REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Bess F, Tharpe A. Case history data on unilaterally hearing-impaired children. Ear Hear. 1986; 7(1):14–9.	Case history data examined in 3 ways: Total group of children. Close examination of subgroup of 25 children. Close examination of 8 academically unsuccessful children from the group of 25.	60 children with UHL* from mid-Tennessee region.	Only selection criteria used: An audiogram obtained by an audiologist. SNHL* loss of ≥45 dB* (.5, 1, 2 kHz*) in poorer ear and ≤15 dB in better ear. No experience with amplification.	Total tested: N = 60 with UHL. Subsample of 25 children who satisfied more stringent criteria. Group of 8 academically unsuccessful children from the group of 25. Aged 6–18 years.	Comprehensive medical and educational case histories	Only 23% of children with UHL were identified before age 5 (Mean = 5.68 years). Approximately 50% of 60 showed some difficulty in educational progress. 35% failed at least one grade (most failed 1st grade, although half failed higher grades). 13.3% were in need of some special resource assistance. All children received classroom seating preference. 20% described by teachers as having behavioral problems. Similar finding obtained on a subset of 25 children with UHL that satisfied more stringent criteria. Small group of 8 academically unsuccessful children: Half had a right ear loss–repeated 1st grade due to "immaturity" or "hyperactivity." Data from metro-Nashville public schools: 3.5% of children in grades K–6 failed one or more grades.	Most important finding was half of the children showed problems in educational progress. Results indicated a need to re-assess these children's needs.

* UHL = unilateral hearing loss; SNHL = sensorineural hearing loss; dB = decibel; kHz = kilohertz

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Bess FH, Tharpe AM. Unilateral hearing impairment in children. Pediatrics. 1984;74(2): 206–16.	Case-matched control. Medical and educational case history data via parental interview and school records. Subsample of 25 received comprehen-sive examination of auditory and linguistic skills. Subsample of 25 with UHL* matched to group of 25 control children.	Convenience sample from patient files of Bill Wilkerson Hearing and Speech Center, files of Nashville. Metro school system and other local educational and health agencies in mid-Tennessee.	Selection criteria: Audiogram by an audiologist. SNHL* loss PTA* ≥45 dB* HL* (.5, 1, 2 kHz*) in poorer ear and ≤15 dB in better ear. No experience with amplification. Normal hearing: threshold ≤15 dB HL PTA (.25 to 8 kHz) bilaterally; normal tympanometry bilaterally.	Total: N = 85 N = 60 with UHL aged 6–16 years. Subsample of 25 children with UHL received comprehen-sive examin-ation of auditory and linguistic skills. Subsample of 25 children was compared with matched controls (N = 25).	Medical and educational case history data collected via parental interview and school records. Subsample of 25 children received comprehensive exam of auditory and linguistic skills. Subsample of 25 children with UHL matched with group of 25 control children. Measures: BRS*; auditory localization, syllable recognition using NST* in varying signal to noise conditions; extensive battery of language measures; WISC-R* for cognition.	35% failed at least 1 grade compared with norm of 3.5% in Nashville. 13.3% needed special assistance; 48.3% received special assistance even if they didn't repeat a grade. Of 25 in subsample 32% failed a grade (mostly 1st grade and kindergarten); no controls failed. 22% with UHL rated by teachers as above average versus 47.3% of control children. On 4 of 5 categories of BRS higher percentage of negative ratings than controls; Only category with no differences was organizational skills. Children with UHL showed more errors of localization than control children. Syllable recognition: poorer in all signal-noise conditions than controls. Lower verbal IQ (but same on WISC-R) for children who failed a grade. WISC-R full-scale IQ lower with more severe UHL; Children with UHL performed comparably with controls on language, but more analyses were being done at the time of this publication.	Children with UHL experienced difficult listening complications that could compromise educational progress. Auditory and language results might explain difficulties. Results indicate a need to re-examine current management of children with UHL.

* UHL = unilateral hearing loss; SNHL = sensorineural hearing loss loss; PTA = pure tone average; dB = decibel; HL = hearing level; kHz = kilohertz; BRS = Behavioral Rating Scale; NST = Nonsense Syllable Test; WISC-R = Weschler Intelligence Scale for Children-Revised

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Bess FH, Tharpe AM, Gibler AM. Auditory performance of children with unilateral sensorineural hearing loss. Ear Hear. 1986;7(1): 20–6.	Case-Matched Control. Purpose: To assess the performance of children with UHL* on two basic fundamental auditory tasks: Horizontal sound localization and speech recognition of nonsense syllables.	Convenience sample from patient files of Bill Wilkerson Hearing and Speech Center, files of Nashville-metro school system, and other local educational and health agencies in mid-Tennessee.	PTA* .5, 1, 2 kHz.* Selection criteria: Audiogram by an audiologist. Sensorineural loss ≥45 dB* in poorer ear and ≤15 dB in better ear. No experience with amplification.	Total: N = 50 With UHL: N = 25 Controls: N = 25 25 children with UHL and 25 control children matched for age, sex, SES,* race, and, intelligence. Aged 6–13 years (mean = 10).	Localization in anechoic chamber: Only 20 of 25 UHL children participated. Speech recognition assessed with NST.* MD* and MI* conditions.	*Localization:* UHL children more errors than controls; More difficult for both groups at 3 kHz than .5 kHz; wide variability among UHL children; no differences between groups as a function of educational success. *Speech Recognition:* UHL children showed more difficulty understanding nonsense syllables than controls under all MD conditions. The more adverse the listening condition, the greater the difference between UHL and controls. *Degree of Loss:* Under MI conditions children with more severe hearing loss had greater difficulty understanding speech than controls. *Success in School:* Tendency for children who have difficulty in school to perform more poorly in the MD condition than children who do better in school (in quiet condition only). *Side of Hearing Loss:* MD condition: trend for children with right ear loss to perform more poorly than children with left ear loss.	Children with UHL performed more poorly on auditory skills than control children. Implications for clinicians, teachers, and parents; problems UHL children experience in background noise highlight the need to consider the acoustic environment in a typical noisy classroom; recommendations for management are made in the article.

