Psychopathology in hearing-impaired children

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CHAPTER 7

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Psychopathology and its risk and protective factors in hearing-impaired children and adolescents: a systematic review

JAMA Pediatrics (in press)

ABSTRACT

Importance

Pediatric hearing impairment is a chronic handicap that can potentially lead to the development of psychopathology. Yet, for hearing-impaired children and adolescents, the exact occurrence of various forms of psychopathology and its causes are unclear, while this knowledge is essential to enable targeted screenings and interventions.

Objective

This systematic review investigates the level of psychopathological symptoms in hearing-impaired children and adolescents as compared to normally hearing peers. Secondly, the influence of type of hearing device and possible risk and protective factors on psychopathology were examined.

Evidence

Review A systematic literature search was performed covering relevant databases, including PubMed, Embase, and Web of Science. Two independent researchers identified the relevant articles. The final search was performed on the 2nd of May 2013 and resulted in a total of thirty-five articles.

Findings

Literature consistently demonstrated that hearing-impaired children and adolescents were more prone to developing depression, aggression, Oppositional Defiant Disorder, Conduct Disorder, and psychopathy than their normally hearing peers. Levels of anxiety, somatization, and delinquency were elevated in some, but not all hearing-impaired participants, for reasons related to gender, age, and type of school. Divergent results were obtained for the level of Attention Deficit Hyperactivity Disorder and the influence of type of hearing device on psychopathology. Possible risk and protective factors were identified, including age at detection and intervention of hearing loss, additional disabilities, communication skills, intelligence, type of school, and number of siblings.

Conclusions and Relevance

Literature on psychopathology in hearing-impaired children and adolescents is scarce and sometimes inconsistent. To define a more precise occurrence of psychopathology, more studies are needed. These studies should have a longitudinal design to draw firmer conclusions on causality. Hopefully this will lead to more knowledge in the future, in order to help and support each HI individual.

INTRODUCTION

In the last few decades, research in the field of social and emotional development and psychopathology in hearing-impaired (HI) children and adolescents has emerged gradually. As promoted by the World Health Organization, many studies reported on broad and general concepts, such as Quality of Life and mental health [1,2]. These studies demonstrated fairly consistent outcomes, with lower Quality of Life and more mental health problems in HI than in normally hearing (NH) children and adolescents [1,3-11]. For example, HI individuals have more difficulties with making friends and are more socially isolated [12-14]. Although Quality of Life and mental health give a good first impression, knowledge on specific psychopathological forms, such as depression or Attention Deficit Hyperactivity Disorder (ADHD), give a more differentiated view [15]. In fact, this knowledge allows performing targeted screenings and interventions on psychopathology in HI children and adolescents, since nowadays only the ones that evidently stagnate in their functioning are helped.
In line with the *Diagnostic and Statistical Manual of Mental Disorders – IV*, two broad categories of psychopathological symptoms can be identified: internalizing and externalizing symptoms. Internalizing reflect symptoms such as depressive/anxious feelings, and somatization, whereas externalizing refer to symptoms such as aggressive, oppositional defiant and delinquent behavior, and impulsivity [16]. Both internalizing and externalizing symptoms have a destructive impact on daily social and occupational functioning and are precursors to various psychiatric disorders later in life [17,18]. Hence, it is of the utmost important to prevent HI children from developing psychopathology. Additionally, researchers stress the fact that factors that increase risks for, or conversely, protect against psychopathology must be listed [1,5,11]. Therefore, the aim of this review is three-fold: 1. to describe the occurrence of psychopathological symptoms in HI children and adolescents, as compared to NH peers; 2. to examine the possible effect of type of hearing device on the development of psychopathology; 3. to study which auditory, medical, communication, intellectual, and sociodemographic factors potentially influence the level of psychopathology.

METHODS AND MATERIALS

Inclusion criteria

This review included studies that reported on internalizing (i.e., depression, anxiety, and somatization) or externalizing symptoms (i.e., aggression, delinquency, ADHD, oppositional defiant disorder, conduct disorder, and psychopathy). Involving the participants of each study, the following inclusion criteria were formulated: 1. having permanent bilateral hearing losses, 2. that are moderate to profound (i.e., 40 to 120 dB at the better ear, calculated by averaging unaided hearing thresholds at 500, 1,000, and 2,000 Hertz), 3. being child (6-12 years) or adolescent (12-18 years). We chose this age range, because it is a transition phase marked by large psychological and cognitive changes that pertain to emerging adulthood.

