Chapter 6

Characteristics of children and adolescents in the Dutch national in- and outpatient mental health service for deaf and hard of hearing youth over a period of 15 years.

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Abstract

In this study socio-demographic, deafness-related and diagnostic characteristics of hearing impaired children and adolescents referred to a national mental health service for deaf and hard of hearing children and adolescents were examined, as well as differences with characteristics of hearing referred peers with identified mental health problems. A total of 389 deaf and hard of hearing and 3361 hearing children and adolescents were derived from a database, all first referrals of patients of a centre for child and adolescent psychiatry over a 15 year period of time. With deaf and hard of hearing patients we found higher rates of environmental stress, as indicated by conditions such as more one parent families (38.6% versus 25.8%), and more parents with a low educational level (44.2% versus 31.1%). Moreover, deaf and hard of hearing patients were older at their first referral (10.8 versus 9.4 years) and had higher rates of pervasive developmental disorders (23.7% versus 12.3%) and mental retardation (20.3% versus 3.9%). Within the target group of deaf and hard of hearing patients, most patients were deaf (68.9%; 22.3% was severely hard of hearing), relatively few (13.7%) had a non-syndromal hereditary hearing impairment, and with relatively many (21.3%) a disabling physical health condition was found, especially among those with a pervasive developmental disorder (42.6%). These findings illustrate both the complexity of the problems of deaf and hard of hearing children and adolescents referred to specialist mental health services, and the need for preventive interventions such as aimed at early recognition.

Keywords: hearing loss, mental health, multiple disabilities, pervasive developmental disorders, mental retardation, environmental stress.

Highlights

- 389 hearing impaired and 3361 hearing children with psychiatric disorder were studied
- Age at first referral is higher with hearing impaired than with hearing referrals
- Clinical pictures of hearing impaired youth are often more complex
- Much distress, and high rates of physical and autistic spectrum disorders are found
- Those with low IQ or disabling physical health conditions are very vulnerable

1. Introduction

Specialist mental health service provision for deaf and hard of hearing children and adolescents occurs in a low incidence, highly specialized area of cure and care. Probably more than 1 in 1000 children in European countries have permanent, bilateral congenital hearing impairment (HI)[1] of moderate or greater severity (e.g., Davis & Parving, 1994; Fortnum & Davis, 1997), rising to another 50-90% among children 9 years of age and older, mainly due to late onset or progressive inherited HI, and, to a lesser extent, by acquired HI (approximately 4-9 % of overall prevalence) and delayed confirmation of congenital HI (Fortnum et al., 2001).

Since the 1960s there has been an increasing recognition of the need for specialist mental health services for deaf and severely hard of hearing people in order to meet the visual-spatial and communicative needs of this small minority group with mental health problems more adequately than in generic mental health services (e.g., Rainer & Altshuler, 1966; Altshuler, 1971; Denmark & Warren, 1972; Schlesinger & Meadow, 1972). Specialist mental health services for HI children and their families bundle expertise in Psychiatry, medical and audiological aspects of HI, the influence of deafness and loss of hearing on development, as well as linguistic-communicative, systemic and socio-cultural aspects of deafness and other hearing impairments (e.g., Roberts & Hindley, 1999; Mathos & Broussard, 2005). Hearing staff-members need to be trained in sign language. Referral to specialist services should be guided by two considerations: the communication needs of the HI child and/or his HI family members and the complexity of the case (Hindley & Van Gent, 2002).

1.1. Added complexities of mental health problems in deaf and hard of hearing youth

As a group, deaf and hard of hearing children and adolescents are exposed to a number of factors that may add to the complexity of their mental health problems. Firstly, especially children with syndromal and acquired HI are particularly at risk of central nervous system disorders, other concomitant physical health disorders or concomitant intellectual impairment (Evans & Elliott, 1987; Hindley, 1997).

Secondly, m.i. linguistic-communicative problems (e.g., low language skills) may contribute to social deprivation and negatively affect psychological development and the sense of self (e.g., Calderon & Greenberg, 2003). Thirdly, deaf youth may more often experience environmental risk factors such as distress within the family, particularly in hearing families (e.g., Gregory, Bishop, & Sheldon, 1995; Hindley, 1999), the experience of traumatic life events such as bullying, especially in mainstream schooling (Smith & Sharp, 1994), and maltreatment and abuse, which might occur more often frequently in residential settings (Sullivan, Brookhouser, & Scanlan, 2000).

Besides the challenge of dealing with the complexity of cases (Heller, 1987), the scarce specialist mental health services must also actively deal with difficulties in reaching deaf youth with mental health problems and promoting accessibility of services. Communication problems between the deaf child and the hearing environment as well as diagnostic shadowing, i.e. the unwarranted assumption that deafness explains all problems in deaf children (Kitson & Thacker, 2000), may impede both the sharing of problems by HI children and adolescents and the exploration and recognition of their psychological problems by hearing key figures, thus contributing to lower service use. Findings from community surveys suggest that only about 25 % of hearing children and adults with serious mental health problems contact mental health services (e.g., Ford, Hamilton, Meltzer, & Goodman, 2007). The proportion of deaf adolescents with serious problems in contact with mental health services may be much smaller (less than 10%; Van Gent et al., 2007), indicating substantially lower mental health service utilization.

1.2. Present study

The present study is the first to examine a large number of characteristics in clinical samples of both hearing impaired and hearing children and adolescents over a longer period of time, i.e. 15 years. Comparing characteristics of hearing and HI children and adolescents who are referred to mental health services will help to identify specify factors that may add to the complexity of the mental health problems of deaf youth and factors that may impede contact with specialist mental health care services. We found only two studies of clinical samples of HI children

that made use of a hearing sample with mental health problems as comparison group (Van Gent & Hendriks, 1994; Willis & Vernon, 2002). Both studies reported higher rates of concomitant neurological, visual and other physical disorders, intellectual impairment and environmental distress, as indicated by increased rates of parental divorce and one-parent families. The greater prevalence of physical disorder in clinical samples may be largely explained by a relative underrepresentation of a non-syndromal genetic cause of HI combined with an overrepresentation of syndromal and acquired aetiologies of deafness (e.g., pre-, peri- or postnatal infection, prematurity or rhesus-antagonism) found in clinical samples (Goldberg, Lobb, & Kroll, 1975; Van Gent & Hendriks, 1994; Willis & Vernon, 2002), However, we found no study that examined the way physical disorders and mental retardation may add to the complexities of mental health problems of HI youth.

