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Psychosocial functioning in toddlers with moderate hearing loss : the importance of caregivers

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CHAPTER 5

Talk with me! Parental Linguistic Input to Toddlers with Moderate Hearing loss

Submitted

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ABSTRACT

Objectives

The purpose of this study was to examine parental linguistic input to toddlers with moderate hearing loss (MHL) compared with toddlers with normal hearing (NH). In particular, the relationship between parental linguistic input and children's language abilities was examined.

Method

Eighteen toddlers with MHL and 24 toddlers with NH and their parents participated in the study. The quantity and quality of parental linguistic input during a 10-minute free play activity with parents was recorded and later coded using Ambrose et al.'s (2015) coding system. In addition, the use of mental state language was also coded.

Results

Toddlers with MHL were exposed to an equivalent amount of parental linguistic input as toddlers with NH. Parents of toddlers with MHL used less high-level facilitative language techniques, used less mental state language, and had a more limited vocabulary and shorter utterances than parents of toddlers with NH. The quantity and quality of parental linguistic input was positively related to children's language abilities.

Conclusions

The quality of parental linguistic input differed between parents of toddlers with MHL and toddlers with NH. Toddlers with MHL were exposed to a less rich language. No differences between the two groups were found in the quantity of parental linguistic input. The quantity and quality of parental linguistic input was related to children's language abilities. Early intervention programs should therefore focus on promoting optimal language environments for children with MHL.

INTRODUCTION

Language acquisition occurs by means of interactions with knowledgeable others (Vygotsky, 1978). Parents have a crucial role in the language development of their young children. By talking to children about what they are seeing or doing, parents promote children's language abilities. Both the quantity and quality of parental linguistic input can impact a child's language development (Hart & Risley, 1995; Rowe, 2012; Weizman & Snow, 2001).

When a child has a moderate hearing loss (40 -60 dB HL) (MHL), parents may encounter more challenges in providing optimal language input to their children. Since most children with hearing loss (HL) have hearing parents (Mitchell & Karchmer, 2004), parents often have no experience with HL what may hamper their intuitive parent behavior. Given that children with MHL are more at risk for language difficulties (Moeller, Tomblin, Yoshinaga-Itano, Connor, & Jerger, 2007; Tomblin et al., 2015), parents may need to adapt their linguistic input in order to enhance their child's language development. In the current study, the relationship between the quantity and quality of parental linguistic input and the language abilities of toddlers with MHL was examined.

Parental linguistic input

A large body of research suggests that parental communication with children is related to children's language development (Hart & Risley, 1995; Huttenlocher, Waterfall, Vasilyeva, Vevea, & Hedges, 2010; Rowe, 2012; Weizman & Snow, 2001). The quantity of parental linguistic input is an important determinant of children's vocabulary development (Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991; Weizman & Snow, 2001). Children have better language skills when their parents talk more frequently to them and expose them to a larger amount of words. The more talk a child is exposed to, the more opportunities they have to become familiar with certain words, and to practice skills important for word learning (Weisleder & Fernald, 2013). The variety and type of parental talk is also associated with child language development (Huttenlocher, et al., 2010). Parents who apply a more extensive vocabulary in their child-directed communication have children with more extensive vocabularies (Hart & Risley, 1995; Hoff & Naigles, 2002; Taumoepeau, 2016).

Various quality features of parental linguistic input have been identified in the literature. Some of these features which require more complex verbal responses (for example open-ended questions) are positively related to child language skills (Rowe, Leech, & Cabrera, 2017). Parallel talk (talking about what a child is doing, seeing, or touching), expansion (restating and completing a child's utterance with correct grammar), and recasting (changing a child's utterance into a question) are other examples of so-called high-level facilitative language techniques that are associated with better receptive and expressive language skills (Cruz, Quittner, Marker, DesJardin, & Team, 2013; Girolametto, Weitzman,

Wiigs, & Pearce, 1999). Examples of low-level facilitative language techniques are imitation (repeating a child's utterance), labeling (stating the name of an object or picture), and linguistic mapping (putting into words what a child may be trying to communicate). Research suggests that low-level facilitative language techniques promote language development in young children at the pre-linguistic stage (Girolametto et al.; Yoder & Warren, 2001), whereas high-level facilitative techniques enhances this development in older children who use more complex language structures (Rowe, 2012). In sum, while the quantity and quality of parental talk is related to children's language development, this relation may be dependent on the child's age.

