
Efficacy of Using Teachers as Identifiers of Hearing Problems

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Although most school children are routinely screened for hearing impairment across their academic careers, schools and parents rely on teachers to make referrals when they suspect a hearing problem. To explore the reliability of this referral process, six first-grade educators were asked to identify students in their classrooms who were not likely to pass a hearing screening. They identified 27 children in all, and then completed SIFTER screeners for each one. One hundred and five pupils from their collective classes were then screened at 500-6000 Hz at 15 dB HL, bilaterally. Results showed that teachers' identification rates were 17% sensitive, but 70% specific: that is, they were generally inaccurate in identifying children who would not pass a hearing screening, but among those they did identify, they were generally correct. SIFTER results are also discussed.

Introduction

Hearing impairment affects the ability of a child to achieve his/her maximum potential in the typical aural/oral educational setting. If a hearing loss is not detected, it may also lead to social problems, possible rejection by peers, and adverse effects on the child's self-concept and self-esteem (Cappelli, Daniels, Durieux-Smith, McGrath & Neuss, 1995; Gravel, Wallace, & Rubin, 1996).

Teachers are the individuals most familiar with a child's abilities and potential in the classroom. With the advent of the inclusion movement in education, they are now responsible for ensuring quality education for children with a myriad of educational difficulties and for knowing when to make the appropriate referral, whether it be for a hearing, speech, vision or psychological consultation. Unfortunately, many teachers are not aware of the behaviors that correlate with hearing impairment, or the impact of hearing loss on academic performance (Martin, Bernstein, Daly & Cody, 1988). Martin et al. (1988) determined that 78% of the teachers who had a child with a hearing loss in their classroom had little or no information regarding that child's abilities and limitations. In addition, 69% of the surveyed teachers did not have contact with an educational audiologist.

Two early studies reported that teachers may have difficulty identifying children with hearing problems. Kodman's (1956) study screened 665 children, and identified 126 children who did not pass the screening (follow-up evaluations indicated the presence of hearing loss in all 126 children). However, only 20 of these 126 children (16%) were correctly identified by their teachers beforehand. The remaining 106 children (84%) were not identified by their teacher; in other words, teachers only identified one out of six children with a hearing loss.

Nodar (1978) reported that in 51% of referrals, the behavior of the child alerted the teacher to a potential problem. The

remaining 49% of the time, the teacher was advised of a hearing difficulty by parents, the child's file or evidence of amplification. This study showed that teachers only correctly identified 50% of the 93 children with a known hearing loss. They also missed 3% of children classified with a severe handicap, and 9% of children classified with a moderate handicap. Nodar concluded that teachers could be helpful in supplementing audiometric and tympanometric screening measures, but should not be the only referral sources for hearing concerns.

More recent studies have demonstrated the importance for identifying even minimal hearing loss. Children with hearing sensitivity poorer than 15 dB HL have been reported to have increased difficulty in challenging listening conditions (Bess, 1985; Bess, Dodd-Murphy, & Parker, 1998). Anderson (1998) described how a child with a hearing loss of 16 dB HL can result in miss 10% of the speech signal if the teacher or sound source is farther away than three feet, not an uncommon phenomenon in the classroom.

Timely referrals for hearing screenings are more important than ever (Bess, Klee, & Culbertson, 1986; Bess et al., 1998; Oyler, Oyler, & Matkin, 1988). The present study was designed to update Kodman's 1956 investigation, with the assumption that changes in training and service delivery (i.e., inclusion) in the last 45 years would result in an improved referral rate by classroom teachers. Specifically, it was hypothesized that teachers would accurately identify children who would fail a hearing screening, and that the under- and over-referral rates for hearing problems would be small, as measured by the sensitivity and specificity rates of a group of first grade teachers in a rural Michigan school district. It was also hypothesized that a popular screening instrument (Screening Instrument For Targeting Educational Risk [SIFTER] (Anderson, 1991) would correlate strongly with these referrals.

Methods

Subjects

The subjects included six first-grade teachers with a range of 4-29 years of teaching experience. Their pupils (N = 105, 50 males and 55 females) had a mean age of 6.75 years.

Procedures

On the day of the screening, the six teachers were requested to identify the children they suspected would not pass. They were asked to do this without consulting other teachers, parents, or student files, but to base their identification on their observations of the child in the classroom. The teachers then completed a Screening Instrument For Targeting Educational Risk (SIFTER) (Anderson, 1991) questionnaire for each identified child.

The children were screened using two portable audiometers (Maico models MA 41 and MA 20). The equipment was calibrated to ANSI S.3.6-1996 using supra-aural earphones as the transducers. Audiometric screening data were collected on two separate days, one week apart, three months into the school year.

