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PSYCHOLOGICAL IMPLICATIONS OF ACQUIRED DEAFNESS FOR ADULTS OF EMPLOYMENT AGE.

Alan J. Thomas, M. Sc.

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Department of Applied Social Studies
Polytechnic of North London

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PREFACE

The research on which this dissertation is based was carried out between October 1975 and August 1978 while the author was the co-director of the project: "Social and Psychological Implications of Acquired Deafness for Adults of Employment Age" funded mainly by the Medical Research Council and partly by the Royal National Institute for the Deaf. The other director was Mrs. K. Gilhome Herbst. Mrs. Gilhome Herbst is also submitting a doctoral dissertation based on the research, the title of which is "Social Implications of Acquired Deafness for Adults of Employment Age".

The present author is entirely responsible for the following areas of the research project: the standardised inventory based on scales of anxiety and depression, which measures psychological disturbance; a measure of suspiciousness; discrete questions related to general psychological health and wellbeing. Mrs. Gilhome Herbst was responsible for the following areas: social life, family life, employment and social policy.

There is a thematic as well as a substantive distinction between the two dissertations in that the aim of this dissertation is to ascertain the extent to which hearing loss constitutes a genuine handicap when the dependent variable is psychological disturbance. Mrs. Herbst's dissertation examines the interrelationship between the areas for which she is responsible.

Analysis and interpretation of audiological data contained in Chapter Nine is the responsibility of the present author with the exception of that related to part of the data contained in Table 9.16.

ACKNOWLEDGMENTS

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Most of all I am indebted to Karin Gilhoane Herbst, with whom I carried out the research project on which this dissertation is based.

ABSTRACT

Acquired deafness is relatively common but has been little researched and has received scant attention from writers on disability. A review of personal experiences, professional observations and the few empirical studies which have been reported, provide enough evidence for the hypothesis that acquired hearing loss may have serious consequences for psychological adjustment. This hypothesis was tested on a sample of 211 adults obtained from 3 NHS hearing aid clinics in the Greater London Area. All respondents had owned a hearing aid for a minimum of one year. At the interview session pure tone audiometry and a test of speech discrimination was carried out; a number of other audiological variables were also quantified . An inventory designed to identify the psychologically disturbed, with norms for the general and psychiatric populations, was administered. A number of discrete questions on general wellbeing, health, employment, social and family life were asked, each one controlled on the general population. Finally, a scale designed to measure suspiciousness was included.

Thirty nine (19%) respondents were identified as psychologically disturbed, compared with 5% found in the general population. Those who had a severe hearing loss coupled with poor speech discrimination ability form a small subsample of 23, of whom 11 were psychologically disturbed. Conclusions pertaining to psychological disturbance were supported by an analysis of discrete questions in the interview schedule, firstly by controlling them on the general population, and secondly by examining their relationship to psychological disturbance. There was no evidence to support the commonly held belief that hearing loss is associated with suspiciousness.

Studies concerning the relationship between other handicaps and psychological disturbance are reviewed briefly. When the findings from these studies are used as a yardstick it is concluded that if the criterion of psychological disturbance is employed then acquired deafness is indeed a serious handicap.

CONTENTS

PART ONE

BACKGROUND

CHAPTER ONE

INTRODUCTION

The blanket term "deafness" covers various forms of hearing loss which have widely differing implications. The obvious and most important distinction is between prelingual and postlingual deafness.

Prelingual onset of deafness, whether congenital or in the first few years of life, will almost certainly interfere with the acquisition of speech and language. As a result the prelingually deaf suffer a massive educational retardation by school leaving age; moreover their speech, in most cases, is unintelligible to all but closest acquaintances (DES, 1963: Denmark, 1973; Conrad, 1977; Denmark et al, 1979). Therefore, it is not surprising that a large section of the prelingually deaf population forms a unique "sub-culture" whose separate identity is reinforced by the extensive use of sign language as a means of communication. In fact, about 90% of marriages are between prelingually deaf partners (Schein and Delk, 1975).

Research into the psychological and educational consequences of prelingual deafness has gathered considerable momentum over the last 20 years or so. A number of general texts have appeared (Levine, 1960; Myklebust, 1964; Furth, 1966; Mindel and Vernon, 1971; Frisina, 1976; Conrad, 1979).

There is a certain amount of confusion concerning the nomenclature of different forms of partial and postlingual deafness. Partially hearing children may have suffered onset of hearing loss before or after the acquisition of language and speech; they are referred to as partially hearing mainly because they have been educated at Partially Hearing Units attached to

normal schools or to schools for the deaf. When they leave school however, they are called, not partially hearing, but hard-of-hearing adults and tend to be grouped with those who suffer onset of hearing loss after leaving school. The term hard-of-hearing is also misleading because it may include adults who become totally or profoundly deaf. Sometimes the term "deafened adults" is used to distinguish those who suffer onset of hearing loss in adulthood. However this term does not allow for the distinction between those who have useful residual hearing and those who are profoundly or totally deaf. It is not surprising that a great deal of confusion exists in the general population with regard to hearing impairment and its effects (Horowitiz and Rees, 1962).

Lack of knowledge of the effects of deafness is not confined to the general public. A number of writers have not fully grasped the extremely important distinction between prelingual and postlingual deafness. Remmers and Wright (1960) and Cattell et al (1970), for example, have attempted to obtain norms for "the deaf" for adjustment and personality inventories respectively, without indicating to what type of deafness the norms refer. A very recent definition of deafness in a book on the psychology of handicap also neglects to make the distinction:

> "Hearing impairment includes deafness and partial hearing. Again the degree varies, the impairment may be almost complete, the person may be able to hear some sounds but not others or be generally a little hard-of-hearing". (Shakespeare, 1975).

Similarly, McDaniel (1976) in an otherwise excellent book on psychological aspects of disability, when referring to "hearing loss" states:

> "By far the most complete and informative investigation of the mental health aspects of hearing loss has been contributed by Rainer et al (1963) based on samples of the deaf throughout the state of New York".

McDaniel is apparently unaware that Rainer's study is restricted to the prelingually deaf population.

Not even psychiatrists working with the deaf have always understood the distinction. Knapp (1948) for example, quotes studies of prelingually deaf adults as analogous to his own study of war deafened veterans. Mahapatra (1974a, 1974b) argues that the findings of his own study on acquired deafness contradict a claim made by Furth (1966) concerning the life style of prelingually deaf adults.

A specialist psychiatrist for the deaf, obviously impressed by the lack of understanding of deafness, has felt it necessary to explain the difference between prelingual and post-lingual deafness in a medical journal:

> "Those suffering from a profound pre-lingual deafness suffer a sensory deficit; those deafened in adult life suffer a sensory deprivation. The problems of the one are developmental, of the other traumatic. They cannot be equated". (Denmark, 1969).

Evidence from a number of sources attest to the paucity of research on the psychological effects of acquired deafness. For example, the article chosen to represent the field of acquired deafness for the Open University course "The Handicapped Person in the Community" consists mainly of a plea for research (Rimmer, 1974). Similarly, a very recent monograph supplement on acquired deafness in the British Journal of Audiology does not cite one reference in a chapter entitled "Psychosocial Functioning" (Markides, 1977). The "Rawson Report" (DHSS, 1973) concerned with the promotion of research into deafness in general, specifically referred to the dearth of research into the social and psychological implications of acquired deafness.

With regard to policy implications, a study of the psychological effects of acquired deafness seems timely. The professional specialisms of audiological medicine, audiological science, hearing therapy and social work with the deaf are becoming established. The bodies of knowledge which underpin these professions lack a very important dimension if little is known of the psychological implications of acquired deafness.

The overall aim of the investigation on which this dissertation is based is to measure the effect that acquired hearing loss has on psychological wellbeing for adults of employment age who have owned a hearing aid for between one and seven years.

There has been little systematic research on the effects of acquired hearing loss. Nevertheless, there does appear to be a consensus of opinion that acquired hearing loss is accompanied by considerable psychological stress. Personal accounts written by hearing impaired individuals lend further support to this hypothesis as do clinical observations made by psychiatrists and the findings from two small studies on the simulation of hearing loss. Paranoia is also associated with hearing loss although, contrary to popular belief, there is little evidence to support the association.

A number of measures are used to test the hypothesis: an inventory standardised on psychiatric hospital patients and the general population, a scale designed to measure suspiciousness and a number of discrete questions on general health and wellbeing controlled on a national survey of the general population.

The results of the study are described in Part Four. Chapter Nine consists of a demographic and audiological description of the sample; relationships between audiological variables are also examined. Chapter Ten, the central one in the dissertation, is devoted to a discussion of the psychological findings and to the relationship between psychological and audiological variables. Chapter Eleven examines the psychological consequences of acquired deafness in relation to physical and visual handicap.

In Part Five a summary of the findings is presented (Chapter Twelve); the main conclusions arising from the study are outlined in Chapter Thirteen.

The main conclusion is that acquired hearing loss results in a great deal of psychological stress. When compared with the effects which physical and visual disability have on psychological wellbeing it appears that hearing loss may be a handicap in the full sense of the word. As suggested above however, such a possibility has been given little consideration by writers on handicap. In the light of the findings from the study, a tentative interpretation is offered as to why this is the case; it is based on the possibility that people may not be fully aware of the effect that hearing loss has on their lives.

CHAPTER TWO

ACQUIRED HEARING DISORDERS

I. Hearing

The ear is usually considered as divided into three parts, the outer, middle and inner ear (Fig. 2.1). The outer ear consists of the auricle which is the visible part of the ear, and the external auditory canal. The external auditory canal conducts air borne sound waves to the tympanic membrane or ear drum which separates the outer ear from the middle ear. Sound waves are air pressure changes which cause the tympanic membrane to vibrate.

The middle ear is an air filled cavity which contains a series of three small bones or ossicles, the hammer (malleus), anvil (incus) and stirrup (stapes). Vibration of the tympanic membrane causes the malleus to vibrate, and in turn the incus and stapes. Movement of the stapes at the oval window, which marks the boundary between the middle and inner ear, causes pressure waves to travel through the perilymph and endolymph fluids of the inner ear.

Variations in fluid pressure of the inner ear stimulate sensory hair cells located in the cochlea. It is at the cochlea that conduction of sound ends and neural activity begins for it is here that the first stage of acoustical analysis occurs before information is transmitted via the auditory nerve to the higher auditory centres of the temporal lobe of the brain.

This description of the hearing mechanism is sketchy. It is sufficient however to serve as a basis for an understanding of the different types of hearing loss which result from malfunction of different parts of the hearing mechanism.