The first aim of the current study is to compare the socio-demographic, psychological and diagnostic characteristics of referred hearing impaired (HI) children and adolescents to corresponding characteristics of referred hearing youth. We expected to find increased rates of identified risk factors and additional factors complicating the clinical picture in the HI sample as compared to the clinical picture in the hearing patients. In addition we expected a higher mean age at first referral for deaf youth because due to deafness-related factors that may impede contact with specialist mental health care services. We also explored whether there are different shifts in (some of the) diagnoses of the referred HI patients as compared to referred hearing patients. We expected to encounter a shift in referrals with HI patients, from relatively more behavioural disorders to relatively more emotional disorders compared to the referral pattern with hearing patients, in line with the assumption that referral patterns differ over time, when the first need to cope with the most serious and disturbing behaviour problems is met. In addition we examined the influence of the parental hearing status on socio-demographic and diagnostic differences between referred HI and hearing children and adolescents. We expected more concomitant central nervous system disorders and other physical disorders due to an acquired cause, as well as developmental disadvantages related to the risk of a possibly less optimal

adaptation to deafness with referred HI patients of hearing parents in comparison with HI patients with one or two deaf parents (e.g., see Hindley & Van Gent, 2002; Marschark, 2007). We also examined the socio-demographic characteristics and psychiatric diagnosis of hearing children of HI parents, as growing up hearing in a family with profoundly or severely HI parents has been associated with the risk of communication problems between parents and their child, problems of the child to cope with a role of spokesperson or interpreter for its parents, which may lead to parentification at an early age (Singleton & Tittle, 2000), or the risk of social and emotional problems (Charlson, 2004). Therefore we expected to find a preponderance of emotional disorders in this specific subgroup.

The second aim is to better understand the way mental retardation and a disabling physical health condition may add to the complexities of diagnosis and treatment of mental health problems of deaf youth. To this end we examined the correlates of mental retardation and a disabling physical health condition with deafness-related and socio-demographic variables and with the psychiatric diagnosis. In a preliminary analyses we operationalized a disabling physical health condition by creating a combination of physical health problems that strongly differentiated referred HI youth attending special schools for deaf students with multiple disabilities from other referred HI youth. Research on HI children with multiple disabilities is scarce. The co-occurrence of multiple, i.e. physical or cognitive, disabilities and severe to profound HI has consequences for communication, education, mobility, living skills and learning (Knoors & Vervloed, 2011), and an increased risk of mental health problems (Sinkkonen, 1994).

2. Method

2.1. Participants

This study relies on archival data available within an Academic Centre for Child and Adolescent Psychiatry which delivers in- and outpatient services for hearing children and adolescents in a large, socio-demographically diverse region in the mid-western part of The Netherlands. An outpatient and outreaching consultation

service for deaf and hard of hearing children and adolescents and children of severely hearing impaired parents started as a department of the larger Academic Centre in 1987. Between 1993 and 2008 this specialized mental health service was the only centre in The Netherlands with a specialized inpatient, outpatient and outreaching consultation mental health service for deaf and hard of hearing patients from all over the country. The patients of this specialist department may be regarded as representative for the total clinical population of deaf and (severely) hard of hearing children and young people with serious mental health problems in The Netherlands. Deaf and -generally severely- hard of hearing individuals are characterised by the shared need for visual or otherwise adapted communication and special facilities which make communication and social interaction accessible, and which cannot be sufficiently met in regular local mental health services. The national specialist mental health department worked intensively together with the special educational organisations for the deaf and severely hard of hearing students, with the ambulatory specialist mental health services for the deaf and the hard of hearing and with other care organisations in the country to cover a countrywide network of educational, care and mental health services for this population. In addition the mental health service for the deaf and hard of hearing was sufficiently well-known in the country to get referrals from regular health and mental health services.

Socio-demographic and diagnostic data on all referred patients are registered in an electronic patient database in the Academic Centre, which is described by Treffers, Goedhart, Waltz, and Koudijs (1990). Specific data on (past) physical disorders and significant characteristics related to hearing impairment of 286 deaf or hard of hearing patients who completed the psychiatric assessment of their first admission at the Department for the Deaf and Hard of Hearing between January 1990 and January 2002, are registered in an additional database of patients referred to the specialist department. For the purpose of this study we used all records of the additional database. From the general patient database we selected all the records of first admissions who underwent a complete diagnostic assessment of the outpatients admitted between January 1990 and January 2005. 3750 Cases from the patient database were selected. 3339 cases were hearing

control patients of hearing parents (HOH) assessed in the regular mental health service. Assessments from the specialist mental health service included 362 deaf or hard of hearing children of hearing parents (DOH), 27 deaf or hard of hearing children of one (N=11) or two (N=16) deaf or hard of hearing parents (DOD) and 22 hearing children of one (N=3) or two (N=19) deaf or hard of hearing parents (HOD). Informed consent from participants was not required because data which could lead to identification were removed

2.2. Measures

The routine assessment procedures of the regular and the specialist centre were comparable, and based on a multi-informant approach and were performed by multidisciplinary teams of professionals. The standard procedure included, generally, two separate interviews with the parents in order to obtain information about the development and actual functioning of the child, at least two psychiatric interviews with the child, in many cases a family interview, a psychological assessment of significant cognitive, educational, neuropsychological and personality aspects, parental and teachers questionnaires, as well as self-reports with young people, a physical examination by an expert pediatrician in the field, and -upon parental or patient consent- information by others, such as school, primary care physician, social agencies, medical and paramedical professionals involved. The final diagnosis and treatment planning were decided upon at a diagnostic conference with the multidisciplinary team members involved and chaired by a child- and adolescent psychiatrist. All professionals of the specialist mental health service were experienced in working with deaf and hard of hearing children and adults and were expected to achieve high levels of sign language proficiency. If required, professional interpreters in sign language, in sign supported Dutch, in four-hand signing with deaf-blind individuals, or in other languages were involved.

2.2.1. Diagnosis

In this study, we used the broad diagnostic categories of (a) emotional disorder (DSM codes 296.00 to 296.70, 300.4, 311, 300.00-300.02, 300.20-300.29, 309.21,

309.81, 309.89, 313.00 and 313,21); (b) behavioral disorder (DSM codes 313.81, 313.82, 313.89, 312.00 - 312.90, 314.00, 304.01, 304.9); (c) pervasive developmental disorder (DSM codes 299.00, 299.10, 299.80); (d) mental retardation (DSM codes 317.00 – 318.20, 319); and (5) other diagnoses, for inter-diagnosis comparison of hearing and deaf groups of patients.