Immittance testing was not part of the screening paradigm because the primary investigator was seeking to determine if the teachers could identify the presence of hearing loss rather than determining the cause of hearing loss.

An octave band analysis (using a Quest sound level meter [model 2700]) confirmed that noise levels were within the limits determined by the American Speech-Language-Hearing Association (1997). Biologic calibration of the equipment was conducted at the beginning and midpoint of each screening session. Levels of 0 dB HL were obtained by the tester; the screening was performed at 15 dB HL from 500-6000 Hz in both ears. To pass the screening, children were required to respond to all frequencies in both ears.

Analysis

The screening results were then analyzed to determine the teachers' accuracy rates in identifying children who would fail the hearing screening. The results of the SIFTER also were analyzed to determine the relationship between these identification rates and behaviors observed by teachers in the classroom. [Note: for analysis purposes, scores that fell within the "marginal" category were considered as passing scores.]

Results

Referrals

From 105 children in their classrooms, teachers identified 27 as not likely to pass the audiometric screening. Associated SIFTER scores for these children are reported in a subsequent section.

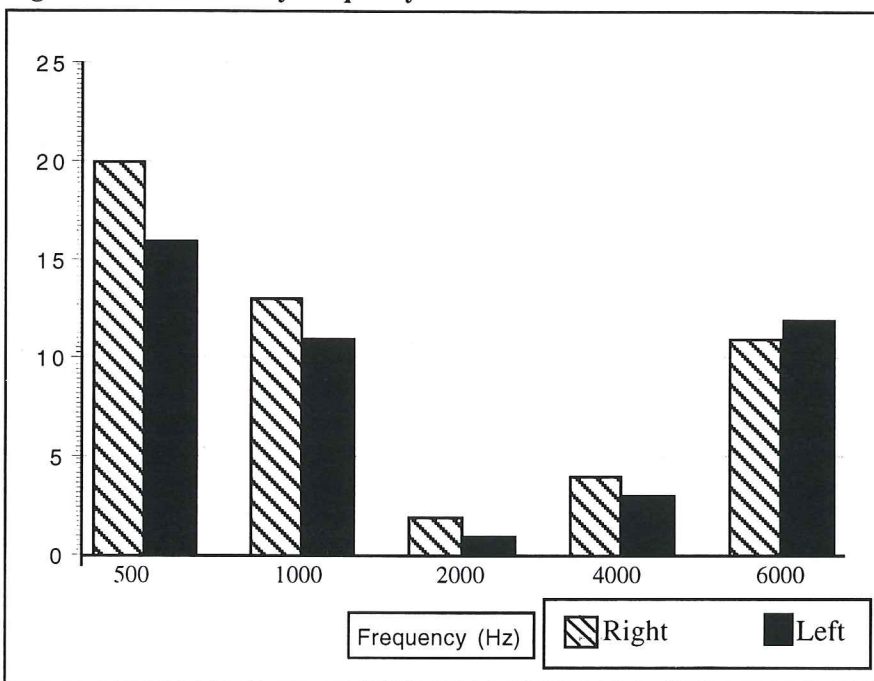
Hearing Screening Results

Thirty six of the 105 children screened (34%) did not pass the screening procedure. Nineteen children (9 males and 10 females) did not pass in at least one frequency in one ear, and 17 children (N males and N females) did not pass in at least one frequency in both ears. Slightly more males (N = 19, 53%) than females (N = 17, 47%) failed the screening, a result that is consistent with Oyler, Oyler, and Matkin (1987) and Bess et al. (1986).

More right ears failed the screening than left ears (50 right ears versus 43 left ears). Most failures occurred in the lower frequencies (500 and 1000 Hz), followed by failures at 6000 Hz (see Figure 1).

The 36 children who failed the screening were divided into three groups: failure to pass the screening at 15 dB in the low-frequencies (500 and 1000 Hz), high-frequencies (4000 and 6000 Hz) and across frequencies (both high and low frequencies). Seventeen children did not pass the screening in the low frequencies. Ten children did not pass the screening in the high frequencies, and nine failed across the low and high frequencies.

Figure 1. Failure Rate by Frequency



Sensitivity and Specificity Rates

Of the 105 children screened, six children (6%) were identified by both their teacher and the screening procedure as having a possible hearing loss, and 48 children (46%) were correctly identified by both methods as having no hearing problem. Twenty-one children were teacher-referred for hearing problems but passed the screening protocol. Finally, 30 children failed the screening but were not referred by the teacher. A summary of these data is shown in Table 1. Table 2 provides a breakdown of the "hits" and "misses" (over- and under-referrals) by individual teachers.

