

## MarkeTrak VIII: The efficacy of hearing aids in achieving compensation equity in the workplace

By Sergei Kochkin



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According to a recent national survey by the Better Hearing Institute, more than 34 million Americans in non-institutional settings acknowledge having a hearing loss.<sup>1</sup> Only 40% of these are at or beyond retirement age, and the majority are either of school age or in the workforce. Only 40% of hard-of-hearing Americans with moderate to severe hearing loss and 9% of those with mild hearing losses wear hearing aids, the treatment of choice for 90%-95% of people with hearing loss.

There is an extensive body of research concerning the impact of hearing loss on quality of life.<sup>2,3</sup> When we talk of quality of life, the benefits of healthy hearing are not limited to enhancing the esthetic pleasure of acoustic sounds in a person's environment. Indeed, hearing loss has been shown to have a negative effect on nearly every dimension of the human experience, including: physical health, emotional and mental health, perceptions of mental acuity, social skills, family relationships, and self-esteem, not to mention work and school performance. In a review of the literature,<sup>4</sup> Bridget

### KEY FINDINGS OF INCOME STUDY

A study of more than 40,000 households demonstrated that hearing loss has a deleterious impact on earnings and unemployment rates.

- ❖ There is a \$14,100 income differential between subjects with mild and severe hearing loss. People with untreated hearing loss lose as much as \$30,000 annually, depending on their degree of hearing loss.
- ❖ Hearing aids were shown to mitigate the impact of income loss by 90%-100% for those with milder hearing losses and from 65%-77% for those with severe to moderate hearing loss.
- ❖ The loss in income for people with untreated hearing loss due to underemployment is estimated at \$176 billion, and the cost to society is estimated to be as high as \$26 billion in unrealized federal taxes.
- ❖ Unemployment rates for aided subjects were not significantly related to degree of hearing loss.
- ❖ There was a strong relationship between degree of hearing loss and unemployment for unaided subjects. Those with severe hearing loss had unemployment rates (15.6%), double that of the normal-hearing population (7.8%) and nearly double that of their aided peers (8.3%). Thus, one would expect that the cost to society of unemployment benefit payments is double that for normal-hearing households, depending on degree of hearing loss.
- ❖ However, there is little evidence that people with hearing loss believe they have been discriminated against in terms of compensation equity and in being passed over for promotions.

Shield, PhD, a professor of acoustics at London South Bank University, has shown that hearing loss is related to unemployment and underemployment. However, research in this area has focused primarily on people with severe to profound hearing loss.

The literature has historically been less clear regarding the impact of the full spectrum of hearing loss and how it impacts effectiveness in the workforce. In a 2005 Better Hearing Institute (BHI) study of more than 40,000 households, hearing loss was shown to reduce average household income by up to \$23,000 a year depending on the degree of hearing loss.<sup>5</sup> However, the use of hearing aids was shown to mitigate the effects of hearing loss by 50%. The BHI estimated that people with hearing loss in the workforce could be losing more than \$100 billion a year in income. This reduction in earnings not only damages the quality of life of the person with hearing loss, but it also has a detrimental impact on society as a whole due to reduced productivity and losses in tax revenues.

The purpose of this paper is to update the relationship between treated and untreated hearing loss and income compared to normal-hearing households.

In addition we will determine the following:

- ❖ Are people with hearing loss more likely to be unemployed?
- ❖ Do people with hearing loss believe their compensation is equitable compared to their peers with equal skills, experience, and education?
- ❖ Do people with hearing loss believe they have been passed over for promotions?

## METHOD

In November and December 2008, a short screening survey was mailed to 80,000 members of the National Family Opinion (NFO) panel. The panel consists of households that are balanced to the latest U.S. census information with respect to market size, age of household, size of household, and income within each of the nine census regions, as well as by family versus non-family households, state (with the exceptions of

Hawaii and Alaska), and the nation's 25 largest metropolitan statistical areas.

This short screening survey was completed by 46,843 households and helped identify 14,623 people with hearing loss, and also provided detailed demographics on those individuals and their households. The response rate to the screening survey was 59%. In January 2009, an extensive seven-page legal-size survey was sent to the total universe of hearing aid owners in the panel database (3789); 3174 completed surveys were returned, an 84% response rate. In February 2009, another seven-page legal survey was sent to a random sample of 5500 people with hearing loss who had not yet adopted hearing aids. The response rate for the non-adopter survey was 79%. Both hearing aid owners and non-adopters were given a \$1 incentive to complete and return their surveys.

