



School-Based Audiology Advocacy Series

Minimal, Mild and Unilateral Hearing Loss/Single-Sided Deafness

(Approved by the Board of Directors of the Educational Audiology Association August 2017)

School-Based Audiology Advocacy Series

Minimal, Mild, and Unilateral Hearing Loss/Single-Sided Deafness

Children with minimal or mild, unilateral hearing loss, or single-sided deafness (MMUSSD) often experience communication and educational difficulties. Unilateral hearing loss (UHL) refers to any level of hearing loss in one ear and normal hearing in the other ear while single-sided deafness (SSD) refers to a profound hearing loss in one ear and normal hearing levels in the other. The definitions have varied across studies but generally include three patterns of hearing loss (Centers for Disease Control and Prevention, 2005):

- Mild or Minimal HL: bilateral, three-frequency, air conduction pure tone averages between 20-40 dB HL
- High Frequency HL: air conduction thresholds ≥ 25 dB HL at two or more frequencies above 2KHz in both ears
- Unilateral HL: air conduction pure tone average is ≥ 20 dB HL in the impaired ear; single-sided deafness is a sub group of unilateral HL.

Prevalence of MMUSSD also varies by study. Overall school age estimates range from 54 per 1000 (Bess, Dodd-Murphy, & Parker 1998) to 84 per 1000 (Niskar et al 1998), a significant increase from a reported incident rate of .51 per 1000 at birth (Oyler & Mckay, 2008). Unilateral hearing loss had the highest prevalence rates in each of these studies.

According to Bess et al (1998), children with MMUSSD make up more than 5% of the school-age population. Thirty-seven percent of children with MMUSSD will fail at least one grade compared to only 3% of their normal hearing peers (Tharpe, 2008). These children typically hear well when they are in ideal acoustic listening environments; yet, many of these children experience difficulties understanding speech when listening at a distance, in noise, or in reverberant environments. Based upon an extensive literature review, Winiger et al. (2016) identified challenges commonly associated with MMUSSD in the areas of speech recognition, language development and competence, academic performance, psychosocial and emotional well-being, listening effort, and localization. Of additional consideration is the fact that up to 50% of children with hearing loss have co-occurring disorders (Mitchell & Karchmer, 2011). Not only can additional disorders mask the presence of hearing loss, but they may also increase the difficulties experienced by children as a result of their hearing loss. Children with UHL are four times more likely to require an IEP as compared to children with typical hearing and, if audiological needs are ignored, academic performance fails to improve (Lieu, Tye-Murray, & Fu 2012).

While interventions may vary depending on the type of hearing loss, the potential problems associated with MMUSSD are the same. Factors that may lead to educational problems include:

1. Difficulties understanding speech both in ideal and in challenging listening environments such as the classroom setting (Crandell, 1993) and poorer performance on complex listening tasks (Lewis et al., 2014).
2. For those with UHL, difficulties locating the direction of sounds (Bess, 1986).
3. Increased risk of speech production errors, language delays and deficits especially in structural language (Tharpe, 2008; Walker et al., 2015; Winiger et al., 2016).
4. Phonological delays and difficulties with reading comprehension (Ross et al., 2008).
5. Low attention, lack of motivation, poor attention in class, and reduced class participation (Flexer, 1995; Porter et al., 2013)
6. Behavioral problems associated with high internal stress such as noncompliance, aggression, impulsivity, and inflexibility. (Winiger et al., 2016).

This document is part of the School-Based Audiology Advocacy Series. Please see additional statements on School-based Audiology Services, Audiology Services Under 504, Auditory (Re)habilitation, Classroom Acoustics, Educational Audiology Services Under IDEA: Pertinent Regulations, Hearing Assistance Technology, Hearing Screening, Noise and Hearing Loss Prevention, Role in EHD and On-Going Hearing Loss Surveillance in Young Children, and References and Resource Materials.

7. Strained communication with peers, difficulties making friends, and poorer peer relations (Tharpe, 2008; Winiger, et al., 2016).
8. Low self-esteem (Bess, Dodd-Murphy, & Parker, 1998; Winiger et al., 2016).
9. Higher fatigue, increased listening effort, and stress levels as compared to peers (Bess, Gustafson, & Hornsby 2014; Tharpe, 2008; Lieu et al., 2012).

Because children with MMUSSD are at high risk for academic difficulties, an educational audiologist should evaluate these students to verify that they have access to their educational programs in their school environments. Testing should minimally include assessing speech perception at normal and soft conversational levels in quiet and in competing noise. Additional components of the educational audiology evaluation follow as well as considerations for technology, accommodations and intervention.