Parental linguistic input to children with MHL

Children with MHL are more at risk for language difficulties than children with normal hearing (NH) (Moeller et al., 2007; Tomblin et al., 2015). Despite their use of hearing aids, most children with MHL have inconsistent access to speech, which may impact their language development (Bagatto, Moodie, Seewald, Bartlett, & Scollie, 2011; McCreery et al., 2015; Stiles, Bentler, & McGregor, 2012). Early intervention programs for children with HL are often focused on optimizing children's language development; these programs emphasize the potential role that parents can play (Moeller, Carr, Seaver, Stredler-Brown, & Holzinger, 2013). The assumption is that (qualitatively) rich conversations between parent and child will boost the language abilities of children with MHL. It is therefore important to identify strategies that promote high quality language use by parents in their interactions with children with MHL.

A limited number of studies of children with MHL (40-60 dB HL) have been published which examine the parent linguistic input. Most of these studies included children with mild to severe HL (20-90 dB) and were not specifically focused on children with MHL (Ambrose, VanDam, & Moeller, 2014; Ambrose, Walker, Unflat-Berry, Oleson, & Moeller, 2015; DesJardin et al., 2014; VanDam, Ambrose, & Moeller, 2012). Outcomes of these studies showed that children (two years of age and younger) with mild to severe HL were exposed to a similar amount of parental talk than children with NH (VanDam et al.; Ambrose et al., 2015). These findings were in line with those of Nittrouer (2010) and Aragon and Yoshinaga-Itano (2012) who studied groups of children with a range of HL (both hard-of-hearing and deaf). Ambrose et al. (2015), however, reported differences between three-year-olds with mild to severe HL in terms of the quantity of parental linguistic input. Three-year-old children with MHL in their study were exposed to fewer words than their peers with NH. Furthermore, they also found that these children were exposed to a limited variety of words and shorter utterances, features of linguistic input that reflect the quality of the input. Ambrose et al. (2015) noted that parents of children with HL may have adapted their own language levels as a result of their sensitivity to the lower language abilities of their children. While language differences between young children with HL and young children with NH are less obvious, they become more apparent when children grow older and consequently, parents may adapt their language levels

accordingly. This reasoning may explain why differences in the amount of words, the variety of words and length of utterance were found between three-year-old children with HL and NH but not in two-year-olds.

The quality of linguistic input is also reflected by parents' use of facilitative language techniques. Ambrose et al. (2015) and Desjardin et al. (2014) examined the use of these techniques during parent-child interactions in children with mild to severe HL. Parents' use of high-level facilitative language techniques such as recasting, asking open-ended questions, and expansion was positively related to children's oral language abilities (Ambrose et al.; Desjardin et al.). These findings are in line with research on children with cochlear implants (Cruz, et al., 2013; DesJardin & Eisenberg, 2007) and on children with moderate to profound HL (Nittrouer, 2010). While parents' use of high-level language techniques is thus important in promoting the language abilities of children with mild to severe HL, parents of these children used high-level language techniques less frequently than parents of children with NH (Ambrose et al.).

Ambrose and colleagues (2015) however also reported that parents of children with mild to severe HL used more directing language than parents of children with NH. This low-level language technique was negatively related to children's language abilities. Directing language is used to direct a child's attention or behavior (e.g. "Say Mummy"; "Look here"; "Don't touch that). Not all low-level language techniques are (negatively) related to language abilities in children with mild to severe HL. Desjardin and colleagues (2014) for example found that a composite score of low-level techniques (e.g. labeling, linguistic mapping, commenting, directing, asking closed-ended questions, and imitating) was not related to language abilities of children with mild to severe HL. The use of a composite score of low-level language techniques and the larger age range of the children included in the study may have resulted in different outcomes than those reported by Ambrose and colleagues. Parents' talk to children with mild to severe HL did seem to change over time: parents used less directive language and provided their children with more high-level language when their children were older (Ambrose et al.).

