children (Wellman, 1990). The outcomes signify that children with CI find it difficult to predict other people's behavior based on their mental states, particularly when these differ from their own (chapter 4). This is consistent with studies among HI children without CI (cf. Peterson & Siegal, 2000), and also corroborates previous findings among children with CI (Macaulay & Ford, 2006; Peterson, 2004). The current study extends our knowledge by demonstrating that a delay in ToM understanding is already present in children with CI under 5 years old, who have received their implant early (before age 3 years) in comparison to children included in previous studies (who were implanted up till the age of 6 years). On a positive note, our results indicate that children with CI develop an understanding of desires before they start to understand false beliefs. Paired with the finding that intention understanding does not seem to be impaired in these children, this implies a sequence of development which resembles that of the control group of NH children in our study, and of prior studies with typically developing

children (Colonnesi et al., 2008; Wellman & Liu, 2004). This is indicative of a delayed, rather than a qualitatively different development of ToM. Over time, these children will presumably catch up with their NH peers, as is the case for HI children without CI. A longitudinal study by Peterson (2009) demonstrated that the majority of HI children did not pass ToM tasks until the age of 10 years old. Whether children with CI will catch up to their NH peers at an earlier age than has been found for HI children without CI needs to be addressed in future studies.

A well-developed ToM helps children to behave appropriately during social interactions, but a strong moral sense might be just as important. It is people's moral sense which motivates them to do the right thing, and to treat others nicely. Conversely, a lack of morality is associated with antisocial and criminal behavior (Holmqvist, 2008; Mealey, 1995; Menesini & Camodeca, 2008). As with ToM, perspective-taking skills are required in order to judge your behavior through the eyes of others. If the behavior is not up to par or causes harm to someone else, shame or guilt are experienced. If the behavior exceeds expectations, pride is experienced (Barrett, 1995; Lewis et al., 1992; Tracy & Robins, 2004a). Whereas shame and guilt communicate that you feel bad about your transgression and you want to make amends in order to maintain the relationship, pride is a sign of dominance and enhances one's social status within the group (Stearns & Parrott, 2012; Tracy & Robins, 2004a). Moral emotions emerge at a later age than the basic emotions, and are assumed to develop in interaction with the social environment. In other words, at first children are explicitly and implicitly taught by their parents and others in their direct surroundings how to behave, and when they should feel and express moral emotions. Over time, these external evaluations are internalized and children will develop their own moral compass.

Given the communication and ToM difficulties that HI children generally experience, we assumed that it would be difficult for children with CI to learn about moral emotions. As expected, children with CI expressed less shame/guilt than their NH peers following staged emotion-evoking events such as failure on a mastery task or damaging another person's property. In addition, children with CI also showed less signs of pride than NH children when they succeeded on a mastery task (chapter 5). Again, this may suggest a lack of insight into other people's perspectives. Impaired expression of moral emotions, even in the presence of overt feedback on the child's performance by the experimenter,

may reflect lack of a sense of what is generally regarded as reprehensible or admirable by others. Contrary to our expectations, we did not find a negative relation between moral emotions and behavioral problems in either group. This could be explained by the fact that parents in both groups reported quite low levels of behavioral problems in their children. In addition, NH children who displayed more shame/guilt and more pride were reported to be more socially competent, whereas this relation was not found for children with CI. We could hypothesize that at this young age, impaired expression of moral emotions does not damage the social relations of children with CI yet. Parents of children with CI, who were the source of information on their children's social competence, might also be more forgiving regarding their children's social behavior than parents of NH children. Follow-up studies should examine whether moral emotions become more important for the social functioning of children with CI over time.

Underlying Factors

Deafness in itself does not cause social-emotional difficulties. Instead, we hypothesized that difficulties may arise as a result of underlying factors such as language delays or parenting issues. Moreover, a large body of studies has established that CI-related variables such as age at implantation play a substantial role in language development (e.g., Boons et al., 2012a; Ganek et al., 2012; Geers & Nicholas, 2013; Niparko et al., 2010), and we therefore aimed to assess whether this also accounted for inter-individual differences in social-emotional functioning.

