Psychopathology in hearing-impaired children

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CHAPTER 2

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Self-esteem in hearing-impaired children and adolescents: the influence of communication, education, environment, and audiological characteristics

In revision

ABSTRACT

Objective

Sufficient self-esteem is extremely important for psychosocial functioning. Yet, hearing-impaired children are hypothesized to encounter difficulties regarding their self-esteem, because they have less or no access to the sound-dominated world. The aim of this study was to compare levels of self-esteem in hearing-impaired children to those of normally hearing children and to investigate the influence of communication, education, environment, and audiological characteristics.

Methods

This large (N = 252), retrospective, multicenter study used a sample (mean age = 11.8 years) that consisted of two age- and gender-matched groups: 123 hearing-impaired children and 129 normally hearing controls. Self-reports were used to measure self-esteem in four relevant domains: social acceptance by peers, parental attention, physical appearance, and general perception of the self.

Results

Hearing-impaired children experienced lower levels of self-esteem regarding peers and parents than normally hearing controls. Particularly hearing-impaired children who attend special schools for the deaf were at risk, after correcting for their language development and intelligence. Yet, levels of general self-esteem and self-esteem involving physical appearance in hearing-impaired children equaled those of normally hearing controls. Furthermore, younger age at implantation and longer duration of having CIs were related to more self-esteem.

Conclusion

Hearing impairment has a negative effect on self-esteem in the social domains. Yet, due to the heterogeneity of the hearing-impaired population, large variability in levels of self-esteem is present.

Discussion

Clinicians must always be aware of the risk and protective factors related to self-esteem, in order to help the individual patient reaching the full potential.

INTRODUCTION

Self-esteem is defined as one's general evaluation or appraisal of the self as a totality [1]. For example, good school performance leads to more self-esteem [2]. Self-esteem is an essential indicator of mental health later in life, because it has a continuous and large impact on well-being, motivation, and behavior [3]. Yet, individuals with sufficient self-esteem are able to cope more adequately with stressful life events [1]. Conversely, low self-esteem is associated with loneliness, peer rejection, delinquency, and psychopathology, which can possibly result in impaired social functioning [2-5].

It can be speculated that hearing-impaired (HI) individuals encounter more difficulties regarding their self-esteem, because they often face multiple challenges, including speech and language delays, communication problems, and less or no access to the sound-dominated world. The studies that looked more in-depth into levels of self-esteem in HI children showed inconsistent results. When compared to their normally hearing (NH) peers, some researchers reported less self-esteem in mildly [6] to profoundly [7,8] HI children [9], while others demonstrated that levels of self-esteem were similar to those of NH counterparts [10-14]. No consensus either was reached for the influence of type of school on self-esteem: some researchers stated that type of school was important for the level of self-esteem [14], with children attending mainstream schools having more self-esteem than the ones attending special schools [15], whereas others found no difference [16]. Yet, other studies consistently demonstrated that some factors could improve self-esteem. For example, good language and communication skills have been linked to more self-esteem [17]. In addition, some older studies which included deaf children before the cochlear implantation era showed that deaf children of deaf parents [18] reported more self-esteem than the ones with NH parents. This entails that parental hearing status is related to self-esteem. Yet, nowadays many of the deaf children receive cochlear implants (CIs), which considerably changed and improved outcomes for them. That is, CI-recipients have been found to have levels of self-esteem that equaled those of NH children [12,13].

Self-esteem is often conceptualized as being multidimensional, resulting in different domains related to various facets of life and one separate domain consisting of a general view of oneself [3,19]. Self-esteem can fluctuate considerably across different domains, particularly during adolescence because it is a transition phase marked by crucial emotional and behavioral changes [3]. Parents become less influential, while close friends' and classmates' judgments become more important. Attention and perception of one's physical appearance also increase. So, a child can be at risk for low self-esteem in one specific domain, but not in other domains, and these distinctions must always be taken into account when helping or counseling the child. Besides the contrasting findings in past research, there is a paucity of data concerning the different domains of self-esteem in HI children compared to NH children. Only few studies reported on different domains in HI children when compared to NH controls and found that the HI children had more difficulties regarding peer acceptance and family relations, but similar or even higher levels for physical appearance [7,8,14]. To the best of our knowledge, to date, no other studies have been performed in which these four different domains were studied and compared in both HI and NH children.

