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William A. Welsh

Rochester Institute of Technology

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THE ECONOMIC IMPACT OF DEAFNESS

WILLIAM A. WELSH, Ed.D.
Rochester Institute of Technology
Rochester, New York

Abstract

The purpose of this paper was to determine the economic impact of deafness over a 40-year work life. Information provided by the U.S. Internal Revenue Service made it possible to estimate the lifetime earnings of 4,398 deaf adults who had a wide variety of educational backgrounds. Data on the U.S. population as a whole (matched on age and education), extracted from U.S. Bureau of the Census publications, were used for purposes of comparison. Results indicate that the economic cost of deafness is great. Over the course of a lifetime deaf people earn between \$356,000 and \$609,000 less than their comparably educated hearing counterparts. Overall differences between deaf and hearing persons would be increased further by virtue of the fact that hearing people are more likely to receive some college education, and are thus more likely to enjoy attendant higher salaries. As an afterword, some of the non-economic costs of deafness are noted.

groupings are usually in the labor force less often, unemployed more often, restricted—often severely—in the range of occupational options available, and earn far lower wages and salaries.

For example, the 1989 labor force participation of women was 57.7 percent, compared to 78.1 percent for males. The unemployment rate for white people was 4.5 percent; for Hispanic people, it was 8.0 percent; and for black people, 11.4 percent (Bureau of Labor Statistics, 1990). Difficulties faced by members of these groups have myriad causes. In many instances, they are brought about by lower basic skills. They are quite often the product of some combination of restricted educational opportunity and discrimination on the basis of sex, race, and/or disability.

Consistent with these findings, deaf people have faced comparatively poor employment conditions for a very long time. Many studies (Best, 1914, 1943; Lunde and Bigman, 1959; Schein and Delk, 1974; Schroedel, 1976; Walter and MacLeod-Gallinger, 1989) have shown that deaf people are overrepresented in Blue Collar occupations, earn substantially less money, and enjoy significantly less mobility than do their hearing counterparts. Williams and Sussman (1971) address underemployment specifically. They write that "...employed deaf people are very often seriously *underemployed*. Everywhere, we find deaf men and women...occupied in unchallenging routines. This stereotyping illustrates the inadvertent discriminatory attitudes toward deaf job applicants that are inevitable among slightly informed professionals...." (p. 25). Schein and Delk (1974) add: "While education as a single criterion for underemployment is

Data published by the U.S. Bureau of Labor Statistics (1960, 1970, 1980, 1990) and the U.S. Bureau of the Census (1968, 1978, 1988) reveal that, in terms of labor force participation, employment rate, level of employment, earnings, and socioeconomic status (among other things), the most privileged group of Americans are white males aged 25-50. What does it cost to be outside this group—to be a woman, to be black or Hispanic, to be an older worker, or to be disabled? The same set of data has shown that those who are not white males in the middle age

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inadequate, it does provide a gross indication. For example, almost 43 percent of deaf adults who have completed 13 years or more of school (i.e., have one or more years of higher education) have principal occupations in the following categories: clerical, transit and nontransit operatives, farm and nonfarm laborers, and service and household workers. Underemployment certainly describes many of these job placements, though not necessarily all" (p. 84). Compare this with the fact that, of all hearing persons having 1-3 years of college, nearly 70 percent are employed in either Managerial/Professional or Technical/Sales/Administrative Support (i.e., "White Collar") jobs.

One of the effects of underemployment is the restriction of the amount of discretionary income available to the deaf worker. While money may not, as the cliché goes, buy happiness, it can buy additional education; it can give one more leisure time and the avocations with which to fill that time; it can make possible much more comfortable home surroundings; and (last but not least) it frees us from one of life's great anxieties: "Where am I ever going to get the money for...." So...while money is not the only thing, it is important, and it affects directly or indirectly most parts of our lives.

The focus of this paper is on this most visible effect of underemployment—depressed earnings. While previous analyses (Welsh, Walter, and Riley, 1988, 1989b) have focused on earnings in particular years, the current analysis will go beyond this. Depressed earnings in a given year or short period of years can be cumulative over a lifetime (a lower base salary yields lower increments, there is less disposable income for investments, etc.). The purpose of this paper is to determine as nearly as possible what deafness itself costs an individual in cumulative earnings over a lifetime of work.

Method

Earnings in 1985 for 4,398 deaf withdrawals and graduates from five federally supported

postsecondary programs for the deaf were analyzed. Subjects were grouped into three categories: Withdrawals (18%), Sub Bachelor (59%), and Bachelor (23%). The sample was 52% male and 48% female, and their average age was 30 years.