A differentiated picture emerged with respect to the language skills of children with CI. On measures of spoken language understanding and production (i.e., Reynell and Schlichting), children with CI scored approximately one standard deviation below the norm of NH children (chapters 3, 5, and 6). However, we also asked parents to report on their children's language skills, and found no differences between children with CI and NH according to this source of information (chapter 6). Two explanations for these seemingly contradictory findings come to mind. The first is that the Reynell and Schlichting tests only measure spoken language skills, whereas parents reported on children's language skills regardless of language mode (i.e., spoken or signed). It could be that language understanding and production skills of children with CI are up to par when they can switch between and combine language modes, but

not solely by means of spoken language. The second explanation might be that parents are a biased source of information regarding their children's language skills. Parents are quite skilled at understanding their toddler's emerging speech, even when no one else can make sense of it. Likewise, parents of children with CI might be able to understand what their child is trying to say even though the words aren't pronounced correctly. Nonetheless, the child might fail when these spoken language skills are tested formally.

Note that while the study in chapter 6 indicates similar language skills in children with CI and NH children according to their parents, Wiefferink and colleagues (Wiefferink et al., 2012a), using the same parent questionnaire, did report delays in language understanding and production for children with CI as compared to their NH peers. A closer inspection of the data from the Wiefferink et al. study revealed that some parents did not fill in the questionnaire on children's language skills. After recalculating the mean ages per group based on complete cases only, children in the NH group turned out to be six months older on average than children in the CI group, which could explain the difference in language skills between the groups.

Language is assumed to play a major role in children's social-emotional development. The mismatch between communication modes of deaf children and their hearing parents and deaf children's language delays are thought to hamper these children's social-emotional development (Moeller, 2007; Moeller & Schick, 2006; Peterson & Siegal, 2000; Vaccari & Marschark, 1997). Yet, in our studies, language turned out not to play a major role in the social-emotional functioning of children with CI. Neither formally measured spoken language skills (Reynell and Schlichting), nor their understanding and production of everyday language (spoken or signed) as reported by parents were related to social-emotional functioning when age was controlled for (chapters 3 through 6). An explanation for the absence of relations between language and social-emotion functioning could be that the language measures employed did not sufficiently tap into specific language domains which are important for social-emotional development. It has been suggested that mental-state talk in particular is associated with emotional functioning (Adrian, Clemente, Villanueva, & Rieffe, 2005; Moeller & Schick, 2006; Ruffman et al., 2002). Important to note in this respect is that although everyday language skills (as reported by parents) were intact, emotion language skills were impaired (chapter 5). Children with CI knew and used less words (regardless of language mode)

related to emotions and mental states than NH children. This could imply that children with CI are competent language users who can handle themselves when it comes to concrete language (i.e., naming objects, telling left from right) in their preferred language mode, but that they are less competent when dealing with abstract language (i.e., mental states, emotions). Peterson and Siegal (2000) stated that parents of HI children without CI find it hard to talk to their children about abstract matters, which may be due to a lack of fluency in sign language (Vaccari & Marschark, 1997). The parents participating in our research arguably experienced similar difficulties when discussing abstract matters with their children with CI, given that the spoken language skills of these children were below average. Although this could offer an explanation for the impaired emotion vocabulary of children with CI, ill-developed emotion language skills did not account for their delays in emotional functioning. In contrast with expectations, emotion language was unrelated to (moral) emotional functioning in both groups of children. Emotion language was, however, positively related to social functioning in the CI group only (chapter 5).

Regarding parenting styles, no differences were observed between parents of children with CI and parents of NH children (chapter 6). Parents in both groups reported to predominantly practice a positive parenting style, which is characterized by responsiveness and sensitivity towards children's needs, and is associated with adaptive social-emotional functioning in NH children (Kawabata et al., 2011; Stack et al., 2010). Moreover, no differences were found between the groups on any of the parenting styles (i.e., positive, negative, and uninvolved). This stands in contrast to prior research, which indicated less positive and more negative (i.e., harsh, punitive) parenting practices among parents of HI children without CI compared to parents of NH children (Knutson et al., 2004; Meadow-Orlans, 1997; Meadow-Orlans & Spencer, 1996).

The effect of parenting styles on children's social-emotional functioning turned out to be equally strong in both groups. Parents who more frequently adopted a negative or uninvolved parenting style had children who experienced more difficulties regulating their negative emotions (i.e., anger and sadness). Positive parenting, on the other hand, was related to more empathic behaviors in children. Yet, this relation was modulated by children's capacity for language understanding. Children with better language abilities may have been more able to express their needs verbally, instead of having to resort to outbursts of sadness or anger. In turn, this could have made it easier for parents to

approach these children in a positive manner. Although we set out to measure the influence of parenting styles on children's social-emotional functioning, the data was collected cross-sectionally, which means relations could very well be the other way around, or - which is most likely - of a reciprocal nature.