The data presented in this article refer only to households as defined by the U.S. Bureau of Census; that is, people living in a single-family home, duplex, apartment, condominium, mobile home, etc. People residing in institutions have not been surveyed. These include residents of nursing homes, retirement homes, mental

hospitals, prisons, college dormitories, and the military. The reader should keep in mind that the demographics to follow refer only to those who are aware of and admit to their hearing loss.

The screening survey determined for each household:

- 1) if the household had one or more people "with a hearing difficulty in one or both ears without the use of a hearing aid,"
- 2) if the household had one or more owners of hearing aids,
- 3) detailed employment status for the top two household heads,
- 4) whether or not the two household heads felt they were passed over for a promotion in the last 5 years,
- 5) perceptions of compensation equity for the two household heads.

## Sample selection

For this study three samples were identified considering only heads of households 20 years or older. The following sample sizes were achieved for this study:

- ❖ **Aided:** 1818 households in which the head of household or spouse indicated that one or both had a hearing loss and that one or both wore a hearing aid.

**Table 1.** Demography comparing people with hearing loss (aided and unaided) versus normal-hearing people.

Demography	Normal hearing population	Hearing loss population	
		Aided	Unaided
Sample size	(n=34,351)	(n=1,818)	(n=3,232)
<b>Age</b>			
Means	48	71	59
Median	47	74	59
<b>Education</b>			
Mean (lsmeans adjusted for age)	14.2	14.1	13.9
<b>Household composition (%)</b>			
Husband and wife	49	55	64
Male/other relative	3	2	3
Female/other relative	14	5	7
Male single	14	16	10
Female single	15	19	12
Male/non-relative	2	2	2
Female/non-relative	3	1	2

**Table 2.** Household sample sizes by degree of hearing loss; normal hearing households = 34,351.

Decile	Aided		Unaided		Total with hearing loss
	Sample	Percent	Sample	Percent	
10%	24	1.3%	502	15.5%	526
20%	54	3.0%	472	14.6%	526
30%	75	4.1%	469	14.5%	544
40%	116	6.4%	396	12.3%	512
50%	185	10.2%	353	10.9%	538
60%	175	9.6%	314	9.7%	489
70%	245	13.5%	247	7.6%	492
80%	266	14.6%	226	7.0%	492
90%	332	18.3%	149	4.6%	481
100%	346	19.0%	104	3.2%	450
<b>Total</b>	<b>1,818</b>		<b>3,232</b>		<b>5,050</b>

❖ **Unaided:** 3232 households where neither the head of household nor spouse wore a hearing aid, but where one or both reported having a hearing loss.

❖ **Normal hearing:** 34,351 households in which neither the head of household nor spouse reported having a hearing loss.

Demographics for the three samples are shown in Table 1. Normal-hearing households on average are 23 years younger than aided households and 11 years younger than unaided households; aided households are on average 12 years older than unaided households. Education levels among the three groups (controlling for age differences) varied by only 0.3 years. Household designation is significantly different for the three groups, with a greater likelihood that people with hearing loss are living as husband and wife.

### Hearing loss measures

Since previously income has been shown to be related to degree of hearing loss, both aided and unaided subjects were asked to complete the following subjective measures of hearing loss in the detail survey phase. Consumers were segmented into one of ten groups (deciles) based

on their responses to five measures of hearing loss:

❖ **Number of ears impaired:** (1 or 2)

❖ **Score on the Gallaudet Scale:**<sup>6</sup> An eight-point scale in which respondents indicated if they could understand speech under the following conditions: “whisper across a quiet room,” “normal voices across a quiet room,” “shouts across a quiet room,” “loud speech spoken into their better ear,” “not able to understand loud speech in their better ear.” In addition, respondents said if they could “tell noises from each other,” “hear loud noises at all,” and “hear any sound or any noise.” Respondents’ scores ranged from 1 to 8 and typically they were classified into one of five groups: (1-hear whisper, 2-hear normal voice, 3-hear shouts, 4-hear speech in loud ear, 5-can’t hear speech). The Gallaudet Scale is of particular value because it has been validated against clinical information (dB loss better ear). The scale has historically been used by the Centers for Disease Control in their quantification of

the hearing-impaired population.

