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

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Summary

Each year between 150 and 200 children in the Netherlands are born with a hearing loss (Korver, 2010). In Western countries nowadays, a large proportion of children with a severe to profound degree of hearing loss receives a cochlear implant (CI) (De Raeve & Lichtert, 2011; Hyde & Power, 2006). This device converts sounds to electrical signals which are transmitted to the auditory nerve. These signals are perceived by the brain as sounds. Completely deaf people are able to hear with a CI, although not to the extent of people without hearing loss.

Since the implementation of cochlear implantation as a remedy for hearing loss, research has been conducted to assess its outcomes. To date, most of this research was primarily focused on the consequences of cochlear implementation for sound perception and speech and language acquisition. A large number of studies has demonstrated that cochlear implantation leads to improvements in these areas, particularly for children who have been implanted before the age of 2 years old (Boons et al., 2012a; Connor et al., 2006; De Raeve, 2010; Ganek et al., 2012; Niparko et al., 2010). Up till now, not much attention has been paid to the consequences of cochlear implantation on other areas of development, such as the social-emotional development, even though it is well known that children with hearing impairments who do not have a CI experience social-emotional difficulties to a greater extent than children without hearing impairments (Barker et al., 2009; Kouwenberg et al., 2012; Theunissen et al., 2014; Van Eldik et al., 2004; Wolters et al., 2011). The main question that underlies this thesis is whether the social-emotional development of young children with a CI (aged 1 to 5 years old) is comparable to that of hearing children, and which factors influence this development.

Chapter 1 provides some background information concerning the development of children with hearing impairments and the influence of a CI on this development. Subsequently, social-emotional development is explained from a functionalist perspective. This perspective entails that emotions function to make ourselves as well as other people in our surroundings aware of our goals, desires, needs, and so on (Keltner & Haidt, 1999; Parkinson, 1996; Scherer, 2000). From this perspective it is explained that, as they grow older, children become increasingly able to recognize and regulate their own emotions, and to recognize other people's emotions and respond to these appropriately

(Denham et al., 2003; Pons et al., 2004). Next, an overview is provided of prior research, which indicates that social-emotional development of children with hearing loss is often impaired. Two factors which could affect this development are referred to: parenting style and communication. Lastly, the heterogeneity of the population of children with hearing loss is being considered, and the goals and research questions of this thesis are described.

Chapter 2 concerns the development of a parent-report questionnaire to measure empathy in young children: the EmQue. Empathy plays an important role in social interactions with other people. It helps to understand what someone else is feeling and to respond appropriately, for example by comforting or helping the other person (Decety & Jackson, 2004; Hoffman, 1987). The parent-report questionnaire was developed with the aim to assess three different levels of empathy, as described by Hoffman (1987): emotional contagion, attention to others' feelings, and prosocial behavior. The results show that this three-factor structure is present in the questionnaire. Moreover, the questionnaire turns out to be valid. In conclusion, the EmQue is a useful instrument to measure empathy in young children.

The EmQue is employed in the study described in ***Chapter 3*** to assess empathy in hearing children and children with CI, and to examine whether empathy is important for social competence in both groups of children. In addition, empathic reactions of children were observed in response to emotions that were simulated by the experimenter. As expected based on the literature (e.g., Eisenberg et al., 2006), empathy was associated with social competence in hearing children. This relation was also found for children with CI. In addition, the ability to acknowledge other people's emotions was also important for social competence in children with CI, whereas this was not the case for hearing children.

A very positive outcome was that children with CI did not show a delay compared to their hearing peers concerning social competence or empathy. It should be noted however, that the indices used to measure empathy in this study predominantly assessed whether children were affected by another person's emotion (affective empathy), and to a lesser extent whether they could understand the other person's emotion (cognitive empathy). This latter aspect of empathy is related to Theory of Mind (ToM) (Blair, 2005), which develops less well in children with hearing loss (Peterson & Siegal, 2000).

Comparing ToM skills in children with CI and hearing children is the focus of ***Chapter 4***. A large number of studies among children with hearing loss without CI has unequivocally demonstrated that ToM is delayed in this population (Peterson, 2009; Peterson & Siegal, 2000; Russell et al., 1998; Terwogt & Rieffe, 2004; Woolfe, Want, & Siegal, 2002). Children with hearing loss are less able than hearing children to taken another person's perspective. They experience difficulties understanding that another person's behavior is motivated by that person's intentions, desires and beliefs, and that these are not necessarily in accordance with their own intentions, desires or beliefs. Findings among children with CI were less consistent and the focus of prior studies was mainly on one aspect of ToM: whether children with CI were able to understand that someone else may act on the basis of a belief that they know to be incorrect (false belief). In the study described in this chapter, the other important aspects of ToM are also being examined.

