Children With Cochlear Implants and Their Parents: Relations Between Parenting Style and Children's Social-Emotional Functioning

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ABSTRACT

Objectives Parenting a child who has a severe or profound hearing loss (HL) can be challenging and at times stressful, and might cause parents to employ more adverse parenting styles compared with parents of hearing children. Parenting styles are known to impact children's social-emotional development. Children with a severe to profound HL may be more reliant on their parents in terms of their social-emotional development when compared with their hearing peers who typically have greater opportunities to interact with and learn from others outside their family environment. Identifying the impact which parenting styles pertain on the social-emotional development of children who have cochlear implants (CI) could help advance these children's well-being. Therefore, the authors compared parenting styles of parents with hearing children and of parents with children who have a CI, and examined the relations between parenting styles and two key aspects of children's social-emotional functioning: emotion regulation and empathy. **Design** Ninety-two hearing parents and their children (aged 1 to 5 years old), who were either hearing (n = 46) or had a CI (n = 46), participated in this cross-sectional study. Parents completed questionnaires concerning their parenting styles (i.e., positive, negative and uninvolved), and regarding the extent to which their children expressed negative emotions (i.e., anger and sadness) and empathy. Furthermore, an emotion-regulation task measuring negative emotionality was administered to the children. **Results** No differences in reported parenting styles were observed between parents of hearing children and parents of children with a CI. Additionally, negative and uninvolved parenting styles were related to higher levels of negative emotionality in both groups of children. No relation was found between positive parenting and children's social-

emotional functioning. Hearing status did not moderate these relationships. Language mediated the relationship between parenting styles and children's social-emotional functioning. **Conclusions** Children's hearing status did not impact parenting styles. This may be a result of the support that parents of children with a CI receive during their enrollment in the rehabilitation program preceding and after implantation. Rehabilitation programs should dedicate more attention to informing parents about the impact of parenting behaviors on children's social-emotional functioning. Offering parenting courses as part of the program could promote children's well-being. Future longitudinal research should address the directionality of the relations between parenting styles and children's social-emotional functioning.

INTRODUCTION

Currently, most children with a severe to profound hearing loss (HL) in the Western world receive a cochlear implant (CI) (Fortnum et al. 2002; Preisler et al. 2002; Johnston 2004; Hyde & Power 2006; Bradham & Jones 2008; De Raeve & Lichtert 2011). This device electrically stimulates the auditory nerve, bypassing the damaged part of the ear. The positive effects of this technology are undisputable. Numerous studies have shown that cochlear implantation improves auditory and language skills in the majority of children with a severe to profound HL (Nikolopoulos et al. 1999; Svirsky et al. 2000; De Raeve 2010; Boons et al. 2012; Ganek et al. 2012).

In comparison, few studies have been dedicated to examining children's social-emotional development after cochlear implantation. There are two major reasons why we should examine the social-emotional development of children with a CI. First, research in the hearing population has demonstrated that attaining social-emotional competence is critically important for children to successfully engage in social relationships, which in turn is predictive of their mental health at later ages, but also of their academic achievement (cf. Denham et al. 2003; Rubin et al. 2006). Second, a recent review of studies conducted among children with moderate to profound HL convincingly showed that these children experience social-emotional difficulties more often than hearing children (for an overview, see Theunissen et al. 2014). Although a CI enables speech perception to a certain extent in children with a severe to profound HL, it does not restore normal hearing. This implies that children with a CI could still be at risk for experiencing social-emotional difficulties.

In general, the few social-emotional studies that have been carried out thus far among children with a CI indicate that quality of life increases and that symptoms of psychopathology (e.g., anxiety, depression, behavior problems) and social problems (e.g., difficulties communicating with hearing others, withdrawn behavior, difficulties making

friends) are reduced substantially (Nicholas & Geers 2003; Bat-Chava et al. 2005; Huttunen et al. 2009; Sahli et al. 2009; Schorr et al. 2009; Huttunen & Valimaa 2010; Huber & Kipman 2011; Theunissen et al. 2012; Theunissen et al. 2015). Notwithstanding, the social and emotional development of young children with a CI is often not on par with their hearing peers. For example, young children with a CI have repeatedly been found to exhibit impairments on verbal as well as nonverbal tasks of emotion understanding and theory of mind (e.g., grouping faces together based on emotion expression, predicting a protagonist's behavior based on his false belief) (Peterson 2004; Wang et al. 2011; Ketelaar et al. 2012; Most & Michaelis 2012; Wiefferink et al. 2012; Ketelaar et al. 2013; Wiefferink et al. 2013; Sundqvist et al. 2014).

In this study, two key aspects of social-emotional functioning in children with a CI are examined: emotion regulation and empathy. Emotion regulation can be defined as the ability to control your emotions in order to comply with the rules of society (Denham et al. 2003; Zeman et al. 2006; Morris et al. 2007; Rieffe 2012). The capacity to regulate emotions is not innate. Young children bluntly act out the emotions they are experiencing; they are not yet able to control their level of arousal and corresponding emotion expression. Expressing negative emotions in particular is seen as less acceptable by older children than by younger children (Shipman et al. 2003). Whereas frequent displays of negative emotions are quite common among younger children, continued high levels of negative emotionality are associated with internalizing (e.g., depression) as well as externalizing (e.g., aggression) problem behaviors (see Shipman et al. 2003 for an overview). In contrast, children who show low levels of negative emotionality, i.e., children who are able to regulate their negative emotions, are judged to be more socially competent (Eisenberg et al. 2001; Eisenberg et al. 2003; Zeman et al. 2006; Wiefferink et al. 2012).

Whereas emotion regulation refers to controlling the own emotions, empathy is a response to other people's emotions. Empathy denotes the ability to acknowledge and be affected by emotions of others. It motivates us to respond to those in distress, for example by offering consolation or support (Rieffe et al. 2010; McDonald & Messinger 2011). Empathy has been referred to as the 'social glue' in relationships, and is considered to be an important predictor of children's social functioning (Eisenberg & Miller 1987; Baron-Cohen & Wheelwright 2004; Jolliffe & Farrington 2006; Ketelaar et al. 2013). Children who show low levels of empathy are more likely to show aggressive and antisocial behavior (Miller & Eisenberg 1988; Jolliffe & Farrington 2006). Together, emotion regulation and empathy provide insight into children's ability to deal with their own and with other people's emotions, which are two important aspects of social-emotional functioning.