Literature search

A systematic literature search on various forms of psychopathology in HI participants covered relevant databases, including PubMed (1946-2013), Embase (OVID version, 1974-2013), and Web of Science (1945-2013). The subject query was applied in all databases taking into account the terminological differences between these databases. The query consisted of the combination of three subjects: 1. Hearing impairment; 2. Psychopathology; 3. Child or adolescent. Various synonyms and related terms for the subjects were used (Appendix 1 shows all accompanying search terms). The final search was performed on the 2nd of May 2013. Papers that are currently under review were also included, because of scarce literature. Limits were set to include English, French, German, and Dutch language articles. Case reports, editorials, and letters were excluded.

Selection of articles

Two investigators (S.T. and A.N.) independently screened all unique article titles and abstracts to identify which articles were relevant. Disagreements were solved by discussion. Additionally, a manual review of citations within the bibliography of relevant articles was performed. The initial search generated a total of 7954 abstracts, of which 206 were identified as potentially relevant. Involving our first aim of this review (i.e., the occurrence of psychopathology), 15 met the inclusion criteria. Most of these studies reported on one form of psychopathology, but some included more forms. For the second aim (i.e., type of hearing device) another 3 new studies were included and for the third aim (i.e., risk and protective factors), 17 other studies were included (Figure 1). All studies were published in peer-reviewed journals and were assessed for their level of evidence. In line with the guidelines of the Cochrane Collaboration [19], the included studies had recommendation B (cohort or case-control study), except for one study by Vostanis et al. which had recommendation C (case-series study) [7]. Due to differences in outcomes when examining different study samples, the 18 included studies on specific psychopathological symptoms were grouped based on the study sample and recapitulated in Table 1 (community-based samples), 2 (samples with children attending special schools and/or profoundly HI), and 3 (children with cochlear implants).

RESULTS

Internalizing symptoms

Seven studies investigated *depression* in HI children and adolescents. Three studies included representative community-based samples [39,40] and four studies examined children with a minimum of 90 dB, which almost all attended special or residential schools for the deaf [4-6,41]. These seven studies had coherent results: when compared to NH controls, higher scores were obtained both by parent-reports [5,6] and self-reports [4,40-42]. Lifetime prevalence for depression was 26%, based on clinical interviews with parents [39],