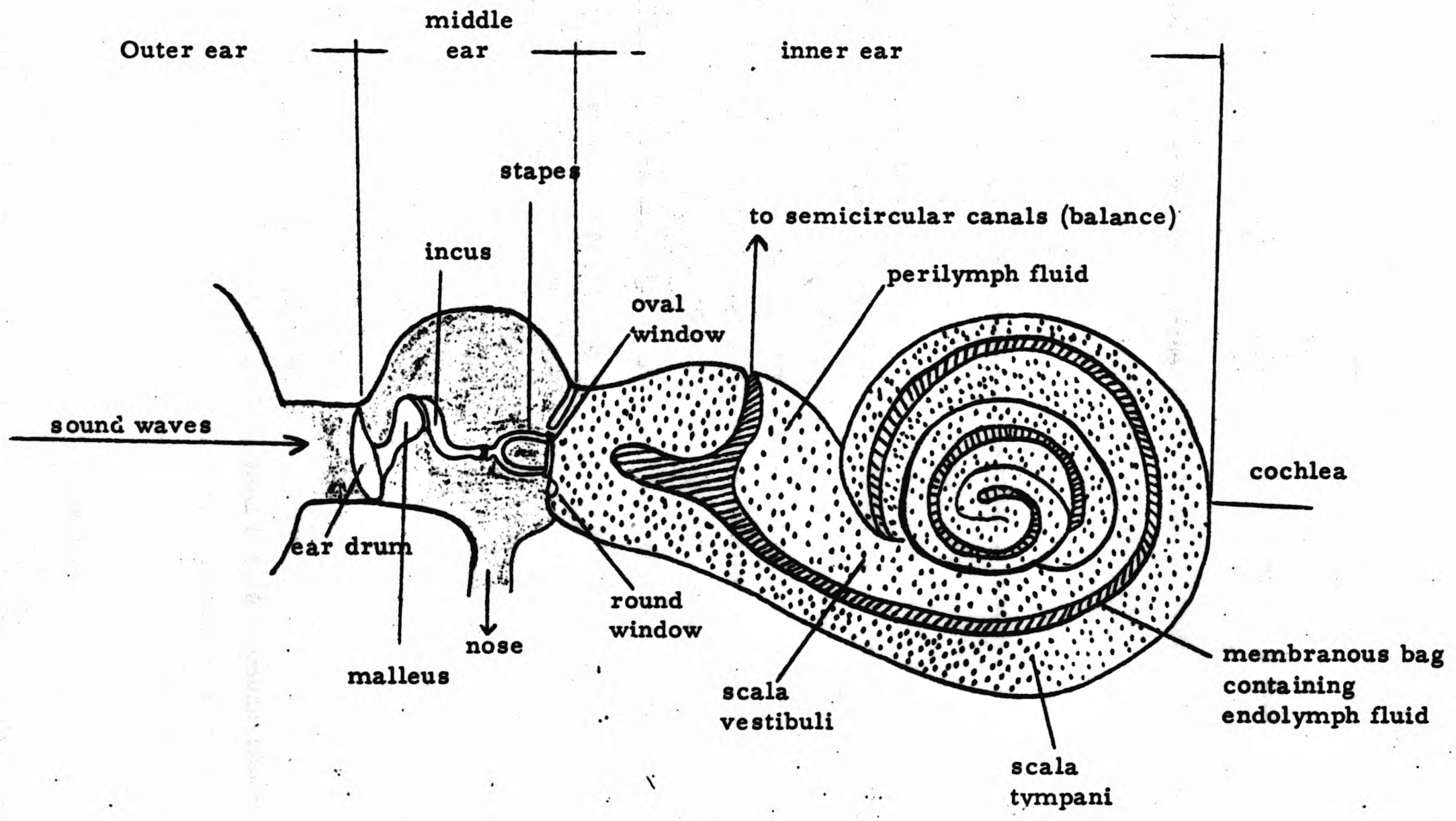


Figure 2.1. The hearing apparatus. Adapted from Beales, P.H. (1965). Noise, hearing and deafness. Michael Joseph, London.

II. Conductive Hearing Loss

Conduction of sound is by air in the outer ear, by bone in the middle ear and by fluid in the inner ear.

Almost all forms of hearing loss resulting from the attenuation of air conduction of sound in the outer ear can be treated. The accumulation of wax, for example, causes this type of hearing loss. It is rarely that a blockage caused by wax or some foreign body cannot be removed. More seriously, severe otitis externa (infection of the outer ear) may cause a significant hearing loss. If the condition clears then hearing almost always returns to normal. Because of this, the term conductive loss is usually confined to hearing loss which arises from a middle ear disease.

The middle ear is highly susceptible to infection, commonly via the eustachian tube which is connected to the nasal cavity. Otitis media is the name given to infections which result in the inflammation of the mucus membranes of the middle ear. Otitis media may cause fluid to accumulate and thus interfere with the free movement of the ossicles in the normally air filled cavity. This disease of "glue ear" as it is commonly called, is mainly one of early childhood in that 75% of cases occur in children under ten years of age (MRC working party report, 1957). While the disease can be treated with antibiotics, the accompanying fluid may still remain in the middle ear cavity. If it does not clear certain drainage procedures may be carried out. If the disease becomes chronic a permanent hearing loss may result and inner ear damage becomes a possibility.

The two most common forms of conductive deafness occurring in adults are otosclerosis and otitis media. Otosclerosis is a disease of unknown cause in

which the final bone in the ossicular chain, the stapes, gradually seizes up. The disease can be treated surgically by a stapedectomy which may restore normal or near normal bone conduction.

The possibility of medical or surgical intervention will mean that a conductive hearing loss is not usually regarded as serious. Moreover, a hearing aid is well suited to a conductive hearing loss because straightforward attenuation is largely compensated by straightforward amplification.

It is possible of course that the effects of a conductive hearing loss may not be as straightforward as appears from the above description. Peterson et al (1972) point out that "conductive impairments arising from more than one part of the conductive apparatus may make the system more nonlinear in its action and thus increase the distortion of the acoustic waveforms that reach the sense organ...any nonlinear distortion will not only not be corrected, but is likely to become worse when the input signal is increased in order to deliver more acoustic energy to the same organ".

III. Sensorineural Hearing Loss

Sensorineural hearing loss is also referred to as inner ear, perceptive, or end-organ hearing loss. The terminology results in a little confusion. In fact, the endolymph and perilymph fluids of the inner ear are concerned with conduction rather than sensation or perception. The most common disease associated with these fluids, Meniere's disease causes fluctuations in hearing ability which may include recovery of normal hearing for long periods. The disease can result in an eventual sensorineural loss however as the excessive pressure caused by the hydrops increasingly affects the cochlea.

Another source of confusion concerns the fact that sensory hearing loss and neural hearing loss are different. Sensory hearing loss arises at the inner ear, while neural hearing loss is caused by lesions in the auditory nerve which transmits information from the inner ear to the brain. For present purposes the blanket term will be adhered to simply because both sensory and neural losses are almost always permanent and irreversible.

The most common cause of sensorineural deafness is presbyacusis or "old age deafness". There is some evidence that presbyacusis is not simply a degenerative disease. This is based on the finding that elderly people in primitive societies have better hearing than those in modern industrial societies (Rosen et al, 1962). Factors such as exposure to excessive noise, survival of the less healthy, experience of ototoxic drugs, stress, high blood pressure, diet may all contribute to the difference. In fact, a comparison of the hearing levels associated with age in the Mabaan tribe and with North Americans at the Wisconsin State Fair in 1954 (Glorig et al, 1957) seems to demonstrate that degenerative changes play little part in the onset of "old age deafness" in modern societies. Stephens (1979a) has queried the very existence of presbyacusis as a degenerative disease in that many of its forms can be explained in terms of other aetiological factors such as those described above and which will now be considered.

Loss of hearing due to noise has been documented for nearly 159 years. Fosbroke (1831) reported deafness in blacksmiths and Barr (1886) first described "boiler-makers' deafness", a term still used today. Explosions, blasts and sudden noises can cause sudden hearing loss which may be temporary or permanent. Gradual

industrial (or similar) noise induced deafness is always permanent however. The seriousness of this type of hearing loss derives from its insidious and almost imperceptible onset which may occur over a number of years. Thus resistance to cumbersome protective devices is understandable, especially given the adverse effect they have on social discourse.

Meniere's disease has already been mentioned. Its cause is unknown though a number of theories have been postulated including one that it is psychosomatic in origin (Czubalski et al, 1976). The disorder is usually unilateral, though eventual bilateral involvement is not uncommon.

Sensorineural deafness may also be drug induced, usually gaining access to the inner ear via the blood stream. Quinine and nicotine are among a number of drugs which have been associated with hearing loss. Certain antibiotics have also been shown to cause hearing loss, the most well known being streptomycin which was once used to treat tuberculosis.

Viral and bacterial infections have been shown to result in hearing loss, usually in children. Maternal rubella in the first three months of pregnancy for example, is known to be associated with congenital deafness. Mumps and measles are among other infections which may also result in a sensorineural hearing loss.

The above outline of causes of sensorineural hearing loss should not obscure the commonly held view that the largest aetiological category is that of "unknown".

With a purely conductive loss, discrimination of sound will be limited only by the extent of the imperfection of artificial amplification. With sensorineural losses however, imperfect amplification further interacts with imperfect discrimination resulting in considerable

distortion, even more so if the loss is not a "flat" one, i.e. where the threshold for hearing varies across the frequencies, sometimes markedly so.

There are further complications associated almost wholly with sensorineural loss which serve to underline the stress accompanying the impairment. Tinnitus often accompanies sensorineural hearing loss. Tinnitus consists of "noises in the head" which are heard by the sufferer alone and for which there is almost always no known physiological correlate. Stress caused by the presence of tinnitus has often been reported but not empirically documented.

Diplacusis may accompany sensorineural loss. It consists of one tone perceived as two different tones, or a single tone perceived at a different frequency in each ear.

The phenomenon of recruitment is also commonly associated with sensorineural hearing loss. For the sufferer it means that a slight increase in sound above threshold results in a disproportionate increase in the sensation of sound. Hence the dynamic range for hearing may be reduced.

It is clear that any stress caused by hearing loss may be exacerbated by the side effects which have been described.

IV. Central Deafness

Central deafness is concerned with disorders which occur beyond the auditory nerve, that is, between the brain stem and the cerebral cortex. The nature of the disorder may be physiological or psychological in origin. Either way, the proportion of such disorders in the hearing impaired population is very low. Actual brain damage which results in hearing loss may be due to thrombosis, tumour, meningitis and senility among other possible causes.

Psychogenic deafness has been known to result from extremely stressful life events, especially wartime ones. Such deafness is usually but not always of short duration. Psychotic conditions may be accompanied by hearing loss. Whether forms of central deafness related to a known psychopathology are truly forms of deafness is open to question, especially as pure tone audiometric responses may be normal, indicating that the disorder may consist of an inability to process information rather than an inability to respond to sound. Chaiklin and Ventry (1963) have found that adults suffering from functional or psychogenic deafness constitute a problem category that is distinct from that of acquired hearing impairment known to be organic in origin.