Merely stating group differences regarding social-emotional functioning between children with a CI and their hearing peers does not suffice. In order to be able to promote these children's well-being we first need to identify factors that influence their social-emotional development. In line with Bronfenbrenner's (1979) social-ecological model, we propose that a child's social-emotional development is not only affected by intrapersonal factors such as temperament or physical characteristics (e.g., hearing status), but also by interpersonal factors such as family, neighborhood, and school. Children learn to appropriately express and regulate their emotions through a socialization process. For example, they watch role models deal with their respective emotions and they receive feedback and instructions regarding their own social-emotional behavior. As young children spend most of their time with their parents, parents in particular play an important role in the socialization and development of young hearing children (Lieb et al. 2000; Amato & Fowler 2002; Morris et al. 2007). Therefore, this study aims to examine the extent to which parental

child rearing, as expressed in their parenting style, is related to aspects of social-emotional functioning in young children with a CI, when compared with their hearing peers.

Parenting a Child with Hearing Loss

Even more than parents of hearing children, parents of children with a severe to profound HL play a crucial role in the development of their children. Having a HL in a predominantly hearing world can cause social isolation (Most 2007; Most et al. 2012) because these children are more likely to encounter difficulties interacting with their hearing peers or siblings. Children with a severe to profound HL miss out on many social experiences with peers that are easily accessible to hearing children, which is a disadvantage for the possibility of 'incidental learning', i.e., learning by observing or overhearing others (Rieffe et al. 2015). Because interactions with peers are likely to be more difficult and less frequent, parents will be an important source of information for these children (Vaccari & Marschark 1997). Compared with hearing children, their development will more heavily rely on direct instructions and feedback - in the preschool years mainly offered by parents - than on incidental learning.

Yet, most parents who are told that their child has a severe or profound HL are facing an unfamiliar situation, taking into consideration that over 90% of these children are born to hearing parents (Mitchell & Karchmer 2004). Hearing parents of children with a severe to profound HL encounter more challenges and often experience more communication- and health-related parenting stress than hearing parents of hearing children (Quittner et al. 2010). Parental stress, in turn, has been found to have a negative effect on the social-emotional development of children with moderate to profound HL (Hintermair 2006). Shortly after they have learned about their child's HL, parents have to make decisions that may exert life-long consequences on their child. If their child has a severe or profound HL, one of the major

decisions parents need to make is if and when their child should receive a CI, which can be stressful (Hyde et al. 2010). Once parents have decided to proceed with cochlear implantation, they will likely encounter another emotional and stressful period after the implantation (Zaidman-Zait 2008). Some parents may feel uncertain about the needs and future of their child. For example, whether their child should be addressed in sign language or spoken language, and whether their child should attend mainstream or special education. Furthermore, parents find it difficult to meet all of the demands of the intensive rehabilitation process necessary for children with CIs, while also trying to run a household and/or have a career (Sach & Whynes 2005; Zaidman-Zait 2008). This adds to parents' stress levels and could negatively affect the way they interact with their children.

In addition, many hearing parents experience difficulties communicating with their child who has a profound or severe HL. Several studies have shown that parent-child interactions occur less frequently and/or extensively among hearing-HL dyads than among hearing-hearing dyads (Prezbindowski et al. 1998; Barker et al. 2009; Gale & Schick 2009). Discussing abstract topics, such as emotions, is particularly difficult for hearing parents of children with a severe to profound HL (Vaccari & Marschark 1997), and could lead to social-emotional difficulties in these children (Peterson & Siegal 2000; Moeller & Schick 2006). Cochlear implantation could potentially reduce these communication problems, because it makes spoken language much more attainable to children with HL in the severe to profound range (Niparko et al. 2010; Ganek et al. 2012). It should be noted, however, that a CI does not ensure optimal spoken language development right away, if at all. Nor does it make up for the fact that these children were auditory-deprived before the implantation took place. Language development often is delayed in these children (Ganek et al. 2012) and many hearing parents of implanted children continue to report communication difficulties (Zaidman-Zait 2008). Given these communication difficulties and heightened stress levels in parents, it is important

to examine the child-rearing practices of parents who have children with a CI, and to study its relation with children's social-emotional functioning.

Parenting Styles Among Parents of Hearing Children

Parenting styles refer to a set of parenting practices and strategies that parents employ during child-rearing. In a meta-analytic review by Kawabata and colleagues (2011), three major styles of parenting were identified: positive, negative, and uninvolved parenting. A positive parenting style is characterized by sensitivity, warmth and responsiveness. Parents who employ this parenting style are sensitive and responsive to their child's needs, interact in positive and meaningful ways with their children, praise their children's good behavior, and will set clear standards while granting their children autonomy (Kawabata et al. 2011). A positive parenting style has been found to be related to adaptive social-emotional functioning in hearing children (Stack et al. 2010; Kawabata et al. 2011).

Parents who employ a negative parenting style usually set strict rules for their children. These parents have a tendency to use punitive disciplining, without allowing much room for discussion (Kawabata et al. 2011). A negative parenting style is found to hamper a healthy social-emotional development in hearing children (Stack et al. 2010; Kawabata et al. 2011; Newland & Crnic 2011).

The third parenting style that we distinguish is the so-called uninvolved parenting style, which can involve ignoring or disregarding the child and showing inconsistent parental behaviors, causing unpredictability for the child. Uninvolved parenting has been related to higher levels of aggressive behavior in hearing children (Van Aken et al. 2007; Kawabata et al. 2011).

Parenting Styles Among Parents of Children with Hearing Loss

There is a paucity of studies concerning the parenting practices of parents who have a child with HL. Moreover, none of the existing studies has examined parenting in relation to social-emotional outcomes in children with HL.