❖ **Subjective hearing loss score:** Respondents subjectively evaluated their hearing loss as “mild,” “moderate,” “severe,” or “profound.” This measure is given a score of 1 (mild) to 4 (profound).

❖ **Difficulty hearing in noise:** This five-point scale runs from “extremely difficult” hearing in noise to “not at all difficult” and is based on the work of Plomp.<sup>7</sup>

❖ **BHI Quick Hearing Check:** This 15-item, 5-point Likert-scaled hearing loss inventory is based on the revised American Academy of Otolaryngology-Head & Neck Surgery (AAO-HNS) 5-minute hearing test,<sup>8</sup> and has been shown to be correlated with objective measures of hearing loss.

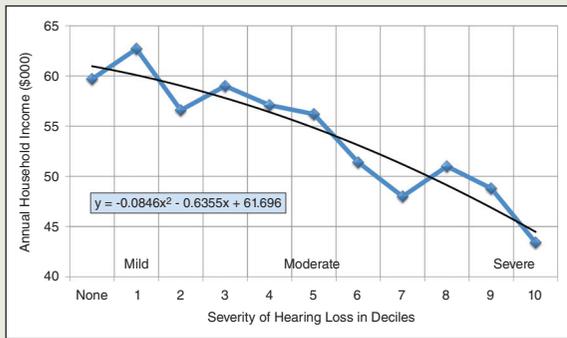
In an earlier publication,<sup>1</sup> a factor analysis of the above subjective measures was performed, which revealed a single measure of hearing loss. Factor scores were computed and each person was placed into one of 10 hearing loss groups where decile 1 = the mildest hearing loss—the lower 10% of people with hearing loss; and decile 10 = the most serious hearing loss—the top 10% of people with hearing loss. Normal-hearing households were classified as “Normal.” The sample sizes for hearing-impaired households are shown in Table 2.

The following variables were evaluated as possible predictors of household income:

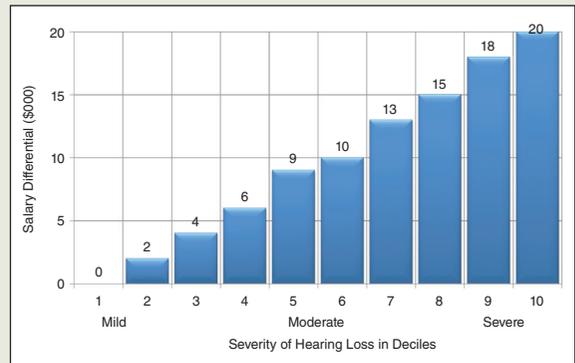
❖ **Household designation** (7-point classification of household composition): husband and wife; male, no wife, child, and/or other relative present; female, no husband, child, and/or other relative present;

**Table 3.** ANOVA results. Prediction of household Income.

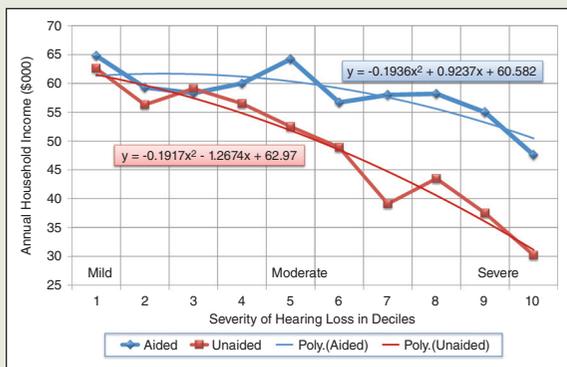
Factor	df	F Value	Pr > F
Hearing loss by group	20	8.53	<.0001
Geographic location	8	39.62	<.0001
Age	6	91.25	<.0001
Household designation	6	625.5	<.0001



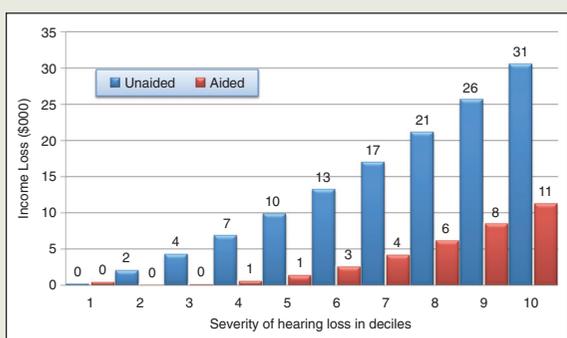
**Figure 1.** Relationship between hearing loss and household income.