The DSM versions used with hearing and hearing impaired patients over time concerned DSM-III R (till 1994), DSM- IV (1994-2000) and DSM-IV R (from 2000).

2.2.2. Intelligence Quotient (IQ)

IQ was generally assessed using total, i.e. performance and verbal, IQ tests from the Wechsler series (WISC) with hearing patients. With most HI patients the performance scales of the Snijders-Oomen non-verbal intelligence test (SON) were used instead of the performance scales of the WISC tests (with 55% and 24% of the HI patients respectively; other tests were used with 8%, IQ was not assessed with 13%). In order to increase comparability, hearing norms were used for HI and hearing patients.

2.3. Data analyses

Firstly, we described the socio-demographic and psychiatric characteristics of hearing children of hearing parents (HOH), hearing children of deaf or hard of hearing parents (HOD) and deaf and hard of hearing children of hearing (DOH) or deaf or hard of hearing parents (DOD). Secondly, we examined whether the hearing status of the patients, i.e. hearing versus deaf or hard of hearing, had a unique contribution to the prediction of psychiatric diagnoses, over and above the contributions of socio-demographic variables. Thirdly, we used the additional database to demonstrate the associations of mental retardation and a disabling physical health condition with socio-demographic, deafness-related and psychiatric characteristics.

Analyses of Variance (ANOVA's) were used to compare continuous characteristics and χ^2 tests were used to compare categorical characteristics. In addition to the χ^2 tests, we identified cells that offer a substantial contribution

to the χ^2 statistic by using the |standardized residual| > 2 criterion suggested by Haberman (1973). Multivariate logistic regression analyses were used to examine the unique contributions of independent variables to the prediction of psychiatric diagnoses. All analyses were conducted using the statistical package SPSS 18.0; α was set at 0.05.

3. Results

3.1. Socio-demographic and psychiatric differences between patient groups

Substantial differences were found in the distributions of the socio-demographic variables age, performal IQ, family composition, parental country of origin and highest parental educational level, across the HOH, HOD, DOH and DOD patient groups. As shown in Table 1, less favorable family compositions, i.e. child not living with two biological parents, parents with low levels of education and one or both parents being foreign-born, were more often found with DOH patients (Standardized Residuals were -2.7, 2.9 and 13.8 respectively) and, to a lesser extend with DOD patients. In addition, we found that only 1% of the HOH patient's lives in a residential setting most of the time compared to 44% of the DOH, 30% of the DOD and 14% of the HOD patients.

HOH patients showed a higher mean level of performal IQ as compared to DOH patients and DOD patients. This finding reflects the relatively high percentage of deaf and hard of hearing patients with mental retardation (see Table 2). The difference between the mean IQ's of HOH and DOH patients decreased from 18.9 to 10.7 after removal of all patients with mental retardation, but the differences between the groups remained significant ($F(3,1945)= 21.29$, $p<0.0001$). Mean IQ difference between HOH and DOD patients decreased in a comparable way, from 16.4 to 9.8.

Fewer emotional disorders were found in DOH patients as compared to the remaining three patient groups (|standardized residual|>2, see Table 2). More specifically, we found a significantly lower percentage of anxiety disorders with DOH patients (18.0% versus 27-33%; $\chi^2_{(3,3670)} = 14.15$, $p<0.005$) and a higher percentage of depressive disorders with HOD patients (36.4% versus 14 – 17.1%;

Table 1.

Socio-demographic Characteristics

	HOH N= 3339	HOD N=22	DOH N= 362	DOD N=27	χ^2 or F
Girls, %/SR	30.8/-0.5	45.5/1.2	34.5/1.1	33.3/0.2	$\chi^2_{(3,3670)}$= 4.18
Age, mean (SD)	9.4 (3.6)[1]	9.4 (3.7)	10.8 (4.4)[2]	11.1 (4.1)[2]	F(3,3746)=19.22***
Performal IQ[a], mean (SD)	102.5 (16.8)[1]	93.5 (22.3)	83.6 (26.3)[2]	86.1 (24.0)[2]	F(3,2075)=73.19***
Lives with both biological parents, %/SR	74.2/1.0	59.1/-0.8	60.8/-2.7	70.4/-0.1	$\chi^2_{(3,3670)}$= 31.82***
One or both parents foreign-born, %/SR	8.4/-4.9	18.2/1.0	35.6/13.8	33.3/3.4	$\chi^2_{(3,3670)}$= 256.11***
Highest parental education[b] %/SR					$\chi^2_{(6,3108)}$= 32.62***
Low	31.1/-1.2	60.0/2.2	43.0/2.9	61.1/2.1	
middle	38.7/0.4	35.0/-0.2	34.1/-1.0	16.7/-1.5	
High	30.2/0.8	5.0/-2.0	22.9/-1.9	22.2/-0.6	

Note: HOH: hearing patients of hearing parents; HOD: hearing patients of deaf or hard-of-hearing parents; DOH: deaf and hard of hearing patients of hearing parents; DOD: deaf and hard of hearing patients of deaf or hard of hearing parents; SR: Standardized Residual. ***: $p<0.001$.[1,2]: different superscripts indicated different means using the Ryan-Einot-Gabriel-Welsh Range ($p<0.05$); [a]: due to missing data number of cases are: HOH: 1836, HOD: 14, DOH: 205, DOD: 24; [b]: due to missing data number of cases are: HOH: 2862, HOD: 20, DOH: 249, DOD: 18.

$\chi^2_{(3,3670)}$= 8.46, p<0.05). After removal of all patients with mental retardation, we found higher percentages of both emotional disorders (32.6% instead of 27.6%) and behavioral disorders (38.2% instead of 35.4%) and lower percentages of pervasive developmental disorder (20.8% instead of 24.3%) for DOH patients selectively.

A remarkable difference was found for the trend of referrals for behavioral disorders over 5 periods of 3 year each only. Nearly equal rates of behavioral disorder in each of the 5 periods were found in the HOH group, but a strong decline of the rates was found in the group of hearing impaired patients. A one sample chi-square test indicated a significant declining rate of behavioral disorders in the DOH group compared to the expected equal frequencies (as found in the HOH group): $\chi^2_{(4)}$= 9.53, p<0.05. No differences between the HOH en DOH patient groups were found in the referral trends for the remaining disorders.

Table 2.