Past studies by Meadow-Orlans and colleagues suggest less sensitivity and responsiveness among mothers of 1-year-old children with a severe to profound HL (without a CI) compared with mothers of hearing children (Meadow-Orlans & Spencer 1996; Meadow-Orlans 1997). Yet, a study on the related subject of maternal emotional availability (which subsumes sensitivity, among other things) revealed no differences between parents of 1-year-old children with a mild to profound HL and parents of hearing children (Pressman et al. 1998). In sum, it is as yet unclear whether parents of children with HL less often practice positive parenting than parents of hearing children. Parents of children with a severe to profound HL (without a CI) are reported to show more of a tendency towards using physical discipline (Knutson et al. 2004), which suggests that they are more likely to employ a negative parenting style than parents of hearing children. To our knowledge, the prevalence of uninvolved parenting among parents of children with HL has not yet been examined.

Currently, the majority of children with a severe to profound HL receives a CI (Fortnum et al. 2002; Preisler et al. 2002; Johnston 2004; Hyde & Power 2006; Bradham & Jones 2008; De Raeve & Lichtert 2011). Knowledge concerning the parenting styles practiced by parents of children with a CI is largely lacking, except for one study by Quittner and colleagues (2013). They found that mothers of children with a CI were less sensitive compared with mothers of hearing children. In addition, parenting styles might show a different relation to social-emotional development in children with a CI than in hearing children. Although no studies on the interrelations between parenting and the social-emotional development of children with a CI are available, the Quittner et al. (2013) study does point in this direction. In this study, maternal sensitivity had as much of an effect on language

development of children with a CI as did age at implantation. This suggests that parenting styles might even have a stronger influence on the development of children with a CI compared with their hearing peers.

Current Study

The current study aims to answer three research questions: 1) do parenting styles of hearing parents differ according to their young children's hearing status (hearing versus CI) and preferred communication mode (spoken versus signed language)?, 2) does children's hearing status (hearing versus CI) moderate the relationship between parenting styles and children's social-emotional functioning, and 3) do children's language skills mediate the relationship between parenting styles and children's social-emotional functioning?

The literature regarding parenting styles practiced by parents of children with a severe to profound HL without a CI is inconclusive (Meadow-Orlans & Spencer 1996; Meadow-Orlans 1997; Pressman et al. 1998; Knutson et al. 2004). Only one study thus far examined an aspect of positive parenting among parents of children with a CI (Quittner et al. 2013). In this study, mothers of children with a CI were less sensitive towards their children than were mothers of hearing children. Based on this study, we expect parents of children with a CI to exhibit lower levels of positive parenting compared with parents of hearing children, but we did not formulate an expectation concerning negative parenting practices. Because parenting a child with a CI is demanding for parents, requiring strong and positive involvement, we expect that parents of children with a CI will report involved parenting equal to, or more than parents of hearing children do. Additionally, we examine whether parenting styles differ according to communication mode within the CI group. Although no literature is available, we assume that having a shared mode of communication (i.e., spoken language) helps parents to understand and be responsive to their children's needs, and not to become frustrated

because of communication difficulties. Therefore, we expect that children with a CI who communicate in spoken language will evoke more positive and less negative parenting behaviors in their parents compared with children with a CI who rely on some form of signed language.

Links have been established between parenting and emotion-regulation skills (e.g., Eisenberg et al. 2003; Zeman et al. 2006; Morris et al. 2007) and between parenting and empathy in hearing children (e.g., Valiente et al. 2004; Cornell & Frick 2007). To our knowledge, no studies have been conducted thus far examining these links in children with a HL. Parents may exert a stronger influence on the lives of children with a CI as compared to hearing children. Consequently, we expect that hearing status will moderate the relations between parenting styles and social-emotional functioning. That is, we expect stronger relations between parenting styles and children's social-emotional functioning in children with a CI than in hearing children.

Language and communication problems in children with a severe to profound HL are often considered to be a main cause of these children's social-emotional difficulties (Vaccari & Marschark 1997; Peterson & Siegal 2000; Moeller & Schick 2006). Additionally, many parents of children with a CI still experience difficulties communicating with their child (Zaidman-Zait 2008), which might have a negative effect on their parenting styles. We will examine whether the relationship between parenting styles and children's social-emotional functioning is mediated by children's language proficiency. We hypothesize that parenting styles in children with a CI are compromised because of these children's language problems, and that these language problems ultimately explain children's social-emotional functioning.

MATERIALS AND METHODS

Participants

The total sample participating in this study consisted of 92 children aged 1 to 5 years old: 46 children with a CI and 46 hearing children. The samples were matched on age, sex, and socio-economic status (SES; based on maternal education and net household income). Additionally, gross and fine motor skills were assessed using the Dutch version of the Child Development Inventory (CDI; Ireton & Glascoe 1995). As IQ cannot be reliably measured in very young children, motor skills were taken as an indication of cognitive development (cf. Piek, Dawson, Smith & Gasson, 2008) on which we could compare the samples. After removing five items referring to balance - because children with a HL (with or without a CI) are known to frequently have problems with their organ of balance (Gheysen et al. 2008) - from the gross motor scale, no differences appeared between the two samples (see Table 1). All children were born to hearing parents and had no known secondary condition other than their HL. Additionally, all children with a CI had severe to profound prelingual HL, and had been implanted before their third birthday. Seventy-two percent of the sample had 12 months or more experience with their (first) CI. Half of the sample was unilaterally implanted, the other half was bilaterally implanted. Parents reported on their children's daily CI use on a 4-point scale *((almost) never, sometimes, often, (almost) always*). All but two children were (almost) always wearing their CI, the remaining two were wearing their CI often. The majority (65%) of children with a CI preferred to use some form of signed language instead of relying solely on spoken language. Detailed characteristics of both samples are reported in Table 1.

[Insert Table 1 here]

Materials

Negative Emotionality

A multi-method and multi-informant approach was applied to increase construct validity and get a broader perspective on children's negative emotionality. Parents were asked to report on their children's negative emotion expressions and children were administered a frustration task in order to obtain standardized observations of their emotional responses. Both instruments were combined into a single score.