* UHL = unilateral hearing loss loss; PTA = pure tone average; kHz = kilohertz; SES = socioeconomic status; NST = Nonsense Syllable Test; SNR = signal-to-noise ratio; MD = monaural direct; MI = monaural indirect

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Bovo R, Martini A, Agnoletto M, Beghi A, Carmignoto D, Milani M, et al. Auditory and academic performance of children with unilateral hearing loss. Scand Audiol Suppl. 1988; 30:71–4.	Case-matched control.	Subjects referred to outpatient clinic at the ENT* department of the University of Padua Medical School during 1981–86. 30 patients selected for a more detailed case history.	UHL:* ≤15 dB* in the speech frequencies in the good ear; profound or total hearing loss in other ear; normal tympanogram and acoustic reflex in both ears. UHL developed during the first 12 years of life. No history of neurological disease. UHL for more than 3 years. Normal hearing: ≤15dB bilaterally, normal tympanograms and acoustic reflex.	Total: N = 115 With UHL: N = 115 Aged 6–18 years Matched controls with subgroup of 30 children with UHL: N = 30	Questionnaire given to determine age UHL developed, how it was recognized, and potential causes. Academic case history and difficulties encountered due to hearing loss included. 30 patients selected from the 115 respondents were matched with 30 controls and tested for speech in noise using the Bocca Pellegrini word list and were assessed for horizontal sound localization using pure tone stimuli of .5 and 3 kHz.*	41% visited speech and hearing center because parents and/or teachers noticed hearing difficulty. 30% identified at age 3–5 years; 42% identified at age 6–8 years. Etiology unknown for 50%. 63% reported difficulty in speech discrimination in noise. 83% reported difficulty in sound localization. 50% not provided preferential seating in classroom; 32% reported difficulty understanding teachers' speech. 22% failed at least one grade in school and 12% required assistance from a specialist in learning disabilities. 27% had feeling of embarrassment and a sense of inferiority. Children with UHL performed significantly worse than controls in word discrimination at 0 dB SNR* and -10dB SNR ($p < 0.01$) in MD* condition and for all SNRs in MI* compared to MD.* Children with hearing loss exhibited higher error indices than controls in horizontal sound localization tests at .5 and 3 kHz ($p < 0.01$).	School-aged children with UHL demonstrated significant problems affecting academic performance. Confirmed the findings of Bess (1986) that children with UHL performed poorer than controls even when primary signal presented to good ear. Side of hearing loss did not influence performance for localization or speech discrimination. UHL represents a far from negligible disability in social relations and learning, especially during compulsory school life.

* ENT = ear, nose, and throat; UHL = unilateral hearing loss; dB = decibel; kHz = kilohertz; SNR = signal-to-noise ratio; MD = monaural direct; MI = monaural indirect

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Brookhouser PE, Worthington DW, Kelly WJ. Unilateral hearing loss in children. Laryngoscope. 1991;101(12 Pt 1):1264–72.	Descriptive. Prevalence rates by demographics. Etiology, age of identification, severity of hearing loss, and prevalence of school-related problems examined. Longitudinal follow-up of 115 children.	Children with USNHL* evaluated at BTNRH.* Of 1,829 consecutive patients aged 19 years or younger: 690 had asymmetrical losses. 391 diagnosed with USNHL. Final N of children with purely sensori-neural losses = 324	PTA* = .5, 1, 2 kHz.* Borderline: 16–25 dB.* Mild: 26–45 dB. Moderate: 46–65 dB. Severe: 66–85 dB. Profound: ≥86 dB. Anacusic: no measurable threshold. High Frequency: normal hearing through 2 kHz.	Total: N = 324 With UNSHL: N = 324 Controls: NA 391 diagnosed with UNSHL. Final N of children with purely sensorineural losses = 324. Data regarding school performance collected from 172 children with USNHL.	Review of records for demographics, age of identification, etiology, severity, audiometric configuration, stability of losses over time, and prevalence of school-related problems.	Percentages out of total with UNSHL: 13% borderline; 16% mild; 12% moderate; 6% severe; 10% profound; 15% anacusic; 28% high frequency. More males than females (62% v. 38%); age of diagnosis birth–19.83 years; mean 8.78 years. Borderline, mild, and high frequency losses understood speech quite well; moderate or worse had difficulty in the affected ear even under optimal conditions. Longitudinal follow up for 155 children for periods ranging 1–15 years: Severe hearing loss group showed mean decline of SFA* of 10dB or more; some children in each category had progressive losses. Of 172 children, 102 (59%) had history of academic or behavioral problems in school. Of 102 children with school problems, 46% had right ear losses and 54% had left ear losses. 17 of 102 with school problems also had speech/language delay and of these 17 (65%) had right ear losses; school problems not related to degree of loss.	Most of the children were identified late. Physicians should make an effort to obtain ear-specific audiometry at an early age. Progressive loss in normal ear did not appear to be common. School problems as pervasive as in other similar studies; children with USNHL were at higher risk for academic difficulty and behavior problems than control children. Author provided list of conclusions and suggestions for management.

* UNSHL = unilateral sensorineural hearing loss; BTNRH = Boys Town National Research Hospital; PTA = pure tone average; kHz = kilohertz; dB = decibel; SNHL = sensorineural hearing loss; SFA = speech frequency average

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Colletti V, Fiorino FG, Carner M, Rizzi R. Investigation of the long-term effects of unilateral hearing loss in adults. Br J Audiol. 1988;22(2): 113–8.	Case-matched control *T*-tests, chi-square, and Fisher tests used.	31,325 patients had hearing evaluated at the ENT* Department of the University of Verona between 1970 and 1987. 11% had UHL.* 1,176 out of 1,583 subjects had UHL >40dB.* 610 aged 30–55 years—from this group 61 were selected because onset before school age and no other neurologic disorder.	>40 dB HL* in worse ear. Sensorineural loss. No other significant general or neurologic disorder. No other information provided.	Total tested: N = 106 adults With UHL: N = 61 Controls: N = 45 Aged 30–55 years who had UHL since pre-school age. No other significant general or neurologic disorder. Controls matched for age and sex.	Questionnaire developed by authors to identify some objective and subjective indices of disability. Questions of auditory function, degree of education, and type of work included. Social Problem Questionnaire of Corney and Clare (1985).	No differences were found for scholastic achievement or types of employment between the two groups. Significant difference in hobbies—only 7.5% of UHL patients indicated music as a hobby versus 17.8% for the control group 95% of patients with UHL indicated difficulties in speech recognition in noise and 82.5% in sound localization, p <.001 compared with the control group. No difference between groups for sedative or alcohol use. Social Problem Questionnaire indicated 60% of subjects had no or slight problems, 32% had moderate problems and 6.7%–10% had severe problems. No significant difference between the groups.	The study did not support the existence of non-auditory long-term effects of monaural hearing loss.