Broad diagnostic categories of study groups

Diagnostic Category	Percentage with Diagnosis / Standardized Residual				$\chi^2_{(3,3750)}$
	HOH N= 3339	HOD N=22	DOH N= 362	DOD N=27	
Emotional disorder	37.7/0.9	50.0/1.3	27.6/-2.9	37.0/0.0	16.01***
Behavioral disorder	28.7/-0.7	22.7/-0.6	35.4/2.1	29.6/0.0	7.41 n.s.
Pervasive developmental disorder	12.3/-1.8	9.1/-0.6	24.3/5.6	14.8/0.2	40.50***
Mental retardation	3.9/4.2	9.1/0.7	20.4/11.9	18.5/2.8	117.47***

Note: HOH: hearing patients of hearing parents; HOD: hearing patients of deaf or hard-of-hearing parents; DOH: deaf and hard of hearing patients of hearing parents; DOD: deaf and hard of hearing patients of deaf or hard of hearing parents. n.s.: not significant; ***: p<0.001.

Table 3.

Mental Retardation, Cause of Deafness and Physical Health Problems by Type of School of Deaf and Hard of Hearing Patients.

Characteristic	Type of school		Total n (%)	$\chi^2_{(df, n)}$
	S. Mult. Hand.[a] n (%)/ SR	Other n (%)/ SR		
Mental Retardation	28 (37.3)/ 3.4	30 (13.9)/ -2.0	58 (19.9)	$\chi^2_{(1,286)}$=19.17***
Cause of hearing impairment				$\chi^2_{(5,286)}$=29.01***
Hereditary, non-syndromal	7 (9.3)/ -1.0	33 (15.3)/ 0.6	40 (13.7)	
Syndromal	8 (10.7)/ -0.2	25 (11.6)/ 0.1	33 (11.3)	
Rubella	24 (32.0)/ 4.0	18 (8.3)/ -2.4	42 (14.4)	
Meningitis	6 (8.0)/ -0.5	23 (10.6)/ 0.3	29 (10.0)	
Otherwise acquired	9 (12.0)/ -0.9	17 (7.9)/ -0.5	26 (8.9)	
Unknown	21 (28.0)/ -1.8	100 (46.3)/ 1.1	121 (41.6)	
Past Physical disorders[b]				
Ear and mastoid	38 (50.7)/ -1.0	130 (62.2)/ 0.6	168 (59.2)	$\chi^2_{(1,286)}$=3.04
Eye	39 (52.0)/ 3.3	48 (23.0)/ -2.0	87 (30.6)	$\chi^2_{(1,286)}$=21.90***
Neurological motor disorder	41 (54.7)/ 2.7	61 (29.2)/ -1.6	102 (35.9)	$\chi^2_{(1,286)}$=15.57***
Epilepsy	9 (12.2)/ 3.0	4 (2.0)/ -1.8	13 (4.6)	$\chi^2_{(1,286)}$=12.76***
Respiratory system	11 (14.7)/ -1.2	49 (23.4)/ 0.7	60 (21.1)	$\chi^2_{(1,286)}$=2.55
Circulatory system	20 (26.7)/ 2.2	27 (12.9)/ -1.3	47 (16.5)	$\chi^2_{(1,286)}$=7.55**
Peri- or neo-natal	34 (45.3)/ 0.7	80 (38.3)/ -0.4	114 (40.1)	$\chi^2_{(1,286)}$=1.14
Other	32 (42.7)/ 0.2	86 (41.1)/ -0.1	118 (41.5)	$\chi^2_{(1,286)}$=0.05
Four or more past phys. disorders	36 (48.8)/ 2.5	54 (25.8)/ -1.5	90 (31.7)	$\chi^2_{(1,286)}$=12.52***
Three or more actual phys. disorders	19 (25.7)/ 1.9	27 (13.2)/ -1.2	46 (16.5)	$\chi^2_{(1,286)}$=6.18*
Four or more hospital admissions	21 (28.0)/ 1.7	34 (16.1)/ -1.0	55 (19.2)	$\chi^2_{(1,286)}$=5.03*

Note: [a]: S. Mult. Dis. = Special school for deaf youth with multiple handicaps; [b]: A past physical disorder is defined as a disorder for which specialist medical care has been provided in the past. SR = Standardized Residual; *: p<0.05; **: p<0.01;***: p<0.001.

Multivariate logistic regression analyses were used to examine the associations of hearing status (i.e. HOH patients versus all deaf and hard of hearing patients) with each of the four diagnostic categories after controlling for gender, age, family composition, parental country of origin and highest parental educational level. We found that even after controlling for the other socio-demographic variables, hearing patients were more likely to have an emotional disorder than deaf and hard of hearing patients (OR= 0.68, $p<0.001$, 95% CI: 0.51 – 0.90), while deaf and hard of hearing patients were far more likely than hearing patients to have a pervasive developmental disorder (OR= 3.01, $p<0.001$, 95% CI: 2.14 – 4.26) or mental retardation (OR= 4.08, $p<0.001$, 95% CI: 2.65 – 6.29). After removal of all patients with mental retardation, hearing status was no longer a significant predictor of emotional disorder while the OR of hearing status dropped to 2.55 (95% CI: 1.74 – 3.74) for the prediction of pervasive developmental disorder.

3.2. Preliminary analysis: operationalisation of disabling physical health condition

As shown in Table 3, higher rates of mental retardation (MR), past physical disorders and rubella-induced deafness were found in patients attending a school for deaf children and adolescents with multiple handicaps (the MH group) compared with other deaf and hard of hearing children and adolescents (the non-MH group). It may be noted that there was a high rate of acquired causes in both groups, and this was more pronounced for the MH group than for the non-MH group. In line with this finding and the notion that acquired causes of HI coincide more often than a non-syndromal genetic HI with other physical disorders, histories of serious eye disorder, neurological motor disorder, epilepsy or circulatory system disorder were found significantly more often among MH patients than among non-MH patients. The presence of a more complicated physical health condition for many patients from the MH group in particular is illustrated by a more serious history of physical disorders, the presence of more actual physical disorders and a history of more hospital admissions for physical disorders in the group of MH patients than in the group of non-MH patients.

