

MILD AND UNILATERAL HEARING LOSS: OUTCOMES

REFERENCE	DESIGN	RECRUITMENT	CASE DEFINITION	SUBJECTS	ASSESSMENT TOOLS	RESULTS	AUTHOR'S CONCLUSIONS
Bess FH, Dodd-Murphy J, Parker RA: Children with minimal sensorineural hearing loss: prevalence, educational performance, and functional status. <i>Ear Hear.</i> 1998; 19(5): 339–53.	<p>Case-control.</p> <p>In order to assess the relationship of MSHL* to educational performance and functional status, MSHL children were assigned as cases into a subsequent case-control study.</p> <p>Results for children with MSHL in 3rd, 6th, and 9th grades were compared to matched cases of children without MSHL.</p>	<p>All children from same school district.</p> <p>Consent forms sent to subset of students based on computer-assigned numbers.</p> <p>Those students who returned signed consent form participated in the study.</p>	<p>MSHL includes:</p> <p><i>Bilateral sensorineural:</i> PTA* (.5, 1, 2 kHz*) 20–40 dB* HL* (inclusive) with average air-bone gaps no greater than 10dB at 1, 2, and 4 kHz.</p> <p><i>High-frequency sensorineural:</i> Air conduction thresholds ≥ 25 dB HL at 2 or more frequencies above 2 kHz in one or both ears with air-bone gaps no greater than 10dB at 3 and 4 kHz.</p> <p><i>Unilateral sensorineural:</i> PTA (.5, 1, 2 kHz) ≥ 20 dB HL in impaired ear, with average air-bone gap no greater than 10 dB. Average air conduction thresholds in good ear ≤ 15dB.</p>	<p>Total: N = 1218 (with MSHL).</p> <p>3rd grade: N = 565.</p> <p>6th grade: N = 350.</p> <p>9th grade: N = 303.</p> <p>All children in selected schools in the 3rd and 6th grades were invited to enroll.</p> <p>Children from 9th grade randomly selected.</p>	<p><i>Audiologic evaluation:</i> Air conduction pure-tone thresholds .5–8 kHz.</p> <p>Bone conduction threshold obtained if subject fitted criteria for MSHL.</p> <p><i>Educational Performance:</i> Scores obtained from school records for the CBTS/4.*</p> <p>Teachers completed the SIFTER.*</p> <p>RBPC* administered to teachers.</p> <p>Data on grade retention.</p> <p><i>Functional Status:</i> COOP* Adolescent Chart Method.</p>	<p>The prevalence of MSHL remained fairly constant over 3rd, 6th, and 9th grades.</p> <p>Bilateral and high-frequency loss increased slightly with increasing grade.</p> <p>Unilateral loss most common.</p> <p>High frequency loss more common in boys than girls and in white children than Black or African American children.</p> <p>Unilateral losses more common in girls than boys.</p> <p>3rd grade children with MSHL scored significantly lower than controls on basic skills test, but there were no differences at 6th and 9th grade.</p> <p>The MSHL children scored worse than controls on a communication subtest.</p> <p>37% of children with MSHL failed at least 1 grade.</p> <p>Children with MSHL exhibited greater dysfunction than hearing children on subtest of behavior, energy, stress, social support and self-esteem.</p>	<p>Children with MSHL experienced more difficulty than children with normal hearing on a series of educational and functional test measures.</p>

* MSHL = minimal sensorineural hearing loss; PTA = pure tone average; dB = decibel; kHz = kilohertz; CBTS/4 = Comprehensive Test of Basic Skills, 4th ed; SIFTER = Screening Instrument for Targeting Education Risk; RBPC = Revised Behavior Problem Checklist; COOP = Dartmouth Primary Care Cooperative Information Project

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Davis A, Reeve K, Hind SB: Children with mild and unilateral hearing loss. In: A Sound Foundation Through Early Amplification 2001 – Proceedings of the Second International Conference – Section V. 2001; 179–186.	Questionnaire survey. 40% of questionnaires returned; this information was combined with audiology notes for 95 children with a mild hearing loss, of whom 39 provided data from the questionnaire; and 58 children with UHL* of whom 27 responded to the questionnaire.	150 families with children with mild bilateral or UHL were sent QoL* questionnaire. All children had been seen at Children's Hearing Assessment Centre in Nottingham, United Kingdom. 40% (N=66) returned.	Mild bilateral: 20–40 dB HL in both ears. UHL: Permanent sensorineural loss in one ear only. Types of losses include conductive and sensorineural.	Total: N = 66 With mild bilateral loss: N = 39 With UHL: N = 27 Approximately 1/3 of children had additional disabilities with Down syndrome being most common. Average age of children with mild/unilateral hearing loss was 13 years. Average age of children with greater losses was 8 years.	QoL questionnaire combined with audiology notes for 95 children with mild bilateral loss and 58 children with UHL.	<i>Impact on Speech and Language:</i> 44% of parents of child with mild bilateral loss and 40% of parents of child with UHL reported child had difficulty saying certain speech sounds. Little concern about overall communication. No difference between ability to hear in noise and quiet. HAs helped ease of listening. <i>Amplification:</i> PTA did not relate to use of HAs for children with mild bilateral losses. Degree of loss related to HA use for children with UHL, but 50% never used HA. 44% of children with mild bilateral loss used HAs, 25% never used them. Main reason for not using HAs was stigma and bullying at school. <i>QoL:</i> Highest impact on family health. No effect on seeing friends and relatives, employment, or income. <i>Communication, behavior, independence, and education:</i> Children with mild bilateral, UHL, and higher degrees of hearing loss all affected negatively. <i>Identification:</i> Half with mild bilateral or UHL passed newborn hearing screening.	Major uncertainty still surrounds aspects of best practice and management. Benefits of early as opposed to later identification have yet to be scientifically studied. Future studies will include randomized controlled trials.