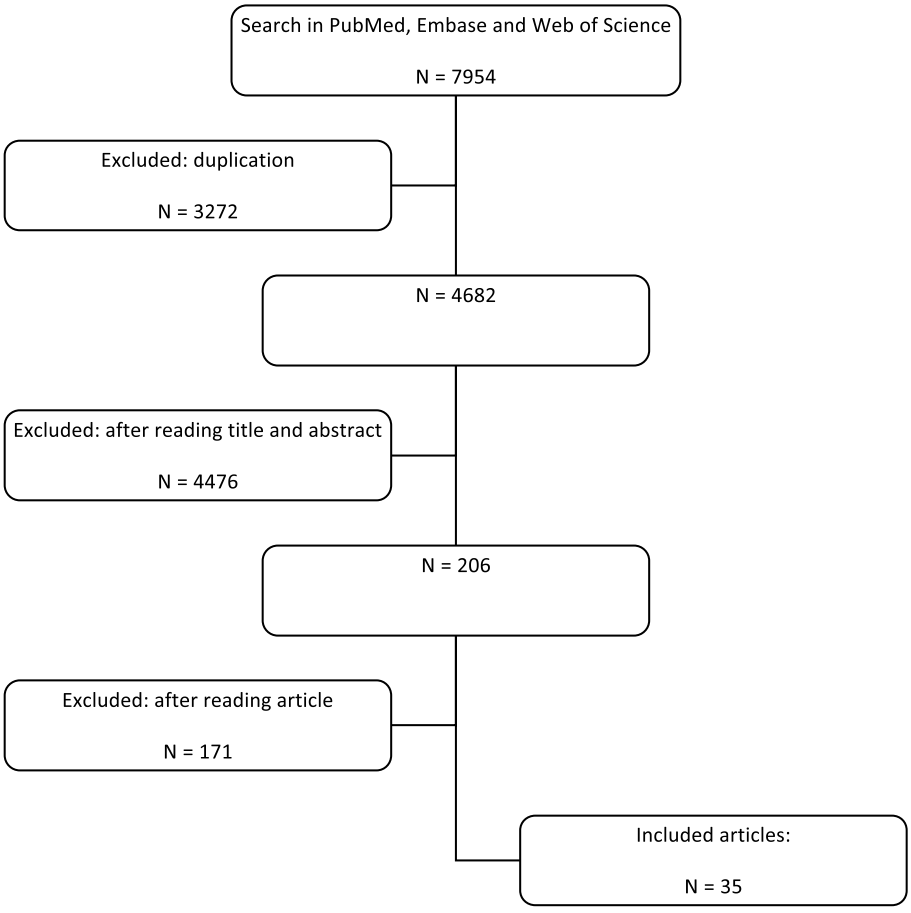

Figure 1 Flow chart for search results

and this is significantly higher than that of the NH population (15 to 20%) [39,43]. Two of the above-mentioned studies investigated children at both special and mainstream schools, and detected more depression in children at special schools [4,40]. Based on these outcomes, HI children and adolescents appear to be more prone to developing depression than their NH peers, particularly when attending special schools.

Four studies examined levels of anxiety [10,28,44,45]. Two studies included community-based samples and found that parent-reported levels of anxiety were higher in HI than in NH participants [28], whereas self-reported levels of anxiety were equal in both groups [45]. For children with profound losses and/or attending special schools, the two available studies both revealed more self-reported anxiety in HI compared to NH children [10,44]. So, HI individuals have at least as much anxiety as NH individuals, but it is plausible that they in fact experience more anxiety, especially the children with profound losses attending special schools.

Table 1 Literature on psychopathology in community-based samples

Study	Methods	HI sample	Nature of sample	Main findings	Factors affecting psychopathology
Kent (2003)	Health Behavior in School-Aged Children [20]	N = 52 Age range = 11 - 15 yrs	HL ≥ 40 dB; regular schools only	More somatic complaints in HI than in NH children.	-
Gallaudet research Institute report 2007-2008	ADHD diagnosed by professional	N = 31784 Age range = 0 -21 yrs	Complete population of HI children and youth in the USA (from baby to adult)	5.6 % of total HI population has ADHD diagnosis. No control group.	-
Fellinger et al. (2009)	Strengths and Difficulties Questionnaire [21,22] and Interview	N = 95 *M* age = 11 (6 - 16) yrs	HL ≥ 40 dB; general HI population	Point and lifetime prevalence of any psychiatric diagnoses are 32.6% and 45.3%; and for depression 7.4% and 26.3%. Prevalences were higher in HI than in NH children and adolescents.	Communication, being teased and maltreated: 6 times higher chance of internalizing problems
Remine and Brown (2010)	Child Behavior Checklist [23,24] and Youth Self Report [23,24]	N = 66 Age range = 6 - 18 yrs	HL ≥ 40 dB; participants were chosen by staff of organizations servicing HI children	HI children and adolescents: internalizing problems in 17%; externalizing problems in 14%. NH controls: internalizing problems in 13%; externalizing problems also in 13%.	Sign language
Kouwenberg et al. (2011)	Child Depression Inventory [25]	N = 78 *M* age = 12 (8 - 16) yrs	HL ≥ 40 dB; general HI population	More depression in HI than in NH children and adolescents.	Theory of Mind
Theunissen et al. (2011)	Child Depression Inventory [25]	N = 83 *M* age = 12 (8 - 16) yrs	HL ≥ 40 dB; general HI population	More depression in HI than in NH children and adolescents.	Type of school and mode of communication