* ENT = ear, nose, and throat; UHL = unilateral hearing loss; dB = decibel; HL = hearing level

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Culbertson JL, Gilbert LE. Children with unilateral sensorineural hearing loss: cognitive, academic, and social development. Ear Hear. 1986;7(1):38–42.	Case-matched control. 1-way and 2-way analyses of variance used to compare groups.	Convenience sample from patient files of Bill Wilkerson Hearing and Speech Center, files of Nashville-metro school system, and other local educational and health agencies in mid-Tennessee (See Bess and Tharpe, 1986).	Good ear <15dB*; worse ear ≥45 dB. UHL* for at least 3 years. No history of OME* in good ear.	Total: N = 50 With UHL: N = 25 Controls: N = 25 Aged 6–13 years matched on sex, age, SES* and WISC-R.* Excluded children in full-time special education.	Psychological testing in 2 sessions by trained examiners blind to children's group assignment WISC-R H-N* WRAT* BRS* Bender-Gestalt Sentence-Repetition from Aphasia Test Battery Piers-Harris Self-Concept Scale Group achievement test data from school system.	*Cognitive and Academic (WISC-R and H-N):* No differences between 2 groups on 4 I.Q. measures. No differences between WISC-R (more verbal) and H-N (less verbal). *Subscales of WISC-R:* UHL subjects had more difficulty on word recognition and spelling. No differences on group achievement, but UHL subjects had more difficulty on language measures. *Self-Concept and Behavior:* No differences on Piers-Harris Self-Concept Scale. BRS revealed differences on 4/5 categories: UHL had higher percentage of negative ratings from teachers. *Analyses Within UHL Group: Mild–moderate versus severe–profound:* Severe–profound lower WISC-R Full Scale I.Q. than mild–moderate. No differences in WISC-R performance I.Q. or H-N. *Grade Repetition:* UHL who repeated a grade scored lower on WISC-R verbal I.Q. and subscales of arithmetic, vocabulary, digit span, and any subscales that required freedom from distractibility. Academic differences significant on WRAT-R word recognition, spelling, and arithmetic; UHL children lower on reading and language.	Data suggested children with UHL exhibited greater academic difficulty than hearing peers. Children with UHL were more likely to repeat a grade or need special education resource help or private tutoring. Children with severe–profound UHL had verbally-based learning difficulties. Awareness of hearing loss was helpful to teachers in planning effective teaching approach. For children with severe–profound UHL, verbally-based cognitive measures like WISC-R might not be appropriate. Teachers rated children with UHL as having more behavior problems and distractibility.

* dB = decibel; UHL = unilateral hearing loss; OME = otitis media with effusion; SES = socioeconomic status; WISC-R = Weschler Intelligence Scale for Children-Revised; H-N = Hiskey-Nebraska Test of Learning Aptitude; WRAT = Wide Range Achievement Test; BRS = Behavior Rating Scale

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Dancer J, Burl NT, Waters S. Effects of unilateral hearing loss on teacher responses to the SIFTER. Am Ann Deaf. 1995;140(3):291–4.	Case-matched control. Subject's primary teacher completed 2 SIFTER* questionnaires: one concerning a child with UHL* and the other concerning an average hearing child within same classroom. *T*-tests and chi-square analyses.	Reviewed audiological charts at Arkansas Children's Hospital in Little Rock, Arkansas.	Mild: 40 dB* "or better" (N = 1). Moderate: 45–60 dB (N = 7). Severe–profound: 65 dB "or better" (N = 10). See Table 1 page 292 in article for detailed individual characteristics.	Total tested: N = 36 With UHL: N = 18 Controls: N = 18 18 students with UHL. Aged 5–17 years. 12 males; 6 females.	SIFTER SIFTER has 15 questions in 5 content areas: -academics -attention -communication -class participation -school behavior Overall scores and scores within each content area were compared between the two groups (UHL versus control).	Students with UHL scored significantly lower than controls on 13 of the 15 SIFTER questions. No significant difference in rating on questions relating to students working up to their potential and not being easily frustrated. In all areas, the mean scores for children with UHL were significantly lower than the mean scores of the control children. No significant differences were found between sex, affected ear, degree of loss, or variation in assistive listening devices.	Classroom teachers consistently rated students with UHL lower in academics, attention, communication, class participation, and behavior than their average classroom peers. No difference in ratings for UHL versus control students as working up to their academic potential—might indicate teachers expect less from their UHL students and also might give less challenging work to limit frustration. Teachers need in-service education on the effects of hearing loss in general, and UHL in particular, on the student's classroom performance.

* SIFTER = Screening Instrument for Targeting Educational Risk; UHL = unilateral hearing loss; dB = decibel