The U.S. Internal Revenue Service, Statistics of Income Division, provided summary analysis for 1985 wages and salaries as reported on the deaf workers' 1985 W-2 statements. IRS procedures for safeguarding the confidentiality of data about individuals are stringent. For this reason, the type of information provided by the IRS is grouped data only, and regulated by their Disclosure Litigation Division. Any identification of individuals was impossible.

The earnings of the deaf workers were compared with 1985 earnings of U.S. workers as reported by the U.S. Bureau of the Census (1987). The Bureau of the Census reports earnings for three educational levels that can be compared with the categories for deaf subjects: high school only, 1 - 3 years of college, and 4 years of college for U.S. workers between the ages of 25 and 34.

It must be pointed out that the characteristics of the deaf and hearing groups are not exactly the same. For example, while the mean age of the deaf workers is 30, the range is slightly larger than the 25 to 34 range for U.S. workers. Another incongruity in the two comparisons results in the fact that not all U.S. workers with 1-3 years of college have earned a sub-bachelor degree, and not all individuals with four years of college have a bachelor's degree. Still, recognizing these limitations, the comparisons should provide some useful analyses of the effect of education on earnings for deaf workers compared with the U.S. work force.

The Earnings Gap

Lifetime earnings were calculated by projecting earnings growth from the first year of work. Since data were not available on actual first year earnings, they had to be estimated from the 1985 earnings of persons whose average age during that year was 30. A model was devised to determine the average starting salaries using the following assumptions:

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- (1) Workers with no college (withdrawals and high school graduates) on the average began work in 1974 at age 19.
- (2) Workers with some college (sub-bachelor and 1-3 years) on the average began work in 1977 at age 22.
- (3) Workers with significant college (bachelor and 4 or more years) on the average began work in 1980 at age 25.

In order to calculate starting salary, we first calculated the mean annual earnings increments for the period 1975 to 1985, using statistics reported by the U.S. Bureau of the Census (1977, 1987). These increments are 6.7% for high school graduates, 7.1% for persons with 1-3 years of college, and 8.2% for persons with four or more years of college. These percentages permitted us to estimate the mean starting salaries for each of the groups of workers being compared. For example, for high school graduates, we took their 1985 earnings of \$10,085 (Table 1) and reduced the figure by 6.7 percent for each year since they started work. This procedure yields an estimated 1974 starting salary of \$5,264. Results of these calculations for each of the groups are shown in Table 1. Also displayed are 1985 earnings, estimated number of years in the work force, and estimated first year earnings.

The reader should notice that for both deaf and

hearing workers, earnings increase with level of education. Additionally, note that the *difference* between the earnings of deaf and hearing people decreases at each succeeding degree level.

The starting salaries reported in Table 1 were then used to project lifetime earnings. To do these projections, the overall rate of inflation for the 35 year period 1953 - 1988 was calculated, using the average change in the Consumer Price Index of the period (U.S. Bureau of Labor Statistics, 1974, 1985, 1990). This average rate is 4.3%.

To account for differences in education level in our model, we calculated an annual inflation rate for each of the three groups that is based on the proportional differences in salary growth for U.S. workers during the period 1975 - 1985. Since this was a period of relatively high inflation (7.1% compared to a 35 year average of 4.3%) the yearly increments were reduced by the proportional difference between the 35 year average and the ten year average. The resultant differential inflation rates, based on educational level, are as follows:

High school graduates	4.04%
1-3 years of college	4.29%
4 years of college	4.89%

Cumulatively, the above calculations make possible the estimation of lifetime earnings. In Table 2 are presented lifetime earnings converted

**TABLE 1
EARNINGS FOR DEAF AND HEARING WORKERS BY YEARS IN THE WORK FORCE**

Population	1985 Earnings	Years in Work Force	First Year Earnings
Deaf college leavers	\$10,085	11	\$5,264
U.S. workers with high school diplomas	\$14,757	11	\$7,703
Deaf sub-bachelor graduates	\$13,501	8	\$7,750
U.S. workers with 1-3 years college	\$17,162	8	\$9,851
Deaf bachelor graduates	\$18,201	5	\$12,322
U.S. workers with 4 years college	\$21,968	5	\$14,872
Deaf master graduates	\$22,785	4	\$16,679
U.S. workers with more than 4 years college	\$25,703	4	\$18,815

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to current (at the time of this writing) dollars using the Consumer Price Index (CPI).

By these estimates, differences between comparably educated groups of deaf and hearing people vary between over \$350,000 to just over \$600,000.