Receiver Operating Characteristic (ROC) analysis was used to create a combination of past physical disorders and rubella-induced deafness that best

discriminated between MH and non-MH patients. First, we found that the area under curve (AUC) of the sum score of the four best predictors (rubella-induced deafness, histories of serious eye disorder, neurological motor disorder and epilepsy) was higher than the AUC of all five significant predictors (i.e. including a history of circulatory system disorder): .733 (S.E. .036) versus .722 (S.E. .036). The ROC curve indicated 2 as cut-off point for the sum score of the four best predictors. Consequently, disabling physical health condition (DPHC) was defined by the presence of two or more of the following characteristics: rubella-induced deafness, a history of specialist medical care for visual problems, for neurological motor disorder(s) or for epilepsy. A substantial association was found between DPHC and the distinction between MH and non-MH patients: kappa= 0.38, p<.0001.

As DPHC was not associated with mental retardation we decided to combine DPHC and mental retardation in the Multiple Disabilities Index (MDI) defined as: 0= no MR and no DPHC, 1= MR without DPHC, 2 = DPHC with or without MR. The Multiple Disabilities Index was strongly associated with the MH/non-MH distinction: OR=3.98, p<0.0001 (95% CI: 2.72 – 5.83), a score of 0 on this index was found in 78.7% of the non-MH group and 28.0% of the MH-group.

3.3. Deafness-related Characteristics and the Multiple Disabilities Index

In table 4 characteristics of deafness are shown of the total HI sample, the subgroup with mental retardation (MR) and the subgroup with a disabling physical health condition (DPHC), i.e. the two subgroups which largely describe the population with significant multiple disabilities, and the subgroup without multiple disabilities. Irrespective of the presence or absence of multiple disabilities, most patients in the total sample were deaf (69%; according to one of the classification criteria used in the Netherlands) and had two hearing parents (90.3%). Nearly all deaf and hard of hearing patients had a perceptive HI (90.7%), were prelingually HI (HI at birth or before 19 months of age: 95.3%), and had no Cochlear Implant (97.9%). A large majority (83.6%) had no HI relatives.

With respect to the distribution of etiologies of hearing impairments of more than 40dB, especially more rubella with referred patients (14.4%) were found as

compared to rubella as a cause of HI in a general population of moderately to profoundly HI children (4.1% for all prenatal causes including infections in the UK population; Fortnum et al., 2001), as were fewer referrals with non-syndromal genetic HI (13.7% versus > 20% in the same population of HI children; Fortnum et al., 2001) which co-occurs less frequently with multiple organic dysfunctions (Evans & Elliott, 1987; Walch, Anderhuber, Köle, & Berghold, 2000).

Primary communication modes between child with parents and parents with child were associated with the degree of HI ($\chi^2_{(6,271)}$=51.75, p<0.001 and $\chi^2_{(8,271)}$=42.58, p<0.001, respectively), especially because of differences in the use of speech. In the child-parent communication speech was used by 9% of the deaf, by 21% of the severely HI patients and by 58% of the mildly to moderately HI patients.

A Disabling Physical Health Condition (DPHC) was present in 61 (21%) of the HI patients. Patients with a DPHC were more severely to profoundly hearing impaired than other patients from the other groups; patients with DPHC were on average older at the time of referral than patients with mental retardation (MR), who in turn were older than others without multiple disabilities. The great majority of parents of children with either DPHC or MR were found to be hearing. The modes of both child-parent and parent-child communication were also strongly associated with the multiple disabilities index (see Table 4): Especially HI patients with DPHC but also patients with MR used speech only significantly less often than other patients, and significantly more often than basic communication other than sign or speech. Finally, a much larger number of patients with multiple disabilities stayed in a residential setting than without multiple disabilities: DPHC patients were admitted more often (67.2%) than MR patients (46.3%) and other patients (35.3%)

Emotional disorder was found significantly more often in patients without mental retardation and DPHC, pervasive developmental disorder was found significantly more often in patients with DPHC (see Table 5). Multivariate logistic regression showed that the Multiple Disabilities Index remained associated with emotional disorder and pervasive developmental disorder after controlling for the socio-demographic variables gender, age, family composition, parental country

Table 4.

Deafness-related Characteristics by Multiple Disabilities Index

	Multiple disabilities Index			Total n (%)	$\chi^2_{(df,n)}$
	None n (%) / SR	MR[a] n (%) / SR	DPHC[b] n (%) / SR		
Degree of hearing impairment[c]					$\chi^2_{(4,273)}$=11.30*
Deaf (>89 dB)	126 (72.0)/ 0.5	22 (57.9)/ -0.8	40 (66.7)/ -0.2	188 (68.9)	
Severely HH (60-89 dB)	30 (17.1)/ -1.5	12 (31.6)/ 1.2	19 (31.7)/ 1.5	61 (22.3)	
Mild. to mod. HH (20-59 dB)	19 (10.9)/ 0.9	4 (10.5)/ 0.4	1 (1.7)/ -1.9	24 (8.8)	
One/ both parents hearing impaired	22 (12.3)/ 1.2	4 (10.5)/ 0.2	0 / -2.3	26 (9.5)	$\chi^2_{(2,273)}$=7.53*
Lives (partly) in residential setting	65 (35.3)/ -1.7	19 (46.3)/ 0.3	41 (67.2)/ 2.8	125 (43.7)	$\chi^2_{(2,286)}$=19.07***
Type of school					n.e.
Special school for deaf/HH	128 (69.6)/ 2.5	16 (39.0)/ -1.4	16 (26.2)/ -3.1	160 (55.9)	
Special school mult. hand.[e]	20 (10.9)/ -4.1	19 (46.3)/ 2.5	36 (59.0)/ 5.0	75 (26.2)	
Ordinary school	19 (10.3)/ 1.7	1 (2.4)/ -1.1	0 / -2.1	20 (7.0)	
No school[d]	17 (9.2)/ -0.7	5 (12.2)/ 0.3	9 (14.8)/ 0.9	31 (10.8)	
Parent(s)-child communication					$\chi^2_{(8,286)}$=36.11***
Speech only	54 (29.3)/ 1.3	9 (22.0)/ -0.3	7 (11.5)/ -2.1	70 (24.5)	
Speech with signing	66 (35.9)/ 1.4	9 (22.0)/ -0.9	11 (18.0)/ -1.7	86 (30.1)	
Signing	28 (15.2)/ 0.2	5 (12.2)/ -0.4	9 (14.8)/ 0.0	42 (14.7)	
Other (e.g., gestures, writing)	18 (9.8)/ -2.1	9 (19.5)/ 0.5	20 (32.8)/ 3.3	46 (16.1)	
Unknown	18 (9.8)/ -1.7	10 (24.4)/ 1.6	14 (23.0)/ 1.7	42 (14.7)	