Hence, our goal was not only to investigate the level of self-esteem in a large and diverse sample of HI and NH children and adolescents, but also to examine four relevant domains: social acceptance by peers, parental attention, physical appearance, and general perception of the self. Secondly, we wanted to study whether 1. communication, 2. education, 3. environment (i.e., parental and friend's hearing status), and 4. audiological characteristics would influence the level of self-esteem, because this knowledge could improve targeted interventions. Based on (the majority of) the existing literature, we expected that: 1. adequate communication skills would result in more self-esteem; 2. children attending special schools for the HI would have lower self-esteem than children at mainstream school. Concerning parental and friends' hearing status no recent studies were available on which to base our predictions on. This was also the case for audiological factors, so we will perform several explorative analyses to see whether relations between these factors and the level of self-esteem exist.

MATERIALS AND METHODS

Participants

A total of 252 children (Mean age = 11.8 years, *SD* = 1.7) participated, of which 123 with hearing losses and 129 NH controls. All participants lived in the Netherlands or the Dutch speaking part of Belgium and had nonverbal intelligence quotients of at least 80, ruling out learning problems. The HI participants met the following inclusion criteria: experiencing hearing loss of at least 40 decibels in the best ear, which was detected pre- (< 3 years) or perilingually (3 - 5 years), and having no other comorbidities, such as visual impairment or Autism Spectrum Disorders. Table 1 shows characteristics of the study group. For the cochlear implant (CI) recipients specifically, the mean age at implantation was 3.8 years (*SD* = 2.7; range = 0.9 – 10.8 years). The mean duration of CI use was 8.3 years (*SD* = 2.6; range 0.8 – 13.0 years). Additionally, most CI users (*n* = 40; 76%) had one CI and 13 (24%) children were bilaterally implanted.

Table 1 Characteristics of all participants

	Total sample (N = 252)		**HI sample (*n* = 123)**	
	Controls	**HI**	**CI**	**Hearing aid**
Number of children - *n*	129	123	53	70
Age mean in years (*SD*)	11.6 (1.3)	12.0 (1.8)	11.9 (2.1)	12.0 (1.7)
Age range (in mo)	99 - 176	100 - 197	100- 197	110 - 188
Gender - *n* (%)				
Male	58 (45%)	60 (49%)	24 (45%)	36 (51%)
Female	71 (55%)	63 (51%)	29 (55%)	34 (49%)
Socioeconomic status mean (*SD*) [a]	12.1 (2.4)	11.5 (2.3)	11.7 (2.3)	11.3 (2.4)
Socioeconomic score range	5.3 - 15	4 - 15	7.3 - 15	4 - 15

Table 1 Continued

Nonverbal IQ				
IQ norm score Picture arrangement (*SD*)	10.6 (3.4)	10.2 (3.5)	9.9 (3.5)	10.4 (3.5)
IQ norm score Block design (*SD*)	10.6 (3.0)	10.4 (3.1)	10.3 (2.8)	10.5 (3.4)
Spoken language skills [b]				
Sentence comprehension (*SD*)	7.1 (2.3)	6.6 (3.1)	6.6 (3.1)	6.7 (3.1)
Story comprehension (*SD*)	7.0 (2.5)	6.3 (2.8)	5.6 (3.0)	6.8 (2.6)
Sign language skills [c]				
Sentence comprehension (*SD*)	-	2.3 (0.9)	2.1 (1.0)	2.3 (1.0)
Story comprehension (*SD*)	-	2.6 (0.7)	2.8 (0.8)	2.5 (0.7)
Children's Communication Checklist [d]				
General Communication Composite (*SD*)	73.9 (18.2)	91.3 (18.2)	91.9 (18.4)	90.8 (18.2)
Pragmatic Composite (*SD*)	36.2 (9.1)	46.6 (8.7)	47.3 (9.1)	46.1 (8.5)
Degree of hearing loss - *n* (%) [e]				
Moderate (40 - 60 dB)	-	29 (24%)	0 (0%)	29 (41%)
Severe (61 - 90 dB)	-	25 (20%)	1 (2%)	24 (34%)
Profound (> 90 dB)	-	61 (50%)	50 (94%)	11 (16%)
Unknown	-	8 (6%)	2 (4%)	6 (9%)
Preferred mode of communication - *n* (%)				
Oral language only	-	88 (71%)	36 (68%)	52 (74%)
Sign-supported language	-	33 (27%)	17 (32%)	16 (23%)
Sign language only	-	2 (2%)	0 (0%)	2 (3%)
Type of education - *n* (%)				
Regular education	-	74 (60%)	32 (60%)	42 (60%)
Special education	-	49 (40%)	21 (40%)	28 (40%)
Mean age at onset in years (*SD*)	-	1.6 (1.3)	1.3 (0.9)	1.9 (1.5)
Age at onset of hearing loss - *n* (%)				
Prelingual (< 3 yrs)	-	104 (85%)	49 (93%)	55 (79%)
Perilingual (3 - 5 yrs)	-	12 (10%)	2 (4%)	10 (14%)
Unknown	-	7 (6%)	2 (4%)	5 (7%)
Mean age at 1st hearing aid in years (*SD*)	-	2.1 (1.4)	1.4 (0.9)	2.6 (1.6)