Educational Opportunity: Impact of Differences

The salary differences for comparably educated deaf and hearing people are great. Since the discrepancies between deaf and hearing people are related to such an extent on education, what are the chances for degree attainment by deaf and hearing people? As of 1986 (U.S. Bureau of the Census, 1988) the following was the distribution of 77,167,000 persons aged 25-44 (the group closest in age to the sample that could be studied, given the structure of the Bureau of the Census tables):

No college	54.5%
1-3 years of college	20.7%
4 years of college	24.8%

Some 45.5% of hearing workers have significant college experience, at least one year. We cannot say with certainty precisely how many have degrees. However, given that a majority of attrition occurs before one year of college is completed (Tinto, 1987) and that it is also probably true that most of those with 4 or more years of college have at least a bachelor's degree, it appears conservative to estimate that about 33% of the population attains some formal certification (Beal and Noel, 1980).

There are no similar data for deaf persons. However, Allen (1986) reported that, of all deaf 16-year-olds, more than 90 percent read at below the eighth grade level, and more than 80 percent read below the sixth grade level. This does not augur well for the success of large numbers of deaf people in college. Walter and Thompson (1989) took Allen's findings and estimated potential degree attainment of deaf persons based on reading abilities typically required to attain different degrees at the Rochester Institute of Technology. Their estimates are that fewer than 10 percent of deaf high school graduates will attain any postsecondary certification. If their estimates are correct, the chances for a hearing person are about 3.7 times as great as for a deaf person to attain some formal certification. Additionally, their chances for a bachelor's degree or higher appear to be almost 10 times as great.

If deaf and hearing people attain different levels of education, discrepancies in their earnings can increase greatly. Depending on the difference in educational levels, the difference between the earnings of deaf and hearing people can expand from \$356,404 (when both have master's degrees) to \$609,705 (in perhaps the most common example, when neither the deaf nor the hearing person has a degree). The difference between a hearing person with a master's degree and a deaf person with no degree can total as much as \$1,823,251 over a lifetime of work. It should be noted that, while the larger discrepancies are not probable, they are distinct possibilities. As noted above, hearing people have a greater chance to attain a degree than do deaf people.

TABLE 2
FORTY YEAR EARNING CAPACITY OF DEAF AND HEARING WORKERS

Degree Level	Cumulative Forty Year Earnings		Difference
	Hearing	Deaf	
High School	\$1,925,816	\$1,316,111	\$609,705
Sub-bachelor	\$2,126,760	\$1,673,079	\$453,681
Bachelor	\$2,735,156	\$2,266,141	\$469,015
Master	\$3,139,362	\$2,782,958	\$356,404

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Discussion

Economic Consequences

It is expensive to be deaf. The difference between lifetime earnings of deaf and hearing people can range between hundreds of thousands of dollars to nearly two million dollars. Though no 40-year projection can be done with great precision, these data give a reasonably good idea of the range of possibilities as to the loss of earnings that are faced by deaf adults.

This begs a very important question: why are earnings of deaf people lower? There are several distinct possibilities. One of these has to be the lower level of reading ability. Reading is a part of nearly every job, whether it be instructional manuals, memos from supervisors and co-workers, professional papers and journals—the list is long. A lower level of reading skill necessarily hampers work performance, and is probably reflected in lower income for many deaf individuals.

Another possibility is discrimination. People who have characteristics that are devalued by society are simply not treated equally, justifiably or not. Persons with physical or sensory impairments—as well as women, minorities, very old and very young workers—have been, and still are, subject to job and earnings discrimination, and this probably accounts for a significant portion of the discrepancy in earnings between deaf and hearing people.

The opportunity for deaf persons to relocate for a better job or a higher salary is more restricted than for their hearing counterparts. Communication with co-workers can be difficult to establish and maintain, and faced with the often discouraging prospect of re-establishing communication patterns all over again in a new situation, a deaf worker may often elect to simply stay where he/she is (Foster, 1987). Additionally, if deaf workers wish to have access to the deaf community, they are restricted to cities in which there are deaf clubs and other organizations for deaf people. They are often faced with a choice between access to friends and access to the best job opportunities.

There may be other explanations, which data

analyzed in this paper do not permit us to examine. It can be speculated that deaf people, as a group, come from homes with lower socioeconomic status (SES). Some forms of deafness are influenced by poor medical care, and quality of medical care is related to SES. If this is the case, it may be that the lower SES of parents of deaf people influences their occupational attainment; it is known (Jencks and Rainwater, 1972; Jencks et al., 1979) that parental SES is a very powerful determinant of the SES of offspring. This hypothesis is without empirical support at this time. Occupational attainment can be influenced by level of literacy as well (Jencks et al., 1979). Deaf people, even those with levels of education comparable to those of their hearing peers, do not read at the same level (Walter and Thompson, 1989). In fact, for some deaf people, English is a second language. It may well be that this accounts for part of the salary difference as well.