Child-parent(s) communication					$\chi^2_{(6,286)}=38.65^{***}$
Speech only	38 (20.7)/ 1.4	4 (9.8)/ -1.1	5 (8.2)/ -1.6	47 (16.4)	
Speech with signing	76 (41.3)/ 1.0	17 (41.5)/ 0.5	12 (19.7)/ -2.2	105 (36.7)	
Signing	39 (21.2)/ 0.6	6 (14.6)/ -0.7	10 (16.4)/ -0.5	55 (19.2)	
Other (e.g., gestures, writing)	31 (16.8)/ -2.8	14 (34.1)/ 0.8	34 (55.7)/ 4.2	79 (27.6)	

Notes. [a]: MR = mental retardation; [b]: DPHC = Disabling Physical Health Condition. [c]: Degree of hearing impairment is quantified as the unaided average hearing loss for the better ear; mild. = mildly, mod. = moderately, HH = hard of hearing; [d]: no school includes children who are too young (7) or adolescents who finished school (7). [e]: Special school mult. hand. = special school for the multiple handicapped.; SR = Standardized Residual; *: $p<0.05$; **: $p<0.01$;***: $p<0.001$.; n.e. = not examined because part of the criteria of the multiple disabilities index.

Table 5.

Socio-demographic Characteristics and Psychiatric Diagnosis by Multiple Disabilities Index

	Multiple disabilities index			Total n (%) or mean(sd)	$\chi^2_{(df,N)}$ or F(df1,df2)
	None n (%) / SR	MR[a] n (%) / SR	DPHC[b] n (%) / SR		
Gender: girl	56 (30.4)/ -0.6	16 (39.0)/ 0.7	22 (36.1)/ 0.4	94 (32.9)	$\chi^2_{(2,286)}$=1.48
Age, *mean (SD)/ n*	10.4 (4.4)/ 177	11.7 (3.7)/ 39	13.0 (4.1)/ 70	11.2 (4.4)	F(2,283)= 10.27***
IQ, *mean (SD)/ n*	94.5 (15.3)/ 147	62.9 (10.0)/34	81.5 (19.9)/37	87.4 (19.3)	n.e.
Lives with both biol. parents	118 (64.1)/ 0.4	20 (48.8)/ -1.1	39 (63.9)/ 0.2	177 (61.9)	$\chi^2_{(2,286)}$=3.49
One/both parents foreign-born	76 (41.3)/ 0.8	20 (48.8)/ 0.3	34 (55.7)/ 1.2	130 (45.5)	$\chi^2_{(2,286)}$=4.06
Highest parental education					$\chi^2_{(4,211)}$=8.26
Low	57 (39.9)/ -0.8	17 (65.4)/ 1.6	20 (47.6)/ 0.3	94 (44.5)	
Middle	52 (36.4)/ 0.7	3 (11.5)/ -1.9	15 (35.7)/ 0.3	70 (33.2)	
High	34 (23.8)/ 0.4	6 (23.1)/ 0.1	7 (16.7)/ -0.8	47 (22.3)	
Emotional disorder	57 (31.0)/ 1.9	5 (12.2)/ -1.6	7 (11.5)/ -2.0	69 (24.1)	$\chi^2_{(2,286)}$= 13.24***
Behavioral disorder	75 (40.8)/ 0.9	13 (3.7)/ -0.5	17 (27.9)/ -1.1	105 (36.7)	$\chi^2_{(2,286)}$= 3.79
Pervasive developmental dis.	36 (19.6)/ -3.6	12 (29.3)/ 0.4	26 (42.6)/ 2.6	74 (25.6)	$\chi^2_{(2,286)}$= 12.99**
Mental Retardation	0 / -6.1	41 (100)/11.3	17 (27.9)/ 1.3	58 (20.3)	n.e.
Sexual abuse in clinical diagn.	4 (11.1)/ 0.8	4 (11.1)/ 0.8	4 (7.3)/ 0.0	19 (7.3)	$\chi^2_{(2,259)}$=0.91
Other disorders[c]	63 (34.2)/ -0.9	16 (39.0)/ 0.1	30 (49.2)/ 1.4	109 (38.1)	$\chi^2_{(2,286)}$= 4.35

Notes. [a]: MR=mental retardation; [b]: DPHC: Disabling Physical Health Condition with or without MR; [c]: Other disorders include impulse control disorders not elsewhere classified (10.0%) , sleep disorders (9.0%), elimination disorders (7.2%) , tic disorders (5.2%) and specific development disorders (axis II, 6.9%); SR= Standardized Residual; *: p<0.05; **: p<0.005;***: p<0.001; n.e.= not examined because IQ and the presence of MR are implied in the conditions of the multiple disabilities index.

of origin and highest parental educational level. Additionally, highly probable or proven sexual abuse was diagnosed in more than 11% of cases irrespective of the presence of MR and in more than 7% of cases with DPHC.

4. Discussion

This study on referrals to the national specialist mental health service for deaf and hard of hearing children and adolescents in The Netherlands during a period of 15 years concerns the largest hearing impaired (HI) clinical sample of children and adolescents studied to date. The first main aim was to compare socio-demographic characteristics and rates of mental health problems in the HI and a hearing clinical sample. The second main aim was to examine the prevalence and correlates of serious, possibly deafness-related, disabilities in the HI sample.

A number of differences were found between the HI and the hearing clinical samples. First, HI referrals were on average older than hearing referrals, irrespective of the hearing status of their parents. Second, a higher rate of environmental distress was found in the HI referrals, as suggested by increased rates of parental divorce and one-parent families, of immigrant parents, and of parents with a lower educational level. Third, the HI sample showed higher rates of pervasive developmental disorder and mental retardation and lower rates of emotional disorders. Fourth, a lower mean IQ was found in the HI sample; this difference remained after removal of all patients with mental retardation.

With regard to the second aim, we first defined a disabling physical health condition (DPHC) by the presence of two or more of the following characteristics: rubella-induced deafness, a history of specialist medical care for visual problems, for neurological motor disorder(s) and for epilepsy. We found indications that this disabling physical health condition (DPHC) is associated with added complexity of mental health problems, even more so than mental retardation. Patients with DPHC were on average older at the time of referral than patients with MR, who were in turn older than the remaining patients. In addition patients with DPHC more often used other modes of communication than speech and/or signing with their parents (and vice versa) and all DPHC patients had hearing parents. DPHC

patients were also more often diagnosed with a pervasive developmental disorder than patients with MR who in turn had a pervasive developmental disorder more often than patients from the group without disabilities. DPHC patients were found to live more often in a residential setting than MR patients who in turn were admitted more often than non-MR-non DPHC patients. These findings illustrate that patients with multiple disabilities, especially patients with DPHC, but also patients with MR, are much more dependent on intensive professional help, education and support as compared to members of the non-MR-non-DPHC group.

