



## Review article

## A review of unilateral hearing loss and academic performance: Is it time to reassess traditional dogmata?

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## ABSTRACT

**Objective:** The aim of this paper was to review traditional approaches to habilitation of unilateral hearing losses as well as new research concerning management of unilateral hearing loss.

**Data sources:** Literature review/systematic review.

**Review methods:** A PubMed search was performed for articles pertaining to unilateral hearing loss and academic loss and academic performance. Articles ranged in date from 1986 to 2012. Five resources were reviewed for content to determine the pertinence of the materials to the understanding of the history of diagnosis of unilateral hearing loss, the traditional treatment methods and their advantages and disadvantages, and more recent publications concerning academic outcomes for patients with unilateral hearing loss with and without treatment.

**Results:** Unilateral hearing loss can be detrimental to the academic success of children. Effects encompass not only auditory effects such as difficulty hearing in noise, but also self esteem and exhaustion. Although assistive devices were traditionally not offered as options, more recent literature suggests that devices such as BAHA, hearing aids, or FM systems may provide aids in the classroom and that early intervention may provide more favorable outcomes.

**Conclusion:** Since the 1980s, the approach to management of unilateral hearing losses has evolved. In order to maximize academic potential, treatment options should be discussed and implemented.

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## 1. Background

Hearing impairment is one of the most prevalent congenital abnormalities in this country with approximately 1–3 per 1000 infants in the United States clinically deaf at birth and an additional 1–6 born with some milder degree of impairment [1]. According to the CDC [2], unilateral, sensorineural hearing loss is the most prevalent form of hearing loss, affecting approximately 3% of school aged children. Despite the advent of newer and more affordable technologies permitting the early identification of congenital hearing loss, a percentage of these children do not receive a proper and timely diagnosis [2]. Beyond diagnosis, early intervention and treatment may improve the function of children with unilateral hearing loss. The objectives of this literature review were to determine the supporting evidence for current clinical practices in the counseling and treatment of children with unilateral hearing loss, to review the evolving data in performance outcomes for these hearing impaired children and to determine if treatment might be a “medical necessity.”

## 2. Methods

Forty-five resources were reviewed for content to determine the pertinence of the materials to the understanding of the history of diagnosis of unilateral hearing loss, the traditional treatment methods and their advantages and disadvantages, and the content results of more recent publications concerning academic outcomes for patients with unilateral hearing loss with and without treatment.

## 3. Results and discussion

### 3.1. Pitfalls at diagnosis

Newborn screening is the most effective tool available to detect congenital hearing loss, but it is mandated in only 47 states [3]. It is a screening tool, and by definition is not a complete evaluation and risks failing to detect some mild hearing losses. Parental and primary care practitioner compliance is essential to completion of a thorough and timely evaluation for a failed screen, and as a result newborns remain at risk of delay of diagnosis throughout infancy and childhood.

Prior to screening, the average age of diagnosis of UHL was 8-years old [4]. Presenting symptoms of UHL can be subtle, such as decreased babbling during the 1st year of life [5] or apparent inattention, which may not be perceived as problematic until the child reaches school age [6]. Lack of toddler/kindergarten screening programs, improper screening techniques, or misinterpretation of the results puts these children with UHL at risk for delayed diagnosis and treatment.

“Unilateral hearing loss (UHL) of any degree can be detrimental to the growth and development of a child.” [7]

Once diagnosed, the traditional dogma in management of UHL is that single-sided hearing is the “minimum requirement” or “adequate” for speech and language development [6].

Children with UHL are capable of performing well in the preschool setting with respect to speech and language development [9].

Once formal schooling begins, these same children can show subtle weaknesses that stem from their impairment. Bess and Tharpe found that students with UHL were frequently labeled as cognitively slow, unintelligent, distracted, aggressive, or misbehaved [7]. Bess and Tharpe evaluated the case histories of 60 children with UHL with particular attention to the academic and social obstacles encountered. This study revealed that 35% had failed at least one grade – most commonly observed early in their academic careers. This percentage was 10-times higher than that of the normally hearing population, in which only 3.5% of the children had ever been retained in a grade. The groups were stratified in several ways to exclude the possibility of confounding, and ultimately it was concluded that single-sided hearing was inadequate for achieving the same success in the classroom as those with binaural hearing [7]. Follow-up revealed that reasoning described for grade-retention was most commonly student “immaturity” or “hyperactivity.”

A subsequent study one year later by Oyler documented similar findings after distributing a set of surveys to teachers; children with hearing impairment were disproportionately described as “underachievers” [11]. The result of this management technique was that the hearing impaired child was removed from the class with which he or she had grown comfortable and joined new students that subsequently recognize and label him or her as “different” [12] and then ostracize the “underachiever” [13].

Reuben and Schwartz [14] showed hearing to be an integral component to proper language development. Students with UHL display difficulty with receptive communication due to background noise and sound localization difficulties. Such difficulties can lead to personal embarrassment and, ultimately, social exclusion.

In a more recent study by Most et al. [15] the examiners used the Hebrew version of the SIFTER (screening instrument for targeting educational risks) to probe the effect of degree of hearing loss on academic performance. Their hypothesis was that degree of hearing loss would correlate to classroom performance and that the more significant the hearing loss, the poorer the academic performance. However, the results showed that children with greater degrees of hearing loss actually scored better academically and in participation than children with milder degrees of loss. It is possible that part of the underlying reason for the disparity may be that children with more significant hearing losses had been provided with intervention in the way of hearing aids and support services at a younger age.

A longitudinal study by Lieu et al. [9] followed 49 children aged 6 to 12years with unilateral hearing loss for 3 years. The subject group included children with both sensorineural hearing loss as well as more permanent conductive hearing losses. Standardized tests for cognition, achievement, and language were evaluated each year. They found that while language and cognition scores improved over time, the average achievement scores did not change. The authors noted that approximately 25% of subjects continued to show academic difficulty after 3 years.

“Single-Sided Hearing is Inadequate for Development.”-Culbertson & Gilbert, Bess & Tharpe

For decades, studies have demonstrated single-sided hearing to be inadequate for proper development [7,10], but the mechanism has been scientifically explored only recently and is unappreciated

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