CHAPTER THREE

MEASUREMENT OF HEARING LOSS

I. Pure Tone Audiometry

The hearing threshold's for pure tones at given frequencies constitute the most common index of hearing loss, the pure tone audiogram. The hearing threshold is measured in decibels (dB) on a logarithmic scale. The baseline of 0 dB is arbitrarily derived from the threshold of hearing for healthy young male conscripts. Frequencies are measured in cycles per second (cps) or Hertz (Hz), which are two names for the same measure. Measurement of hearing ability is normally concerned with the frequency range of 250 Hz to 8000 Hz which covers almost all speech sounds, although most speech is contained within the 500 Hz to 4000 Hz frequency range.

As a rough guide to what measurements of the intensity of sound mean, a whisper is 30 dB above threshold at 3 feet, light traffic is around 50 dB, a conversational voice 60 dB, a pneumatic drill 90 dB or greater and jet aircraft at take off at least 125 dB. With regard to frequency the lowest note on the piano is 31 Hz, a foghorn has a frequency of about 100 Hz, middle C on the piano is at 256 Hz, the radio news pips are at 1000 Hz, and top C on the piano is at 4096 Hz. A bat squeak ranges between 8,000 and 80,000 Hz. Pure tones at specific frequencies are highly artificial and rarely heard in everyday situations. Indeed, nearly all sounds are highly complex, both with regard to frequency and intensity.

In a typical testing situation a person listens to pure tones, at varying frequencies and intensities, through head phones, in a soundproof or very quiet room. The intention of the test is to establish a hearing threshold for all or some of the frequencies between 250 Hz and 8000 Hz. The result constitutes an audiogram. Figure 3.1 is a rough guide as to what hearing losses mean. However, when the procedure of using average decibel loss is applied (as is the case in this example) the effect on hearing ability of different losses at different frequencies cannot be taken into account. Figure 3.2 contains profiles of three actual cases taken from the study on which this dissertation is based. They illustrate clearly that the very common procedure of averaging hearing loss can be highly misleading.

Pure tone audiometry has the advantage of being a standardised and reliable measure of hearing loss. Its main disadvantage is that it is normally carried out in an artificial laboratory situation with stimuli which are almost never heard. It is for such reasons that attempts have been made to develop measures which reflect more closely the functional effects of hearing loss. Before discussing some of these measures however it is worth considering briefly the use of pure tone audiometry in determining type of hearing loss. Pure tone audiometry described above has been concerned with air conduction of sound, via head phones. Hearing ability for pure tones may also be measured through bone conduction by placing a vibrator on the mastoid bone behind the ear. This allows sound waves to be transmitted directly to the inner ear through the bones of the skull, thus bypassing any middle ear malfunction. Hearing for bone conducted sound cannot be worse than

Figure 3.1. Pure tone audiogram related to hearing ability. Adapted from Beales, P.H. (1965). Noise, hearing and deafness. Michael Joseph, London.

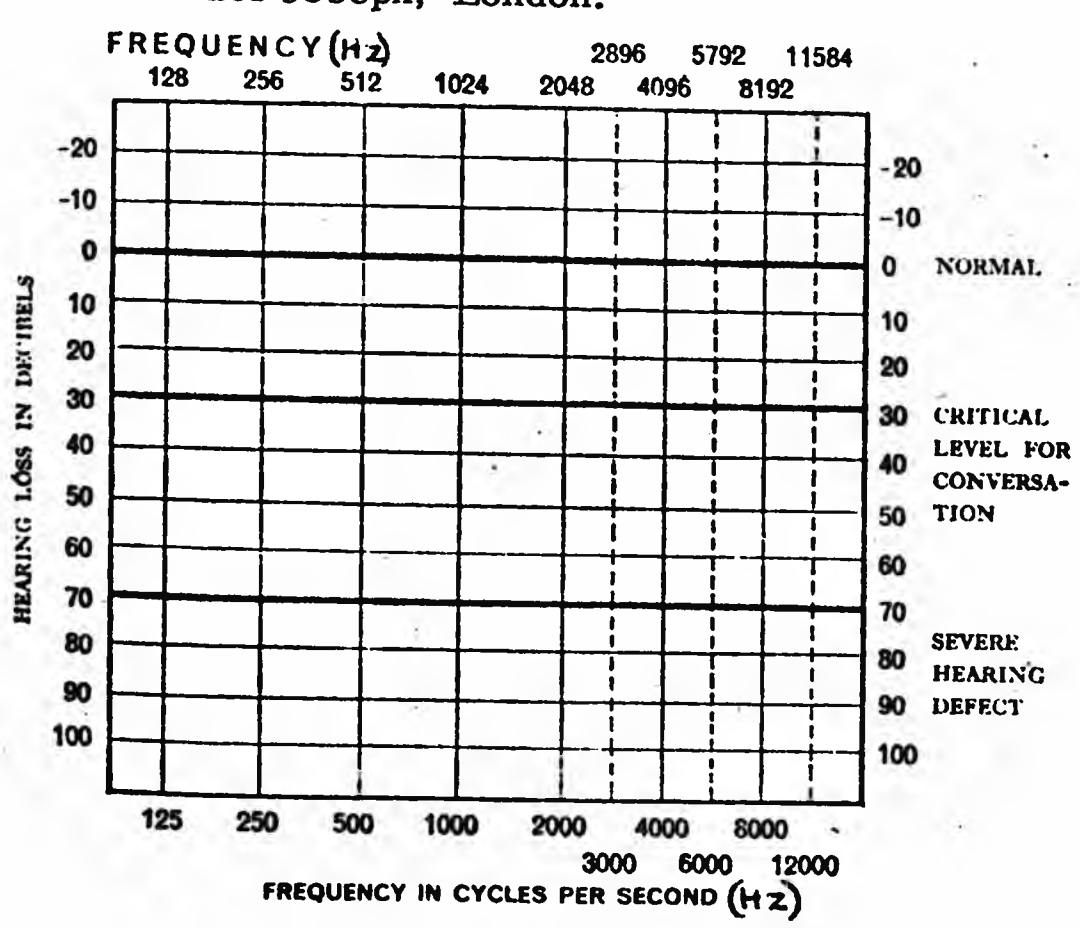
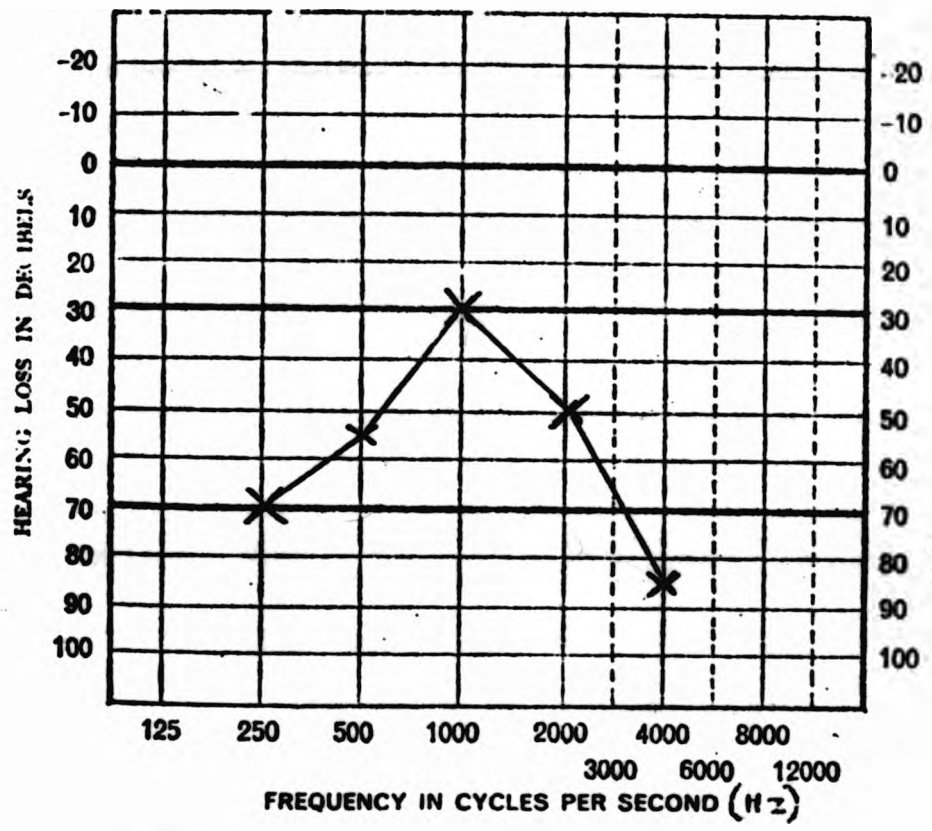


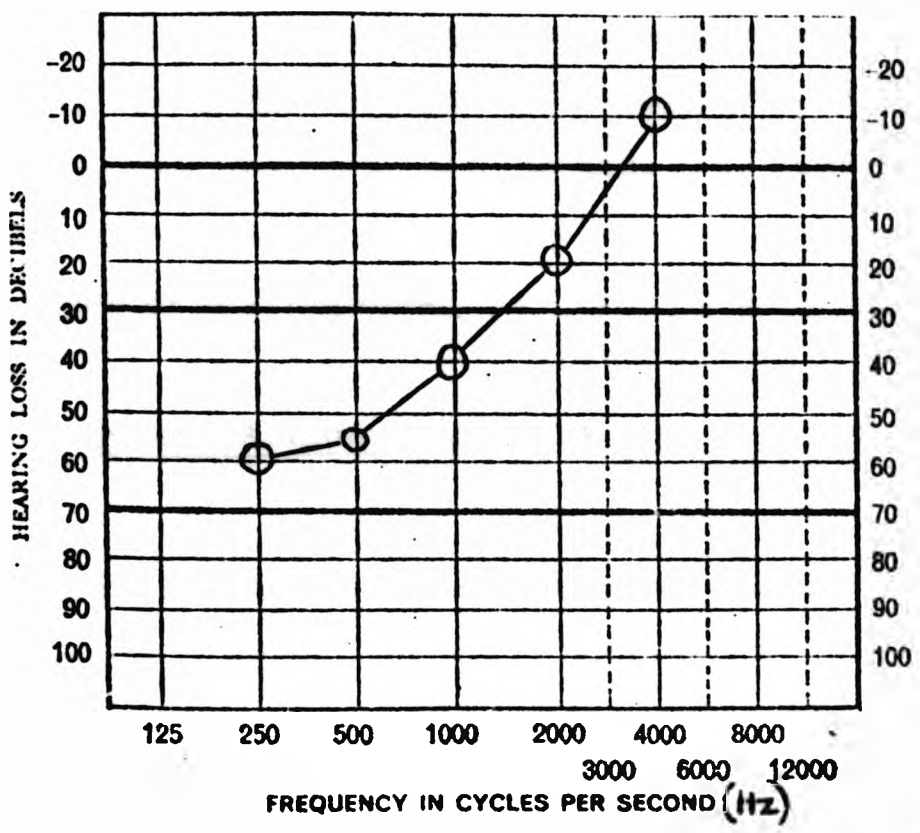
Figure 3.2. Three audiograms which serve to illustrate that averaged dB losses may be misleading. Examples are taken from the present study.