4.1 *Age*

A number of factors may contribute to the older mean age of the HI sample. First, linguistic communication problems between hearing environment and a HI child may impede sharing of problems by the child and recognition of problems by hearing parents, hearing teachers or inexperienced hearing professionals (Van Gent et al., 2007). In addition, serious communication problems between child and parent and vice versa are to be expected with the oldest subgroups of HI patients, i.e. the patients with mental retardation or a disabling physical health condition (DPHC), because their mode of communication was characterised by more simple and primitive modes of communicating far more often than speech, signing or a combination of both, as compared to their non DPHC non MR hearing impaired peers. Second, lack of agreement on the significance of problems, their impact and the preferred interventions between parents, teachers and others may postpone referral to mental health services, part of which may reflect cultural differences between deaf and hearing individuals (e.g., Hindley, Hill, & Bond, 1993), as well as different perceptions of problem behaviour according to the different perspectives of people involved (Fombonne, 2002). Third, the coexistence of HI and mental health problems may lead caregivers to assume prematurely that HI explains all, the phenomenon of diagnostic shadowing (Kitson & Thacker, 2000). Especially in the case of pervasive developmental disorder, which prevailed especially in the HI patients with DPHC, it may have been difficult to differentiate developmental delays due to physical interferences or a cognitive impairment in a HI child

from a developmental disorder characterised by restricted or abnormal social involvement and often occurring atypical sensory responses (Rogers & Ozonoff, 2005). Finally, the accessibility of the few specialist mental health services for HI children and young people throughout the country is restricted due to a long travel distance to such services for families with HI children, combined with a limited opportunity to deliver outreaching services closer to home and schools of potential referrals, due to economic reasons. This may have contributed to the undesirable prolongation of seeking help with and service provision by dedicated professionals in the large educational organisations, who - however- are not specifically trained in the recognition and assessment of psychiatric disorders.

4.2 *IQ*

The difference of about 18 points in average performal IQ of HI and hearing control-patients is much larger than the 4 points difference between larger non-clinical populations of hearing and deaf children (Meadow, 1980). The larger difference found in this study can be explained by the high prevalence of HI patients with mental retardation referred to the specialist service for HI children. A higher prevalence of low IQs in populations of HI children and adolescents than in hearing populations is to be expected as brain damage is a common underlying cause of both HI and cognitive impairment (e.g., Vernon, 1968/2005). Brain damage in itself is one of the main known risk factors to mental health disorders, as is cognitive impairment (e.g., Friedman & Chase-Lansdale, 2002). In this study we found a particularly low mean IQ (81.5) in HI patients with a disabling physical health condition (DPHC), while a higher mean IQ (94.5, approaching the mean of the hearing sample) was found with the other HI patients, i.e. when the patients with MR were excluded. In addition, the considerable difference in rates of mental retardation between the HI and the hearing populations in this study may be partly explained by the not unusual practice of referring hearing children or adolescents with MR and mental health problems to services for the multiple handicapped, while all HI children and youth including children with MR were primarily referred to the new national mental health service for deaf and hard of hearing children and young people.

4.3 *Environmental adversity*

A number of findings may indicate higher levels of environmental adversity in the referred HI population. Firstly, hearing children of HI parents and HI children of hearing parents lived in one-parent families more often than hearing children of hearing parents and HI children of HI parents. This may suggest that aural and concomitant communicative and socio-cultural differences between a child and its parents may be associated with an increased prevalence of parental divorce and a broken home. Both a communicative mismatch and the absence of satisfying communication between the child and his parents (e.g.,Wallis, Musselman, & MacKay, 2004), parental distress, and divorce (e.g., Goodman, 2002) may all contribute to mental health problems in children. Secondly, significantly more HI patients from non-Caucasian or Mediterranean origin were found among the HI referrals than among the hearing referrals. It may be hypothesized that accumulation of health-related and aversive socio-economic risk factors in families from this minority (e.g., see Stacey, Fortnum, Barton, & Summerfield, 2002) has rendered HI children more vulnerable to mental health problems (e.g., see Friedman & Chase-Lansdale, 2002). Alternatively, better educational and mental health care facilities in The Netherlands may have attracted parents from abroad to present their HI child for assessment and treatment in one of the scarce mental health centres for the deaf and the hard of hearing in Europe. Thirdly, the educational level of HI parents differed significantly from hearing parents of referred children, either HI or hearing. This is consistent with the finding of lower educational (Traxler, 2000, Antia, Jones, Reed, & Kreimeyer, 2009) and employment (Winn, 2007) outcome among deaf school leavers and adults, both of which are recognized as cumulative risk factors that may add to the vulnerability of the child (e.g., Friedman & Chase-Lansdale, 2002).

4.4 *Diagnostic groups*

Prevalences of emotional disorder, pervasive developmental disorder and mental retardation were found to vary significantly between the four patient groups: hearing patients of hearing parents (HOH), hearing patients of one or two deaf or hard of hearing parents (HOD), deaf or hard of hearing patients of hearing parents

(DOH) and deaf or hard of hearing patients of one or two deaf or hard of hearing parents (DOD). The highest prevalence of emotional disorders was found in HOD patients. Upon further analysis we found an especially high rate of depression in this group (36.4% versus a mean prevalence of 17.3% in the other groups). Whether this reflects high emotional distress as a consequence of psychological problems balancing between two cultures and recurrent problems between parents and child (e.g., Singleton & Tittle, 2000) needs to be studied further. With regard to the broad category of behavioral disorders more disorders were found in HI children of hearing parents than in either HI children of HI parents or hearing children of hearing parents from the control group but the difference did not prove significant. The difference became significant when omitting all referrals with mental retardation. However, the rate of behavioral disorders in the HI referrals declined over the 15 years of study. A gradual decline of the initially raised rate could indicate that the most urgent demand for assessment and treatment of serious disturbing problem behaviour has been dealt with in the first phase of the new mental health service. Given the often very complex diagnostic presentations in HI patients (Heller, 1987) it might also be hypothesized that psychiatric diagnoses made in the new service have become more differentiated through the experience and gained - differential diagnostic- insights over time. It may take considerable time to differentiate between symptoms, to interpret behavior, and to understand how moods and affect may be displayed in HI patients (Evans & Elliott, 1987). For instance, feelings of impotence, anxiety, sadness or frustration with difficulties of communication may lead to opposition (Kelly et al., 1993) particularly in HI children and young people who have difficulty expressing him or herself in a hearing world. Finally, it is tempting to speculate that the increased attention for better communication with HI and recognition of special communicative needs in education over the years has contributed to a gradual decline of behavioral disorder, as has been proposed in a Swedish study by Sinkkonen (1994). The finding of a preponderance of pervasive developmental disorder (PDD) in the HI group is consistent with findings in other studies (Juré et al,, 1991; Rosenhall et al,, 1999), and has been associated with a common cause for both. Particularly brain dysfunction or damage of prenatal origin has been thought to play a role in the