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Hallmo P, Møller P, Lind O, Tonning FM. Unilateral sensorineural hearing loss in children less than 15 years of age. Scand Audiol. 1986;15(3): 131–7.	Test–Retest (examination, re-examination) Average examination, re-examination interval 3.5 years.	1972–82 61 children <15 years with UHL* referred to ENT* clinic and audiology clinic in Bergen, Norway. 56 subjects came for re-examination. 37.5% requested examination because parents or patient noticed hearing loss. 62.5% referred because of failed screening.	PTA* >20 dB* (.5, 1, 2, 4 kHz*) or PTA >30 dB (4, 6 kHz) Authors assumed that the average age of onset of the hearing loss was 2 years prior to the first examination.	Total tested: N = 56 With UHL: N = 56 Controls: N/A Age <15 years. Average age at 1st exam 8.5 years (range 4–14 years). At re-examination average age 12 years (range 6–16 years).	At first visit and re-examination visit, pure tone audiology was carried out. When possible, word discrimination, tympanometry, acoustic reflex, ABR,* otoneurological and caloric testing were carried out.	Re-examination showed no deterioration in hearing in the better ear for all subjects; only one subject showed deterioration in the affected ear. Hearing loss can result from meningitis, mumps, maternal rubella, heredity, neonatal asphyxia, unknown, and acoustic neuromas (very rare in children). There are huge discrepancies in the reports of percentages for given pathologies; E.g.: hearing loss from mumps range from 0% to 67% for different studies. The vast majority had insignificant additional conditions; e.g., 51 of 56 subjects had normal calorics. School results and linguistic development were normal. Only 2 subjects wanted to try amplification; BTE* was returned after a short period and CROS* was used occasionally.	Study reported that childhood UHL attracted little attention from parents or patients. It was not noticed until grade school (age 7 years in authors' country) that the condition was discovered through hearing screenings and increased demands of hearing performance. Authors concluded that this population experienced few communication and educational problems Periodic monitoring is recommended for children with UHL.

* UHL = unilateral hearing loss; ENT = ear, nose, and throat; PTA = pure tone average; kHz = kilohertz; dB = decibel; ABR = auditory brainstem response; BTE = behind the ear; CROS = contralateral routing of signal

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Hartvig Jensen J, Børre S, Johansen PA. Unilateral sensorineural hearing loss in children: cognitive abilities with respect to right/left ear differences. Br J Audiol. 1989;23(3):215–20.	Case-matched control.	39 children aged 10–16 years. Found from audiology department records to have UHL.* 30 selected based on case definition.	6–16 years. Good ear: <15 dB* PTA* (.5, 1, 2, 4 kHz*) with monaural word discrimination score >90%; Worse ear: >45 dB PTA. Normal tympanograms Normal I.Q. UHL for >3 years. Trauma or meningitis ruled out. *Controls:* Normal hearing: <15 dB .25–8 kHz and normal word discrimination score. Normal tympanograms No recurrent episodes of otitis media. Normal I.Q.	Total : N = 60 With UHL: N = 30 Controls: N = 30 30 children with UHL; 19 left-side UHL (L-group); 11 right-side UHL (R-group). 30 control children matched for age and sex.	Battery of psychological tests in Danish consisting of verbal and non-verbal sub-groups. WISC* verbal and performance subtests. Verbal: RAN,* Auditory-Verbal Learning Test, Token Test. Nonverbal: Raven's Colored Matrices, Trail Making A for children, Trail Making B for children, Bender Visual Motor Gestalt Test.	Children with left UHL showed no differences on verbal and non-verbal tests compared with controls. Children with right UHL showed poorer performance on WISC verbal subtests compared with control group, and left UHL group. Right UHL group also performed poorer than controls on 2 verbal subtests from RAN. Right UHL: No differences found in Token Test and Auditory-Verbal Learning Test. Nonverbal: Raven, Trail Making A and B, and Bender, no differences between groups. WISC: 6 subtests, right UHL lower scores than controls. Difference appears related to academic performance: 96% of left UHL had satisfactory academic progress versus 45% of right UHL. 54% of right UHL required resource help and 18% repeated a grade. Many of the children did not get preferential seating despite recommendations to do so.	Right-ear UHL placed child at risk in educational system. Some verbal tests are more sensitive than others. Left-ear UHL performed as well as controls in all tests, so authors restricted discussion to *right*-ear UHL. One of the significant differences was in "similarities" score of WISC. Right-ear UHL also showed significantly poorer digit span scores. (Both might have been more sensitive to left hemisphere involvement.) Authors advise educators to be made more aware of the issues faced by right-ear UHL children and provide best possible classroom seating as well as amplification if possible.

* UHL = unilateral hearing loss; dB = decibel; PTA = pure tone average; kHz = kilohertz; WISC = Weschler Intelligence Scale for Children; RAN = rapid alternating stimulus naming

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Ito K. Can unilateral hearing loss be a handicap in learning? Arch Otolaryngol Head Neck Surg. 1998; 124(12):1389–90.	Hearing loss and ear disease prevalence among university students were compared with prevalence among Japanese preschool and elementary students. Logic: If university students showed academic abilities above average, "a certain type of hearing impairment" was considered a potential barrier to academic achievement if its prevalence among this population was lower than its prevalence among Japanese preschool and elementary school children.	Audiologic and otologic screening tests performed on 31,902 students from the University of Tokyo from 1988 to 1996.	If students did not pass screening they were referred to an otolaryngologist who made a diagnosis of hearing loss.	Total tested: N = 31,902 With hearing loss: N = 305 86% male 14% female Mean age 18.7 years	University of Tokyo entrance exam is one of the most difficult to pass in Japan; therefore, the authors assumed students did not have any academic achievement problems. The potential barrier to academic achievement caused by hearing loss was evaluated by comparing the prevalence of hearing loss among the study population to that of school children.	The prevalence of unilateral hearing loss and ear disease among the university students (.16% in total, .16% in males, and .15% in females) paralleled prevalence among Japanese preschool and elementary school children (.15% in 6,825 preschool children and .14% in 18,422 school children without sex difference).	Since the prevalence of unilateral hearing loss among university students was similar to that among school children, it can be inferred that hearing loss did not pose a barrier to learning. In other words, if unilateral hearing loss posed a barrier to learning, one would have expected fewer people with unilateral hearing loss to have reached the university level.

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Keller WD, Bundy RS. Effects of unilateral hearing loss upon educational achievement. Child Care Health Dev. 1980; 6(2):93–100.	Case-control	Children with UHL* identified by audiometric tests from 42,000 students in 5 school districts around Buffalo, New York.	UHL: ≥ 25 dB* on two or more frequencies in poor ear with no loss >25 dB in better ear. Control: "normal hearing"	Total tested: N = 86 With unilateral hearing loss: N = 63 Controls: N = 23 siblings 63 UHL children; average age 12.03 years. Controls: 23 siblings with normal hearing; average age 11.6 years. Students in any special education classes were not included. Subjects from relatively affluent suburban school districts.	Stanford Achievement Test and the Metropolitan Achievement Tests compared for the two groups using national and local norms.	No significant difference between scores of UHL children and controls. However, on each subscale the children with UHL scored lower than control children. Male UHL children performed significantly better than females on vocabulary subscale, math applications, mean quantitative score, and mean score for all subscales. No significant differences between males and females in the control group.	No significant educational deficits associated with UHL.