The *Negative Emotion Expression* scale (8 items) from the Emotion Expression Questionnaire (EEQ), developed for children between 1 and 6 years of age (Rieffe et al. 2010) indicates the frequency, intensity and duration of children's negative emotion expressions, and the extent to which they are easily calmed when angry or sad. An example item is 'How often does your child show anger?'. Parents rated the degree to which each item described their child's behavior in the past two months on a 5-point response scale, ranging from 0 = *(almost) never* to 4 = *(almost) always*. Using linear transformation, this scale was converted to a 3-point scale.

The *Emotion Regulation Task* has been developed for children between 1 and 6 years old and examines children's responses to a frustrating event (Wiefferink et al. 2012). The task was developed in consultation with child psychologists and psychiatrists working with very young children. Children were handed a bottle to open after the test leader had demonstrated it could be opened easily. Yet, children did not know that the bottle had a child-proof safety cap. The test leader waited 30 to 60 seconds and coded the child's responses on a checklist (3 items) before helping the child to open the bottle. An example item is 'The child shows a negative facial expression'. The test leader scored each item on a 3-point scale, ranging from 0 = *not at all* to 2 = *a lot.*

The combined 3-point scale is called *Negative Emotionality* (11 items). Mean scores were calculated by summing the scores across items and dividing them by the total number of items in the composite scale. The Cronbach's Alpha of the composite scale was sufficient (.72

for CI and .73 for hearing group), as was the mean inter-item correlation (.22 and .24 for CI and hearing group respectively).

Empathy

The *Empathy Questionnaire* (EmQue) is a 19-item parent-report instrument developed and validated by Rieffe and colleagues (2010) for children aged 1 to 6 years old. It is aimed at measuring children's empathic behavior in daily social situations. The instrument was designed to distinguish different levels of empathy (i.e., emotion contagion, attention to other people's emotions, and prosocial behavior), as proposed by Hoffman (1987). For the purpose of this study, all items were combined to measure the broad dimension of empathy. An example item is 'When another child starts to cry, my child tries to comfort him/her'. Parents rated the degree to which each behavior was displayed by their child in the past two months on a 3-point scale, ranging from 0 = *never* to 2 = *often*. Subsequently, scores across items were summed and divided by the total number of items, resulting in a mean score ranging between 0 and 2. The Cronbach's Alpha was sufficient (.80 for CI and .86 for hearing group). Mean inter-item correlation was sufficient in the hearing group (.24) but slightly below the expected minimum in the CI group (.17).

Parenting Style

Similar to Van Aken and colleagues (2007), we used scales from various parenting questionnaires, which were combined to reflect the three parenting styles defined by Kawabata and colleagues (2011): positive parenting, negative parenting, and uninvolved parenting.

The *Positive Parenting* scale was a combination of the Responsiveness scale from the Dutch Parenting Questionnaire (Gerris et al. 1993), the scale Reinforcement of good behavior

from the Alabama Parenting Questionnaire (Shelton et al. 1996), and the scale Positive interactions from the Parent Practices Scale (Strayhorn & Weidman 1988). This resulted in a 15-item scale. An example item is 'I praise my child when (s)he behaves well'. Cronbach's Alpha was .73 and .85 for the CI and hearing group respectively. Mean inter-item correlation was sufficient in the hearing group (.28) but fell below the expected minimum in the CI group (.17).

The *Negative Parenting* scale was a combination of the verbal punishment items on the Discipline scale of the Parent Behavior Checklist (Fox 1994) and the scale Overreaction from the Parenting Scale (Irvine et al. 1999). This resulted in a 10-item scale. An example item is 'I yell at my child for whining'. Cronbach's Alpha was .84 and .86 for the CI and hearing group respectively. Mean inter-item correlation was .35 in the CI and .37 in the hearing group.

The *Uninvolved Parenting* scale was a combination of the scale Love withdrawal from the Dutch Parenting Questionnaire (Gerris et al. 1993) and the Inconsistency scale from the Alabama Parenting Questionnaire (Shelton et al. 1996). This resulted in a 10-item scale. An example item is 'The punishment I give my child depends on my mood'. Cronbach's Alpha was .73 and .79 for the CI and hearing group respectively. Mean inter-item correlation was .21 in the CI and .28 in the hearing group.

Parents rated how often they showed each parenting behavior on a 5-point scale, ranging from 0 = *(almost) never* to 4 = *(almost) always*. For each scale, scores across items were summed and divided by the number of items in the scale, resulting in a mean score between 0 and 4 (Table 2).

Language Skills

Two measures were used to assess children's language skills. A questionnaire was administered to parents of both groups of children in order to assess everyday language skills, regardless of modality (i.e., signed or spoken language). Additionally, data on the spoken language skills of children with a CI were obtained via hospitals and counseling services.

The *Comprehension* and *Expression* scales from the Dutch version of the CDI questionnaire (Ireton & Glascoe 1995), each containing 50 items, were administered to parents in both groups. Items on both scales addressed syntactic, pragmatic, semantic, and intelligibility aspects. An example item from the Comprehension scale is 'Responds to simple questions appropriately with "yes" or "no"'. An example item from the Production scale is 'Retells short stories such as 'Little Red Riding Hood'; tells what happens in correct order and how the story ends'. Parents indicated for each item whether it described their child's abilities (0 = *no*, 1 = *yes*). Because we were interested in the general language skills of children, not just their spoken language abilities, parents were asked to answer "yes" when their child mastered the topic in either spoken or signed language. For each scale, scores on all 50 items were summed and subsequently divided by the total number of items, resulting in a mean score ranging between 0 and 1. Internal consistencies of the scales were high. For Language Comprehension, Cronbach's Alpha was .97 and .98 for the CI and hearing group respectively. Mean inter-item correlation was .41 in the CI and .52 in the hearing group. For Language Expression, Cronbach's Alpha was .97 and .99 for the CI and hearing group respectively. Mean inter-item correlation was .39 in the CI and .61 in the hearing group.