Mental state language

Parental language input is not only important for children's language development but also for their social-emotional development. Talking with children about their own and others' thoughts, desires and feelings promotes their social-emotional development (Devine & Hughes, 2016; Drummond, Paul, Waugh, Hammond, & Brownell, 2014; Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991; Meins, 2013; Peterson & Slaughter, 2003). Parents' use of mental state language (e.g. think; know; believe; remember; want) is positively related to children's development of a Theory of Mind (Devine & Hughes, 2016). In particular, parents' use of mental state language is positively related to a child's performance on false belief tasks (Devine & Hughes; Taumoepeau & Ruffman, 2008), which require children to understand, explain, and predict the actions of others. The use of mental state language can be considered as a specific high-level language technique.

Until now, two studies have examined parents' use of mental state language in interactions with children with HL (Moeller & Schick, 2006; Morgan et al., 2014). In their study of deaf five-year-old children, Moeller & Schick coded signed references to mental states during mother-child interactions. Verbal expressions were coded for the hearing controls. Although there were no differences in the total number of utterances, mothers of deaf children made less frequent and less varied references to mental states than mothers of children with NH. The study also reported that children with mothers who made more mentale states references showed a better false belief understanding. Reduced access to mental state language was also reported in a younger group of children with HL (Morgan et al.). Mothers of deaf infants included in this study referred less often to mental states during spoken conversations about pictures showing social situations, than mothers of children with NH. The conversations between mothers and the deaf infants were also less connected. Mothers of deaf infants more often initiated the interaction and they had more difficulties in maintaining the conversation, than mothers of children with NH. Having conversations about the mind might be especially important for children with MHL who often lag behind their peers with NH in their social-emotional development (Dirks et al., 2017; Laugen, Jacobsen, Rieffe, & Wichstrom, 2016, 2017; Netten et al., 2015, 2017).

Present study

Recently, studies on young children with mild to severe HL have received increasing attention in the literature (e.g. Koehlinger, Van Horne, & Moeller, 2013; Laugen et al., 2016; Moeller & Tomblin, 2015; Netten et al., 2017; Stika et al., 2013). These studies indicate that even children with less severe HL are at risk for language delays (Koehlinger et al., 2013; Netten, et al., 2015; Tomblin, et al., 2015) and social-emotional difficulties (Dirks, et al., 2017; Laugen, et al., 2016; Netten, et al., 2017). It is therefore essential that further research is conducted in order to gain insights into how the language and social-emotional development of children with less severe HL (MHL) can be facilitated. Parents play a crucial role in enhancing children's language development. The focus of the current study is on the quality and quantity of parental linguistic input in relation to the language abilities of 30-month-old toddlers with MHL.

In order to examine the quality of parental linguistic input, the current study used the coding system developed by Ambrose et al. (2015) and used in their study with a similar population (children with mild to severe HL aged approximately 18 and/or 36 months of age). Using the same coding system would allow us to find out whether we could replicate Ambrose and colleagues' findings in Dutch 30-month-old children with MHL. To enable exploration of the use of mental state language, mental state terms were also coded separately. In line with findings of Ambrose et al., we expected that parents of toddlers with MHL used more low-level language and exposed their children to less high-level language than parents of children with NH, including mental state terms (Moeller & Schick, 2006; Morgan et al., 2014). Positive relations between language ability and high-level

language use were expected, in addition to negative relations between language ability and low-level language.

We expected that parents of children with MHL used fewer words during parent-child interactions than parents of children with NH (Ambrose et al., 2015). Furthermore, positive relations were expected between the quantity of parental linguistic input and language abilities (Ambrose et al.). Next to the relation between linguistic input and language abilities, the relation between hearing loss-related variables (e.g. degree of HL and start intervention) and linguistic input was examined.