**Figure 4.** Salary differential (\$000) between aided and unaided subjects by severity of hearing loss in deciles.



**Figure 2.** Relationship between hearing loss and household income, Aided versus unaided least square means.



**Figure 3.** Income loss (\$000) compared to normal-hearing households ( $n=34,351$ ) by severity of hearing loss for aided ( $n=1818$ ) and unaided ( $n=3232$ ) households.

male living alone; female living alone; male living with non-relative; female living with non-relative.

- ❖ **Age** (7 brackets): <25 years, 25-34, 35-44, 45-54, 55-64, 65-74, 75+.
- ❖ **Geography** (9 regions): East No. Central, East So. Central, Middle Atlantic, Mountain, New England, Pacific, South Atlantic, West No. Central, West So. Central.
- ❖ **Hearing loss by group:** 10 aided samples by hearing loss decile, 10 unaided samples by hearing loss decile, and 1 normal-hearing loss sample for a total of 21 groups.

These demographic variables were included in the model since they were significantly correlated with group membership.

## RESULTS

### *Income loss associated with hearing loss*

The overall model of household income using all predictor variables was significant ( $F=141.36$ ,  $df=40$ ,  $p<0.0001$ ,  $R^2=0.125$ ). All variables were significant at the  $p<0.0001$  level, as shown in Table 3.

The least square means (adjusting for the variables in Table 3) for the 10 hearing loss groups (deciles) and the single normal-hearing group are plotted in Figure 1. The polynomial model expressing the relationship between hearing loss and income is documented in Figure 1.

The model demonstrates that income drops as a function of hearing loss, but more sharply for people with severe hearing losses. For instance, there would appear to be little if any difference between the income of normal-hearing subjects (\$61,700) and people with very mild hearing loss (decile 1). But after that, income declines to \$46,880 for people in decile 10. In other words, individuals with the most serious hearing loss (decile 10) could be expected to earn \$14,100 less per year than one with a mild (decile 1) hearing loss.

### *Mitigating impact of hearing aids*

Does using hearing aids mitigate the impact of hearing loss on income? Yes, as is clear from Figure 2, which plots the least square salary profiles for aided and unaided households. These salaries are again adjusted for the demographic variables listed in Table 3. The salary profile is polynomial in structure, meaning that the salary decrease becomes more pronounced as the hearing loss becomes more serious. In Figure 3, we have graphed the salary differential for both aided and unaided households by degree of hearing loss compared to normal-hearing households. For decile 1 there is no salary differential. For unaided households the income differential increases from \$2000 a year at decile 2 to \$31,000 at decile 10. For aided

households, there is no income differential for people in the lower 30% of hearing loss, meaning complete salary equity. After that it increases to a loss of \$1000 a year at decile 4 up to \$11,000 at decile 10.

We can conclude that income loss is mitigated by hearing aid usage at between 90% and 100% in hearing loss deciles 2-5; and from 77% to 65% in hearing loss deciles 6-10. As graphed in Figure 4, income loss is mitigated by hearing aids up to \$20,000 a year, depending on degree of hearing loss.

### The cost to society

As Table 4 shows, the cost to society of untreated hearing loss could be significant, since it results in underachievement on the job. Currently 24.9 million adults in the U.S. with admitted hearing loss do not use hearing aids. If we segment the unaided population into hearing loss deciles, it can be seen that the unaided hearing loss population has significantly lower hearing loss than the aided hearing loss group. For example, 15.5% of unaided subjects are in the lower 10% of hearing loss, compared to only 3.2% in decile 10. If we cross-multiply population size by income differential we can arrive at:

- ❖ Estimated loss in income due to untreated hearing loss.
- ❖ Estimated federal taxes not realized due to untreated hearing loss assuming a 15% tax bracket (simplified).

The estimated cost in lost earnings due to untreated hearing loss is \$176 billion, while the cost to society in terms of unrealized federal taxes is \$26 billion. We believe it is logical to include the entire hearing loss population in this simulation since earlier studies have determined that unaided individuals have been aware of their hearing loss on average 15 years.<sup>1</sup> In our opinion, it is the cumulative effect of neglect in treating hearing loss that

results in the huge income divergence between aided and unaided subjects.