Spoken language understanding and production skills of children with a CI in the Netherlands are monitored as part of the rehabilitation process. At the time of data collection, the most commonly used language tests to assess these skills were the Dutch version of the Reynell Developmental Language Scales (RDLS) to measure language understanding, and the

Schlichting Expressive Language Test (SELT) to measure word and sentence production (Van Eldik 1998). The RDLS and SELT provide age norms based on hearing children (M = 100, SD = 15). The most recent RDLS and SELT scores of children with a CI in our sample were provided by hospitals and counseling services. As part of the clinical follow-up of children with a CI, the RDLS and SELT are administered by qualified speech therapists who are experienced in working with young children with a HL. The tests are administered in spoken language and aim to measure the child's spoken language proficiency. The use of signs is not allowed (by the speech therapist nor by the child). The duration depends on the child's age and language level (cut-off rules are provided), but also on the child's concentration and motivation. Based on the speech therapist's judgment of the child, the tests are administered in a single session or in multiple sessions. On average a session lasts no more than 45 minutes, although most sessions are shorter in duration. Breaks are provided if needed. For 11 children with a CI (24%), recent language scores were either not available, or children were assessed with other, incomparable tests. To examine whether the subsample of children with a CI for whom Reynell and Schlichting scores were available was comparable to the subsample of children for whom these scores were not available, we performed independent samples t tests on age, parenting styles, social-emotional functioning, and the language scales of the CDI. No significant differences between the subsamples were detected on any of the study variables (ps > .05).

[Insert Table 2 here]

Procedure

Children with a CI were recruited from various counseling services and hospitals all over the Netherlands. Hearing children were recruited from day-care centers and schools throughout

the Netherlands. Recruitment letters to eligible participants were dispersed through these organizations. Once informed consent from the parents was obtained, children were tested individually in a quiet room. Test leaders were trained by the first author in uniformly administering and scoring the Emotion Regulation Task. This included scoring videos of pilot sessions and discussing the scores to ensure interrater reliability. Additionally, each test leader conducted a practice test session with a child and discussed the recording with the first author and fellow test leaders to warrant uniformity in the test administration. Scoring of the test was done in vivo on a checklist but the test session was also recorded on a video camera. This allowed test leaders to confirm their in-vivo scoring afterwards, and make any necessary adjustments. In case of any doubts, the test leaders consulted the first author. Children with a CI who communicated wholly or partially in some form of signed language were tested by a researcher who was familiar with spoken and sign language. Parents filled in questionnaires concerning parenting behaviors, their children's behaviors, and variables such as SES and age at implantation. The study was approved by the university's medical ethics committee.

Statistical Analyses

To examine group differences in parenting styles and children's social-emotional functioning, multivariate analyses of variance and independent samples *t* tests were carried out. Subsequently, regression analyses were performed to examine the unique contributions of parenting styles on children's social-emotional functioning. In order to examine whether hearing status moderated these associations, interactions between the centered independent variables and group (dummy-coded; 0 = hearing, 1 = CI) were added to the regression analyses. Finally, regression analyses were carried out using the PROCESS add-on for SPSS to examine whether language mediated the relationship between parenting style and social-emotional functioning.

RESULTS

Group Comparisons

Table 2 shows the mean scores for the two indices for children's social-emotional functioning (Empathy and Negative Emotionality), the three parenting styles (Positive, Negative and Uninvolved), and language skills (Language Comprehension and Language Expression). Independent samples *t* tests for Negative Emotionality and Empathy revealed no differences between the groups ($t(90) = 0.43$, $p = .670$, $\eta^2 = .00$ and $t(90) = 0.49$, $p = .629$, $\eta^2 = .00$ respectively). A 2 (Group: CI, hearing) x 3 (Parenting style: Positive, Negative, and Uninvolved) multivariate analysis of variance produced a main effect for Parenting style ($F(2, 147.34) = 722.95$, $p < .001$, $\eta^2_p = .89$) but not for Group ($F(1, 90) = 0.62$, $p = .434$, $\eta^2_p = .01$). The interaction between Group and Parenting style was not significant ($F(2,147.34) = 1.21$, $p = .296$, $\eta^2_p = .01$). Post-hoc paired *t* tests revealed that parents in both groups of children most often showed positive parenting behaviors, followed by negative parenting behaviors. Uninvolved parenting behaviors were shown least often.

Additionally, within the CI group we examined the difference between parents of children who preferred spoken language and parents of children who preferred some form of sign language. A 2 (Group: CI spoken, CI sign) x 3 (Parenting style: Positive, Negative, and Uninvolved) multivariate analysis of variance produced a main effect for Parenting style ($F(2, 88) = 439.09$, $p < .001$, $\eta^2_p = .91$), with similar outcomes as in the analysis reported above. No main effect was found for Group ($F(1,440) = 3.59$, $p = .065$, $\eta^2_p = .08$). The interaction between Group and Parenting style was not significant ($F(2,88) = 1.83$, $p = .167$, $\eta^2_p = .04$).

Independent samples *t* tests demonstrated equal language skills in both groups as reported by parents on the CDI (Language Comprehension: $t(90) = 1.59$, $p = .116$, $\eta^2 = .03$;

Language Expression: $t(85.67) = 1.40$, $p = .165$, $\eta^2 = .02$). This measure was insensitive to language modality (i.e., spoken or signed language). Yet, the spoken language skills of children with a CI, as assessed with the RDLS and SELT, were not up to par. Although there was considerable variability within the CI group, scores displayed in Table 1 show that, on average, these children scored one *SD* below the norm of hearing children their age.

Correlations

To explore the data, Pearson correlations were computed between all variables for each of the groups separately. We checked which correlations differed between the groups using Fisher *r* to *Z* transformations. This was only the case for Age x Negative Emotionality. Age was more strongly correlated to Negative Emotionality in the CI group than in the hearing group ($Z = -2.71$, $p = .007$). These are provided separately in Table 3. All other correlations were collapsed over the two groups. Table 3 shows that Positive Parenting correlated negatively with Negative Parenting and with Uninvolved Parenting. In turn, Negative Parenting was positively related to Uninvolved Parenting.

Correlations between parenting styles and children's social-emotional functioning showed that Negative and Uninvolved Parenting were positively related to Negative Emotionality, while Positive Parenting was not related to Negative Emotionality. None of the Parenting Styles was related to Empathy.