METHOD

Participants

This study is part of a larger study on the psychosocial functioning of toddlers with MHL and their families (xx, xx, self-identifying references are removed here for double-blind reviewing procedure. In total, 42 children between 29 and 33 months of age participated in this study. The 18 children with MHL were recruited from two family-centered early intervention centers in the Netherlands. The control group of 24 children with NH was recruited via a well-baby clinic. The children with NH were included in the study if they had passed the neonatal hearing screening and had no known medical or developmental disabilities. Children with MHL were included in the study if they were diagnosed with congenital moderate hearing losses (40-60 dB HL) in the better ear (residual hearing was calculated by averaging unaided hearing thresholds at 500, 1,000 and 2,000 Hz) and they had no other medical or developmental disability such as mental retardation, visual impairment or speech-motor problems. Characteristics of the samples are reported in Table 1. Age, gender and maternal education level did not differ between the groups.

The hearing children were born to parents with NH. Of the sample of children with MHL, four fathers and one mother had MHL and one father was deaf. None of the children had more than one parent with hearing loss. At home the children used spoken language in the interactions with their parents (6 parents and children supported their spoken language often with signs, 1, always, 9 sometimes and 2 never). All children with MHL wore hearing aids and received care from an audiologist. Furthermore, all children with MHL participated in a family-centered early intervention program for children with HL. The family-centered early intervention program offered entailed frequent house visits by early interventionists and speech and language therapists, parent courses at the center together with other parents (e.g., sign courses, communication courses, and interactive reading courses) and specialized treatment groups for toddlers with HL.

Procedure

Members of the research team visited the families at home. The children and their parents engaged in a 10-minute free-play session with standardized toys. The toys were age appropriate and included building blocks (that could be used to build and as a puzzle), animal figures, and a tea set. Parents were asked to play with their child the way they usually did. All interactions were videotaped. The majority of parent-child interaction videos (93%) included the mother and the remaining interactions included the father (MHL = 2 and NH = 1). In the majority of videotaped interactions, parents with NH interacted with their child; one parent-child interaction included a mother with MHL.

Parents were asked to fill in a questionnaire about their family's background. Additional information, such as degree of hearing loss and age at amplification was obtained from medical records. Speech and language therapists assessed the language ability of the children. The study was carried out in accordance with the standards set by the Declaration of Helsinki and informed consent was obtained for all children.

Table 1. Demographic characteristics of the MHL and NH groups

	MHL	NH
No. of children	18	24
Age, mean (SD) months	30.7 (1.0)	31.0 (0.9)
Age, range months	29-33	30-33
Gender, no (%)		
Male	6 (25%)	12 (50%)
Female	12 (75%)	12 (50%)
Maternal educational level, mean (SD)*[1]	2.9 (1.7)	3.2 (0.9)
Degree of hearing loss (dB), mean (SD)	53.6 (8.7)	NA
Age at start FCEI (months), mean (SD)	7.3 (7.5)	NA
Age at start FCEI (months), range	1-24	NA
Age at HA fit (months), mean (SD)	6.5 (5.7)	NA
Age at HA fit (months), range	1-22	NA

Abbreviations: MHL Moderate Hearing Loss, NH Normal Hearing, SD Standard Deviation, NA Not Available; FCEI, Family-Centered Early Intervention; HA Hearing Aid.

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

Measures

Language ability

Linguists assessed the children's receptive and expressive language abilities via two language tests that have been developed and standardized for children between two and five years of age. These tests are widely used for children with and without HL within the Netherlands. Receptive language ability was assessed with the Reynell Developmental Language Scales - Dutch Version (Schaerlaekens A, 1993). Expressive language ability

was assessed with the Sentence Development Scale of the Schlichting Expressive Language Test (Schlichting, Eldik, Lutje Spelberg, Van der Meulen, & Van der Meulen, 1995). Raw scores are converted to age equivalents and language quotients. The quotient scores are normally distributed scores, with a mean score of 100 and a standard deviation of 15.