Educational Audiology Evaluation Recommendations:

1. The child's perception of the impact of MMUSSD as well as the teachers' and caregivers' (Lewis et.al, 2014); examples of questionnaires that assess the functional impact include:
 - a. Listening Inventory for Education- Revised (LIFE-R) teacher and student versions (Andersen, Smaldino, & Spangler, 2011)
<http://successforkidswithhearingloss.com/life-r/>
 - b. Screening Instrument for Targeting Educational Risk (S.I.F.T.E.R.) (Andersen, 1989)
<https://successforkidswithhearingloss.com/uploads/SIFTER.pdf>
Preschool S.I.F.T.E.R. (Anderson & Matkin, 1996)
http://successforkidswithhearingloss.com/uploads/Preschool_SIFTER.pdf
 - c. Classroom Participation Questionnaire (CPQ) (Antia et al., 2007)
www.adevantage.com/Resources.html
 - d. Self-Assessment of Communication (SAC-A) and Significant Others Assessment of Communication (SOAC-A) (Elkayam & English, 2003)
2. The child's performance in his/her daily listening environment using varying distances, background noise, and with and without access to visual cues
 - a. The Functional Listening Evaluation (Johnson, 2013).
www.adevantage.com/Resources.html
 - b. Recorded Functional Listening Evaluation Using Sentences (Anderson & Johnson, 2013)
Purchase from: <http://successforkidswithhearingloss.com/fle-recorded/>
3. A classroom observation to determine how the child uses audibility to gain information and examination of the physical environment and classroom acoustics.
 - a. The Classroom Acoustical Screening Survey Worksheet (AAA, 2011, Appendix 7.1)
https://audiology-web.s3.amazonaws.com/migrated/20110926_HAT_GuidelinesSupp_Bpdf_53996ef98259f2.45364934.pdf

Technology Considerations:

1. Research strongly supports that children with mild or minimal hearing loss should be considered for amplification and/or remote-microphone hearing assistive technology (RMHAT) (AAA, 2013; Bagatto, 2016; Walker et.al, 2015).

(Approved by the Board of Directors of the Educational Audiology Association August 2017)

2. Research strongly supports that children with unilateral hearing loss should be considered for amplification and/or remote microphone hearing assistance technology (RMHAT) in the impaired ear if there is evidence of benefit. If the child has single-sided deafness, other options may be considered such as bone conduction aids/implants, contralateral routing of signals (CROS), cochlear implants, and/or RMHAT (AAA, 2013).

This document is part of the School-Based Audiology Advocacy Series. Please see additional statements on School-based Audiology Services, Audiology Services Under 504, Auditory (Re)habilitation, Classroom Acoustics, Educational Audiology Services Under IDEA: Pertinent Regulations, Hearing Assistance Technology, Hearing Screening, Noise and Hearing Loss Prevention, Role in EHDI and On-Going Hearing Loss Surveillance in Young Children, and References and Resource Materials.

Accommodations and Intervention Considerations:

1. Students with MMUSSD may require additional educational accommodations to ensure maximum auditory access to instruction such as alterations to the classroom to improve the listening environment, strategic seating for optimal auditory and visual access to the instructor and classmates, pre- and post-teaching, and visual aids.
2. Students with MMUSSD should be supported with an Individualized Education Program (IEP), if eligible for specialized instruction, or a 504 Plan for access supports. They need to be monitored closely to ensure that academic, speech/language, and social/emotional performance areas are maintained to determine whether additional resources are needed.
3. Audiologists must ensure that families understand the implications and risk factors associated with MMUSSD as well as available resources and interventions. As early as possible, children should understand their hearing loss, its impact on communication, and strategies for how they can improve and manage their access.

Summary

The language, communication, and learning needs of children with MMUSSD are often overlooked because these children can hear and speak. As a result, difficulties they experience are often attributed to other causes. However, the evidence clearly identifies the need for assessment and monitoring and, when necessary, intervention to support their educational progress. Waiting to intervene when problems surface is no longer acceptable practice.