table 1 continued

Kouwenberg et al. (2012)	Somatic complaint list [26]	N = 73 *M* age = 12 (9 - 16) yrs	HL ≥ 40 dB; general HI population	Equal levels of somatic complaints in HI and NH children and adolescents .	-
Theunissen et al. (2012)	General anxiety [27], social anxiety [28], and Generalized Anxiety Disorder [29]	N = 83 *M* age = 12 (8 - 16) yrs	HL ≥ 40 dB; general HI population	More symptoms of Generalized anxiety disorder in HI than in NH children and adolescents.	Type of device, gender, language skills, age at CI implantation, and duration of CI use
Theunissen et al. (2013)	Aggression [30,31], delinquency [32], ADHD, ODD, CD [16,29], psychopathy [33]	N = 132 *M* age = 12 (8 - 16) yrs	HL ≥ 40 dB; general HI population	More proactive aggression, symptoms of ADHD, ODD, CD, and psychopathy in HI than in NH children and adolescents.	Age, gender, SES, IQ, language development, type of device, type of school, and mode of communication
Theunissen et al. (under review)	Internalizing and externalizing problems [34]	N = 132 *M* age = 12 (8 - 16) yrs	HL ≥ 40 dB; general HI population	CI children and adolescents had similar levels of psychopathology as NH controls, but hearing aided children and adolescents showed more symptoms.	

Abbrevations. dB is Decibel; HL is Hearing loss; M is Mean; SES is socioeconomic status. *Note*. Ages were rounded off into complete numbers.

Table 2 Literature on psychopathology in samples drawn from special schools and/or profoundly HI

Study	Methods	HI sample	Nature of sample	Main findings	Factors affecting psychopathology
King et al. (1989)	Fear Survey Schedule for Children [27]	N = 138 Age range = 8 - 16 yrs	HL ≥ 90 dB; regular and special schools	Total fear scores equals scores of NH, but several subscales show more fear in HI than in NH children and adolescents.	Gender
Watt & Davis (1991)	Beck Depression Inventory [35]	N = 50 *M* age = 14	HL ≥ 90 dB; residential schools	More depression in HI than in NH adolescents.	-
Van Eldik et al. (2004)	Child Behavior Checklist [23,24]	N = 238 *M* age = 11 (4 - 18) yrs	HL ≥ 90 dB; all in special schools	HI children and adolescents: internalizing problems in 38%; externalizing problems also in 38%. NH controls: internalizing problems in 16 - 17%; externalizing problems in 16 – 18.	Age and communication skills
Van Eldik (2005)	Youth Self Report [23,24]	N = 202 *M* age = 14 (11 - 18) yrs	HL ≥ 90 dB; regular and special schools	HI children and adolescents: internalizing problems in 42%; externalizing problems in 28%. NH controls: internalizing problems in 17%; externalizing problems also in 17%	IQ, degree of HL, and type of school
Konuk et al. (2006)	Child Behavior Checklist [23,24]	N = 72 *M* age = 12 (6 - 18) yrs	HL ≥ 90 dB; residential school for the deaf	HI children and adolescents: internalizing problems in 33%; externalizing problems in 22%. internalizing score differed significantly from NH controls, externalizing score did not.	Age and gender
Li and Prevatt (2010)	Fear Survey Schedule for Children [27] and Revised Children's Manifest Anxiety Scale [36,37]	N = 61 *M* age = 15 (8 - 19) yrs	HL ≥ 40 dB; residential schools for HI and deaf	More fear and anxiety in HI than in NH children and adolescents.	Age and gender

Table 3 Literature on psychopathology in CI samples

Study	Methods	HI sample	Nature of sample	Main findings	Factors affecting psychopathology
Sahli et al. (2009)	Depression scale of Rosenberg Self-esteem Scale [38]	N = 30 *M* age = 16 (12 - 19) yrs	CI adolescents only	Level of depression in adolescents with CIs equals that of NH controls.	Number of siblings, preschool education, SES
Huber and Kipman (2011)	Strengths and Difficulties Questionnaire [21,22]	N = 32 *M* age = 15 yrs	CI children and adolescents	Emotional symptoms, inattention-hyperactivity, conduct-problems, and pro-social behavior in children and adolescents with CIs equals that of NH controls.	Auditory performance and type of school
Theunissen et al. (2012)*	General anxiety [27], social anxiety [28], and Generalized Anxiety Disorder [29]	N = 83 *M* age = 12 (8 - 16) yrs	HL ≥ 40 dB; general HI population	CI children had similar levels of symptoms of General and Social anxiety and Generalized anxiety disorder as NH children. Hearing-aided children had more Social anxiety.	Type of device, gender, language skills, age at CI implantation, and duration of CI use
Theunissen et al. (under review)*	Internalizing and externalizing problems [34]	N = 132 *M* age = 12 (8 - 16) yrs	HL ≥ 40 dB; general HI population	CI children and adolescents had similar levels of psychopathology as NH controls, but hearing aided children and adolescents showed more symptoms.	Age at detection, age at intervention, SES, number of siblings, etiology of HL, and communication skills

