

Mild and Unilateral Hearing Loss in Children

Hearing loss is the most common congenital condition, affecting 1 to 3 per 1,000 live births.^{1,2} When left undetected, hearing loss of any degree, including mild bilateral and unilateral, has been shown to adversely affect speech, language, and academic and psychosocial development.³⁻¹⁶ A standard definition of mild bilateral and unilateral hearing loss has not been established. However, several definitions of mild bilateral hearing loss can be summarized by pure tone averages (PTA) between 20 and 40 decibels (dB) in the better ear. The definition of unilateral hearing loss can be summarized by a PTA in one ear of any degree above 20 dB. Permanent conductive, sensorineural, and mixed losses are included for the purpose of this discussion.

The estimated incidences in newborns for mild bilateral hearing loss range from 0.36 to 1.30 (per 1,000) and from 0.8 to 2.7 (per 1,000) for unilateral hearing loss.¹⁷⁻²⁰ Prevalence estimates in school-aged children range from 10 to 15 (per 1,000) for mild bilateral hearing loss and 30 to 56 (per 1,000) for unilateral hearing loss.^{3, 21}

Several studies have suggested that 1 out of every 2 to 3 school-aged children with mild degrees of bilateral hearing loss or unilateral hearing loss have academic, social, and behavioral difficulties.^{3-13, 15} At least some infants and preschoolers with these types of hearing loss already experience delays in language development.²² Some evidence suggests that children with any type and degree of hearing loss are at increased risk for developmental delays, particularly when the hearing loss is identified and treated after approximately 6 months of age.^{14, 16}

It is currently estimated that 90% of infants born in the United States are being screened for hearing loss, with the majority tested before discharge from the hospital.¹⁷ However, for the most part, only infants with a PTA of greater than 35–40 dB HL are being identified in the newborn period. Based on existing school-aged children prevalence estimates, a substantial number of newborns with these lesser degrees of hearing loss are not being identified than would be expected.^{3, 17-21, 23}

Because a subset of children with mild bilateral or unilateral hearing loss exhibit academic, social, and behavioral difficulties,^{3-13, 15} it is particularly important that all infants and children who are identified with, or who have risk factors for such losses be monitored for speech and language delays, behavioral problems, and academic failure. Health care providers can offer important support for children and their families by encouraging parents to have their children's hearing, speech, language, behavior, and academic progress carefully monitored. Providers can also direct families with children identified with mild bilateral or unilateral hearing loss to support services in their areas and offer them information on this topic. Some Web resources for families are provided below.

Where to find an Audiologist and/or Speech-Language Pathologist:

<http://www.asha.org/proserv/>
<http://www.audiology.org/consumer/find/>

Centers for Disease Control web page on mild and unilateral hearing loss in children
www.cdc.gov/ncbddd/ehdi/unilateralhi.htm.

Unilateral Hearing Loss in Children

<http://www.boystownhospital.org/Hearing/info/unilateral.asp>
<http://www.raisingdeafkids.org/hearingloss/types/unilateral.jsp>
http://www.csdb.org/chip/par_unilateral_loss.html

Hard of Hearing Children:

<http://clerccenter.gallaudet.edu/odyssey/Winter2003/hoh-overlooked.pdf>

“Minimal Hearing Loss” in Children

<http://www.handsandvoices.org/articles/tech/minimal.html>

Simulated Hearing Loss:

<http://holmessafety.org/hlsim/> (free download)

<http://www.acoustics.org/press/133rd/2paaa2.html>

Hearing Aids and Assistive Listening Devices

http://www.nidcd.nih.gov/health/hearing/thebasics_hearingaid.asp

<http://www.babyhearing.org/HearingAmplification/AidChoices/evaluated.asp>

<http://clerccenter.gallaudet.edu/SupportServices/series/5003.html>

http://www.asha.org/public/hearing/treatment/assist_tech.htm

http://www.asha.org/public/hearing/treatment/digital_aid.htm

<http://www.audiology.org/consumer/guides/hafaq.php>

<http://www.netac.rit.edu/publication/tipsheet/alds.html>

Eligibility for Services

http://www.handsandvoices.org/articles/early_intervention/pc_idea.html

Classroom Acoustics:

<http://www.quietclassrooms.org/ada/adahandout1.htm>

<http://www.quietclassrooms.org/ada/adahandout4.htm>

http://www.asha.org/about/publications/leader-online/archives/2001/classroom_acoustics.htm

<http://www.nonoise.org/quietnet/qc/booklet.htm>

<http://www.hearingloss.org/html/nixonmj02.HTM>

<http://edfacilities.org/rl/acoustics.cfm>

Bibliography

(1) Finitzo, T., Albright, K., & O’Neal, J. (1998). The newborn with hearing loss: Detection in the nursery. *Pediatrics*, *102*, 1452–1459.

(2) Van Naarden, K., Decouflé, P., & Caldwell, K. (1999). Prevalence and characteristics of children with serious hearing impairment in metropolitan Atlanta, 1991–1993. *Pediatrics*, *103*, 570–575.