(i) <u>mean loss = 58 dB</u>

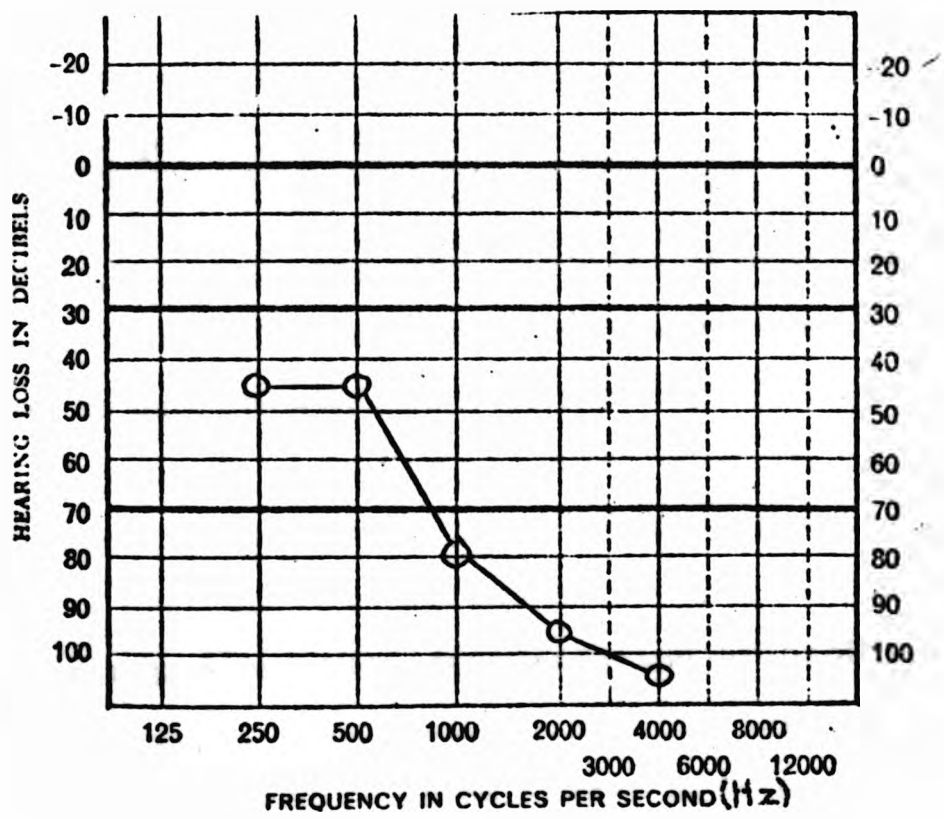


NB: x = left ear; o = ~~right ear~~.

(ii) <u>mean loss = 35 dB</u>



(iii) <u>mean loss = 74 dB</u>



for air conducted sound. If it is significantly better (i.e. a difference of 15 to 20 dB) then interference with the conduction of sound in the middle ear region can be inferred. A comparison of the bone and air audiogram profiles enable type of hearing loss to be determined, i.e. sensorineural, mixed or conductive. Figure 3.3 gives examples of the three types of hearing loss.

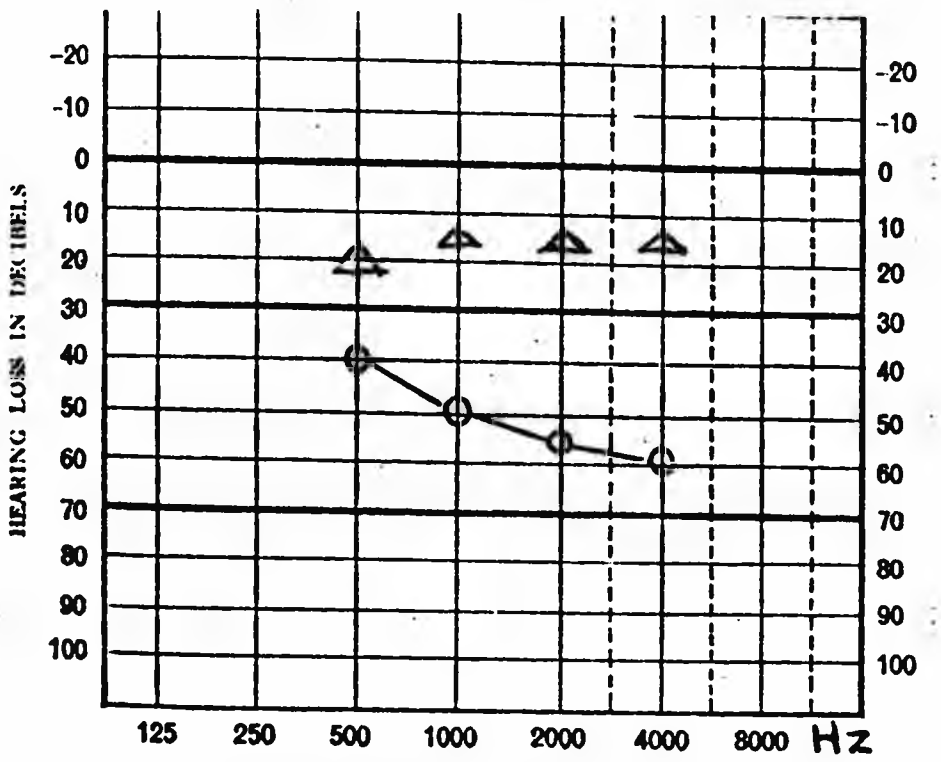
II. Speech Audiometry

Speech aduiometry is concerned with the ability to hear and understand speech. The rationale for the development of speech tests has been that pure tones are rarely heard in everyday life, that people with similar audiometric profiles appear to differ widely in their ability to understand speech, and therefore that ability to discriminate speech will more accurately reflect the limitations imposed by hearing loss. Perhaps the best way to consider speech audiometry is firstly according to the nature of the speech material used and secondly the conditions under which testing takes place.

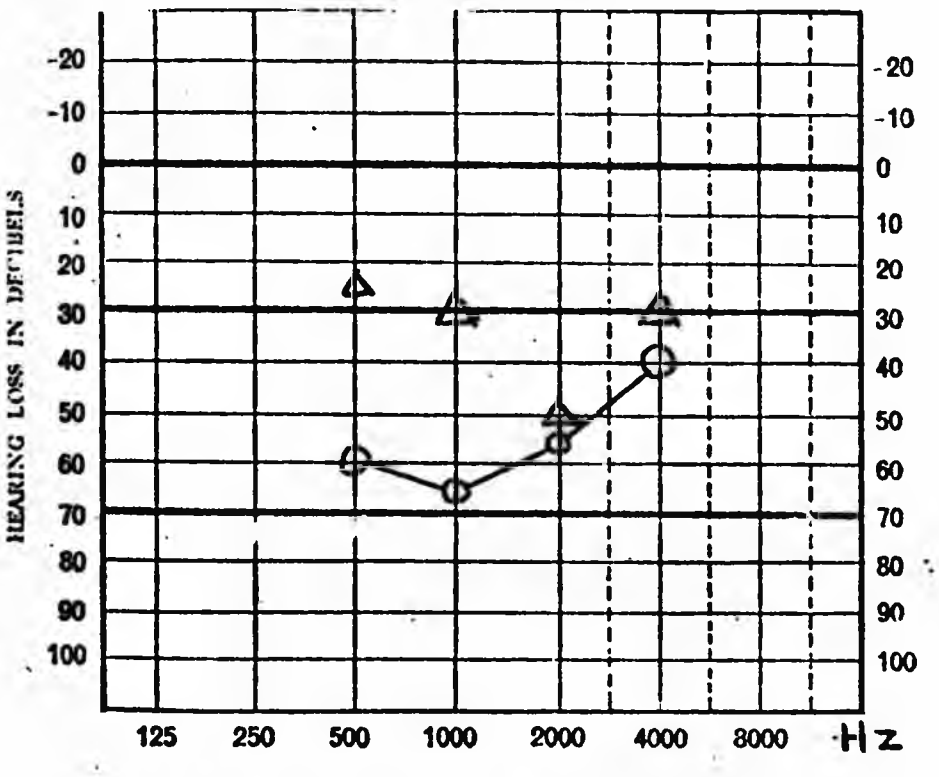
Speech test material ranges from single nonsense syllables to prose passages, thus from a test of what a person can hear to one of what he can understand given contextual,linguistic and other features of prose which aid comprehension. The most commonly used speech material consists of phonetically balanced monosyllabic word lists which allow whole word and phonemic scoring. Sentences used in speech testing have ranged from proverbs to ones in which a systematic effort has been made to control for phonemic representation, frequency and probability of word occurrence. McCormick (1979) has constructed a ten sentence test which can be scored in terms of phonemes, words or sentences. Kalikow et al (1977) have

Figure 3.3. Examples of sensorineural, mixed and conductive hearing losses. (o = air conduction; △ = bone conduction)

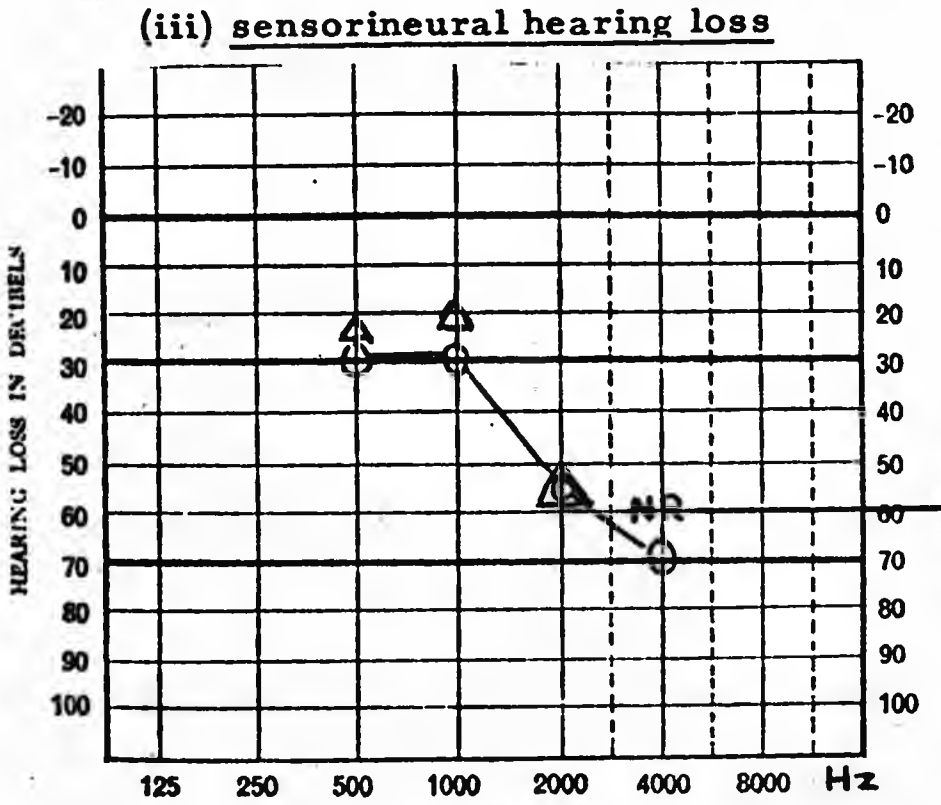
(i) conductive hearing loss



(ii) mixed hearing loss



(iii) sensorineural hearing loss



→ no response

introduced the variable of sequential probability of word occurrence in their Speech Perception in Noise (SPIN) test.