In contrast to findings from language studies, age at implantation and duration of implant use (corrected for chronological age) were unrelated to most indices of social-emotional functioning, except for pride (chapter 5). Yet, by no means we want to suggest that early implantation is not important with respect to children's social-emotional development. It should be noted that the range with respect to the age at which children in our sample were implanted was small (i.e., on average at 16 months of age, and before age 3 years). Lack of sufficient variability regarding age at implantation could explain the absence of a relation with social-emotional functioning. Alternatively, we could hypothesize that there is a sensitive period during which children need to be implanted in order to gain optimal outcomes regarding social-emotional functioning. Research suggests that such a window of opportunity exists with regard to language outcomes. Children implanted under the age of 2 years are most likely to achieve age-appropriate language skills (Boons et al., 2012a; Ganek et al., 2012).

Trends in Cochlear Implantation: Past, Present and Future

The field of cochlear implantation is a dynamic one. Not only with respect to the technology involved, but also regarding aspects such as candidacy criteria, preservation of residual hearing, optimal age at implantation, and unilateral versus bilateral implantation. We should therefore also adopt a dynamic stance with respect to studying the social-emotional development of children with CI. It does not suffice to assess social-emotional skills in one cohort of children at one particular point in time. In order to get a broader perspective of the benefits of cochlear implantation for children's social-emotional development, we should also look at the past and the future.

Recently, two theses on the social-emotional development of 9-to-16-year-old HI children (with and without CI) in the Netherlands were completed (Kouwenberg, 2013; Theunissen, 2013). Zooming in on only the children with CI, these studies provide an overview of - with all due respect - the past. Hearing

losses in these children were identified late (i.e., not with the neonatal hearing screening), they were implanted late (i.e., on average at approximately 4 years of age) according to current standards, and with somewhat older technology. The overall picture that emerged from these theses is that children with CI showed less problems regarding their social-emotional functioning than their HI peers without CI. Children with CI showed equal levels of internalizing (i.e., depression, anxiety, somatic complaints) and externalizing problems (i.e., aggression, delinquency, symptoms of behavior disorders) compared to NH peers. HI children without CI showed higher levels of internalizing and externalizing behavior compared to NH children. Children with CI did experience more social difficulties than NH children. They more often felt victimized and experienced lower friendship qualities.

Past and present seem to be somewhat at odds with each other. Although the theses by Kouwenberg (2013) and Theunissen (2013) provide no information on the emotional skills of older children with CI, their studies do indicate some problems in the social domain. Studies included in the current thesis, on the other hand, showed a largely equal level of social development in children with CI or with NH. There are two plausible explanations for this finding. Improvements in technology and earlier implantation could have prevented social problems from arising in the younger sample of children with CI. Alternatively, problems may not be visible in young children with CI, but could appear later on, because social demands increase when children grow older. Only longitudinal studies could resolve this matter.

Recently, the rate of bilateral implantation has been increasing. Currently in the Netherlands, children under 5 years of age by default are implanted bilaterally, preferably receiving both implants simultaneously. To make predictions about future developments in the social-emotional functioning of children with CI, we draw from studies which have examined the benefits of bilateral versus unilateral implantation in other areas of development. Children who underwent bilateral implantation are reported to have better auditory (i.e., lateralization and localization of sounds) and speech recognition skills over children with a unilateral implant. This in turn may improve their ability for incidental learning because it improves their ability to overhear other people's conversations in noisy situations such as classrooms (cf. Boons et al., 2012b). An increase in incidental learning in social situations would provide children with CI with more opportunities to learn social-emotional skills, and could

in turn improve their social-emotional functioning. Of course, future studies comparing social-emotional skills of children who are implanted bilaterally to those of children who are implanted unilaterally should be carried out to confirm this hypothesis.