Both Language Comprehension and Language Expression, as measured with the CDI, were positively related to each of the parenting styles. Furthermore, Language Comprehension and Language Expression were also positively related to Negative Emotionality and to Empathy. A different pattern was revealed for children with a CI regarding their language skills on the formal tests for spoken language (RDLS and SELT). Neither parenting styles nor social-emotional functioning was related to these age-norm-based

spoken language scores. Two exceptions should be noted: a negative correlation was found between the RDLS (language understanding) and Uninvolved Parenting and a positive correlation was found between SELT-W (word production) and Empathy (Table 3).

Moderating effect of hearing status on the relationship between parenting styles and social-emotional functioning

To examine whether the relationship between parenting styles and children's social-emotional functioning was moderated by hearing status, Group, Parenting Styles, and the interactions between Group and each of the Parenting Styles were included in a regression analysis. A separate regression analysis was carried out for each index of social-emotional functioning. Group and the Parenting Styles were included in Step 1. The interaction terms of Parenting Styles x Group were included in Step 2. The regression model for Negative Emotionality (Table 4) showed significant explained variance. Both Negative Parenting and Uninvolved Parenting were uniquely related to Negative Emotionality. Adding the interaction terms of Parenting Styles x Group in Step 2 did not significantly improve the model fit. Step 1 of the regression model for Empathy did not explain a significant amount of variance. Adding the interaction terms of Parenting Styles x Group in Step 2 did not produce a better model.

Mediating effect of language on the relationship between parenting styles and social-emotional functioning

As an index of children's language skills, the CDI parent questionnaire was used because data were available for both groups on this variable. Data from the formal spoken language tests were only available for the CI sample. The Language Comprehension and Language Expression scales of the CDI were highly correlated ($r = .96$, $p < .001$), we chose to enter Language Comprehension as the mediating variable. To test for mediation effects, we

used the SPSS add-on PROCESS by Andrew F. Hayes. Three separate mediation analyses were conducted for Negative Emotionality, one for each of the parenting styles. Another three analyses were conducted for Empathy.

For Negative Emotionality, the mediation analysis showed that Positive Parenting did not affect Language Comprehension (B = -.09, p = .365), which violates the assumptions of mediation (Baron & Kenny 1986). Language did not mediate the relationship between Positive parenting and Negative Emotionality. Negative Parenting significantly affected Language Comprehension (B = .23, p < .001). When Language Comprehension and Negative Parenting were entered into the regression together, a reduction in the significance of the Negative Parenting coefficient was seen while the Language Comprehension coefficient was significant (B = .10, p = .010 and B = .25, p = .002 respectively). The relationship between Negative Parenting and Negative Emotionality was partly mediated by Language Comprehension. The mediation analysis for Uninvolved Parenting produced a similar result. Uninvolved Parenting significantly affected Language Comprehension (B = .16, p = .002). When Language Comprehension and Uninvolved Parenting were entered into the regression together, a reduction in the significance of the Uninvolved Parenting coefficient was seen while the Language Comprehension coefficient was significant (B = .11, p = .021 and B = .27, p < .001 respectively). The relationship between Uninvolved Parenting and Negative Emotionality was partly mediated by Language Comprehension.

For Empathy, as for Negative Emotionality, the lack of a significant association between Positive Parenting and Language Comprehension violated the assumptions for mediation. When Language Comprehension and Negative Parenting were entered simultaneously, the regression coefficient for Negative Parenting was not significant, whereas the Language Comprehension coefficient was highly significant (B = -.02, p = .770 and B = .47, p < .001 respectively). The relationship between Negative Parenting and Empathy was

mediated by Language Comprehension. Finally, the same pattern was seen for Uninvolved Parenting. When Language Comprehension and Uninvolved Parenting were entered simultaneously, the regression coefficient for Uninvolved Parenting was not significant, whereas the Language Comprehension coefficient was highly significant ($B = .05$, $p = .460$ and $B = .43$, $p < .001$ respectively). The relationship between Uninvolved Parenting and Empathy was mediated by Language Comprehension.

[Insert Tables 3 and 4 here]

DISCUSSION

This study aimed to identify the effect of parenting styles on children's social-emotional functioning in a group of young children with a CI and a comparison group of hearing children. Parenting styles are known to greatly influence the social-emotional development of hearing children (Lieb et al. 2000; Amato & Fowler 2002; Morris et al. 2007). The current study examined whether the relationship between parenting styles and social-emotional functioning would differ according to hearing status. Three major parenting styles - positive, negative and uninvolved parenting - were identified in a meta-analytic review by Kawabata et al. (2011) and were examined in the current study. Emotion dysregulation (i.e., negative emotionality) and empathy were used as indices of children's social-emotional functioning.

Group differences regarding parenting styles and social-emotional functioning

Children with a severe to profound HL are born to hearing parents in over 90% of the cases (Mitchell & Karchmer 2004). Many hearing parents experience difficulties communicating with their child who has a severe or profound HL (Prezbindowski et al. 1998; Barker et al. 2009; Gale & Schick 2009), even after cochlear implantation has taken place

(Zaidman-Zait 2008). In light of this, an outcome of utmost importance was the absence of any differences in parenting styles between the parents of hearing children and the parents of children with a CI in this study. Children's hearing status did not seem to affect parenting behaviors.

Our findings appear to contradict findings from a study by Quittner et al. (2013) on maternal sensitivity, which belongs to a positive parenting style. Quittner and colleagues observed hearing mothers of hearing children and hearing mothers of children with a CI interacting with their child in a semi-structured laboratory setting. Mothers of hearing children in this study were found to be more sensitive than mothers of children with a CI. One explanation for these discrepant findings is the way that data were collected. In our study, parents filled in a questionnaire, which may have painted an overly positive picture of how mothers of children with a CI behaved toward their child in reality. Another explanation might be that one of the settings used by Quittner and colleagues relied on communicative interaction. This is often still problematic for hearing parents of children with a CI (Zaidman-Zait 2008). Mother and child looked at five posters together and had to discuss these for five minutes. Although parent-child interaction was also observed in two other situations (free play and problem solving), this particular situation could have negatively affected maternal sensitivity in mothers of children with a CI, potentially resulting in a lower overall score compared to mothers of hearing children. Clearly, more research is needed before any firm conclusions regarding these differences can be drawn. It is important that future studies adopt a multi-method approach in which both questionnaires and observations are employed to examine the same construct.