(3) Bess, F., Dodd-Murphy, J., & Parker, R. (1998). Children with minimal sensorineural hearing loss: Prevalence, educational performance, and functional status. *Ear & Hearing*, *19*, 339–354.

(4) Bess, F., & Tarpe, A. (1986). Case history data on unilaterally hearing-impaired children. *Ear & Hearing*, *7*, 14–19.

(5) Bess, F., & Tarpe, A. (1988). Performance and management of children with unilateral sensorineural hearing loss. *Scandinavian Audiology. Supplementum*, *30*, 75–79.

- (6) Blair, J., Peterson, M., & Viehwed, S. (1985). The effects of mild sensorineural hearing loss on academic performance of young school-age children. *The Volta Review*, 87, 87–93.
- (7) Bovo, R., Martini, A., Agnoletto, M., Beghi, D., Carmignoto, D., Milani, M., & Zangaglia, A.M. (1988). Auditory and academic performance of children with unilateral hearing loss. *Scandinavian Audiology. Supplementum*, 30, 71–74.
- (8) Brookhouser, P.E., Worthington, D.W., & Kelly, W.J. (1991). Unilateral hearing loss in children. *Laryngoscope*, 101, 1264–1272.
- (9) Culbertson, J.L., & Gilbert, L.E. (1986). Children with unilateral sensorineural hearing loss: cognitive, academic, and social development. *Ear and Hearing*, 7, 38–42.
- (10) Davis, A., Reeve, K., & Hind, S.B.J. (2001). Children with mild and unilateral hearing loss. In: R.C. Seewald and J.S. Gravel (Eds.). *A Sound foundation through early amplification 2001: Proceedings of the Second International Conference*. pp. 179-186. St. Edmundsbury Press, Great Britain.
- (11) Davis, J.M., Efenbein, J., Schum, R., & Bentler, R.A. (1986). Effects of mild and moderate hearing impairments on language, educational, and psychosocial behavior of children. *Journal of Speech and Hearing Disorders*, 51, 53–62.
- (12) Klee, T.M., & Davis-Dansky, E. (1986). A comparison of unilaterally hearing-impaired children and normal-hearing children on a battery of standardized language tests. *Ear and Hearing*, 7, 27–37.
- (13) Lieu, J.E. (2004). Speech-language and educational consequences of unilateral hearing loss in children. *Archives of Otolaryngology and Head and Neck Surgery*, 130, 524–530.
- (14) Moeller, M. (2000). Early intervention and language development in children who are deaf and hard of hearing. *Pediatrics*, 106, 1–9.
- (15) Oyler, R.F., Oyler, A., & Matkin, N. (1987). Warning: A unilateral hearing loss may be detrimental to a child's academic career. *The Hearing Journal*, 9, 18–22.
- (16) Yoshinaga-Itano, C., Sedey, A., Coulter, D.K., & Mehl, A.L. (1998). Language of early and later identified children with hearing loss. *Pediatrics*. 103, 1161–1171.
- (17) Dalzell, L., Orlando, M., MacDonald, M., Berg, A., Bradley, M., Cacace, A., Campbell, D., DeCristofaro, J., Gravel, J., Greenberg, E., Gross, S., Pinheiro, J., Regan, J., Spivak, L., Stevens, F., & Prieve, B. (2000). The New York State universal newborn hearing screening demonstration project: Ages of hearing loss identification, hearing aid fitting, and enrollment in early intervention. *Ear and Hearing*, 21, 118–130.
- (18) Johnson, J.L., White, K.R., Widen, J.E., Gravel, J.S., James, M., Kennalley, T., Maxon, A.B., Spivak, L. Sullivan-Mahoney, M., Vohr, B.R., Weirather, Y., & Holstrum, J. (2005). A multicenter evaluation of how many infant with permanent hearing loss pass a two-stage otoacoustic emission/automated auditory brainstem response newborn hearing screening protocol. *Pediatrics*, 116, 663–672.
- (19) Watkin, P.M., & Baldwin, M. (1999). Confirmation of deafness in infancy. *Archives of Disease in Childhood*, 81, 380–389.

(20) White, K.R., Vohr, B.R., Maxon, A.B., Behreus, T.R., McPherson, M.G., & Mauk, G.W. (1994). Screening all newborns for hearing loss using transient evoked otoacoustic emissions. *International Journal of Pediatric Otorhinolaryngology*, 29, 3, 203-217.

(21) Niskar, A., Kiezak, S., Holmes, A., Esteban, E., Rubin, C., & Brody, D. (1998). Prevalence of hearing loss among children 6 to 19 years of age. *JAMA*, 279,1071–1075.

(22) Stredler-Brown, A. Minimal hearing loss: Impact and treatment. Plenary Panel Discussion, 2005 National Early Hearing Detection and Intervention Conference, Atlanta, GA, March 2005.

(23) Directors of Speech and Hearing Programs in State Health and Welfare Agencies. Estimated number of infants screened for hearing loss (2003). Document on the Internet retrieved February 7, 2006. http://www.cdc.gov/ncbddd/ehdi/2003/Screen_03_web_D.pdf