Table 1. Number of children with and without hearing loss as identified by teacher and audiometric screen

		Teacher	
		Referred	Did not refer
Audiometric Screen	Failed Screening	6 (6%)	30 (29%)
	Passed Screening	21 (20%)	48 (46%)

Table 2. Numbers of hits and misses for hearing loss by individual teacher

	Teacher					
	A	B	C	D	E	F
Years of Experience Teaching	13	23	26	16	29	4
Hits: Correct identification	0	4	0	0	0	2
Misses: Over-referred	2	7	0	3	7	2
Misses: Under-referred	8	2	4	6	4	6

SIFTER Scores

It was hypothesized that the SIFTER would reflect concerns for those children thought to have hearing problems according to teacher referrals. Of the 27 children who were referred overall, 19 failed one or more areas in the SIFTER. Eight children did not show weaknesses in any of the five areas probed by the SIFTER. Dividing this population into hits and misses, 15 of those who were referred for hearing problems but had none (the "over-referred" children), had poor SIFTER scores and six did not fail any.

Discussion

The use of teacher referrals did not prove to be sensitive (17%) to the pass/fail rates of the audiometric screening. However, teachers were fairly specific (70%) because they accurately predicted (based on their referral) more than half of the children's screening results. The current investigation supports previous research (Kodman, 1956; Nodar, 1987) that suggests the use of teachers as sole referral sources for hearing screening is not recommended.

The number of children with failing SIFTER scores and no hearing loss could mean teachers' sensitivity to hearing problems might have been raised during the project, and any student who

did not appear to be meeting class expectations in communication, behavior, or academics may have been referred for hearing. Yet, why then did they miss the one-third of children who did not pass the audiometric screening? In other words, with such a high over-referral rate, why was the under-referral rate also high? The large under-referral rate perhaps could be attributed to the teachers not being sure of the signs and symptoms of hearing loss and its effects. The discrepancy in referral rates could also mean some of these students have poor listening and attending behaviors that could be misconstrued as a hearing problem. These findings underscore the value of collaboration between teachers and audiologists, to ensure genuine understanding of hearing loss and listening problems.

The percentage of failure in the five categories of the SIFTER was also examined. In the Bess et al. (1998) study, 66% of the children failed in the academics section, 48% failed in attention and 79% failed the communication areas of the screener. In general, this investigation found that 55% of the children who were referred for hearing problems demonstrated difficulty in academics. It is possible the teacher knew the child was struggling and decided to have the child recommended for a hearing screen to rule out hearing loss as a contributing factor to the child's poor performance. It appears the teachers are very sensitive to academic struggles, much more so than hearing impairment, perhaps because academic difficulties are quantifiable by test scores, whereas hearing loss, known as the "silent disease," is not as tangible and its behaviors can be easily misconstrued. In both the attention and communication categories, only 40% of the referred children had problems. No SIFTER scores were available for those children under-referred for a screening because the questionnaire was only completed on children referred for a screening.

Conclusion

The purpose of this study was to examine the efficacy of teacher referrals in identifying a possible hearing loss. It also investigated whether teachers attributed academic, social or behavioral difficulties to hearing. In general, teachers did not appear effective in identifying children who would fail a hearing screening. Results indicated that teachers over-referred 21 children and did not identify 30 children with hearing problems. In other words, on a typical day, approximately one-third of a classroom may be experiencing a hearing problem and the teachers may not know which child is having problems.

It appears from the number of children who failed the SIFTER, particularly the academic portion of the screener, that the teachers may have referred children based strictly on difficulty with academic subjects. It is possible those referrals were made to ensure hearing was not a problem, rather than believing it was a contributing factor to the child's lack of academic success. The fair specificity yet poor sensitivity of the screening, and the fact that one-third of the students did have a hearing problem at the time of the screening, suggest that changes in teacher training and inclusion have not resulted in an increased appreciation for the role of hearing in the classroom. This study and the supporting literature indicate that hearing loss continues

to be very difficult for teachers to discern and identify in their students.

Addendum: Since the completion of this study, a new group of students have come under the tutelage of the six participating teachers. The educational audiologist of the school district (third author) noted a significant change in attitude by the principal and the teachers, which she attributes to their participation in this study. Whenever she has a school screening, the teachers have specific questions about students and are asking more questions about listening and attending behaviors. Teachers' awareness of hearing impairment has increased and they are anxious to learn more about what they, as educators, can do about identification of hearing problems. The children's hearing health and the expansion of the teachers' knowledge of hearing loss and its manifestations have become a greater priority for this school.

Authors' Note: This article is based on Deborah Kernan's Audiology Doctorate (Au.D.) project, completed at Central Michigan University. The authors wish to thank Ann Elizabeth Ratcliffe, Stacy White, and Dr. Kris English for their assistance in this project.

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