aetiology of the combination of HI and PDD (e.g., Juré et al., 1991). In this study we found that PDD was associated with a disabling physical health condition (DPHC), indicating the presence of a neurological or visual disorder or rubella-induced deafness: PDD was found in 42.6% of the patients with a DPHC.

4.5 *Other findings*

Other findings are worth mentioning. The finding of a rate of 7-11% of highly likely or proven sexual abuse illustrates the considerable risk of abuse in children and young people with disabilities in general (Sullivan et al., 2000) including children and young people with limited speech and language skills (Sobsey & Varnhagen, 1988) and hearing impairments (Sullivan et al., 2000) which warrants for specific attention at assessments and prevention programs, as many cases may be missed. Secondly, and not surprisingly, the communication mode at home was related to degree of hearing loss with gradually more use of speech only in conjunction with a declining degree of hearing impairment. Thirdly, we expected that the main characteristic of the children attending special schools for students with multiple disabilities (MD) would be an IQ below 70 according to the main formal criterion for admission to those schools. However, mental retardation was found in only 37.3% of the patients attending this type of school, the majority of referred MD students belonged to a category that had been admitted on the basis of a so-called "rational departure of the rule", indicating the need for intensified educational attention for other children and young people with problems with learning, social interaction or behavior. In this study children and adolescents with a complex physical health condition were identified as the majority of patients with multiple disabilities, many of whom attend special school programs for multiply handicapped students. Findings from this study support the evidence of a preponderance of acquired causes among children and adolescents with multiple disabilities, albeit predominantly of prenatal origin rather than perinatal origin as found by Admiraal and Huygen (1999) in deaf people with intellectual disabilities. The high rate of physical co-morbidity in this clinical population, and especially with patients with multiple disabilities, may also reflect the significance of neurological and other physical disorders as potential risk factors

to psychopathology. Moreover, the findings support the view that HI children with multiple disabilities are challenged in many domains of functioning (Knoors & Vervloed, 2011) which may cumulatively add to the risk of mental health disorder. Fourth, as during this study the number of implanted and referred children was only small, this sample may be viewed as representative of the majority of Dutch non-implanted HI children and adolescents with serious mental health problems in the ''pre-implant period". Research is needed to measure the effect of CI on the prevalence of psychopathology, as to date no relation with psychiatric diagnosis was found in a population based study of children and adolescents, using diagnostic parental interviews and parental and teachers' questionnaires (Fellinger, Holzinger, Sattel, Laucht, & Goldberg, 2009). Similarly, the degree of hearing loss and CI use were not related to the increased level of self-reported depression in HI children as compared to the level of self-reported depression in hearing control children (Theunissen, Rieffe, Kouwenberg, Soede, Briaire, & Frijns, 2011).

Finally, degree of hearing impairment was not related to psychiatric diagnosis. In addition, the subgroup of mildly to moderately hard of hearing children and adolescents (8.8 % of the total HI sample) did not differ from the more severely HI majority in socio-demographic and cognitive characteristics.

4.6 *Limitations*

Firstly, the diagnostic data were only partly obtained by a combined approach of standardized diagnostic interviews and questionnaires. However, one could take the position that the validity of the diagnostic classifications used in this study is even higher than the validity of standardized diagnostic measures as our diagnoses result from an extensive - multi-disciplinary and multi-informant- approach to psychiatric diagnosis, based on clinical diagnostic interviews with the child and with the parents, a medical assessment, a psychological assessment using standardized measurements bringing together information from all informants and integrating the contributions from patient, parents, teacher and the professionals involved. Secondly, findings from this study may not be generalized to whole populations as they only reflect problems and characteristics of a referred population with

severe mental health problems. However, it seems likely that these findings reflect the problems and characteristics of the majority of HI children and adolescent with serious mental health disorders, albeit specifically within the mental health system in The Netherlands. Thirdly, no data was obtained on children and young people with psychiatric problems who did not make use of their referral to the specialist service or those who had serious but not recognized psychiatric problems. In general populations the proportion of children with a psychiatric disorder not using mental health services may be about 75% (e.g., Ford, Hamilton, Meltzer, & Goodman, 2007), but preliminary data with deaf adolescents suggests that underconsumption may be even more substantial in deaf populations (Van Gent et al., 2007). Whether the non-users tend to have milder or more serious problems, remains to be clarified.

5. Conclusions

Deafness does not produce any specific psychiatric syndrome (Goldberg et al., 1975), but specific factors related to deafness (e.g., degree, aetiology, physical comorbidity), cognition (IQ), communication (e.g., quality) and demographic circumstances (e.g., parental distress, ethnic background, residential setting) may help to identify characteristics of specific clinical subgroups and to specify risk factors to varying mental health disorders which may be cumulative. This data demonstrates that differential diagnosis in HI children and young people warrants a high degree of combined expertise in medical-audiological aspects of HI, the influence of deafness on development and social interactions, socio-cultural and communicative aspects. It highlights factors which may be the focus of more specific preventive interventions, such as those aimed at the early recognition and treatment of known risk factors and early screening for psychological problems. These findings also support the notion that a multi-informant approach by a multi-disciplinary team of specialized mental health professional, trained in communicating with HI individuals and their families, is warranted in order to meet the mental health needs of the children and adolescents with and without cognitive or other comorbidity and to deal with the high prevalence of disorders in this heterogeneous minority population.

[1] Note

For practical reasons the abbreviation HI is used for the terms hearing impairment or hearing impaired to indicate deaf and hard of hearing children and adolescents throughout the text of this article.

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