In the SPIN test the key word which is scored is always the last word in the sentence. A typical high probability word is "sheets" in:

"She made the bed with clean sheets"

and a low probability one is "dive" in:

"The old man discussed the dive".

Frequency of occurrence was controlled by restricting key words to those within the range of 5 to 150 per million words on the Thorndike-Lorge Word List.

The authors of this test claim that it combines high objectivity in assessing acoustic-phonetic ability while allowing the listener to use linguistic-situational clues. In fact the validity of the test is greater than those which use single words in that if low probability sentences only are scored then the listener is still able to use the cues which arise from the key word following naturally on the preceding words for such cues are not available in words which are presented in isolation.

Speech tests may be used in a variety of ways. The most common clinical procedure concerns the establishment of a speech reception threshold (SRT). This is analogous to a pure tone measure and is usually the threshold at which a given percentage of phonemes or words are discriminated usually 50%. As might be expected, a close relationship exists between SRT and the pure tone threshold.

Apart from the SRT, the conditions under which speech is tested will depend greatly on the research or clinical question that the user is posing. For example,

speech may be recorded or live, and output may be at a given level such as that for normal conversation. It can be presented acoustically or audio-visually if the listener is to take advantage of gesture, facial movements and lip patterns. A film sequence may be used so that situational clues are available.

Speech is often heard in a background of noise and testing may reflect this with presentation of speech material accompanied by white noise or conversational babble. Factors such as the sex and age of the speaker, accent and so on, may also be varied experimentally.

Speech audiometry has been used to assist in the differential diagnosis of sensory and neural hearing loss, as a guide to hearing aid selection, and in conjunction with pure tone audiometry to diagnose non-organic hearing loss. It is commonly used in conjunction with auditory training, to diagnose difficulties in hearing for speech and to assess the effect of training programmes.

The rationale behind the development of speech testing has been that it will be a better measure of functional disability than will the pure tone threshold. However, the extent to which hearing or understanding of isolated speech segments, however realistic the structure of the material and the testing conditions, are a valid indicator of communicative competence is open to question. Artificiality arises not only from the nature of the speech material and the conditions of presentation but also because it does not take into account the fact that most communication is interactive, and that very much will depend on an individual's circumstances and life style. The next section discusses self report inventories which attempt to take these and other such factors into account.

III. Measures of Hearing Handicap

The more that speech tests simulate a real life situation, using contextual cues, live voice, different speakers and so on, the less reliable they become. If they are not reliable then it is extremely difficult to carry out a meaningful validity study in which speech discrimination score is related to everyday communicative competence. As Noble (1978) puts it:

> "Speech tests that can be relied upon are so corseted in terms of content and style that they are freakish forms of speech as it is heard in the world at large. Conversely, those that try to emulate everyday conditions provide such widely variable results that no firm outcome emerges from their use...(and) no evidence is available to show that the speech test itself bears any relation to actual performance at listening or communicating in everyday conditions".

Furthermore, any test which is related to communicative ability does not take into account other aspects of the disability, such as localisation, hearing for nonspeech sounds, especially warning signals. Neither has it been demonstrated that they are related to the ability to follow television and radio or to use the telephone.

In order to take such aspects of the disability into account and in an attempt to obtain a measure of the overall effects of hearing loss a number of self-report indices of hearing handicap have been constructed in which the individual rates his own hearing difficulties. By doing this it is possible to overcome the problem of artificiality which inevitably occurs in a laboratory type testing situation.

Three such measures have been developed over the past fifteen years or so. High et al (1964) developed a Hearing Handicap Scale in the United States in order to provide an objective measure "to complement the wealth of anecdotal material available". Similar indices have been developed in Denmark by Ewertsen and Birk Nielsen (1973) and by Noble and Atherley (1970) in the United Kingdom. The Danish Social Hearing Handicap Scale has been translated into English.

The American and Danish instruments are similar in nature, constructed from observations of audiologists and otologists concerning the everyday effects of hearing loss. The type of question asked is illustrated in the following 3 items taken from High's Hearing Handicap Scale:

> Can you carry on a conversation with one other person when you are on a noisy street corner ?
>
> Can you hear warning signals, such as automobile horns, railway crossing bells, or emergency vehicle sirens ?
>
> When you are buying something in a store do you easily understand the clerk ?

In reviewing the two measures Noble (op cit) points out that hearing handicap is defined by self styled experts, who having normal hearing are "not much less ignorant than the population at large... when it comes to knowing the experienced world of the partially deaf person". While this may be true in that the authors of the measures did not take interviews with hearing impaired people as their starting point, nevertheless both correlate reasonably well with pure tone and speech

reception thresholds, implying a certain degree of communality between the two kinds of measure.

The Hearing Measure Scale of Noble and Atherley (op cit) was developed from interviews with people likely to have suffered from noise induced hearing loss. They ranged from bus drivers who would be least deaf to boilermakers who would be most likely to be severely deaf. The scale was finalised on 13 moulders, 8 grinders and 6 chippers. The questionnaire was found to distinguish between the three groups and therefore deemed to have sensitivity. A test-retest coefficient of 0.928 indicated the high reliability of the instrument. It would be a little facile to decry the Hearing Measure Scale in that it has been little tried and is based on such small samples, for the instrument is in its early stages of development and has at least covered those areas which the hearing impaired themselves believe to be important. Below is given the title of each of the 7 sections (which emerged from initial open ended interviews) in the questionnaire with a question taken from it as an example:

Section 1. Hearing for Speech
Do you have difficulty hearing in group conversation at home ?

Section 2. Hearing for Nonspeech Sound
Can you hear the clock ticking in the room ?

Section 3. Spatial Localisation
Do you turn your head the wrong way when someone you can't see calls out to you ?

Section 4. Emotional Response
Do you get bothered or upset if you are unable to follow a conversation ?

Section 5. Speech Distortion
Do you find that announcers on tv/ radio fail to speak clearly ?

Section 6. Tinnitus
Do you get buzzing or singing noises inside your hear or ears ?

Section 7. Personal Opinion
Does any difficulty in hearing restrict your social or personal life ?

The main advantage of the Hearing Measure Scale is that it takes into account any individual coping strategies that hearing impaired individuals may have developed, especially those which are concerned with the utilisation of visual and situational cues, or that are related to the particular everyday environment and life style of the hearing impaired person.

Noble mentions that the Hearing Measure Scale is being used increasingly for clinical and research purposes in the United Kingdom and the United States. This will perhaps lead to further refinement and standardisation of the Scale.

CHAPTER FOUR

PROVISION FOR HEARING LOSS

I. Classification and Prevalence

There has been no thoroughgoing research on the prevalence of hearing loss in this country since Wilkins (1948). carried out a survey intended to gauge the demand for hearing aids following the advent of the National Health Service. His study was based on a self estimate of hearing loss. There has never been a study of the prevalence of hearing loss in this country based on objective audiometric criteria. The categories used by Wilkins were:

1. Can hear all normal speech without an aid.
2. The same as 1, but with one defective ear.
3. Can hear speech at close range without an aid, but has difficulty in group conversation and in hearing in church or theatre.
4. Has difficulty with normal speech but can hear loudly spoken speech.
5. Has difficulty with loud speech but can hear amplified speech.
6. Cannot hear speech at all but became deaf after normally learning speech.
7. Deaf mutes, or became deaf early in life, and did not acquire speech normally.

In Table 4.1, Shepherd (1978) summarises the findings from the Wilkins survey.

Table 4.1

Summary of findings from Survey of the Prevalence of Deafness in the Population of England, Scotland and Wales (Wilkins, 1948)

Deaf mutes	15,000
Totally deaf (6)	30,000
Deaf to normal speech (5)	70,000
Hard of hearing (4)	790,000
Hard of hearing (3)	860,000

The numbers in parentheses refer to Wilkins' categories.

The General Household Survey (1971) carried out on 1% of all households asked handicapped people to state the nature of their handicap. Only 395 people were identified as hearing impaired. Projected on to the whole population this would result in around 40,000 deaf people. It seems likely however that the people identified in this way were mainly the prelingually deaf and the totally deafened as identified by Wilkins. An alternative possibility is that those identified by this method are those who have voluntarily registered as disabled in one of the three categories used by the Department of Health and Social Security:

Deaf without speech: those who have no useful hearing and whose normal method of communication is by signs, finger-spelling or writing.

Deaf with speech: those who (even with a hearing aid) have little or no useful hearing but whose normal method of communication is by speech and lipreading.

Hard-of-hearing: those who (with or without a hearing aid) have little or no useful hearing and whose normal method of communication is by speech, listening and lipreading.

The numbers registered in England in 1975 were:

Deaf without speech	13,951
Deaf with speech	11,619
Hard-of-hearing	20,400
Total	45,970

For more precise data concerning prevalence, extrapolations are made from data acquired in surveys carried out in the United States. Two studies, one based on a questionnaire and the other on audiometric testing, related their findings to the following classification of hearing loss, an index recommended by the Committee on Conservation of Hearing of the American Academy of Opthalmology and Otolaryngology, described by Burns (1973). Hearing levels are based on thresholds averaged across the speech frequencies of 500, 1000 and 2000 Hz (Table 4.2).

Table 4.2

Classification of hearing loss used in two prevalence studies

Class	Degree of handicap	Average hearing level (dB)	Ability to understand speech
A	Not significant	< 25	No significant difficulty with faint speech.
B	Slight	25 - 40	Difficulty only with faint speech.
C	Mild	41 - 55	Frequent difficulty with normal speech.
D	Marked	56 - 70	Frequent difficulty with loud speech.
E	Severe	71 - 90	Amplified speech only understood.
F	Extreme	91 +	Usually even amplified speech not understood.

In a study of the "Characteristics of persons with impaired hearing" (US Dept. of Health, Education and Welfare, 1965) people who admitted to a degree of impaired hearing were followed up. They were aged up to 79 years. The prevalence rate was 2.21%, made up of 1.3% in Classes C and D, 0.4%, in category E and 0.5% in category F.

A similar survey based on audiometric data (US Dept. of Health, Education and Welfare, op cit) found that the prevalence rate for a loss of between 41 and 55 dB was 1.6% and 1.1% for losses in excess of 55 dB, thus totalling 2.7%.