Parental linguistic input

Three research assistants transcribed video recordings of the parent-child interactions. They followed conventions that allow for coding and transcribing speech using the Codes for the Human Analysis of Transcripts (CHAT). The Computerized Language Analysis (CLAN) software (MacWhinney, 2000) was used to analyze the transcriptions that were transcribed in CHAT format. CLAN was used to calculate the number of total utterances (NTU), number of total words (NTW), number of different words (NDW), and mean length of utterances (MLU) for parent talk in the samples. Because the parent-child interactions were between 9 ½ and 12 minutes in length (mean: 10.55 min; SD: .39) the counts were divided by the number of minutes in the sample and then multiplied by ten to normalize all count variables to 10 minutes. Ten percent of the videos were transcribed independently from each other to calculate the inter-rater reliability. The percent agreement ranged from 81 to 98% (mean: 90%).

Using a coding procedure developed by Ambrose et al. (2015), parent utterances were coded as serving one of ten mutually exclusive functions: basic acknowledgements, clarification questions, informative statements, informative questions, simple social phrases, test questions, directing utterances, conversational-eliciting utterances that were open ended, conversational-eliciting utterances referencing topics outside the immediate context, and real utterances. Ambrose et al. used the latter four types of utterances (directing, two conversational-eliciting types, and real utterances) in their article because previous literature has indicated that these utterances may specifically enhance or hinder language development (Cruz, et al., 2013; DesJardin & Eisenberg, 2007; Hoff-Ginsberg, 1985; Taumoepeau & Ruffman, 2006; Zimmerman et al., 2009). In line with Ambrose et al. we used these four types of utterances in the current study. Directing utterances are considered lower-level functions which are used to direct a child's attention and/or to tell a child something to do (e.g. "look", "don't touch" or "bring me that cup") (Cruz et al., 2014; Desjardin et al., 2007; Ambrose et al. 2015). Conversational-eliciting utterances (open or outside) and real utterances are considered high-level functions. These utterances are exposed to invite a child to talk or request for information (e.g., Ambrose et al., 2015; Cruz et al. 2013; DesJardin & Eisenberg 2007). Examples of conversational-eliciting utterances are "what kinds of animals do you see" (open) or "tell me about the animals at grandparents' home" (outside) and examples of real utterances are " what color is your favorite toy" or "what is going to happen with Sam". These three types of utterances were added up together to calculate the number of high-level utterances. Then, the proportion of high-level utterances and directing utterances were calculated.

Two research assistants (linguists) who also transcribed the video recordings used the 10-level coding system to code parent's utterances. To establish inter-rater reliability of the coding, the research assistants coded 20% of the sample independently. The intra-class reliability coefficients ranged from .81 to .95 (mean .87).

Mental state language

The parent-child interaction transcriptions were used to code the amount of mental state terms used by both parents and children. Mental state terms included references to cognitive terms (e.g. think, know, remember or believe), desires (e.g. "want", "like', "don't like", "hope" or "whish") and emotions (e.g. "happy", "sad", "angry" or "worried") (Ensor & Hughes, 2008; Moeller & Schick, 2006; Morgan, et al., 2014). All of the videos were coded independently from each other by two members of the research team to calculate the inter-rater reliability. The intra-class reliability coefficient was r = .97.

Statistical analyses

Group demographics were compared using independent t-tests. Independent t-tests were also used to test for differences between groups in the language ability and the parental linguistic input. Effect size was estimated with Cohen's *d.* Holm's sequential Bonferroni method was used to control for Type 1 error at the .05 level across comparisons. Correlations between the measures were calculated with Pearson's Correlations. These correlations were compared between the two groups using Fisher's *r*-to-*z* transformations to show significant differences in the strength of the correlations.

The assumptions for parametric testing were checked due to the small sample size. When the assumptions were violated, non-parametric analyses were conducted. For two variables (parental mental state language and directives) the assumptions were not met. Yet, the outcomes of the parametric and nonparametric analyses did not show differences. For reasons of clarity, we decided to report the outcomes of the t-tests, in line with the other variables.