Finally, it must be noted that the incidence of secondary disabilities (blindness, Usher's syndrome, cerebral palsy, etc.) is higher among deaf people than it is among the general population (Flathouse, 1979; Gentile and McCarthy, 1973; Rawlings and Gentile, 1970; Schein and Delk, 1974). Some of the salary discrepancy between deaf and hearing people may be attributable to the presence of secondary physical or sensory impairments.

The income data presented above do not represent the sole economic cost of deafness. Other economic costs can further reduce the net income of deaf adults. First of all, it must be noted that all of the above data assume equal work lives for deaf and hearing people. There is evidence that this may not reflect reality. Deaf people typically take longer to complete comparable levels of education (thus getting a later start), and deaf people, especially younger deaf people, show much higher unemployment rates than do their hearing counterparts (MacLeod-Gallinger, 1989). These factors may combine in many cases to reduce significantly the number of years deaf people are in the work force compared to their hearing counterparts.

There are other dollar costs associated with

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being deaf that further reduce discretionary income. Deaf people must purchase telecommunication devices that are not required by hearing persons. These devices range between \$200 to a little under \$1000, and answering machines designed to receive TDD calls can cost several hundred additional dollars. TDD calls (including long-distance) must necessarily be longer, as it takes longer to type than it does to talk. Moreover, when the individual with whom they need to speak does not have a TDD, they must either forego the call or drive to the other person for a face-to-face meeting.

Further, deaf people must purchase and maintain decoders for their television sets in order to view closed-captioned programs. Those who wear hearing aids must, of course, purchase and maintain them and replace batteries regularly. Their doorbells must be equipped with flashing lights. Their alarm clocks are often accompanied by vibrators that shake the bed. Some deaf people own hearing dogs, a significant initial and continuing investment. Some deaf people must, from time to time, hire interpreters when they are needed but not provided, and this can cost between \$12 and \$25 *per hour*.

Not only do all of the above cost money in and of themselves, they result in less money available for savings and investments, so their *real* cost is significantly more than their purchase price. None of these compare in magnitude to salary loss, but they are very important and must not be overlooked.

Advantages of Deafness

In the process of reviewing this paper, several colleagues pointed out that there is no discussion of some of the potential *advantages* of deafness. And indeed, strictly from an accounting perspective, there are certain economic advantages to deafness. For example, many deaf people who do not have jobs are eligible for Social Security Income (SSI), Special Supplementary Disability Income (SSDI), and other forms of federal assistance to which most of their hearing peers are not entitled. Also, deaf people can be the beneficiaries of special hiring considerations (e.g., affirmative action), especially

with the passage of the Americans with Disabilities Act in 1990.

To be sure, these arguments are intriguing, and they doubtless deserve further study, but they are beyond the scope of this paper. The goal of this particular effort was not to determine the relative advantages and disadvantages, but to determine costs. Subsequent research is necessary to address these other matters.

Implications for Practice

What can be done to reduce the gap between earnings of deaf and hearing people? Perhaps the place to begin is elementary school. For whatever reason, deaf children, on average, do not read as well as hearing people. Better reading ability, other things being equal, means a *much* better chance for a higher college degree, and it has been shown that a degree reduces the earnings gap between deaf adults and their hearing peers (Welsh, Walter, and Riley, 1989a). It behooves educators, VR counselors, and anyone else in a position to be of influence, to encourage deaf people to stay in school as long as possible and earn the highest degree their abilities allow. The higher educational credentials serve deaf people well. It may also be possible for some of those deaf people who are in college but have lower reading levels to select areas of training in which their reading skill will make less of a difference in terms of academic achievement.

Those in a position to do so should counsel deaf people to train for, and enter (as their abilities and aptitudes allow), occupational areas in which the greatest growth is anticipated (e.g., certain jobs in data processing, the health professions, and the law) and hence will have the greatest demand for workers. The greater the demand for workers with skills, the less it will be possible to discriminate against any workers with those skills.

Further, in the long term, political and legal action should be taken to reduce the amount of job discrimination faced by deaf people. Existing laws guaranteeing equal treatment in the work place should be vigorously enforced, and, when necessary, new laws should be considered.

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To the extent we can do these things, and these are *difficult* tasks, we will have (1) reduced or eliminated the lower achievement level of

some deaf people, (2) maximized the benefits of postsecondary education, and (3) reduced or eliminated the effects of discrimination. These are the ways to, finally, reduce or eliminate the costs of deafness.

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