### Job status, pay equity, and perceptions of discrimination

Without referring to hearing loss, our survey asked all heads of households to provide us with their detailed employment status as well as their perception of compensation equity (*less than, equal to, greater than*) compared with their peers with equal education and experience. In addition, all heads of households responded “yes” or “no” to a question asking if they had been passed over for a promotion in the last 5 years. The results are documented in Table 5 segmented by age group.

According to the Bureau of Labor Statistics, the national unemployment rate in the U.S. in January 2009 was 8.5%.<sup>9</sup> Our survey differs from that of the Bureau of Labor Statistics in that we considered people unemployed whether or not they were looking for work, while the bureau considered as unemployed only people who were looking for employment. Our statistics do not include people who said they were homemakers, retirees, students, or disabled.

Referring to Table 5, we found no evidence of an association between hearing loss and unemployment for any age group. An unexplained finding is that aided subjects tended to be employed more often than normal-hearing subjects and than unaided subjects, though the relationships were insignificant.

Figure 5 shows the unemployment rates for aided and unaided subjects by hearing loss quintile (*hearing loss segmented into groups of 20% to increase sample sizes*). There is no significant relationship between hearing loss and unemployment rates for aided subjects ( $p < 0.07$ ). However, there is a significant relationship between unaided subjects and unemployment ( $p < 0.0003$ ), with unemployment

**Table 4.** Simulated household income loss and unrealized federal taxes from non-aided households with hearing loss.

Hearing loss decile	Distribution for non-aided households	Adult population size in millions	Salary differential unaided versus aided households (\$000)	Annual lost income (\$ billions)	Annual unrealized Federal taxes (\$ billions)
10%	15.5%	3.87	0	0.00	0.00
20%	14.6%	3.64	2	7.28	1.09
30%	14.5%	3.61	4	14.46	2.17
40%	12.3%	3.05	6	18.31	2.75
50%	10.9%	2.72	9	24.49	3.67
60%	9.7%	2.42	10	24.20	3.63
70%	7.6%	1.90	13	24.75	3.71
80%	7.0%	1.74	15	26.13	3.92
90%	4.6%	1.15	18	20.67	3.10
100%	3.2%	0.80	20	16.03	2.40
<b>Total</b>	<b>100%</b>	<b>24.91</b>		<b>176.3</b>	<b>26.4</b>

**Table 5.** Unemployment, perceptions of compensation equity, and perceptions of promotion discrimination comparing hearing loss households (aided and unaided) and normal-hearing households controlling for age group. Households include only heads of households considered part of the U.S. workforce.

Demography	Normal hearing households	Hearing loss households		Significance level
		Aided	Unaided	
<b>Ages 20-44</b>	(n=11,162)	(n=44)	(n=306)	
Unemployed (%)	8.1	6.8	6.8	n.s.
Passed over for promotion (%)	22.7	19.6	24.4	n.s.
Compensation equity perception (%)				
Salary less than peers	26.7	23.9	28.1	n.s.
Salary equal to peers	46.2	60.9	46.1	
Salary more than peers	27.1	15.2	25.8	
<b>Ages 45-64</b>	(n=11,630)	(n=206)	(n=999)	
Unemployed (%)	7.6	4.4	8.1	n.s.
Passed over for promotion (%)	16.7	15.1	16.8	n.s.
Compensation equity perception (%)				
Salary less than peers	26.4	20.4	29.5	p<.01
Salary equal to peers	50.4	54.9	50.7	
Salary more than peers	23.1	24.6	19.8	
<b>Ages 65+</b>	(n=1,304)	(n=129)	(n=170)	
Unemployed (%)	6.9	4.7	7.7	n.s.
Passed over for promotion (%)	4.9	3.9	4.3	n.s.
Compensation equity perception (%)				
Salary less than peers	15.7	16.4	18.3	n.s.
Salary equal to peers	59.7	55.3	58	
Salary more than peers	24.6	28.3	23.7	

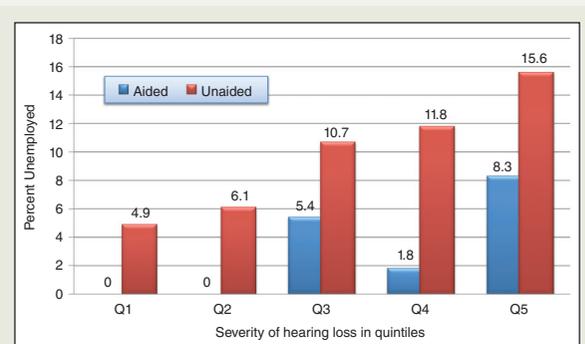
rates increasing significantly as a function of hearing loss. Unaided subjects in quintile 1 (lower 20% of hearing loss) had an unemployment rate of 4.9%, while those in quintile 5 (highest 20% of hearing loss) had an unemployment rate of 15.6%. Thus, one can conclude that there is probably an additional cost to society in the form of unemployment benefits paid to subjects with untreated hearing loss.