RESULTS

Between group differences

Table 2 shows the summary statistics and between group-differences in child language abilities and parental linguistics input. Children with MHL had lower receptive and expressive language scores than the children with NH. No significant differences were found for the quantity of parental linguistic input to children with MHL and NH. Parents of children with MHL used a similar amount of words and utterances during the interactions compared to parents of children with NH. Differences between groups were found for quality measures of language input. Children with MHL were exposed to shorter utterances, fewer different words, less high-level language, and less mental state language.

No significant differences were found in the exposure to low-level language (directing utterances).

Associations between linguistic input and hearing loss related variables

The associations between parental linguistic input and hearing loss-related variables are shown in Table 3. Negative associations were found for low-level language input and the start of family-centered early intervention and age of hearing aid (HA) fitting. Children who started the intervention at a young age, and those who were younger at HA fitting were exposed to more low-level language (directing utterances). No other significant associations between parental linguistic input and intervention measures were found. The degree of HL was negatively related to high-level language input and the amount of parental mental state language. Children with more decibels HL were exposed to less high-level language and less mental state language.

Table 2. Summary statistics of child language and parental linguistic input

	Mean scores (SD)		*t*	*p*	*d*
	MHL (n = 18)	NH (n =24)			
Child language ability					
Receptive language***	99.4 (13.3)	111.6 (10.2)	-3.37	0.00	1.02
Expressive language***	94.6 (18.3)	110.3 (10.8)	-3.42	0.00	1.04
Mental states**c	0.9 (1.81)	2.50 (2.39)	-2.38	0.02	0.76
Parental linguistic input					
NTU	128.9 (31.7)	129.0 (30.6)	-0.37	0.72	0.00
NTW	548.8 (197.2)	623.4 (156.0)	-1.67	0.10	0.41
NDW**	148.9 (44.3)	181.1 (31.7)	-2.98	0.00	0.84
MLU**	4.0 (0.8)	4.8 (0.6)	-2.86	0.00	1.87
High level***a	0.10 (.05)	0.16 (.04)	-3.74	0.00	1.33
Low levelb	0.15 (.05)	0.15 (.07)	-0.18	0.86	0.16
Mental states**c	4.4 (3.4)	9.0 (5.7)	-3.04	0.00	0.98

Abbreviations: MHL Moderate Hearing Loss, NH Normal Hearing, SD Standard Deviation NTU Number of Total Utterances; NTW Number of Total Words; NDW Number of Different Words; MLU Mean Length of Utterance.
[a,b] Proportion of utterances that were high/low. [c] number of mental state references
*p <.05, **p < .01***, p <.001

Table 3. Pearson's Correlation for HL-related variables and parental linguistic input variables

	NTU	NTW	NDW	MLU	Directing	High level	Mental states
Degree of HL	-.09	-.28	-.23	-.41	.11	-.79**	-.59*
Age at HA fit (months)	-.26	-.25	-.15	-.11	-.52*	.29	.01
Age at start FCEI (months)	-.30	-.37	-.31	-.32	-.49*	.21	-.15

Abbreviations: HA, Hearing Aid; FCEI; Family-Centered Early Intervention
*p <.05, **p <.01

Associations between linguistic input and language abilities

Table 4 shows the associations between parental linguistic input and children's language abilities. The number of utterances was unrelated to children's language abilities. Significant positive relations with children's language abilities were found for number of words, length of utterances, and high-level language. More exposure to different words, longer utterances and more high-level language was associated with better receptive language abilities in children with MHL and with NH. Low-level language (directing utterances) was negatively related to children's receptive language abilities. More high-level language, more exposure to different words and mental state language was related to better expressive language abilities in both children with MHL and NH. Longer utterances and more total words were related to better expressive language abilities in children with MHL but not in children with NH. Pearson's correlations between maternal educational level and parental linguistic input or children's language abilities revealed no significant associations.