[a] Socioeconomic status score was measured by parental education, job, and net income. (Unfortunately, due to privacy reasons, almost half of the parents did not fill out the question concerning the net income, so these were not taken into account.)

[b] Spoken language skills were derived from the Clinical Evaluation of Language Fundamentals®; see Materials section for more information.

[c] Sign language skills were derived from the Assessment Instrument for Sign Language of the Netherlands; see Materials section for more information.

[d] Higher scores indicate more (social) language problems. More than 70% of the parents responded.

[e] Degree of hearing loss was calculated by averaging unaided hearing thresholds at 500, 1,000, and 2,000 Hertz.

Procedure

To collect a sample that represented the complete spectrum of HI children, we recruited from 28 (both primary and secondary) regular schools and special schools for the deaf (schools that supported development of auditory and oral skills, with or without the use of signs), 2 hospitals, 5 Speech and Hearing centers or residential schools, and via social media. In line with privacy policy, consent forms were sent to the parents via these schools, organizations, and hospitals. In total 14 schools and all ambulatory organizations and hospitals agreed to participate. The other schools did not participate due to time commitment or other research projects. The NH controls were recruited from primary and secondary schools across the country to reach a geographically and socioeconomically diverse sample.

Before the assessment started, all children were assured that the given answers would be processed anonymously. Instructions were provided clearly, in the child's preferred mode of communication to ensure that the child understands. The participant could choose between two versions of the questionnaires: the first version comprised written items exclusively and in the second version each item was presented in written text and sign language simultaneously (by means of a video clip). Translation from spoken language into sign language was performed by a qualified interpreter and back translation of all signed items showed good convergence with the original items.

Ethics statement

Approval for the study was obtained by the Medical Ethics Committee of the Leiden University Medical Center under number P10.137, and carried out in accordance with the standards set by the Declaration of Helsinki. All parents or caregivers gave written consent for their child's participation prior to data collection. Next to parents and caregivers, all children aged 12 or older gave written consent as well.

Self-esteem questionnaire

To assess Self-esteem, the self-report *Children's Self-Confidence and Acceptance Scale* was used [20], which has been used only in NH children. This questionnaire showed a strong convergent validity with the CBSK [21], which is the Dutch well-established version of the Harter's self-esteem scale (*The Self-Perception Profile for Children* [22]). The reason for choosing a self-report instead of parent or teacher-reports is that self-reports give most accurate scores when measuring self-esteem [23,24]. The questionnaire represents four relevant domain-specific categories:

1. The *Perceived social acceptance* by peers domain examines the perception of the child of how well he or she is accepted by peers or feels popular (Example item: "All Children ask to play with me").
2. The *Perceived parental attention* domain assesses the self-perceived degree to which parents or caregivers are interested in and give support to the child's thoughts and needs ("My father or mother are happy with me").
3. The *Perceived physical appearance* domain reflects the child's idea of how good-looking or attractive he or she is ("Other children think my appearance is nice").

4. The *General perception of the Self* measures the child's perceptions of general statements concerning the self ("I am happy with myself").

Children were asked to rate the items on a 3-point Likert-type scale (1 = *not true*, 2 = *sometimes true*, 3 = *often true*). The internal consistency was good for both the HI and the NH group (Table 2).