Implications for Clinical Practice

The finding that better language skills were not associated with better social-emotional functioning has important implications from a clinical perspective. Language development of children with CI in the Netherlands is carefully monitored, and these children receive extensive support in the form of speech therapy following implantation. On the basis of our results, however, we cannot assume that children with CI whose language development is progressing well, will also show a healthy social-emotional development. Therefore, professionals working with children with CI should be made aware that these children, despite having (re)gained a sense of hearing following implantation, and even in the presence of adequately developing language skills, could still present with considerable difficulties in the social-emotional domain.

In order to distribute monetary and time resources most efficiently, interventions should ideally be targeted at those children with CI who are most at risk for developing problems in their social-emotional functioning. Studies included in the theses by Kouwenberg (2013) and Theunissen (2013) have shown that children who are in special versus mainstream education, and who prefer some form of sign language over spoken language are more at risk for developing social-emotional problems. However, we should keep in mind that these children are in special education and rely on sign language for a reason. They are likely to experience difficulties which caused them to be placed in special education, and which prevent them from developing spoken language. Nonetheless, this constitutes important information and professionals should be extra vigilant when working with these children. Belonging to an ethnic minority group could also pose a risk for children's social-emotional development. Parents from minority group might experience difficulties communicating with professionals about the care for and needs of their child with CI, which could stand in the way of the rehabilitation process of these children (cf. Wiefferink, Vermeij, & Uilenburg, 2012b). This thesis has also

revealed that the way parents raise their children (i.e., their parenting style) may either promote or hamper children's social-emotional development. A negative parenting style puts children at risk for emotion dysregulation. Finally, low SES has been associated with problematic social-emotional development in typically developing children (Wadsworth & Achenbach, 2005). Growing up in a low-SES household may therefore also be a risk factor for children with CI.

Given that some impairments in the social-emotional domain were already apparent in children with CI below the age of 5 years in our studies, we could assume that these problems may only grow worse when children grow up and more sophisticated social-emotional behavior is expected of them. Providing professionals who are involved in the rehabilitation of children with CI with an easy and systematic way to monitor progress over time could make an important difference in the lives of these children. This will allow for early detection of delays and, in turn, early intervention if needed. For this reason, the data collected for this research project as well as for the research project with 9-to-16-year-old HI children described in the theses by Kouwenberg (2013) and Theunissen (2013) have been made available to professionals by means of the website www.emotieweb.nl. Professionals who sign up through this website are trained to administer the tasks and receive all materials required to assess the social-emotional functioning of an individual child in their care. Scores on the tasks and questionnaires are entered into the scoring program on the website and compared to norm scores of NH children as well as to norm scores of HI children (with CI), which were calculated based on the scores of the children who took part in these research projects.

Results from the studies in this thesis pinpoint the areas which are most likely to be problematic for individual children with CI, and at which interventions could be targeted. Impairments were predominantly found in the emotional functioning of children with CI, not in their social functioning. However, this does not preclude social difficulties from arising later on. Problems in the emotional domain may not only become more apparent over time, but these may also cross over into the social domain. In children this young, social skills are still very much in development and may currently be judged as sufficient by adults. Yet, when children grow older, interactions with peers become more important and peers are bound to be less forgiving than parents towards social behavior that deviates from the norm. As discussed previously, Kouwenberg (2013) found that older children with CI more often than NH

children experienced social difficulties. Improving social skills of children with CI by means of an intervention may prove to be quite difficult. How do you teach children to improve their social relationships? Instead, interventions could better be targeted at enhancing children's underlying emotional competence in order to keep their social skills up to par over time.

Making children aware of other people's perspectives, their drives and inner thoughts, helps them to make sense of other people's behavior, and to adjust their own behavior accordingly. Parents are to play a critical role in this respect. They may be advised to more overtly teach their children with CI social-emotional skills. Picture-book reading with extra attention for the story characters' emotions and motives behind behavior could be helpful (Adrian et al., 2005; Ruffman et al., 2002). Another approach could be for parents to explain their own behavior and emotions during daily activities with their children, or those of other people with whom the child interacts. Teaching children schemas, prototypical ways to behave in certain situations, could also improve their understanding of appropriate social behavior. For example, in the case of their child having a birthday party, parents could tell their children beforehand that they are expected to say thank you and smile when they are given a present, even when they do not particularly like the present, because it is the polite thing to do and that way they will avoid hurting the feelings of the person giving them the present.