The results show that children with CI were as able as hearing children to understand other people's intentions. They were however less able to predict other people's behavior based on their desires (which were incongruent with the participants' desires), or based on their false beliefs. Even when children with insufficient language skills were excluded, a difference between children with CI and their hearing peers could still be observed. Language skills were not related to ToM skills in children with CI, whereas they were in hearing children. Language skills assessed during this study were of a general nature, while research among hearing children and children with hearing loss without CI demonstrated that particularly mental-state language is important for ToM development (Moeller & Schick, 2006; Ruffman, Slade, & Crowe, 2002). It is feasible that a imbalance exists between general language skills and mental-state language skills in children with CI.

The study in ***Chapter 5*** examines the extent to which moral emotions have developed in children with CI as compared to hearing children, and whether there is a relation with social functioning. Moral emotions such as guilt, shame and pride are evoked when people evaluate their own behavior against the prevailing norms and values (Eisenberg, 2000; Tangney, Stuewig, & Mashek, 2007). This ability for self evaluation implies a certain level of ToM skills, considering that one has to be able to see oneself through other people's eyes.

As expected based on the ToM delays that were observed in children with CI, these children also expressed moral emotions to a lesser degree than hearing children in response to failing or succeeding a task. Previous research among hearing children and adults established a relation between moral emotions and social functioning. Moral emotions motivate people to adhere to prevailing norms and values, whereas a lack of moral emotions is associated with antisocial behavior and even psychopathy (Barrett, 1995; Holmqvist, 2008; Mealey, 1995; Menesini & Camodeca, 2008; Olthof, 2012; Stearns & Parrott, 2012). Findings from the study described in this chapter showed that in hearing children moral emotions were related to more positive social behavior, but not to less negative behavior. In children with CI no relation between moral emotions and social functioning was found at all. At this young age, children with CI showed equal levels of social functioning as their hearing peers, even though there moral compass seemed to be less well developed.

Parents are the focus of ***Chapter 6***, in which the influence of parenting style on children's social-emotional functioning is being examined. The mostly hearing parents of children with CI are confronted with hard decisions and stressful situations, such as the decision to opt for a CI, communication difficulties, and extra care and counseling for their child (Hyde, Punch, & Komesaroff, 2010; Sach & Whynes, 2005; Zaidman-Zait, 2008). This could negatively affect the way parents raise their children with CI. Research among hearing children and their parents demonstrated that a negative parenting style, in which parents are strict and not very responsive to their children's needs, can have negative consequences for children's social-emotional development. This also applies to an uninvolved parenting style, in which children are ignored and receive inconsistent responses. A positive parenting style on the other hand, in which parents support and encourage their children, is related to a better social-emotional development (Kawabata, Alink, Tseng, Van Ijzendoorn, & Crick, 2011; Newland & Crnic, 2011; Stack, Serbin, Enns, Ruttle, & Barrieau, 2010; Van Aken et al., 2007).

Prior studies among parents of children with hearing loss without CI showed that they more often employ a negative parenting style and less often a positive parenting style in comparison to parents of hearing children (Knutson, Johnson, & Sullivan, 2004; Meadow-Orlans, 1997; Meadow-Orlans & Spencer, 1996). From the study described in this chapter it became clear that this is not

the case for parents of children with CI. No differences were found concerning parenting style between parents of hearing children and parents of children with CI. In both groups of children a negative or uninvolved parenting style was related to more display of negative emotions. A positive parenting style was however not directly related to better social-emotional functioning in children. This relation seems to be mediated by children's language skills; children with better language skills display more positive behavior (in this case empathy) and might therefore be approached in a more positive way by their parents.

In the concluding ***Chapter 7*** the main outcomes of the studies included in this thesis are outlined to paint a picture of the strengths and weaknesses in the social-emotional development of young children with CI. Based on these studies it can be concluded that a CI does not only lead to improvements in the auditory and language domains but also, to a certain extent, in the social-emotional domain. It turns out that children with CI do not fall behind hearing children concerning their social functioning, whereas research among (older) children with hearing loss without CI does point to social difficulties (Barker et al., 2009; Kouwenberg et al., 2012; Theunissen et al., in press; Van Eldik et al., 2004). Compared to hearing children, children with CI did exhibit delays on some aspects of social-emotional development that are learned by means of communication and socialization, such as ToM and moral emotions. However, language levels did not play a major role in these delays. Implications of these outcomes for clinical practice are discussed and recommendations for future research are offered.