QoL = quality of life; UHL = unilateral hearing loss; PTA = pure tone average; dB = decibel; kHz = kilohertz; HA = Hearing aid

MILD AND UNILATERAL HEARING LOSS: OUTCOMES (REVIEW)

REFERENCE (Review)	OBJECTIVE	ARTICLES INCLUDED	RESULTS	AUTHOR'S CONCLUSIONS
<p>Bess FH: The minimally hearing-impaired child. <i>Ear Hear.</i> 1985; 6: 43–7.</p>	<p>Reviewed research on 3 specific groups of children with minimal hearing loss to examine whether hearing loss causes more educational and/or communicative difficulty than previously supposed.</p>	<p>Articles including those who had:</p> <p>Middle ear disease with effusion and associated hearing loss.</p> <p>UHL.*</p> <p>Mild bilateral sensorineural hearing loss.</p>	<p><i>Middle Ear Disease with Effusion:</i> Abundance of literature supports assumption that children prone to otitis media are at risk for delays in speech-language, cognition, and education. However, research is severely criticized for limitations in design. Hence cause-effect relationship cannot be assumed. Despite limitations, there are many consistencies in these studies.</p> <p><i>Unilateral Sensorineural:</i> Review of literature shows UHL children experience greater difficulty with communication and/or educational progress than previously supposed. In general, they exhibit problems in directionality, understanding under many listening conditions, and educational and behavioral complications.</p> <p><i>Bilateral Sensorineural:</i> Children assumed not to experience difficulties in communication or education. Several studies since the 1930's are summarized to demonstrate that such children can experience difficulties in school achievement, standardized achievement tests, grade retention, and speech recognition, especially when there is a lot of background noise.</p>	<p>Review offers evidence to support the premise that children with mild forms of hearing loss can experience greater problems than previously thought.</p> <p>This should be recognized and professionals should reconsider the current definition of hearing handicap.</p> <p>Practice to use average dB* loss to define hearing handicap is not appropriate, especially when the population described in this report is considered.</p>

* UHL = unilateral hearing loss; dB = decibel

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<p>Tharpe AM, Bess FH: Identification and management of children with minimal hearing loss. <i>Int J Pediatr Otorhinolaryng.</i> 1991; 21: 41–51.</p>	<p>Review of the literature on children with minimal hearing loss, their audiologic and academic performance, and possible management strategies in order to challenge the view that children with minimal hearing loss exhibit few, if any, handicaps and require no special assistance in academic settings.</p>	<p><i>Unilateral sensorineural, Flat bilateral sensorineural: 15–25 dB* between 0.5 and 4 kHz*.</i></p> <p><i>Conductive hearing loss secondary to middle ear effusion: 10–50 dB.</i></p> <p><i>High frequency bilateral sensorineural: <15dB between 0.5–2kHz dropping in the higher frequencies to varying degrees.</i></p>	<p>Children UHL* have greater difficulty with communicative skills and educational progress than previously supposed.</p> <p>Children with mild bilateral sensorineural hearing loss have greater academic and communicative difficulties than children with no hearing loss.</p> <p>Several studies demonstrate that children with prolonged periods of middle ear effusion score significantly lower on tests of speech and language.</p> <p><i>Management recommendation for children with minimal hearing loss:</i></p> <p>More aggressive management.</p> <p>Identification and monitoring of children with mild loss before academic difficulties arise.</p> <p>Appropriate amplification.</p> <p>Possibly have sound field amplification in all classrooms (effect needs to be studied).</p> <p>Preferential seating in classroom.</p> <p>Placement in classrooms with low noise levels.</p> <p>Periodic in-service training for teachers.</p>	<p>Authors hypothesized that changes in medical care may cause decreasing numbers of severe and profound losses, and greater numbers of mild losses.</p> <p>Further research needed to address more specifically the psychoeducational, linguistic, and audiologic status of children with minimal hearing loss.</p>

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

MILD AND UNILATERAL HEARING LOSS: OUTCOMES (REVIEW)

REFERENCE (Review)	OBJECTIVE	ARTICLES INCLUDED	RESULTS	AUTHOR'S CONCLUSIONS
<p>Wake M, Poulakis, Z: Slight and mild hearing loss in primary school children. J Paediatr Child Health. 2004; 40: 11–13.</p>	<p>To explore what is known about prevalence and impact of slight and mild hearing loss in primary school children</p> <p>Review recent articles related to prevalence of hearing loss and its impact on language, academic achievement, behavior, and quality of life. Discuss implications.</p>	<p>PTA* <40dB*.</p> <p>School age children.</p>	<p>Estimates of slight/mild hearing loss vary greatly (0.1% to 14.9%).</p> <p>Children with slight/mild hearing loss have adverse language outcomes, receptive vocabulary, verbal ability and reasoning.</p> <p>Children with slight/mild hearing loss have poorer early educational performance and a substantially higher grade-retention rate.</p> <p>Children with mild/moderate hearing loss are much more bothered by background noise.</p>	<p>More large-scale research is needed to better address prevalence of mild hearing loss and its impact on language, learning and quality of life.</p> <p>Mild hearing loss does make a difference to children across many domains, especially during the primary school years.</p>

* PTA = pure tone average; dB = decibel