* UHL = unilateral hearing loss; dB = decibel

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Kiese-Himmel C. Unilateral sensorineural hearing impairment in childhood: analysis of 31 consecutive cases. Int J Audiol. 2002;41(1):57–63.	Case studies. All children given hearing aids and tested average of 6 months later to give them time to get used to HA.* HA was only intervention provided; no additional services provided; 26 of 31 children (84%) actually wore HA, 81% accepted HA.	31 children aged 1–10 years identified over 4-year period (10/01/1995–09/30/1999) in defined geographical area of Germany (Lower Saxony). Children went to clinic due to parental concern, referral by pediatrician, otolaryngologist, or general practitioner.	USNHI = PTA ≥30 dB in ear with loss with average air-bone gap not >10 dB. Good ear ≤15 dB.	Total tested: N = 31 With USNHI: N = 31 No controls 31 children with USNHI aged 1–10 years. Hearing loss ranged from mild–profound. Age of amplification from 7 months–9.9 years.	*Standardized tests:* Subtest of Picture Vocabulary of German version of French Intelligence Test. German version of K-ABC subtest of Vocabulary (expressive vocabulary 2.5–2.9 years). Aktive Wortschatztest für Drei –bis Sechsjährige (expressive vocabulary 3–5 years). 6 subtasks of German version of ITPA* (auditory reception, auditory association, grammatic closure, sequential auditory memory, auditory closure, sound blending). History of each child's language development based on parent interview (age in months at emergence of 1- and 2-word utterances); parental assessment of child's acceptance of HA.	Non-verbal I.Q. within normal range (even if postnatally identified children excluded). No delay in using 1st words; delayed 2-word utterances (on average by 5 months). USNHI children had no more difficulty on standardized linguistic tasks than controls, based on mean scores, although some individual children scored below norms. No significant mean differences between children with right or left ear hearing loss.	Main characteristics of subjects were high proportion of unknown etiology and late identification. No previous studies considered HA acceptance, which seems to be one of most relevant factors in rehabilitation. Present study demonstrated that traditional amplification might be successful with USNHI children if the hearing sensitivity difference between 2 ears was not significantly large; several children with severe–profound USNHI did not seem to profit from HA.

* HA = hearing aid; USNHI = unilateral sensorineural hearing impairment; PTA = pure tone average; dB = decibel; ITPA = the Illinois Test of Psycholinguistic Abilities

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Klee TM, Davis-Dansky E. A comparison of unilaterally hearing-impaired children and normal-hearing children on a battery of standardized language tests. Ear Hear. 1986; 7(1):27–37.	Case-matched control. Compared overall group differences; language differences viewed from (1) effect of severity of loss (2) whether loss was right or left sided (3) whether child had been academically successful	Convenience sample from Bill Wilkerson Hearing and Speech Center, files of Nashville-metro school system, and other local educational and health agencies in mid-Tennessee.	UHL:* ≥45 dB* (PTA* .5 to 2 kHz*) in worse ear and ≤15 dB in the better ear (PTA .5 to 4 kHz).	Total tested: N = 50 With UHL: N = 25 (Same subset of children as in Bess and Tharpe, 1986). Controls: N = 25 25 UHL and 25 controls aged 6–13 years. Controls matched on age, IQ, SES,* sex, and race.	Token Test for Children. Wiig-Semel Test of Linguistic Concepts. Illinois Test of Psycholinguistic Abilities. Auditory Verbal Learning Test. Detroit Tests of Learning Aptitude. MLU* from speech sample. WISC-R* for I.Q. match.	No significant differences on full-scale IQ score (WISC-R), performance verbal subscales between children with UHL and controls. Difference in full scale IQ between children with >60dB loss versus <60dB loss, however, all within normal range. No significant differences between children with left and right sided loss. Children who failed a grade showed lower verbal IQs than children who did not fail a grade. *Language Performance:* No significant differences between UHL children and controls. *Language Performance within UHL group:* Significant difference between children with >60dB loss versus those with <60dB loss on part 4 of Token Test for Children —measures ability to process complex commands involving verb-object clause structure. No differences based on right or left ear loss. 17 children were academically successful; 8 failed one grade; children who failed had significantly lower verbal IQ than those who did not, but both group's scores were within normal range.	1/3 of children with UHL failed a grade; same proportion as in Bess and Tharpe's larger sample of 60. Although no specific language impairment found, children who failed a grade still showed lower verbal IQ than those who didn't (although within normal range). WISC-R verbal scale correlated most closely with verbal memory and ability to understand and comply with verbal instruction and comprehension-production skill of antonym use. Limitations: some children might have had onset of loss at a later age, which would have weakened the results. If all were congenital, effects might have been greater. Children were matched on WISC-R which includes a verbal scale; future studies should equate children only on nonverbal IQ. Language tests used might not have be sensitive enough.

* UHL = unilateral hearing loss; PTA = pure tone average; kHz = kilohertz; dB = decibel; SES = socioeconomic status; MLU = mean length of utterance; WISC-R = Weschler Intelligence Scale for Children-Revised