We found no significant relationships between hearing loss and perceptions of being passed over for a promotion. With respect to perceptions of compensation equity only the age bracket 45-64 showed significant differences in responses. Unaided subjects were more likely to report being paid less than their peers, and again aided subjects were even more likely to report that they made more income than their normal-hearing and unaided peers.

### CONCLUSIONS

Hearing is critical to effective communication in the workforce. Most jobs require proficiency in spoken communication in order to engage effectively in commerce and in dealing with the public. Effective hearing may also be critical to assure safety on the job.

Without aided hearing, as these data and other studies show, the individual with a hearing impairment can be expected to suffer losses in compensation due to underemployment, may make mistakes on the job, is likely to experience higher rates of unemployment, and may experience an overall reduction in quality of life (e.g., anxiety, depression, social



**Figure 5.** Unemployment rates by hearing loss quintile comparing aided and unaided subjects.

isolation, and reduced physical and mental health and cognitive function), which may damage job performance.

Most hearing health professionals have encountered patients who delayed hearing loss treatment due to fear of stigmatization on the job. This author is personally aware of a CEO who indicated that he had delayed treatment for his hearing loss due to vanity until he made a critical error that caused him personally to lose a million dollar contract. We have also talked with people who suffered needlessly during their school years with “hidden” hearing loss.

Unfortunately, untreated hearing loss is not hidden, for it results in underachievement for nearly all who delay treatment while they are in the prime of their life. The tragedy is that untreated hearing loss negatively affects individuals and their families for the rest of their lives in the form of lost wages, lost promotions, lost opportunities, lost retirement income, and, perhaps worst of all, in unrealized dreams.

#### Acknowledgments

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## IMPLICATIONS FOR CORPORATE HR

Since approximately 60% of people with hearing loss in the U.S. are under retirement age, corporations need to be aware that hearing loss is prevalent in 11% of the U.S. population and that if left untreated it could result in lower employee productivity as evidenced by the income differential study reported here. However, there are practical ways to achieve equity in the workforce for people with hearing loss.

### ADA requirements

The Americans with Disabilities Act (ADA) requires corporations to make reasonable accommodations for people with disabilities in the workforce. Hearing loss is a disability that, in most cases, can be mitigated by the use of hearing aids in the workplace. Accommodating employees with hearing loss need not be expensive. A no-cost solution for many corporations could be encouraging the use of hearing aids in the workforce. This can be accomplished by:

- ❖ Creating a corporate climate where hearing loss is acceptable. This may positively affect workers who feel stigmatized and hide their hearing loss on the job.
- ❖ Cover hearing aids in corporate insurance plans.
- ❖ Recommending that employees use the company’s medical flex-spend program to buy hearing aids.
- ❖ Providing easy accommodations, such as moving an

employee’s desk away from noisy hallways or installing a phone that amplifies high frequencies.

- ❖ More costly solutions include designing cubicles with noise-absorbent materials or equipping meeting rooms with inductive loops.

### Increasing awareness and education

Previous research has shown that 50% of people with untreated hearing loss have never had their hearing professionally checked.<sup>10</sup> Thus, they have insufficient information to seek professional help. Human resource executives can help employees by:

- ❖ Encouraging local hearing health professionals to do onsite corporate hearing screenings.
- ❖ Encouraging employees to take valid online hearing tests. The Better Hearing Institute has a 5-minute hearing test at [www.hearingcheck.org](http://www.hearingcheck.org).
- ❖ Educating employees on the impact of untreated hearing loss on their quality of life. A good summary of this topic appears at the BHI web site.<sup>11</sup>

By encouraging employees to treat hidden loss, an employer creates a win-win situation. The company is assured that employees’ hearing loss does not interfere with job performance, productivity, and safety, and employees are assured that their hearing loss does not interfere with their ability to excel in their careers or reduce their quality of life on or off the job.