*Both studies were also mentioned in Table 1, but as they report on CI recipients as well, they were included in Table 2

For *somatization*, six different studies were carried out [4-6,45-47]. Some researchers found no difference in level of somatization between HI and NH children and adolescents [5,45,46], while others reported more somatic complaints in HI individuals [4,6,47], with a reported prevalence varying from 17 to 20% for HI participants [4,6]. These seemingly inconsistent outcomes could not be explained by differences in study samples, since community-based samples as well as samples derived from special schools were included in both groups. Yet, age differences between the samples were present. That is, the studies with higher scores included fairly older participants and more somatization has been linked to increasing age, both in HI [6,45] and NH [48] individuals. Therefore, we can conclude that mainly HI adolescents, and not HI children, could be at risk for somatization.

Externalizing symptoms

Five studies examined *aggression* [4-6,45,49]. Irrespective of the study sample, all but one of these studies revealed more parent- and self-reported aggression in HI than in NH children and adolescents [49] and found levels of aggression that ranged from 15 to 23% in HI participants [4-6] and about 5% in NH controls [4,5]. The study that showed no difference was the only one that used relatively many girls [45], who generally demonstrate less aggressive behavior than boys [50,51]. In conclusion, these studies suggest that HI children have higher levels of aggression than NH children.

For *delinquency*, five studies were carried out [4-6,45,49]. Three studies had community based samples and reported similar levels of delinquency of HI and NH participants [45,49]. Three other studies included participants that experienced more than 90 dB loss, which almost all attended special schools [4-6]. These studies demonstrated elevated levels of delinquency in HI children and adolescents (10 to 20%), which were significantly higher than in NH controls (4 to 6%). Concluding, delinquency in HI children and adolescents equals NH children, but children attending special schools may be at risk.

Three studies were carried out involving symptoms of *ADHD* [39,49,52]. Compared to NH peers, parents of HI children and adolescents reported more symptoms of ADHD [49], even up to 12% of HI children [39]. Yet, the Gallaudet Research Institute demonstrated a prevalence of ADHD of 5.6% [52], which is lower than in the NH population of which 8 to 10% have been diagnosed with ADHD [53]. Unfortunately, Gallaudet did not describe the study methods, so we are unable to further examine the possible causes for this difference. It thus remains unclear whether HI children experience higher or lower levels of ADHD than NH controls.

The final three externalizing symptoms, *Oppositional Defiant Disorder (ODD), Conduct Disorder (CD), and psychopathy*, have large conceptual overlaps and are therefore grouped together in this paragraph. Prevalence of these antisocial behaviors in NH children is a matter of debate, whereas almost no studies with HI individuals have been published. To the best of our knowledge, only two studies (both with community-based samples) examined antisocial behavior [39,49]. The first study found more symptoms of ODD, CD, and psychopathy in HI than in NH children and adolescents, but did not investigate exact prevalences [49]. The second study found that eight percent of HI children have ODD [39], which is higher than in NH children (approximately 1 to 3%) [54]. In summary, the few

studies that are available indicate that more symptoms of ODD, CD, and psychopathy occur in HI individuals compared to NH controls, but more studies are definitely needed to confirm these findings.

The influence of type of hearing device on psychopathology

The above-mentioned studies showed that levels of most internalizing and externalizing symptoms can be higher in HI than in NH children, irrespective of the type of hearing device. Only few studies investigated the influence of type of device on psychopathology [28,34,39,40,42,46,49,55,56]. Various researchers found that a CI can be protective for psychopathology [28,34,49,55,56]. For example, studies with large and representative samples showed positive results for CI children: levels of both internalizing and externalizing symptoms were similar to those of NH children [55,56], whereas children with hearing aids had higher levels than the other groups in both areas [28,34,49]. Not all studies could confirm these encouraging outcomes: others detected no difference between CI children and hearing aided children [28,39,40,42,46,49]. Yet, it never occurred that hearing aided children performed better than CI children on these measures, despite their smaller initial hearing loss.