While parents should be encouraged to be actively involved in their children's social-emotional development, they should at the same time avoid being too intrusive or directive during interactions with their children. This has been reported to occur among parents of HI children (cf. Spencer & Meadow-Orlans, 1996) and could actually hamper children's development. Instead, parents should be encouraged to allow their child to initiate interactions and to be responsive to the child's interests, thereby creating reciprocity in interactions. Several programs have been developed to help parents become responsive communication partners. One of these is the comprehensive Hanen Program. This program uses video feedback, role play and group discussion to teach parents to allow their children to take the lead in communication attempts, and to respond appropriately to these attempts. An adaptation of the Hanen Program tailored to the specific needs of HI children helped parents to be less controlling and more responsive during communication with their young children with CI (Harrigan & Nikolopoulos, 2002).

Programs like the Hanen Program are ultimately aimed at improving children's communication skills through the empowerment of parents. Nonetheless, these programs could indirectly also benefit children's social-emotional development, because parent-child communication provides a platform for learning social-emotional skills. There are, however, other programs which are specifically aimed at improving children's social-emotional skills. A well-known example is the PATHS (Promoting Alternative Thinking Strategies) Curriculum. This school-based prevention program teaches children a better understanding of emotions and how to regulate emotions, as well as problem-solving skills (Greenberg, Kusche, Cook, & Quamma, 1995). The downside to this program is that it runs at schools, which first of all means that the school has to be willing to employ this program, and second, delays in social-emotional development may have already started to develop before children first go to school.

Directions for Future Research

Several directions for future research stemmed from the current research project, and were alluded to briefly throughout the discussion. The most important ones are outlined here. First, there is a need for longitudinal studies concerning the social-emotional development of children with CI in order to, for example, make causal inferences regarding the relations between emotional and social functioning, or between parenting practices and child development. The children who participated in this research project have in fact been retested multiple times with a one-year interval, so the first steps toward this longitudinal approach have already been taken. Following the same group of children for a number of years will also provide us with the opportunity to see whether children with CI who have been implanted relatively early will eventually catch up with their NH peers regarding those aspects of emotional functioning they were currently found to fall behind on.

Second, the finding that children's language abilities were largely unrelated to their social-emotional functioning means the search is on to identify which variables are causing the delays in emotional functioning in children with CI. The actual content and process of communication between parents and their children with CI seems a likely candidate in this respect.

Future studies should employ ecologically valid ways of assessing parent-child communication in order to observe exchanges of mental-state language, but also parental sensitivity and responsiveness during interactions.

Third, because children with CI are known to often still experience language delays (cf. Ganek et al., 2012), it is difficult to disentangle social-emotional difficulties from language difficulties. Children with CI might have been prevented from showing their true potential because verbal requirements of the tasks designed to measure their social-emotional skills were too high, even though efforts were made to keep these as low as possible. Alternatively, language might be a prerequisite of social-emotional skills, meaning that the delays in emotional functioning that were found are an accurate reflection of their capacities. Some preliminary evidence that the latter is the case stems from a study with preverbal HI infants. Meristo and colleagues (2012) used eye tracking as a means to assess NH and HI infants' belief understanding. Results suggest that even in infancy, HI children have less of an understanding of the relation between beliefs and behavior than NH children. This study included a small sample of only 10 HI children, half of whom had a CI. Replication of this study with a larger sample is called for.

Fourth, future studies should try to identify child or family factors that increase the risk of a delayed social-emotional development in children with CI. For example, the role of SES or ethnicity needs to be examined, as well as the influence of being implanted bilaterally as opposed to unilaterally. A related and final point that needs to be addressed concerns the heterogeneity of the population of children with CI, and its dynamic nature. Although we aimed to draw conclusions about the current status quo of young children with CI in the Netherlands, there is of course no such thing as 'the average child'. In this population in particular, many children present with other difficulties besides their hearing impairment, for example an autism spectrum disorder. The extent to which children benefit from their CI also differs considerably from one child to the next. Children with additional disabilities, with deaf parents, or who were implanted beyond 3 years of age were excluded from the study. This enabled us to draw conclusions about the unique effect of a CI on children's social-development. Yet, it makes it harder to generalize these findings to those children with CI who did not fit our inclusion criteria.

The research presented throughout this thesis is a first attempt to shed light on distinct aspects of the social-emotional development of young children

with CI. Although clearly a lot remains to be examined yet, this research provides important new insights into these children's social-emotional development following cochlear implantation.