References

- American Academy of Audiology. (2013). American Academy of Audiology Clinical Practice Guidelines: Pediatric Amplification. <http://www.audiology.org/publications-resources/document-library/pediatric-rehabilitation-hearing-aids>
- American Academy of Audiology. (2011). American Academy of Audiology Clinical Practice Guidelines: Remote Microphone Hearing Assistance Technologies for Children and Youth from Birth to 21 Years. Supplement B: Classroom Audio Distribution Systems-Selection and Verification. https://audiology-web.s3.amazonaws.com/migrated/20110926_HAT_GuidelinesSupp_B.pdf_53996ef98259f2.45364934.pdf
- Anderson, K., Smaldino, J., & Spangler, C. (2011). The Listening Inventories for Education- Revised. <http://successforkidswithhearingloss.com/wp-content/uploads/2011/09/LIFE-R-Instruction-Manual.pdf>
- Anderson, K. (1989). Screening Instrument for Targeting Educational Risk. <https://successforkidswithhearingloss.com/uploads/SIFTER.pdf>
- Anderson, K. & Matkin, N. (1996) Preschool S.I.F.T.E.R. http://successforkidswithhearingloss.com/uploads/Preschool_SIFTER.pdf
- Anderson, K. & Johnson, C.D. (2013). Recorded Functional Listening Evaluation Using Sentences. <http://successforkidswithhearingloss.com/fle-recorded/>
- Antia, S., Sabers, D., & Stinson, M. (2007). Validity and reliability of the classroom participation questionnaire with deaf and hard of hearing students in public schools. *Journal of Deaf Studies and Deaf Education*, 12, 158-171.
- (Approved by the Board of Directors of the Educational Audiology Association August 2017)*
- Bagatto, M. (2016) Considerations for hearing aid use in infants and children who have mild bilateral hearing loss. *Perspective of the ASHA Special Interest Groups*, 1, 17-27
- Bess, F. (1986). Unilateral sensorineural hearing Loss in children. *Ear Hear*, 7(1).
- Bess, F., Dodd-Murphy, & J. Parker, R. (1998). Children with minimal sensorineural hearing loss: Prevalence, educational performance, and functional status. *Ear Hear*. 19, 339-354.

This document is part of the School-Based Audiology Advocacy Series. Please see additional statements on School-based Audiology Services, Audiology Services Under 504, Auditory (Re)habilitation, Classroom Acoustics, Educational Audiology Services Under IDEA: Pertinent Regulations, Hearing Assistance Technology, Hearing Screening, Noise and Hearing Loss Prevention, Role in EHDl and On-Going Hearing Loss Surveillance in Young Children, and References and Resource Materials.

Bess, F., Gustafson, S., & Hornsby, B. (2014). How hard can it be to listen? Fatigue in school-age children with hearing loss. *Journal of Educational Audiology* (20) 1-14.

Centers for Disease Control and Prevention. (2005). National workshop on mild and unilateral hearing loss. Retrieved from <http://www.cdc.gov/ncbddd/hearingloss/conference.html>

Crandell, C. (1993). Speech recognition in noise by children with minimal degrees of sensorineural hearing loss. *Ear & Hearing*, 14, 210-216.

Elkayam, J & English, K. (2003). Counseling adolescents with hearing loss with the use of self-assessment/significant other questionnaires. *Journal Academy Audiology* (14) 9, 485-496.

Flexer, C. (1995). Classroom management of children with minimal hearing loss. *Hearing Journal* 48, 10–13.

Johnson, C.D. (2013). The Functional Listening Evaluation. www.adevantage.com/Resources.html

Lewis, D.E., Valente, D.L., & Spalding, J.L. (2014) Effect of minimal/mild hearing loss on children's speech understanding in a simulated classroom. *Ear Hear*. doi: 10.1097/AUD.0000000000000092

Lieu, J.E., Tye-Murray, N., Fu, Q. (2012). Longitudinal study of children with unilateral hearing loss. *Laryngoscope*, 122, 2088-2095.

Mitchell, R. E., & Karchmer, M. A. (2011). Demographic and achievement characteristics of deaf and hard of hearing students. In M. Marschark & P. E. Spencer (Eds.), *Oxford handbook of deaf studies, language, and education*, 2nd ed., Vol. 1, 18 –31. New York, NY: Oxford University Press.

Niskar, A.S., Kieszak, S.M., Holmes, A., Esteban, E., Rubin, D., & Brody, D.J. (1998). Prevalence of hearing loss among children 6 to 19 years of age. *Journal of the American Medical Association*, 279, 1071-1075.

Oyler, R., & McKay S. (2008). Unilateral hearing loss in children. *The ASHA Leader*, 13 (1), 12-15.

Porter H., Sladen D., Ampah S., Rothpletz A., Bess F. (2013). Developmental outcomes in early school-age children with minimal hearing loss. *American Journal of Audiology*, 22(2), 263-70.

Ross D., Gaffney M., Green D., & Hostrum J. (2008). Prevalence and effects. *Seminars in Hearing*, 29(2), 141-148.

Tharpe, A. M. (2008). Unilateral and mild bilateral hearing loss in children: Past and current perspectives. *Trends in Amplification*, 12(1), 7–15.

Walker, E., Holte, L., McCreery, R., Spratford, M., Page, T., & Moeller M. (2015). The influence of hearing aid use on outcomes of children with mild hearing loss. *Journal of Speech Language Hearing Research*, 58, 1611-25.

Winiger, A., Alexander, J., Diefendorf, A. (2016). Minimal Hearing Loss: From a Failure-Based Approach to Evidenced-Based Practice. *American Journal of Audiology*, 25, 232-245.