Table 2 Psychometric properties of the four domains of Self-esteem

	Range	Number of items	Inter-item correlation	Cronbach's Alpha	
				HI	NH controls
Domains of Self-esteem					
Perceived social acceptance by peers	1 - 3	5	.75	.74	.75
Perceived parental attention	1 - 3	7	.34	.76	.75
Perceived physical appearance	1 - 3	5	.46	.83	.78
General perception of the self	1 - 3	5	.25	.66	.60

Intelligence

An index of the nonverbal intelligence was obtained with two tests of the *Wechsler Intelligence Scale for Children - Third Edition*: Block Design by copying geometric designs with cubes and Picture Arrangement by sequencing pictures to make logical stories [25,26]. All raw scores were converted into age-equivalent norm scores based on Dutch standards (10 = average). A random sampling (n = 23) across HI children who were assessed with a complete intelligence test earlier (either the Snijders-Oomen Nonverbal Intelligence Test [27] or the WISC) showed a high correlation between the scores of our tests and the IQ score, r = .79, p < .001. The tasks were not administered to 8 HI and 17 NH children, due to time constraints.

Language and communication skills

Two types of language skills were assessed; *Sentence comprehension* and *Story comprehension*. HI children using spoken language and NH controls received two corresponding subtests of the Dutch version of the *Clinical Evaluation of Language Fundamentals® - Fourth Edition* (CELF®) [28,29]. HI children who use sign or sign-supported language received specific subtests of the *Assessment Instrument for Sign Language of the Netherlands* (AISL) [30]. All original language scores were transformed to norm scores and these were corrected for chronological age. To 10 HI and 16 controls the Sentence comprehension task was not administered and to 5 HI and 16 NH controls the Story comprehension task was not administered.

The *Children's Communication Checklist version 2* was used to identify communication problems indicated by the parents or caregivers [31]. This questionnaire, consisting of 70 items, has been predominantly designed for assessing social and pragmatic language of children aged 4 to 16, although it also assesses other qualitative aspects of language.

The checklist contains eight scales: a. speech production, b. syntax, c. semantics, d. coherence, e. inappropriate initiation, f. stereotyped conversation, g. use of context, and h. non-verbal communication. Two composite scores are conventionally obtained from these scales: the General Communication Composite (GCC; scales a to h) and the Pragmatic Composite (PC; scales e to h). Each item can be scored from 0 (*never or less than 1 time a week*) to 3 (several times a day or always). To the parents of the HI children using sign or sign-supported language, the speech production and syntax scales were self-evidently not administered.

Environment: parental and friend's hearing status

Of each HI child the *Environmental context* (Table 3) was evaluated by checking whether the parents and the best friend of the participant had hearing losses or not, because past research showed that daily interaction with other HI people, such as parents and peers[3], could be important for the level of self-esteem [32]. For the Friends' hearing status, a significant difference between the children at regular and special schools was found, with more HI friends and parents in the group of children attending special schools, $X^2(1) = 23{,}50$, $p < .001$. The Parental hearing status did not differ.

Table 3 Environmental context: hearing status of parents and friends, divided by school

	Total sample HI (*n* = 123)	**Regular education (*n* = 74)**	**Special education (*n* = 49)**
Parental hearing status			
One/both parents HI - *n* (%)	10 (14%)	5 (12%)	5 (19%)
Both parents NH - *n* (%)	59 (86%)	37 (88%)	22 (82%)
Unknown	54	32	22
Friend's hearing status			
Friend HI - *n* (%)	20 (21%)	3 (5%)	17 (35%)
Friend NH - *n* (%)	62 (67%)	47 (81%)	15 (43%)
No friend - *n* (%)	11 (12%)	8 (14%)	3 (6%)
Unknown	30	16	14

Statistical analyses

First, in order to compare the levels of Self-esteem between the HI group and the NH controls, Multivariate Analysis of Variance (MANOVA) and Multivariate Analysis of Covariance (MANCOVA) were used. In the MANCOVA several covariates were incorporated, including Age, Gender, IQ, SES and Language and Communication skills. For the second and third research questions (i.e., influence of Communication skills and Type of school, respectively) MANCOVAs were performed, in which confounding variables were included in case of group differences. The fourth study question involved studying the influence of Parental and Friend's hearing status on levels of Self-esteem, but unfortunately, some

subgroups did not reach sufficient participants to be able to perform a proper analysis, due to lack of statistical power. These results were therefore omitted from the results presented here. The fith and final study question was addressed by examining several audiological factors and their association with levels of Self-esteem by using Pearson's correlations. The program *Statistical Packages for the Social Sciences* version 20.0 was used. When a score or variable was not available, the participant was excluded from the analysis concerned. It was checked whether there were group differences on age, gender, socioeconomical status (SES), and type of hearing device between responders and non-responders and this was not the case.