Comparisons, especially cross national ones, may be dangerous. However, if Wilkins' category 4 in which "the subject has difficulty in hearing normal speech but can hear loudly spoken speech" is roughly the equivalent of Class C used in the United States surveys in which there is "frequent difficulty with normal speech", then a comparison may be possible. For this, category 3 would have to be excluded from the Wilkins Survey (Table 4.1) thus leaving a total of 905,000.

Based on the population of England, Scotland and Wales in 1947 this would have yielded a prevalence rate of roughly 2.2%. As deafness is an age related disability, population growth, especially in the aged sector suggests that had a national survey been carried out in the early 1960's in the United Kingdom (at the same time as the US study) the prevalence rates for the two countries may have been similar. The most recent estimate in this country (DHSS, 1977) is that there are 2,360,000 people over 16 with a significant hearing impairment, representing a prevalence rate of more than 4%, an increase interpreted in terms of growth in numbers of the elderly population.

That acquired deafness is an age related phenomenon is without question. Wilkins' estimate for the prevalence within each age group in 1948 was:

Age	%
25 - 34	1.6
44 - 54	4.7
64 - 74	12.2
75 +	27.0

There is evidence that as more people survive for longer the proportion of hearing loss in the elderly population increases. Townsend and Wedderburn (1965) found on the basis of a national survey that almost a third of people over 65 had a hearing impairment, a marked increase on the Wilkins estimate. More recently, Herbst et al (1979) in a community study have found that more than 60% of people over 70 years living in a general practice in North London have a significant bilateral hearing loss in excess of 35 dB.

A study carried out by D'Souza et al (1975) is of special interest for the present study. In an audiometric study of a general practice in Kent they found that 5.8% of a sample of 2,278 people between 40 and 64 years of age had a bilateral hearing loss in excess of 30 dB averaged across the frequencies of 500, 1000 and 2000 Hz. This largely confirms the prevalence rate established by Wilkins (op cit) which was based on self estimates.

II. Hearing Aids

A hearing aid is almost always recommended for those whose hearing loss cannot be treated by medical or surgical intervention. Basically, there are two kinds of hearing aid, air conduction and bone conduction aids.

The time honoured air conduction hearing aid consists of a hand cupped behind the ear. Over the centuries various ear trumpets have been developed. Four nonelectric hearing aids are still available under the National Health Service.

Electrical aids have been developed over the last hundred years or so, but it was electronic advances made in the Second World War which made possible the first truly portable, bodyworn aid. In this country the bodyworn aid was pioneered mainly by the Medical Research Council to meet the demand likely following the founding of the National Health Service. Bodyworn aids were the only ones issued by the NHS over a period of 25 years or so. The typical bodyworn aid consists of a microphone-amplifier unit in a box weighing a few ounces which is usually clipped to clothing on the chest. Amplified output at the ear is conducted through an orifice in an individually made ear mould along part of the exterior auditory canal.

A bone conduction hearing aid is similar except that amplified sound is transmitted via a vibrator pressed against the mastoid bone behind the ear, and thence directly to the inner ear, bypassing the defective middle ear.

There is a very wide range of hearing aids available from private hearing aid companies. The list published by the Royal National Institute for the Deaf in 1975 contained over 200 aids "each of which has its own particular characteristic such as high or low tone gain, wide or narrow frequency response tailored to the subject's audiograms, directional microphones etc. Unfortunately there is a paucity of systematic research on which type of aid is best for which type of hearing disorder, and the 'prescription' of a hearing aid is often made by inspired guesswork rather than on the basis of sound scientific measurement" (Moore, 1977).

In 1974 the BE (behind-the-ear) postaural aids were introduced by the National Health Service in which the microphone, amplifier and the receiver are all contained in a small unit which rests on and behind the

ear. This type of aid had already been available for a number of years in the private hearing aid sector. The latest type of aid to appear on the market is the "in-the-ear" aid in which the whole unit is contained within the ear. This type of aid is not available under the National Health Service. Neither is the spectacle aid in which the unit is contained in the spectacle arm.

Certain refinements and modifications have accompanied developments in hearing aid design. Many hearing aids are able to pick up signals by virtue of being within the magnetic field of an induction loop which is strung around the interior of a room, hall or theatre. Input to the loop comes from a microphone; the listener is thus able to hear speech or music free from background interference, which is particularly troublesome in public places.

Other refinements include high-tone and low-tone cut outs for losses which slope steeply across the frequencies, directional microphones and telephone pick-ups.

Hearing aids amplify all sounds indiscriminately unless a low tone or high tone cut out is imposed. Thus they are most suitable for conductive losses or possibly for "flat" sensorineural ones.

Another problem for those with sensorineural hearing losses is, ironically, that of noise. This is because the range between hearing threshold and loudness discomfort threshold may be narrower than for the normally hearing, for the uncomfortable loudness level may be unaffected by hearing loss. Loudness recruitment may also serve to restrict the range between threshold and loudness discomfort.

Thus distortion of input arises from restriction of the dynamic range between threshold and loudness discomfort, from the mere fact of artificial amplification and possibly from frequency restriction imposed on the aid. For sensorineural and mixed hearing losses this distortion will interact with the imperfection of the sensory receptor mechanisms.

Other difficulties commonly reported by hearing aid users arise in public places and in group situations. The extent to which hearing aid users are able to relearn to habituate to those sounds they do not want to hear and to selectively attend to those they do want to hear is not known.

Attempts to assess satisfaction with hearing aids have not contributed greatly to an understanding of exactly what benefits accrue from hearing aid use. A typical approach has been to ascertain how much an aid is worn on an "always, often, rarely, never" scale. The drawback of this procedure is that satisfaction with the aid is not necessarily related to the amount that it is worn. Much will depend on the user's life style, job and so on. A recent study by Kapteyn (1977) has attempted to relate a number of satisfaction items concerned with everyday use to various hearing loss measures. The relationship was very weak on almost all scores. The author concluded that the "population consists of sub-populations in which different criteria apply to hearing aid satisfaction (and that) these criteria may be more related to psychosocial factors than to technical aspects".

The prescription of hearing aids by the NHS appears to be more or less matched by the sale of hearing aids in the private sector (Table 4.3). However, as Stephens (1979b) has pointed out, NHS figures are for first issues only while figures for the private sector are inflated by the inclusion of replacement issues.

Table 4.3

Sale of private hearing aids in the UK, 1973-1976 and supply of NHS hearing aids in England, 1973-1976

Year	Private aids	NHS aids*
1973	95,000	71,438
1974	85,300	76,347
1975	99,600	99,135
1976	82,300	92,000

* The NHS figures are for first issues only.

Sources: Price Commission Report No. 28, 1977; Registers of handicapped persons on 31st March 1975 (England summary), DHSS (1976); Hansard Issue No. 1088, November 23rd - December 1st, 1977.

Apart from the hearing aid a number of other aids to hearing are available. The General Post Office provides amplified telephone bells with a frequency variation if necessary. The receiver end of the telephone may also be amplified; if required an extra earpiece may also be supplied for binaural hearing. Door, telephone, and alarm bells may all be supplemented by a flashing light or a vibrator placed under the pillow in the case of an alarm clock. A baby alarm is available which consists of a flashing light.

Recent developments have concentrated more on the visual representation of speech for those too deaf to make much use of a hearing aid. A telephone package in which messages typed by the "speaker" and viewed on a television screen by the "hearer" has recently appeared on the market. The simultaneous transmission of naturally spoken speech has even been achieved. It involves a stenographer typing out an abbreviated form of spoken language which is received visually by the deaf person on a portable video screen. This method is used by Mr. Ashley,

the Member of Parliament who is profoundly deaf. Whether this method is better than manual interpreting (where nuances of meaning, emotional tone, and general atmosphere can be conveyed) is open to question. Future research is aimed at simultaneous transmission via a computer speech reader which does away with an interpreter altogether.

III. Services

The general practitioner is normally the first point of contact for a person with a hearing loss. If the doctor thinks it necessary the person is referred to an Ear, Nose and Throat Surgeon for a thorough investigation, both medical and audiometric. If the hearing loss cannot be treated satisfactorily a hearing aid is normally recommended. An audiological technician will take an impression for an earmould and decide on the type of aid most suitable. At a later appointment the aid is fitted and the wearer instructed on its usage, care and maintenance. At any stage after visiting the GP it is open to the hearing impaired person to turn to the private hearing aid sector. Private dispensers are required to ascertain that their customers have obtained medical advice before selling them a hearing aid. Repairs to aids are carried out at the hospital which also issues hearing aid batteries free of charge. This brief description covers all of what is statutorily available at present to the vast majority of hearing impaired people.

Some hospitals offer follow up appointments. A very small number of hospitals have audiological scientists who may participate in hearing aid choice and evaluation. These scientists are usually physicists with post-graduate training in audiology. Teachers of the deaf have been employed in a few hospitals. Their role has primarily been devoted to assessing the educational needs of children and in parental

guidance. Very recently a new post of "hearing therapist" has been created but only a handful are presently employed in the health service. The role of the hearing therapist is not clearly defined but concentrates on counselling, auditory training and lipreading. A new medical specialisation has also emerged, that of audiological medicine. This pattern of rehabilitation is modelled on provisions in Scandinavia, especially Denmark. Very little research has been undertaken to establish the needs of people with an acquired hearing loss as a prerequisite to setting up of rehabilitative services, neither in this country nor in Scandinavia. A research project "Hearing Effect" is at present underway at the University of Copenhagen and Bispebjerg hospital in Copenhagen which has the aim of evaluating existing provisions in Denmark.

Outside the hospital service the only professional directly concerned with the welfare of a person with acquired deafness is the social worker with the deaf who is employed by the Social Services Department of a local authority, or by a voluntary organisation. The specialist social worker's main responsibility however is with prelingually deaf adults who rely on sign language as a means of communication. A survey of such workers by the National Council of Social Workers with the Deaf (1975) showed a minimal involvement with acquired deafness.

Lipreading instruction is usually available. However, the great majority of classes in this country are provided under the aegis of the Department of Education and Science, as evening classes in Colleges of Further Education and Evening Institutes; the formation and continuance of a class depends on a minimum enrolment and on a teacher who is willing to take on such a class in a part time capacity.

Other recognised forms of rehabilitation, auditory training, voice conservation and specialist counselling are virtually unavailable at the present time.

A number of voluntary organisations exist which promote the interests of the hard-of-hearing and the deafened. The major national organisation is the Royal National Institute for the Deaf. Besides campaigning, the RNID has a well developed technical department which reports regularly on hearing aids and provides a free service for the testing of hearing aids. The British Deaf Association is almost exclusively concerned with the prelingually deaf. The British Association of the Hard of Hearing is the organisation most directly relevant to those with an acquired hearing loss. Even though it is a national organisation however, it has only one full time official. The role of the Association is concerned with providing fellowship amongst its members and in co-ordinating the activities of local societies and clubs.

For many forms of handicap residential facilities are available for those who may need it. For those who are severely deaf or too deaf to make effective use of a hearing aid the only residential facility consists of one and two week courses run by the "Link" centre, a voluntary organisation based at Eastbourne. In the time available courses such as these can provide an orientation to rehabilitation and no more.