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHORS' CONCLUSIONS
Niedzielski A, Humeniuk E, Przemyslaw B, Gwizda G: Intellectual efficiency of children with unilateral hearing loss. Int J Pediatr Otorhinolaryngology; 2006;70:1529–1532.	The WISC-R* was administered to children to observe the association between left- or right-sided unilateral hearing loss and intellectual functioning and development. All children's scores were compared with the normed reference scores for the WISC-R* based on hearing children's scores.	Pediatric patients of the Audiologic Outpatients Clinic of the Department of Paediatric Otolaryngology in Lublin, Poland, in 2003– 2004.	Right-handed children with unilateral hearing loss (regardless of laterality) above the level of 90 dB* HL*. (Frequencies tested not provided) Mean length of hearing loss was 3.5 years. Most common cause of hearing loss was past viral infections.	64 right-handed children aged 6–16 years (mean age: right- and left-sided hearing loss was, respectively, 12.54 and 10.09 years. 42 males; 22 females 39 children with right-sided hearing loss (14 girls, 25 boys). 26 children with left-sided hearing loss. (8 girls, 17 boys)	Verbal and performance subtests of the WISC-R*	IQ* scores for the children with left- or right-sided hearing loss were not significantly different from the WISC-R normed reference based on hearing children's scores. Children with right-sided hearing loss had statistically significant lower scores on the verbal subtests ($p < 0.02$), particularly in subtests of similarities ($p < 0.01$), vocabulary ($p < 0.01$) and comprehension ($p < 0.05$). Children with left-sided hearing loss had statistically significant lower scores on the nonverbal subtests, particularly in subtests of block design ($p < 0.05$) and object assembly ($p < 0.05$).	Children with unilateral hearing loss achieved average IQ scores. The side of hearing loss had a significant influence on the development of individual intellectual functions. Children with right-sided hearing loss achieved significantly lower verbal scores than children with left-sided hearing loss. Children with left-sided hearing loss achieved lower level of skills in nonverbal intelligence.

*WISC-R = Wechsler Intelligence Scale for Children-Revised; dB = decibel; HL = hearing loss; IQ = intelligence quotient

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Oyler R, Oyler A, Matkin N. Unilateral hearing loss: demographics and educational impact. Lang Speech Hear Serv Sch. 1988;19:191–210.	Descriptive. Detailed audiologic records from last 7 years from large school district grades K–12.	From large school district (~54,000), detailed audiologic records covering last 7 years reviewed for K–12th grade. All children diagnosed with UHL* by licensed audiologist were eligible.	Children with UHL due to otitis media excluded from sample. Distribution of hearing loss categories divided into children with and without flat tympanograms Range mild–profound hearing loss in worse ear. Criteria for better ear not reported.	Total: N = 57 With UHL: N = 57 Controls: N/A (Results compared with district norms). Slightly more boys than girls and twice as many right ear losses than left. 75% sensori-neural. Conductive and mixed losses permanent and not due to transient otitis media included.	Sent detailed questionnaire and copy of PRS-R* to teachers. Of the 106 children with UHL, the data from detailed questionnaires of 57 children with UHL were analyzed. The data from 49 children was not available due to attrition.	Prevalence = ~2/1000. Of 106 children with UHL: 23.7% repeated at least one grade; ~10 times greater than district-wide rate of 2% for kindergarten–8th grade. Among children who failed at least 1 grade, percentage with right ear loss was ~5 times greater than children with left ear loss (34.8% vs. 6.7%). Percentage of children with severe–profound loss who repeated a grade was ~twice as high as those with mild–moderate loss (36.7% vs. 18.7%). 40.7% received special services; ~5 times district rate of 8.6%; neither ear involved nor degree of loss determined whether to provide services. *Teacher ratings:* Overall, 22.8% rated below average, 50.9% average, 26.3% above average; very similar to distribution expected from any random sample. 76.7% rated as working at their potential; majority of children rated as not working at their potential were viewed as underachievers. *PRS-R:* Children with UHL scored lower than norm on auditory comprehension, spoken language and personal-social behavior scale; 33% of UHL group scored lower than 1 SD* below mean; only 16% expected.	UHL places child at risk for academic failure, especially if right ear involved and loss is severe-to-profound; UHL children not a homogeneous population. Not implying UHL is direct or only cause of children's academic difficulties; However, more aggressive intervention is required. Clinicians working with UHL students should monitor their academic progress carefully.

*WISC-R = Wechsler Intelligence Scale for Children-Revised; dB = decibel; HL = hearing loss; IQ = intelligence quotient

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Oyler R, Oyler A, Matkin N. Warning: A unilateral hearing loss may be detrimental to a child's academic career. The Hearing Journal. 1987;9:18–22.	(1) Present a summary of findings, which were subsequently published in Oyler et al (1988). (2) Briefly discuss difficulties children with UHL* might experience. (3) Purpose: Recommend rehabilitation approaches.	From large school district (~54,000), detailed audiologic records covering last 7 years, reviewed for K–12th grade. All children diagnosed with UHL by licensed audiologist were eligible.	Hearing loss due to otitis media eliminated from sample. Distribution of hearing loss categories divided into children with and those without flat tympanograms Range from mild–profound hearing loss in worse ear. Criteria for better ear not reported.	Total: N = 57 With UHL: N = 57 Controls: N/A (Results compared with district norms). Slightly more boys than girls and twice as many right ear losses than left. 75% sensori-neural. Conductive and mixed losses permanent and not due to transient otitis media included.	Detailed audiologic records from last 7 years from large school district grades K–12th grade. Sent detailed questionnaire and copy of PRS-R* to teachers.	23.7% repeated at least one grade; ~10 times greater than district-wide rate of 2% for K–8th grade. Among children who failed at least 1 grade, percentage with right ear loss was ~5 times greater than that of children with left ear loss. Percentage of children with severe-to-profound loss who had repeated a grade was about 2x as high as percentage with mild–moderate loss. 40.7% received special services; ~ 5 times district rate of 8.6%. Teacher ratings: overall, 22.8% UHL children rated as below average, 50.9% rated as average, 26.3% rated as above average; 76.7% rated as working at their potential. PRS-R: only scale where there was a difference between UHL and norm was personal-social behavior scale; 33% of UHL group scored lower than 1 SD* below mean); only 16% expected.	UHL can place a child at risk for academic failure, especially if right ear involved. Children with early onset, severe–profound right ear losses at highest risk. Recommended that clinicians working with UHL students monitor their academic progress carefully. More aggressive early intervention might be required. We currently cannot identify specific causes of problems UHL children experience. Recommendations for rehabilitation: (1) communication strategies (e.g. gaining attention, familiar vocabulary, speech mnemonic device, etc.; (2) classroom management (e.g. take advantage of good ear, minimize noise, well-lighted class, etc.); (3) Referrals for further assessment; (4) amplification; (5) hearing health care.