RESULTS

Self-esteem in HI versus NH children

First of all, no significant differences (using *t*-tests) were found between the HI and NH group on several baseline characteristics, including Age, Gender, Nonverbal IQ, and SES, which makes them properly comparable. To compare the groups with respect to their levels of Self-esteem, a 2 (Group: HI or NH) x 4 (Domains of Self-esteem) MANOVA was carried out. This analysis revealed a multivariate effect for Group, $F(4, 247) = 11.67$, $p < .001$. Post-hoc tests showed that HI children had lower self-esteem than NH controls on two domains: the Social acceptance by peers domain ($\Delta = 0.2$, $p < .002$) and the Parental attention domain ($\Delta = 0.2$, $p < .001$) (Figure 1). For Global self-esteem and self-esteem involving Physical appearance similar levels were detected. A MANCOVA was performed in which we controlled for several important variables (i.e., Age, Gender, IQ, and SES). The findings retained their significance, so these results were omitted from the results presented here.

Communication skills and Self-esteem

As expected on the basis of past research, HI had less Language and Communication skills than NH children, using *t*-tests (Story Comprehension, $\Delta = 0.8$, $p < .038$, General Communication Composite, $\Delta = 17.4$, $p < .001$, and Pragmatic Composite, $\Delta = 10.4$, $p < .001$, respectively). Therefore, a 2 (Group: HI or NH) x 4 (Domains of Self-esteem) MANCOVA corrected for Language and Communication skills was carried out. Again a multivariate effect for Group was detected, $F(4, 159) = 3.01$, $p < .021$. Yet, post-hoc tests showed slightly different results than the first MANOVA: HI children still experienced less Self-esteem involving the Parental domain, whereas the Social acceptance by Peers domain did not reach significance anymore. This entails that adequate Language and Communication skills can interfere with Self-esteem regarding Peers but not regarding Parents.

Type of school and Self-esteem

In order to properly examine levels of Self-esteem between HI children at special schools (for the HI or deaf) and at mainstream schools, these two groups were compared on

several factors: Age, Gender, IQ, SES, and Language and Communication skills. It was found that the latter group had significantly better Language, Communication, and Intelligence skills. A 2 (Type of school: special or mainstream) x 4 (Domains of Self-esteem) MANCOVA which was corrected for these skills. The findings showed a multivariate effect for Group ($F(4, 71) = 3.89$, $p < .007$). Post-hoc tests revealed that children at specials schools ($M = 2.3$, $SD = 0.3$) had lower levels of self-esteem regarding their parents than children at regular schools ($M = 2.7$, $SD = 0.3$), $p < .001$, irrespective of their Language and Communication skills, and Intelligence.

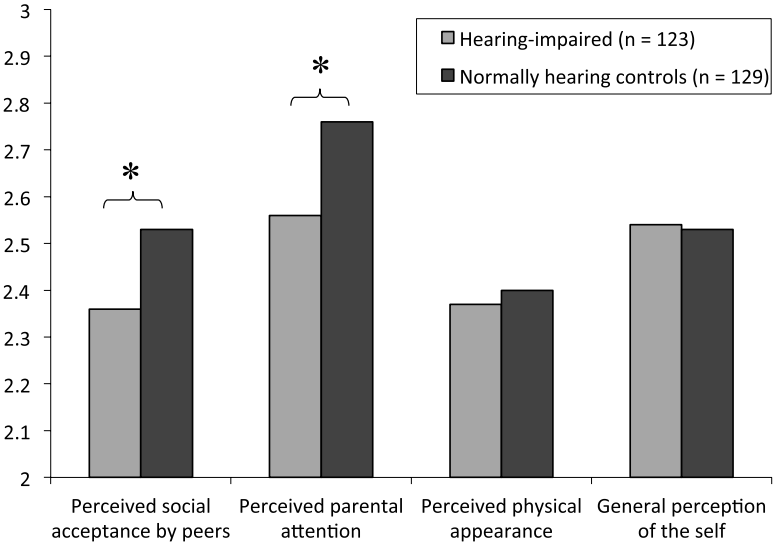

Figure 1 Mean scores Self-esteem per domain.
*$p < .05$.