PART TWO

REVIEW OF THE LITERATURE

CHAPTER FIVE
EXPERIENCE OF DEAFNESS

I. Personal Accounts

In this introductory section brief reference will be made to personal accounts of hearing loss. The rest of the chapter will be divided into two sections dealing firstly with clinical observations and secondly with simulation studies.

Acquired deafness is a very common disability, yet personal accounts of its effects are few. Nearly all are written by those with very severe and profound losses (the deafened), very little having been written by the moderately hard-of-hearing. In a recent anthology of writing by and about deaf people (Batson and Bergman, 1976) the only reference to an account of profound acquired deafness in adulthood is Jack Ashley's book "Journey into Silence" (Ashley 1973) and the only one on being hard-of-hearing is a semi-light-hearted account of a moderate hearing loss (McGreevey,1968). These and other accounts emphasise communicatinn and everyday problems which result from an acquired hearing loss. There is very little referance to the effects on personal wellbeing.

Rawson (1973) for example, concentrates on the inadequacies of lipreading, background noise, limits to social outings, enjoyment of television and radio, difficulty in location of sound, travel difficulties and the inability to do two things at the same time such as walk and talk, eat and talk and drive and talk, which normally hearing people take for granted.

Ashley's book is largely devoted to his life before he became deaf and to his political career. Lysons (1978) in reference to his own hearing loss shows how he compensated by pursuing academic qualifications. Savill (1975) graphically describes the shortcomings on the part of advisory and professional people with whom she came into contact after completely losing her hearing.

It is perhaps understandable that these accounts do not deal at length with the adverse effects of hearing loss on personal well-being. Publishers of autobiographies want success stories or informative accounts of living with deafness. Reference to depression, anxiety or increased suspiciousness are unlikely to have popular appeal. It is necessary to turn to clinical observations on hearing impaired people in order to appreciate more fully the hypothesised link between acquired hearing loss and psychological disturbance.

The personal description of the effect of hearing loss which best serves as an introduction to the next section is the Heiligerstadt Document written by Beethoven (1802), a sample from which is quoted below:

> "for the last six years I have been afflicted with the incurable complaint which has been made worse by incompetent doctors... Though endowed with a passionate and lively temperament and even fond of the distractions offered by society I was soon obliged to seclude myself and live in solitude. If at times I decided just to ignore my infirmity, alas, how cruelly was I then driven back by the intensified sad experience of my poor hearing... Moreover my misfortune pains me double, for inasmuch as it leads to my being misjudged. For there can be no relaxation in human society, no refined conversations, no mutual confidences. I must live quite alone and may creep into society only as often as sheer necessity demands. I must live like an outcast. If I appear in company I am overcome by a burning anxiety, a fear that I am running the risk of letting people notice my condition... Such experiences have almost made me despair, and I was on the point of putting an end to my life - the only thing that held me back was my art."

It is indicative of the reluctance to admit to psychological stress that Beethoven refused to have the document published during his lifetime. Incidentally, it was written 16 years before Beethoven became completely deaf.

II. Clinical Observations

Clinical observers have, for some considerable time, remarked on the relationship between acquired deafness and psychological disorder. Haines (1927) for example, maintained that suspicion and depression resulting from isolation were "marked characteristics" resulting from partial deafness. Kraepelin (1915) had already recorded delusions of persecution amongst people with acquired deafness. Today, the two main areas of concern are still the relationship between deafness and the neuroses (especially depression) on the one hand and deafness and paranoia on the other.

Another early article which seems by its title to be highly relevant is "The Mental Effects of Deafness" by Menninger (1924). A sentence from this article (often quoted by later writers) states of progressive deafness that: "It is as if something vital to one's existence has been torn from him". The following sentence however shows that Menninger is concerned with fitting deafness into a psychoanalytical framework and is not very interested in the phenomenon of hearing loss itself.

> "Psychoanalytic study has shown that this deprivation complex (i.e. deafness) has many roots in the unconscious, going back, to give only one example, to the period in early infancy when the nipple was torn from the baby's mouth, a period when the baby made no distinction between its own body and the body of the nipple and bottle or breast".

For Menninger the result of this deprivation is a "Sense of Inferiority". Compensations for this Sense of Inferiority "in short, in a broad sense, are the mental effects of deafness."

An important upsurge of interest occurred in the years immediately following the Second World War when many war deafened veterans drew the attention of psychiatrists in the United States. Knapp (1948) gives an example of how this came about:

> "an abundance of technicians - lip reading, speech and acoustic - seemed to make psychiatric assistance superfluous...the few cases that did come for consultation were looked on by the psychiatrist as curiosities. Their observations were uncritically ascribed to 'deafness', as a vague but unitarian entity. The latter assumption gradually dissolved...a final fact was that after the first eighteen months it became apparent that there were many hysterics in the (deaf) population. More attention began to be devoted to them. During the next half year the volume of consultations almost tripled. After that the Psychiatric Service merged informally with the Hearing Service, opened an office on the hearing wards and worked in complete collaboration with both medical and lay acoustic personnel."

Knapp's study of hearing impaired veterans is fairly typical of many post war psychiatric reports in that the insights gained are based on the accumulation of professional experience rather than from a research oriented approach. Nevertheless the observations are revealing and have served to generate hypotheses which have since been tested to some extent.

The majority of cases seen by Knapp had mild losses, with a minority in the 50-80 dB loss range and only a fraction with a greater loss. He found a tendency for "severe psychiatric reactions to be associated with severe hearing losses" although there was no one "psychology of deafness" but "the psychology of many individuals defending themselves against a sensory handicap which led primarily to difficulty in communication".

Knapp found a tendency for the cases seen to be suspicious though he was unsure of the extent to which such suspicion might lead on to paranoid psychosis. In fact, of all the patients seen only one case of paranoid psychosis was diagnosed and that in a patient with a slight conductive loss.

It is important to bear in mind that reactions of hearing impaired war veterans are rather untypical because loss of hearing was almost certainly traumatic. It is also unlikely that the

sufferers were owners of hearing aids and if they were had certainly not had time to get used to wearing them. Finally, the psychological effect of combat experience might have made a significant contribution to an abnormal mental state.

Ramsdell (1962) like Knapp has studied reactions of United States veterans. He also found depression and suspicion to be the most common symptoms. Ramsdell has gone further than the description of cases however and has examined what he believes to be the special relationship between hearing and psychological wellbeing. He has postulated three levels of hearing, symbolic, warning and background levels. Ramsdell argues that the importance of the background level has not generally been recognised "although it is psychologically the most fundamental of auditory functions". The background sounds which constitute what he describes as the primitive level of hearing change constantly "because the world around us is in a constant state of activity...(hence) the primitive function of hearing maintains a readiness to react by keeping us constantly informed of events about us. It also contributes to our sense of comfort by ever reassuring us that we are part of the living ongoing world."

Following his observations of very many patients Ramsdell is convinced that common depressive reactions result from an interference with the primitive level of hearing. He quotes a typical case who asks: "Why am I so depressed, so caught in a dead world ?"

Ramsdell does not believe that loss of function at the warning or symbolic levels are as important as loss at the primitive level for they are not so all pervading. Indeed, at the symbolic level, intraindividual as opposed to interindividual communication is unimpaired.

Myklebust (1964) also sees the fundamental importance of hearing for maintaining psychological equilibrium. For Myklebust audition is a temporal sense:-

> "which functions uninterruptedly, keeping the organism in contact with his environment at all times" it being "difficult to conceive of an organism's attaining the level of function found in man without a sense which provides constant environmental contact. Only when one is fully cognisant of the uniqueness of hearing can one understand the extreme isolation which occurs from deafness".

Myklebust argues that lack of awareness of the uniqueness of the hearing sense has resulted in the lack of recognition of the pervasive implications of acquired deafness.

> "It may be hypothesised that there are generalised effects which are felt irrespective of the degree of hearing loss, and of the age of onset, if the impairment is sufficient to interfere with normal environmental contact".

Levine (1960) in her book, "The Psychology of Deafness" devotes a chapter to the hard-of-hearing. It consists mostly of practical advice for people who come into contact with the hard-of-hearing. The opinions expressed and advice given are based on an acquired amalgam of "expertise" which while emphasising the above observations do not take us a great deal further. However, the following quotation from a teacher of lipreading does serve to summarise much of what has been said so far. The teacher reported that:

> "Threats of suicide, rage, depression, isolation, self hate, shame and suspicion are part of her daily contacts with her pupils as they go through the period of intense emotional struggle due to sudden loss of hearing or sudden realisation that the handicap is permanent or progressive."

This section is not complete without a brief reference to psychiatrists who have specialised in treating patients who are deaf, although the patients concerned have almost always been prelingually deaf and the psychiatrists usually fluent in manual communication.

John Denmark is one such psychiatrist who has also commented briefly on the nature of psychological problems associated with an acquired hearing loss (Denmark 1969, 1976).

Denmark's main contribution with regard to acquired deafness has been to state that it is different from prelingual deafness (see Chapter One). He argues that children have an "amazing resilience and often readily adjust to the onset of deafness" while onset in adult life affects "the whole life style of the individual...and results in severe psychiatric illness". In support of this he quotes two typical case studies, one of progressive and one of sudden deafness, both of whom complained of intense depression. From his accumulation of experience he also believes that "suspicion and hostility are not uncommon especially in sensitive personalities but the commonest feelings are those of isolation, insecurity and depression".

III. Simulation Studies

There have to date been no systematic studies of the effects of an experimentally induced hearing loss, due partly to the technical difficulties involved. Simulation in a laboratory setting poses few problems but is obviously far removed from real life situations.

The simplest device is the ear plug but the resulting decrement of 30 dB at most is little more than marginal, at least for those who have normal hearing to start with. Even so, the effects produced may be considerable. Hebb et al (1954) for example paid six college students to spend a weekend with their ears packed with cotton impregnated with petroleum jelly. They were given no information about expected results but were expected to keep a diary.

Two of the subjects reported only trivial emotional effects. One reported strong feelings of personal inadequacy but denied irritability - his girl friend disagreed and described him as irritable and withdrawn during the whole experiment.

The other three reported emotional reactions, especially of irritability and withdrawal. One of them, a male, complained of sleep disturbance and inability to concentrate. Another, the only female in the group commented that: "I feel that this lack of hearing is giving me a snivelling personality". Co-workers believed that these three appeared "to present evidence of a slight personality disturbanne".

It seems that the introduction of a masking noise into the ears is the only method by which a marked hearing loss can be simulated. von der Lieth (1972) reports the effects of spending a few days wearing a noise generator connected to a binaural hearing aid, resulting in a loss equivalent to 50-55 dB. A loss of this magnitude is still only moderate. If the masking noise is too loud it is likely to be heard by other people thus rendering any interpersonal contacts unnatural.