In addition, we examined the extent to which parenting styles differed when taking into account children's preferred mode of communication (spoken or signed language), but

we found no differences in this respect. However, given the small sample sizes of these CI subgroups, additional research is needed to confirm this finding.

No differences between the groups were found regarding the two aspects of children's social-emotional functioning: emotion regulation and empathy. This is a very positive outcome given that studies among children with a severe to profound HL without a CI have repeatedly shown that these children experience difficulties in regard to their social-emotional functioning (e.g., Barker et al. 2009; Wolters et al. 2011). The findings from the current study indicate that a CI benefits children's development in other areas than the auditory and language domains. This does not imply that children who have received a CI are not at risk anymore of developing social-emotional difficulties. Recently, some studies conducted with children with a CI have revealed impairments in emotion recognition skills (Wang et al. 2011; Wiefferink et al. 2013) and theory of mind (Peterson 2004; Ketelaar et al. 2012). Continued monitoring of these children's development across different areas of the social-emotional domain remains necessary.

Effects of parenting styles on social-emotional functioning according to hearing status

The analyses revealed that negative and uninvolved parenting were associated with children's negative emotionality, regardless of hearing status. This is in line with prior research which reported that these parenting styles hamper the social-emotional development of hearing children (Stack et al. 2010; Kawabata et al. 2011). This study extends our current knowledge by demonstrating that this association not only applies to hearing children, but also to children with a CI. This study failed to confirm an effect of positive parenting on children's social-emotional functioning. Insufficient variability, reflected in the high mean scores and relatively small *SD*s for Positive Parenting could be an explanation for this finding. Alternatively, there might indeed not be such a direct link between positive parenting behaviors and children's

empathy. Perhaps looking at children's positive emotion expressions would have produced a different outcome. Future studies should try to identify whether positive parenting does promote other areas of children's social-emotional functioning.

In conclusion, for both groups alike, negative and uninvolved parenting appear to be risk factors for emotion dysregulation. The relationship between positive parenting and children's social-emotional functioning is less straightforward.

The role of language

Research among children with a HL suggests that language difficulties cause these children to experience social-emotional difficulties (Vaccari & Marschark 1997; Peterson & Siegal 2000; Moeller & Schick 2006). In our study, we examined whether language was a mediating variable in the relationship between parenting styles and children's social-emotional functioning. We found that language did not mediate the relationship between positive parenting and children's social-emotional functioning. As discussed in the previous section, there was in fact no relationship between positive parenting and social-emotional functioning. However, language did mediate the relationships between negative as well as uninvolved parenting and children's social-emotional functioning. In other words, the effect of negative and uninvolved parenting on children's social-emotional functioning was a result of children's language skills. Children who had better language skills probably evoked less negative and uninvolved behaviors in their parents. Yet, longitudinal research is needed to confirm this.

It is important to note that we found a discrepancy between how parents perceived the language skills of their children with a CI and how these children's language skills compared to the hearing norm on a formal test. In comparison to hearing children, parents reported that language skills of their children with a CI were not impaired, whereas the formal language tests revealed below-average scores for this group. Yet, these instruments assessed very

different aspects of language, which could explain this discrepancy. Parents reported on their children's spoken as well as signed language skills whereas the formal test only assessed spoken language skills. Moreover, parents were asked about their children's general language use (e.g., 'follows simple instructions', 'uses at least ten words/signs', 'retells short stories'), whereas the formal language tests more narrowly assess language skills by for example asking children to point at objects which are named (e.g., 'where is the chair?'), to name objects themselves, or to repeat sentences.

The fact that everyday language skills (spoken and signed language combined) of children with a CI were intact – even though their spoken language was impaired - could explain why we found no differences between the groups regarding children's social-emotional functioning or regarding parenting styles. Our findings seem to indicate that the sheer ability to communicate, whether communication takes place in spoken language, signed language or a combination thereof, is beneficial for children's development and may positively influence parenting practices. During the rehabilitation process, a lot of emphasis is put on monitoring the development of spoken language, by providing speech therapy and regularly administering formal tests of spoken language. However, these tests may not be the best tool to distinguish those children who are at risk of developing problems in their social-emotional development from those who are not. The child's functional communicative abilities may be just as, or even more important in this respect (Fellinger et al. 2012).

Clinical implications

The outcomes of this study have some important clinical implications. The effects of negative and uninvolved parenting styles on children's negative emotionality imply that interventions should be developed to assist parents with their parenting behaviors. Currently, the parent-directed part of rehabilitation programs is mostly focused on helping parents

communicate effectively with their children and on empowering parents to stimulate their children's language development. We agree that these are important focal points, which indirectly may also positively affect parenting behaviors. Yet, more explicit attention for how to parent children in a positive way is needed. As suggested before by Quittner et al. (2013), including a parental sensitivity training in the rehabilitation program could be helpful in this respect.

In addition, awareness of the relationship between parenting and children's social-emotional functioning should be raised among family counselors and other professionals working with children with a CI and their families. Detecting potentially harmful parenting behaviors early and knowing how to help parents decrease these will ultimately promote the child's well-being. In The Netherlands, home visits by a family counselor are part of the treatment program for children with a moderate to profound HL. During these home visits, parents are guided in how to play and communicate with their children. The family counselor observes and gives advice. This provides an excellent opportunity to inform parents about the importance of positive parenting behaviors and to guide parents, as needed.

Limitations

Note that a limitation of the current study is its cross-sectional nature. This does not allow us to make firm statements about the directionality of the relationship between parenting style and social-emotional functioning of children with a CI. This relationship is most likely a bidirectional one. Longitudinal studies conducted with hearing children show that parenting style is predictive of children's social-emotional functioning, but can also be predicted by children's behavior (Zhou et al. 2002; Stack et al. 2010). However, the outcomes of the current study do not give any reason to assume that the directionality of these relations might be different for parents and their children with a CI.