* UHL: unilateral hearing loss; PRS-R = Pupil Rating Scale-Revised; SD = standard deviation

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Tieri L, Masi R, Ducci M, Marsella P. Unilateral sensorineural hearing loss in children. Scand Audiol Suppl. 1988; 30:33–6.	Descriptive. Review of patient history and ENT* and audiological examina-tions performed.	280 cases of children with sensorineural UHL* from 1979–1986 from the Audiology department of an ENT clinic in a hospital in Rome, Italy. Children referred randomly by parents who suspected hearing loss and by infectious diseases department of hospital.	Mild, moderate, severe, profound. (No criteria provided for the classi-fications).	Total tested: N = 280 With UHL: N = 280 Controls: N/A 79.3% profound. 23.2% due to known etiology (mainly mumps). Age range 8 months–12 years. 211 (75.3%) older than 6 years and 69 (24.7%) younger than 6 years.	Patient history collected from parents. ENT examination carried out. Performed: impedance, masked pure tone audiometry masked ABR* for infants, vestibular caloric tests in some cases, serological tests for viral antibody when necessary for etiology; temporal bone X-rays.	Approximately 50-50 right/left loss (Right N = 139, Left N = 141). Males: 63%, Females: 37%. Mean age of onset 7.6 years. *Degree:* Mild = .7%; Moderate = 7.1%; Severe = 12.9%; Profound = 79.3%. Most had flat audiograms in terms of frequency (89.3% flat). Detail about etiology provided.	UHL was fairly rare in children but it was difficult to evaluate the real incidence. Couldn't relate incidence in the general population. Might have been discovered at school age (around 6 or 7 years) because demands on the child's speech and language increased and it was therefore, noticed more; also, children were exposed to more infectious diseases when entering school. Only prevention is vaccination against infectious diseases. Did not observe any problems with speech/language in this study; however, the majority of parents reported problems with learning in school. Authors suggested preferential seating and family counseling.

* ENT = ear, nose, and throat; UHL = unilateral hearing loss; ABR = auditory brainstem response

REFERENCE (Review)	OBJECTIVE	ARTICLES INCLUDED	RESULTS	AUTHOR'S CONCLUSIONS
Bess F, Tharpe A. Performance and management of children with unilateral sensorineural hearing loss. Scand Audiol Suppl. 1988;30:75–9.	Review of various studies. Summary of children with UHL* who are most at risk for educational and behavioral problems; recommendations for management are outlined.	Focus on children with UHL.	*Educational Performance:* Children with UHL are considered at greater risk for academic failure and behavioral problems than the population of hearing children. *Auditory Performance:* Children with UHL also experience problems in localization and speech recognition in background noise. There is a relationship between the degree of hearing loss and localization skills (more noise, less ability to localize). Fig. 2 shows that children who experienced academic failure tended to perform more poorly on a syllable recognition test than children who perform satisfactorily in school. Children with a right ear loss are at greater risk for academic failure and difficulty with speech recognition in noise than children with left ear loss. *Psycholinguistic Performance:* Evidence that children with UHL exhibit a number of psycholinguistic complications. *Management Approaches:* Children with UHL (1) are at greater risk for academic failure; (2) experience difficulty understanding speech in noise; (3) experience trouble with localization; (4) exhibit more behavioral problems in school; (5) might have a specific profile that puts some children at greater risk for educational problems. Profile includes: Early age of onset; perinatal and/or postnatal complications, severe-to-profound sensorineural impairment; right ear loss. Recommendations for classroom management and use of amplification are summarized.	Such data prompt re-examination of management strategies for this population. More emphasis should be placed on early identification.

* UHL = unilateral hearing loss

REFERENCE (Review)	OBJECTIVE	ARTICLES INCLUDED	RESULTS	AUTHOR'S CONCLUSIONS
Bess FH, Tharpe AM. An introduction to unilateral sensorineural hearing loss in children. Ear Hear. 1986;7(1):3–13.	A general overview of literature on issues pertinent to UHL* in children. Describe research plan to ascertain whether children with UHL exhibit deficits in their auditory, linguistic, and psychoeducational performance. This is the precursor to Bess, F and Tharpe, A: Case history data on unilaterally hearing-impaired children. Ear Hear. 1986;7:14–9.	Varies depending on study. Focus on UHL. Topics reviewed: Demographic considerations; binaural versus monaural listening; head shadow effects; localization; binaural release from masking; effects of noise on speech recognition; learning and educational factors; auditory deprivation.	Other than literature review, see Bess, F and Tharpe, A: Case history data on unilaterally hearing-impaired children. Ear Hear. 1986;7:14–9.	Other than literature review, see: Bess, F and Tharpe, A: Case history data on unilaterally hearing-impaired children. Ear Hear. 1986;7:14–9.

* UHL = unilateral hearing loss

REFERENCE (Review)	OBJECTIVE	ARTICLES INCLUDED	RESULTS and AUTHOR'S CONCLUSIONS
Bess FH, Klee T, Culbertson JL. Identification, assessment, and management of children with unilateral sensorineural hearing loss. Ear Hear. 1986; 7(1):43–51.	Presents general information on identification, assessment, and management of children with UHL* from the perspective of three disciplines: audiology, speech-language pathology, and psychology.	Includes case studies	*Audiological Considerations:* *Identification and Assessment:* Need to identify these children as early as possible, best through UNHS.* Once identified, need for careful monitoring by physician, SLP,* audiologist, local education agency, and parents. Audiologist should monitor both ears for progression of hearing loss and OME.* *Audiological Management*: Style depends on whether or not child is experiencing problems. If child is doing well, preferential seating and monitoring are sufficient. If child is having difficulties, preferential seating, keep parent, teacher, and physician informed and elicit cooperation and support of parent(s). Teachers need to be open to making adjustments for the child. Audiologist can provide advocacy and support. Feasibility of amplification should be explored. CROS* systems and traditional amplification of ear with loss is not always successful for children; wireless FM* systems seem to work best. *Speech-Language Considerations:* *Speech-Language Screening* : Screening for purposes of identifying those at risk for speech-language disorders can take many forms: (1) formal screening test; (2) referral from parent/caregiver; (3) referral from audiologist, psychologist, teacher, physician, etc. The problem is the validity is not known for most screening tests, therefore they can produce false negatives for children with UHL. *Parent or Professional Referrals*: Should always be followed up with audiological testing and speech-language pathology screening or testing. *Full-Scale Assessment of Speech-Language*: Warranted whenever screening failed or referral given. Should include language sample and cognitive testing. Standardized testing has several limitations and should be supplemented with family and child history and information from parents and teachers. Children with problems often have a history of meningitis, viral infections, etc. Intervention should be tailored to the individual child and should be multidisciplinary. *Psychoeducational Considerations:* *Assessment*: Similar to hearing children. *Basic Assumptions*: Basic history with medical information from prenatal period, past illnesses, social/family data, school records, descriptive behavioral information should be obtained. Intervention should be based on a hypothesis-testing approach. The end result should be descriptive (including strengths and weaknesses), not just a rating. See Table 1 for common tests used. *Integration of Test Results:* Convert results to Z scores so they can be compared to each other. *Intervention:* Authors reviews educational programming, psychotherapy, and behavioral intervention.