Table 4. Pearson's correlations for parental linguistic input variables and child language scores

	Receptive language	Expressive language
NTU	.26	.19
NTW	.39*	.70***/ .05
NDW	.36*	.47*
MLU	.38*	.67**/ .05
High level[a]	.29*	.44**
Low level[b]	-.29*	-.11
Parental mental state terms[c]	.24	.35*

Note. Correlations are provided separately for the children with MHL and NH when these were found to be significantly different (using Fisher Transformation) (MHL/NH).
Abbreviations: NTU Number of Total Utterances; NTW Number of Total Words; NDW Number of Different Words; MLU Mean Length of Utterance.
a,b Proportion of utterances that were high/low
c number of mental state references
*p <.05, ***p <.001

DISCUSSION

Having a MHL puts children at risk for language difficulties (Tomblin, et al., 2015) and therefore it is important to optimize their language environment. Parents play a crucial role in promoting young children's language abilities (Hart & Risley, 1995). This study examined the quantity and quality of parental linguistic input to toddlers with MHL and toddlers with NH in relation to their language abilities. The outcomes revealed that parents of toddlers with MHL were as talkative to their children as parents of children with NH. However, the quality of their linguistic input differed from that of parents of children with NH. Parents of toddlers with MHL used less high-level language, including fewer mental

states references, a limited vocabulary, and shorter utterances than parent of toddlers with NH. The exposure to low-level language (directing utterances) did not differ between toddlers with MHL and NH. Both the quantity of parents' linguistic input and exposure to high-level language (quality) were positively related to children's language abilities.

Children with MHL were exposed to similar amounts of words and utterances compared to children with NH. These findings are in line with Ambrose et al. (2015), who reported no differences between 18 and/or 36-month-old children with mild to severe HL and NH in the number of exposed utterances. However, Ambrose and colleagues reported that three-year-olds with HL in their study were exposed to fewer words in the interactions with their parents. This difference was not found in the 18-month-olds in the Ambrose et al. study, or in the 30-month-olds in the present study. A possible explanation of these findings may be that parents of children with NH increase the amount of words they use during interactions at an earlier moment in time than parents of children with HL. In addition, the language difficulties of children with HL become more prominent with age and parents may adapt their language input accordingly.

Unlike parents in the studies by Ambrose et al. (2015) and Desjardin et al. (2014), parents of children with and without MHL in our study used a similar amount of low-level language (directing utterances). However, Ambrose and DesJardin coded the parent-child communication during a structured art gallery task (Ambrose et al.) or while reading a picture book (Desjardin et al.). Both tasks may have elicited more directive behavior than the free play activity that was used in the present study. Shifting the child's attention between the object of conversation (a picture or a book) and themselves in the other studies might have required parents to use more directive language. Another explanation for the inconsistency in the above findings may be related to differences between the studies in the degree of HL in the children studied. In the present study, only children with a HL between 40-60 dB were included (moderate hearing loss), while Ambrose et al. and Desjardin et al. included children between 20-90 dB HL. Low-level parental linguistic input to children with MHL was related to a number of early intervention variables. Negative associations were found between low-level language exposure and the age of HA fitting and start of family-centered early intervention. Children who began the intervention at a younger age were exposed to more directing utterances. These findings may reflect the fact that parents are taught to use directive strategies (e.g., to stimulate eye contact and joint attention) from the start of early intervention. The sooner the start of intervention, when children are at the pre-linguistic level, the more likely it may be that parents adapt their communication in a way that is suited for that level (i.e., low-level language input, directing strategies), but less appropriate for the next language level (i.e., high-level language input; Cruz et al., 2013).

Children with MHL were exposed to less high-level language than their peers with NH. Parents of children with MHL used a limited vocabulary, shorter utterances, and fewer

conversational eliciting utterances than parents of children with NH. These results were in line with an earlier study of three-year-old children with mild to severe HL (Ambrose et al., 2015). Another feature of high-level linguistic input is the use of mental state language. Exposure to mental state language is not only beneficial for children's language development but also for their social-emotional development (Moeller & Schick, 2006; Taumoepeau & Ruffman, 2008). In line with findings of Moeller and Schick and Morgan et al. (2014), the results of the current study showed that parents of children with MHL used less mental state language than parents of children with NH.