Table 4 Pearson's correlations between the four domains of Self-esteem and associated variables

	Domains of Self-esteem			
	Perceived social acceptance by peers	**Perceived parental attention**	**Perceived physical appearance**	**General perception of the self**
Type of hearing device (CI or hearing aid)	.04	-.10	.02	.12
Age of onset hearing loss	-.02	-.04	.06	-.04
Age at first 1st hearing aid	-.02	.09	.04	-.10
Uni- or bilateral CI	-.01	-.05	-.04	.11
Age at CI implantation	.16	-.36*	.20	-.08
Duration of CI use	-.21	.38**	-.07	-.07

*$p < .05$; ** $p < .01$.

Audiological factors

Finally, a series of Pearson's correlations were carried out to see which audiological factors, typical for the HI population, were associated with Self-esteem (Table 4). For three domains (Peers, Physical appearance, and General), no significant associations were detected. However, for the Parental attention domain younger Age at implantation, and subsequent longer Duration of having CIs were related to more Self-esteem. These correlations remained significant when a correction for age was performed, using partial correlation analyses.

DISCUSSION

Self-esteem is a principal prerequisite for healthy psychosocial development and enables children to adjust to stress or burdens [33]. HI individuals often meet demanding situations, so it is of major importance to have sufficient self-esteem. By tapping self-esteem across a number of domains, a differentiated picture of self-esteem was obtained, so that targeted interventions could take place. First, we found that the levels of general and physical self-esteem of HI children equaled those of NH controls, despite wearing external amplification devices visible for their surroundings. This suggests that HI children do not feel more insecure about their looks than other teenagers around this age, which is a positive finding. However, HI children reported lower self-esteem in the domains of peers and parents when compared to NH peers, although adequate language and communication skills increased self-esteem regarding peers, but not regarding parents.

The fact that HI children reported lower self-esteem than NH children in the social domains indicates that HI children feel less liked and appreciated by parents and peers, which is in line with other studies with HI children or subgroups (related to neurological disorders and type of school) [7,8]. Possible reasons for lower self-esteem involving parents could be subjective or objective. Children might perceive that their parents spend less time with them, while in fact parents spend equal or even more time compared to their time with NH children. However, the quality of contact could be different. Parents usually perceive more stress and worries raising a HI than a NH child, because they have to adapt to a new situation which necessitates the investment of time, effort, and resources [34-36]. For example, it requires frequent hospitals visits and intensive rehabilitation programs. Furthermore, past literature showed that chronic parenting stress towards the child can influence the child's functioning [37,38]. It could also be speculated that parents try hard to help the HI child, by for example, speaking slowly to them, helping them with homework, or explaining difficult words [39]. However, children could perceive the increased attention as if they fail or fall behind.

Yet, language and communication skills were positively linked to self-esteem in the peers domain (not in the parents domain). This means that HI children's self-esteem regarding peers equals that of NH children when their language and communication skills are well-developed. HI children are still born into a NH world, where the focus lies on spoken language, resulting in less satisfactory communication. For example, making friends can

be harder for HI children and they are also more neglected and less accepted by NH peers [9,40-43]. The communication barrier between HI and NH people can function as an obstacle for successful interpersonal relationships and hampers the children in developing solid social networks [18,44]. This process may pave the way for social isolation and loneliness, with consequences for the child's self-esteem [45,46]. Hence, by improving language and communication, the HI child can increase his or her self-esteem towards peers.

Moreover, this research revealed that particularly children who attend special schools for the HI or deaf had lower self-esteem concerning parents when compared to HI children attending mainstream schools. Although we have to bear in mind that HI children with language and/or intelligence problems already are more likely to be referred to special schools [15,47-49], this study is the first to show that even after correcting for these problems, children at special schools still have lower levels of self-esteem. It could be hypothesized that this stems from reasons related to discrimination or stigma. Furthermore, HI children often have to travel far to go to their (special) schools, which results in different environments: they have friends at school and different friends at home. Less contact with peers could hinder bonding and attachment, possibly resulting in lower self-esteem [50]. However, longitudinal studies are needed to reproduce these findings, because a cross-sectional study rules out drawing conclusions about causal relations. Additionally, such longitudinal studies must include larger samples in order to examine the influence of the parental and friend's hearing status on the level of self-esteem.

To conclude, self-esteem in HI children can be a problem in the social domains, but luckily, the levels of global and physical self-esteem are similar to those of NH children. Improving language and communication skills can help building up more self-esteem regarding peers Yet, irrespective of their language and communication skills, HI children at special schools still have problems with their self-esteem. Hopefully, this research creates awareness concerning this vulnerable group of children, resulting in more attention and monitoring by professionals, in order to stimulate mental health in each HI child.

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