Auditory and medical factors affecting psychopathology

Next to type of device, other risk and protective factors for psychopathology have been identified, starting with auditory and medical factors [3,5,6,9,28,34,39,40,49,57-65]. A first auditory factor is degree of hearing loss. Although it is plausible that the greater the degree of hearing loss is, the more psychopathology occurs, this hypothesis appears to be incorrect. Most literature found no influence of the degree of hearing loss on psychopathology [3,5,6,9,28,34,39,40,49,63-65]. Apparently other factors are more important for the prediction of psychopathology. For example, age at detection and age at intervention of hearing loss were essential: early detection and intervention of a child's hearing loss have been related to lower levels of psychopathology [28,34]. Furthermore, several specific forms of etiology of hearing loss, such as rubella or prematurity, as well as various syndromes, have been associated with more psychopathology, even up to six times more [9,34,57-60,62]. Particularly when hearing loss is associated with central nervous system disorders [9,57-60] or when additional disabilities are present [9,57,61,62] the risk of psychopathology increases.

Communication and intellectual factors affecting psychopathology

Several studies reported on communication and intelligence factors that affected psychopathology [4,5,7,9,13,28,34,40,45,49,64,66,67]. Lower levels of internalizing and externalizing symptoms have been described in children with better language, speech understanding, speech production, or vocabulary [5,13,28,49,67]. This finding is supported and extended by others, who detected that once speech and language abilities were good, no psychopathological symptoms were present at all [34,64]. Moreover, Dammeyer and colleagues demonstrated that when communication skills were good, regardless of the modality (sign or spoken), no psychosocial differences were observed between HI and NH children [9]. In this respect, deaf children born to deaf parents function psychosocially better than deaf children born to NH parents, but this could also be contributed to factors

related to bonding, parents' expectations, or parenting style [61]. However, other studies did not agree and showed that sign language was significantly associated with more psychopathology [40,45,49,66]. For example, the study by Vostanis and colleagues examined HI children who used sign language. The prevalence of psychopathology in this group was very high, ranging from 40 to 77% [7]. The additional use of spoken language, next to sign language, was considered to be a protective factor for psychopathology [7]. Lastly, higher levels of psychopathology arise more often in children with intellectual impairments [4,49,66].

Sociodemographic factors affecting psychopathology

A body of literature investigated sociodemographic factors [4-7,9,10,13,14,28,34,44,49,66,68]. Older age has been related to more psychopathology [4-6,10,13,44,49,68] except for anxiety because younger children tend to be more anxious than older children [10]. Furthermore, HI girls experience more internalizing symptoms than HI boys, particularly depression and anxiety [4,5,7,9]. Boys experienced more externalizing symptoms [49]. Next, for family income, as indicator of socioeconomic status (SES), mixed results were obtained, with studies reporting no relation with psychopathology [5,28,66], and studies reporting more psychopathology in families with lower SES [13,34,49]. Concerning number of siblings, only one study is available, which showed that lower number of siblings was associated with less psychopathology [34]. Finally, type of school appeared to be relevant: children attending special schools for the deaf exhibited more psychopathology than HI children at regular schools [4,5,40,66]. They "saw themselves in a less favorable light" than children in regular schools [14].

DISCUSSION

This review investigated the occurrence of psychopathological symptoms in HI children and adolescents with bilateral hearing loss of at least 40 dB at the best ear. The outcomes suggest that HI children and adolescents experience higher levels of most internalizing and externalizing symptoms than NH controls. Yet, the literature was not fully consistent for anxiety, somatization, and delinquency and reported elevated levels that applied to certain subsamples of HI participants, related to gender, age, and type of school. Divergent outcomes were obtained for the level of ADHD. Furthermore, the type of hearing device appeared to have an effect on the level of psychopathology. Although the outcomes between studies varied, we can conclude that levels of psychopathology in CI children and adolescents lie somewhere between HI counterparts wearing conventional hearing aids and NH peers. This is a positive outcome for CI children, because the majority of them initially had more severe hearing losses than children with conventional hearing aids, but the occurrence of problems is not higher. Additionally, several possible risk and protective factors that affect psychopathology were found, including age at detection and intervention of hearing loss, additional disabilities, communication skills, intelligence, type of school, and number of siblings.