In line with our expectations and the results of other studies (Ambrose et al., 2015: Cruz et al, 2013; Desjardin et al., 2014; Nittrouer, 2010), children with better expressive and receptive language abilities had parents who used more high-level language, had a more extensive vocabulary, and longer utterances. The reported negative association between the degree of HL and high-level language input by Ambrose et al. was also found in this study, despite the smaller dB range in our study: children with more severe HL were exposed to less high-level language than with less severe HL.

It is unclear what the impact of this limited exposure to high-level language is on the language development of children with MHL. One possibility is that it may impede further language development: parents of children with MHL may underestimate their capacities and therefore provide insufficient stimulation for children to attain the next level of development. Another possibility is that parents may appropriately modify their language use to fit the poorer language abilities of children with MHL, relative to children with NH. Parents of children with MHL may in fact be highly sensitive to their children's abilities and adapt their linguistic input accordingly. From a social constructivist perspective, language learning takes place in the "zone of proximal development" (Vygotsky, 1978): parental linguistic input should be sufficiently challenging for a child to learn new words, neither too simple nor too difficult. This requires parents to be sensitive enough to acknowledge a child's changing language abilities and to provide them with more complex input when appropriate.

The current findings have several implications for family-centered early intervention programs for children with MHL and their families. The results suggest that parent-child interactions are related to the language development of children with MHL and that the language abilities of these children are lower than those of their hearing peers. Several implications for practice can be drawn from these findings. First, it is important to carefully monitor a child's language development so their current level of language abilities can be determined. Next, observations of parent-child interactions are needed to gain insights into the current linguistic input by parents. Based on this information, the appropriate level of parental linguistic input that is needed at that moment to promote children's language development can be determined. Early interventionists may coach parents in providing this linguistic input during daily activities by modeling and video-feedback

techniques. Interactive storybook reading may be one of the activities that could be used to elicit rich parent-child conversations to promote children's language and social-emotional development (Dirks & Wauters, 2015).

Interventions in which storybooks are used to promote mental state language are of interest because storybook reading enhances language development in general in children with HL (DesJardin, et al., 2014; Fung, Chow, & McBride-Chang, 2005). Research on reading storybooks to promote mental state language is mostly focused on hearing children (Adrian et al, 2006; Aram, Fine, & Ziv, 2013; Taumoepeau & Reese, 2013). Aram et al. examined the effect of an intervention to promote parents' use of mental state language during storybook reading with hearing children. After the intervention parents and children referred more often to mental state terms than parents and children who did not follow the intervention. Storybook reading could be useful in exposing MHL children to high-level language and mental state language; however, parents do not do this naturally and we need to support them (Dirks & Wauters, 2018).

One limitation of this study is the cross-sectional design, due to which the causality of relationships between linguistic input and children's language abilities cannot be specified. Future studies could longitudinally examine the linguistic input to younger hearing brothers or sisters of children with MHL and compare them with the input to children with MHL at that age. Future studies could also include hearing children with the same language levels as those of children with MHL to compare their linguistic input.

Another limitation is the relatively small sample size. Despite the limited sample, the findings replicated those found by Ambrose et al. (2015). This was one of the first studies that examined parental mental state language in the interactions of young children with MHL. Future studies should investigate the relationship between mental state language and social-emotional development in this group of children.

In this study we examined the linguistic interactions of toddlers with MHL and their parents in their home environment. When children grow up, they also spend time with peers in day-care or playgroups. Given that early interactions between peers are important for children's development, future studies could examine the (linguistic) interactions of children with MHL and their peers.

Conclusions

Parental linguistic input to children with MHL was found in the current study to be related to children's language abilities. The quantity of parents talk to children with MHL is similar to that of parents of children with NH. The input is however of a lower quality, with parents using less high-level language and mental state language. A question that requires further examination is whether these parents actually appropriately adapt their language use to their child's current capacities, or whether they could further challenge their child with

MHL by using more high-level language? Early interventionists should carefully monitor children's language abilities and their exposure to (parental) linguistic input in order to optimize and promote their language development.

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