* UHL = unilateral hearing loss; UNHS = universal newborn hearing screening; SLP = speech-language pathologist; OME = otitis media with effusion; CROS = contralateral routing of signal; FM= frequency modulated;

REFERENCE (Comment)	OBJECTIVE	RESULTS	AUTHOR'S CONCLUSIONS
Bess FH. The unilaterally hearing-impaired child: a final comment. Ear Hear. 1986; 7(1):52–4.	Focus on UHL*	Findings suggest some children with UHL experience a variety of auditory, linguistic, and cognitive difficulties that appear to compromise educational progress. Important results include: -35% failed at least one grade; an additional 13% needed resource assistance. -Greater difficulty in understanding speech in noise. -More localization errors. -Children with severe–profound UHL had significantly lower full-scale I.Q. scores than control children. -Teachers rated children with UHL as having more social-emotional problems. -Recurring profile of children at greater risk: (1) early age of onset; (2) perinatal and/or postnatal complications; (3) severe–profound loss; (4) right ear loss. Main question is, "Why do these children have problems?" Results prompt need for reexamination of our present management strategies. Early identification, comprehensive evaluations, FM systems, support to child, teacher and family can help many children. <u>Future directions for research</u>: (1) What is prevalence of academic difficulties derived from cross-section of U.S.? (2) Can nature of problems be delineated? (3) Can a profile be developed of children who are at risk for problems? (4) Can sound field studies be duplicated? (5) Do children with right ear loss perform more poorly than children with left ear loss? (6) What are effects of UHL on language when assessed at various stages of language acquisition process? (7) Can cost-effective management strategies be developed for children having problems?	*Shortcomings of study:* Small sample size (N = 60); criteria for repeating grade differs between schools; difficulty controlling for all variables; no blind technique; the usual problems with selecting appropriate language measures. Nonetheless, seems quite certain that some children with UHL experience more difficulty in education and communication than previously supposed. Reexamination of management is necessary.

* UHL = unilateral hearing loss

REFERENCE (Review)	OBJECTIVE	ARTICLES INCLUDED	RESULTS	AUTHOR'S CONCLUSIONS
Lieu JE. Speech-language and educational consequences of unilateral hearing loss in children. Arch Otolaryngol Head Neck Surg. 2004; 130(5):524–30.	To review the literature on the effect UHL* has on the development of speech and language and educational achievement.	MEDLINE search between 1966 and June 1, 2003, using the medical subject heading "hearing loss," combined with the text word "unilateral." Studies were limited to those written in English, reporting speech-language and/or educational results in children with UHL.	Problems in school included: 22% to 35% repeated at least one grade 12% to 41% received additional educational assistance Speech and language delays reported in some but not all studies Chi-square analysis showed no definite statistical trend toward more severely affected populations having more speech-language or educational problems. Some studies reported that children with right UHL had more difficulties than children with left UHL.	School-age children with UHL appear to have increased rates of grade failure, need for additional educational assistance, and behavioral issues in the classroom. Speech and language delays may occur in some children with UHL, but it is unclear whether children "catch up" as they grow older. Studies suffer from "selection bias," i.e., only an unknown fraction of all children with UHL presented to these groups of investigators; the children participating in these studies probably represent the most seriously affected of all children with UHL (i.e., more severe losses). Some children with UHL are more at risk than others for speech-language and educational problems than are others.

* UHL = unilateral hearing loss

REFERENCE	DESIGN	RECRUIT-MENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHORS' CONCLUSIONS
Niedzielski A, Humeniuk E, Przemyslaw B, Gwizda G: Intellectual efficiency of children with unilateral hearing loss. Int J Pediatr Otorhinolaryngology; 2006;70:1529–1532.	The WISC-R* was administered to children to observe the association between left- or right-sided unilateral hearing loss and intellectual functioning and development. All children's scores were compared with the normed reference scores for the WISC-R* based on hearing children's scores.	Pediatric patients of the Audiologic Outpatients Clinic of the Department of Paediatric Otolaryngology in Lublin, Poland, in 2003– 2004.	Right-handed children with unilateral hearing loss (regardless of laterality) above the level of 90 dB* HL*. (Frequencies tested not provided) Mean length of hearing loss was 3.5 years. Most common cause of hearing loss was past viral infections.	64 right-handed children aged 6–16 years (mean age: right- and left-sided hearing loss was, respectively, 12.54 and 10.09 years. 42 males; 22 females 39 children with right-sided hearing loss (14 girls, 25 boys). 26 children with left-sided hearing loss. (8 girls, 17 boys)	Verbal and performance subtests of the WISC-R*	IQ* scores for the children with left- or right-sided hearing loss were not significantly different from the WISC-R normed reference based on hearing children's scores. Children with right-sided hearing loss had statistically significant lower scores on the verbal subtests ($p < 0.02$), particularly in subtests of similarities ($p < 0.01$), vocabulary ($p < 0.01$) and comprehension ($p < 0.05$). Children with left-sided hearing loss had statistically significant lower scores on the nonverbal subtests, particularly in subtests of block design ($p < 0.05$) and object assembly ($p < 0.05$).	Children with unilateral hearing loss achieved average IQ scores. The side of hearing loss had a significant influence on the development of individual intellectual functions. Children with right-sided hearing loss achieved significantly lower verbal scores than children with left-sided hearing loss. Children with left-sided hearing loss achieved lower level of skills in nonverbal intelligence.

* UHL = unilateral hearing loss