Five major pitfalls occurred when reviewing the literature and drawing conclusions from the included articles. First, literature on specific forms of psychopathology in hearing-

impaired children and adolescents is scarce and sometimes inconsistent. Per psychopathological symptoms, the number of studies varied between one and seven. Almost none of the studies investigated and reported exact prevalence rates, which would be very helpful in order to quantify the problems.

Second, due to the large heterogeneity in the HI population, diverse samples were investigated, as shown by the three tables. It is important to know which sample has been examined, because this affects the extent to which the findings can be generalized to the total population of HI individuals. Special attention has to be drawn to the fact that many studies revealed less favorable results for children attending special/residential schools: caution is warranted when interpreting these findings, because HI children with extra problems are more likely to be referred to these schools. For example, thirty percent of HI children experience additional disabilities, such as Autism Spectrum Disorder or mental retardation [69], which are associated with more psychopathology. Unfortunately, we cannot deduct from the included studies how many children have additional problems. Neither is known which other neurocognitive processes affected HI children, while these processes can also lead to inferior outcomes [70]. It thus remains unclear how large the effect of these disabilities on psychopathology is.

A third pitfall that can be pointed out is that different informants (child, parent, or teacher) were used in the included studies. Past research showed that, particularly for internalizing symptoms, parents and teachers frequently underreport the level of problems, while for some externalizing symptoms parents and teachers give more accurate levels. So, perceptions per informant can truly differ, potentially leading to an informant bias [71].

Fourth, all studies had cross-sectional designs and none of them had a longitudinal data collection. A follow-up study design could provide the opportunity to draw firmer conclusions on causality. Additionally, it should be noted that many more factors could be relevant for the development of psychopathology. For example, chronic adversities, concomitant physical health problems, residual hearing, or intrapersonal factors could be contributive in this respect. Furthermore, cultural identity (i.e., Deaf or hearing community) has not been taken into account in any of the studies, while it is known that HI individuals often experience cultural conflicts, potentially leading to issues related to social identity, acceptation, and isolation [11,72].

A fifth and final remark is the fact that the majority of studies have been using general questionnaires to assess psychopathology, such as the Child Behavior Checklist or the Strengths and Difficulties Questionnaire (SDQ) [21-24]. Although these questionnaires give a good first impression, they are not tools that measure psychopathology to a very large extent. Note however that the SDQ is a short easy to administer questionnaire for children, parents, or teachers, which can be useful in providing clinicians with a first global impression of the HI child's level of psychological functioning. Once the SDQ shows elevated levels, the child can immediately be referred to a psychologist for a more in-depth and precise examination on symptoms of psychopathology.

Based on these five issues, we defined several recommendations for future studies. First, further and extensive research on the different forms of psychopathology in HI children and adolescents must be carried out in order to define precise prevalences. In addition

to the above-mentioned factors that could be contributive to psychopathology, attachment and bonding between parent and child would be worth investigating. Hearing impairment impacts on bonding and attachment, often resulting in parenting stress. These parent-related factors have been linked to the genesis of psychopathology, both directly and indirectly.

Furthermore, researchers must be aware of the potential informant bias when assessing psychopathology. Trying to include the type of respondent that is known to give most accurate answers is of utmost importance to receive reliable results. Generally, reports involving internalizing symptoms can best be administered to school-aged children and adolescents, whereas externalizing symptoms can be administered to parents as well. Additionally, multi-informant assessment would be helpful to gain more knowledge on specific contributions and shared variance of diverse respondents, as well as on how to combine data from varying respondents and from varying settings [22,73]. Fourth, measuring psychopathology at different stages in the lives of HI children and adolescents will allow researchers to deduct causal relations and to enable them to prevent psychopathology on an individual basis. A fifth and final recommendation is that specific diagnostic tools should be used to assess psychopathology, instead of general questionnaires that are not primarily designed and validated to measure one form of psychopathology. It would be interesting and helpful to develop these measurements specifically for the HI population.

Concluding, in order to increase our understanding of psychopathological development in HI children and adolescents and to realize focused counseling and treatment in the future, there is a need for further and extensive study of psychopathology in the HI population, as also emphasized by others [1,5,11,63,74]. Hopefully, this knowledge will lead to more awareness and provide guidance for professionals working with this group of vulnerable children and adolescents, in order to help and support each HI individual.

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