This study used several instruments that were created by combining scales from other instruments. Although we had a solid theoretical basis for doing so and the psychometric properties were promising, additional research is required to confirm this. Future studies with larger sample sizes are needed to examine the factor structure and further establish the validity and reliability of the instruments.

It would have been informative to examine the extent to which the sign-language proficiency of parents affects their parenting styles. In cases where children mostly rely on sign language, being able to communicate effectively could promote positive parenting and prevent negative or uninvolved parenting. Unfortunately, data on the sign language skills of parents were unavailable in the present study. Future research dedicated to studying parenting practices among children with HL should gather data on sign language proficiency and reliance for children as well as their parents.

When interpreting the findings of the current study it should be noted that children with a CI form a very heterogeneous group. This makes it difficult to generalize the current findings to the whole population of children with a CI. Technology keeps improving and candidacy criteria change, which could, over time, lead to different outcomes regarding language and communication (e.g., children relying less on sign language and more on spoken language) as well as regarding social-emotional functioning. Therefore, replication of this study is warranted.

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Table 1. Characteristics of the Samples

	CI (*n* = 46)	H (*n* = 46)
Age, mean (SD), mos	37.7 (14.2)	37.6 (14.1)
Age, range, mos	14 - 61	15 - 61
Sex – *n* (%)		
Male	28 (61%)	28 (61%)
Female	18 (39%)	18 (39%)
Socioeconomic status		
Maternal education, mean (SD)[a]	3.53 (0.76)	3.73 (0.50)
Net household income, mean (SD)[b]	3.69 (1.17)	3.94 (1.00)
Motor development		
Gross motor skills, mean (SD)	0.68 (0.23)	0.74 (0.23)
Fine motor skills, mean (SD)	0.65 (0.22)	0.67 (0.24)
Hearing status at birth		
No hearing loss – *n* (%)	8 (17%)	
Hard of hearing – *n* (%)	5 (11%)	
Deaf – *n* (%)	32 (70%)	
Unknown – *n* (%)	1 (2%)	
CI-sample characteristics		
Age at implantation, mean (SD), mos	16.0 (6.7)	
Age at implantation, range, mos	7 - 35	
Time with (first) CI, mean (SD), mos	21.6 (12.7)	
Time with (first) CI, range, mos	2 - 45	
Preferred mode of communication, No. (%)		
Oral language only	16 (35%)	
Sign-supported Dutch	21 (46%)	
Sign Language of the Netherlands	3 (7%)	
Combination of communication modes	6 (13%)	

Note. CI, cochlear implant; H, Hearing;

[a](1 = no/primary education, 2 = lower general secondary education, 3 = higher general secondary education, 4 = college/university).

[b](1 = less than €15,000, 2 = €15,000 - €30,000, 3 = €30,000 - €45,000, 4 = €45,000 - €60,000, 5 = more than €60,000).

Table 2. Psychometric Properties and Mean Scores for all Variables

	No. of items	Min-Max	Mean scores (*SD*)	
			CI	H
Social-emotional functioning				
Negative Emotionality	11	0-2	0.59 (0.21)	0.61 (0.22)
Empathy	19	0-2	0.86 (0.30)	0.90 (0.32)
Parenting styles				
Positive Parenting	15	0-4	3.25 (0.28)	3.09 (0.38)
Negative Parenting	10	0-4	1.02 (0.48)	1.05 (0.56)
Uninvolved Parenting	10	0-4	0.88 (0.47)	0.89 (0.52)
General language skills (spoken or signed)				
CDI, Comprehension	50	0-1	0.58 (0.28)	0.68 (0.32)
CDI, Expression	50	0-1	0.62 (0.27)	0.71 (0.35)
Spoken language skills				
RDLS, Understanding			87.09 (20.64)	
SELT-W, Production			92.03 (17.03)	
SELT-S, Production			85.94 (13.48)	

Note. CI, cochlear implant; H, Hearing; CDI, Child Development Inventory; RDLS, Reynell Developmental Language Scales; SELT-W, Schlichting Expressive Language Test - Word Development; SELT-S, Schlichting Expressive Language Test - Sentence Development

Table 3. Pearson Correlations between Parenting Styles, Indices for Social-Emotional Functioning, and Indices for Language

	1	2	3	4	5	6
1. Age	-	-.20	.46***	.32**	.27 / .70***	.33**
2. Positive Parenting		-	-.37***	-.46***	-.08	.09
3. Negative Parenting			-	.58***	.38***	.15
4. Uninvolved Parenting				-	.36***	.19
5. Negative Emotionality					-	.18
6. Empathy						-
7. CDI, Language Comprehension	.88***	-.11	.41***	.26*	.45***	.45***
8. CDI, Language Production	.85***	-.08	.40***	.22*	.41***	.45***
9. RDLS		.25	.08	-.34*	-.11	.16
10. SELT-W		.21	.23	.13	.24	.41*
11. SELT-S		.24	.23	-.05	.08	.30

Note. CDI, Child Development Inventory; RDLS, Reynell Developmental Language Scales; SELT-W, Schlichting Expressive Language Test - Word Development; SELT-S, Schlichting Expressive Language Test - Sentence Development
Note. Correlations with the RDLS, SELT-W and SELT-S are available for the CI group only
Note. Only when correlations significantly differed in strength, these are provided separately for the H and CI group respectively.

Table 4. Regression Analyses for Negative Emotionality and Empathy (N = 92)

	Negative Emotionality			Empathy		
	R^2_{adj}	β	p	R^2_{adj}	β	p
Step 1	.16***			.05		
Group		-.08	.413		-.11	.334
Positive Parenting		.17	.144		.26	.032
Negative Parenting		.29	.019		.10	.436
Uninvolved Parenting		.27	.035		.26	.057
Step 2	.14**			.02		
Group*Positive Parenting		.01	.934		.07	.618
Group*Negative Parenting		.04	.800		-.02	.924
Group*Uninvolved Parenting		.11	.537		-.04	.806

Note. Negative emotionality: $\Delta R^2 = .01$ for Step 2 ($p = .820$); Empathy: $\Delta R^2 = .01$ for Step 2 ($p = .882$).
*$p < .05$; ** $p < .01$; *** $p < .001$