The necessary equipment which Lieth had strapped to his back was also rather cumbersome and may possibly have contributed, along with noise, to the heightened irritability he reported. The main effect noticed by Lieth was what he termed "social deafness" which referred to the difficulties he encountered in group conversations. Lieth also reported that his family became increasingly irritable and that he was unable to refrain from invading other people's personal space. Perhaps the most objective evidence for the stress caused by hearing loss in Lieth's experiment was that he had to turn the device off on two occasions of family crisis.

Simulation studies are of course limited and can provide little information concerning what it is like to experience a progressive or sudden irreversible loss. Technical obstacles furthermore do not permit normally hearing people to experience more than a mild loss. One way round this might be to invite the participation of people who are moderately deaf so that efficient ear plugs would induce a severe loss.

It is difficult to summarise a diverse collection of personal experiences, whether real or simulated, along with observations based on accumulated wisdom. Suffice it to say that the two most common reactions reported are depression and suspiciousness. It is noteworthy however that the clinical state of paranoia, frequently associated with acquired deafness is mentioned very rarely. Of all the World War II veteran patients seen by the psychiatrists Knapp (op cit), Ramsdell (op cit) and Ingalls * (1946) only one case of paranoid psychosis is reported by Knapp who believed that the psychosis had little to do with the hearing loss which was marginal and conductive.

The extent to which personal accounts and clinical observations concerning the psychological consequences of acquired deafness have been confirmed by empirical studies will now be examined.

* Ingalls' study is described in Chapter Six.

It is difficult to summarise a diverse collection of personal experiences, whether real or simulated, along with observations based on accumulated wisdom. Suffice it to say that the two most common reactions reported are depression and suspiciousness. It is noteworthy however that the clinical state of paranoia, frequently associated with acquired deafness is mentioned very rarely. Of all the World War II veteran patients seen by the psychiatrists Knapp (op cit), Ramsdell (op cit) and Ingalls * (1946) only one case of paranoid psychosis is reported by Knapp who believed that the psychosis had little to do with the hearing loss which was marginal and conductive.

The extent to which personal accounts and clinical observations concerning the psychological consequences of acquired deafness have been confirmed by empirical studies will now be examined.

* Ingalls' study is described in Chapter Six.

CHAPTER SIX
EMPIRICAL STUDIES

I. Early American Studies

Two early studies using the Bernreuter Personality Inventory were carried out by Pintner and his associates in the United States. Pintner (1933) contacted 94 people through a correspondence club for the hard-of-hearing. As the mean age was 22 and the average duration of hearing loss 26 years it seems that the sample must have been heavily weighted to those who had experienced a hearing loss since early childhood.

Pintner, Fusfield and Brunschwig (1937) contacted 126 "deaf" people throughout the United States, selected through contact with "key experts". No information was provided concerning the meaning of "deaf" so that it is quite likely that people with prelingual deafness and those with deafness acquired in childhood were included along with hard-of-hearing and deafened adults as well as the elderly.

The most thoroughgoing study before the Second World War was that carried out by Welles (1938), who also used the Bernreuter Personality Inventory. The subjects in Welles' study were members of organisations for the hard-of-hearing. A matched control group was formed by asking the hard-of-hearing to give a copy of the Inventory to a hearing friend of the same sex and approximately the same age, education and social status. In all, 528 questionnaires were distributed. A total of 225 (43%) questionnaires were returned by the hard-of-hearing group and 148 (28%) by the control group. Apart from the low response rate another source of possible bias arose from the fact that 87% of the hard-of-hearing and 89% of the control group responders were women.

The results of the study were analysed in two ways. Firstly the scores of the experimental and control group were compared. The hard-of-hearing experimental group was found to be significantly more emotional, more introverted and less dominant than the average of their hearing friends. On a measure of self sufficiency however, there was no difference.

Secondly, a group representing 16% of the hard-of-hearing responders were selected on the basis of "having successfully surmounted their handicap." When this sub-sample was compared with a matched control group no differences were found on any of the Bernreuter scales.

While mean differences for the control and experimental groups taken as a whole were significant, the degree of overlap on all measures led Welles to conclude that the hard-of-hearing are only slightly more emotional, introverted and submissive than the normally hearing. For those who were able to achieve success in life the effect of hearing loss was completely overcome.

A problem which has beset empirical studies with the hearing impaired has been the diagnostic significance of certain items in psychological inventories. Barker et al (1953) give examples of certain individual items in the Bernreuter Personality Inventory and strongly suggest "that a number of them would be predisposed in one direction by a hearing impairment, regardless of their intended psychological significance":

> Are you very talkative at social gatherings ?
>
> Do you ever heckle or question a public speaker ?
>
> Do you prefer travelling with someone who will make all the necessary arrangements to the adventure of travelling alone ?

Welles was very much aware of the problem of the validity of the Inventory for people with a hearing loss. He selected the sixteen items that best discriminated between the experimental and control groups. The sixteen items were seen to describe the hard-of-hearing group in the following way:

> They are more often easily discouraged when the opinions of others differ from their own.
>
> They less often find conversation more helpful in formulating their ideas than reading.
>
> They less often prefer a play to a dance.
>
> They are less often careful in not saying things to hurt other people's feelings.
>
> They less often ever heckle or question a public speaker.
>
> They more often feel reluctant at a reception or tea to meet the most important person present.
>
> They less often see more fun or humor in things when they are in a group than when alone.
>
> They more often find books more entertaining than companions.
>
> They more often have ever had spells of dizziness.
>
> They more often feel lonesome when they are with other people.
>
> They more often have frequently appeared as a lecturer or entertainer before groups of people.
>
> They less often find people more stimulating to them than anything else.
>
> They more often have difficulty in starting a conversation with a stranger.
>
> They more often get as many ideas at the time of reading a book as they do from a discussion of it afterward.
>
> They less often face their troubles alone without seeking help.
>
> They can more often be optimistic when others about them are greatly depressed.

Welles then asked a number of psychologists and executives of a league for the hard-of-hearing to point out any items in the inventory which they felt were biased for the hard-of-hearing. Intriguingly, Welles stated that:

> "a majority of each group of judges marked only 3 of these 16 significant items, there being no complete agreement on any one item in either group".

Welles then argued that the findings were in no way invalidated by these 3 items because when they were removed the significant differences between the experimental and control groups remained unaltered. However, as Barker et al (op cit) put it:

> "a number of other items might easily reflect the sensory handicap apart from its psychological significance for behaviour although, as has been noted, only three such items were agreed upon by a majority of judges".

Barker and his associates also noted the high intercorrelations between 3 of the scales showing that the traits are not well differentiated. This shortcoming, along with those of a poor response rate, high sex bias and peculiarity of expert judgement of validity of individual items, suggest that little confidence can be placed in the findings. The experimental group was also drawn entirely from a hard-of-hearing organisation and thus unlikely to be representative. In the study on which this dissertation is based, only 2 out of the total sample of 211 contacted through Hearing Aid Clinics were members of organisations for the hard-of-hearing. Despite its shortcomings however, Welles' study was the first major one of its kind. Moreover, the author was aware of and attempted to overcome many of the obstacles which have always been associated with research of this nature.

II. Early post-war psychiatric studies

While personality studies are concerned for the most part with variations of enduring styles of behaviour within the normal population, psychiatric studies have attempted to quantify the extent to which hearing loss brings about states stressful enough to require psychotherapeutic intervention. The earliest study which has attempted quantification of psychological disturbance as such was that carried out in the United States by Ingalls (1946).

Unlike most studies reported soon after the war, most of Ingalls' patients had not had combat experience. "The great majority had partial hearing in one or both ears. Most cases were of the chronic progressive type with hearing loss present since childhood". Although not stated explicitly, it seems that the patients were predominantly young male conscripts. The criterion for diagnosis of psychoneurosis was "the presence of definite and persistent symptoms or work inefficiency directly related to early life emotional conflicts". A measure of mental ability was included in the study, a score of 79 or less on the Wechsler Bellevue scale being considered mentally deficient. In all, 1,100 patients were seen and were classified in the following way:

Diagnosis	No. of cases	
Psychoneurosis	206	(26.9%)
Psychosis	4	(0.4%)
Mental Deficiency	45	(4.1%)
"Normal"	755	(68.6%)

Ingalls reported that:

> "The great majority of the neuroses were of the anxiety type. Hysteria, depression and psychosomatic symptoms were frequent complicating features. Four instances of psychosis were observed, one of these patients had a severe depression of short duration which cleared partly in relation to the fitting of a hearing aid. Another suffered from dementia praecox, paranoid type".

In a similar study, based mainly on soldiers returning from active service, Knapp (1948) reported on 1,280 patients who attended an Aural Rehabilitation Centre. Of these, 219 only were suspected of being psychologically disturbed and subsequently examined. While not stated, the following classification appears to be based on the 219 so examined:

		Percentage
1.	No psychiatric disease, or disease unrelated to hearing disability	82.3%
2.	Neurotic reactions to physiologic hearing loss	5.5%
3.	Mixed cases with both neurotic reaction to loss and psychogenic increase in hearing loss	2.8%
4.	Psychogenic hearing loss, physiologic loss minimal or insignificant	5.7%

These two studies, though not rigorous or research oriented, provide the first concrete evidence concerning the possible relationship between psychological disturbance and hearing loss. The very much smaller incidence of such disturbance reported by Knapp may well reflect the fact that 1061 of the 1280 patients were not given a psychiatric examination and that a large number of cases might therefore have been missed.

III. Nett (1960)

The study reported by Nett is little known and rarely referred to. A possible reason for this is that the project does not exist in published form but as a report for the United States Department of Health, Education and Welfare.

The aim of the study was "directed toward determining among adult individuals the social-psychological-vocational handicapping which results from hearing loss". It is therefore closely related to the aim of the study on which this dissertation is based.

Nett interviewed 378 respondents who were attending an audiology clinic and were referred from private practitioners, a hospital outpatient department and who in some cases were self referrals. This is therefore the only United States study based on a relatively unselected sample.

Respondents who volunteered to take part in the project were interviewed immediately after audiological examination. Unfortunately this fact largely invalidates comparison with the present study where respondents had owned hearing aids for a minimum of one year. In Nett's study, 71% had never owned an aid and a further 3% had owned one for less than a year.

Comparison will also not be very meaningful because a large proportion appear to have had near normal hearing. 43% had a SRT loss of less than 29 dB. For a speech discrimination test only 15% of the sample obtained less than 80%, 23% obtained 80-89% and 62% obtained 90-100%. It seems that the sample are of people attending for audiological examination rather than confined to people hearing impaired enough to require a hearing aid. Nett gives no information concerning those who later obtained an aid.

The psychological measures used in the study were limited to the WAIS and the MMPI. The mean IQ of the sample was 104. For the MMPI, Nett concludes that scores on certain MMPI scales differ significantly from standardised norms and that MMPI scores can be predicted from degree of hearing loss. The evidence for these conclusions however is far from satisfactory.

With regard to deviation from norms for MMPI scales, Nett found that for some scales around 20% scored outside the normal range (18% for the depression scale analysed below). It may be the case that stress which may be present at the time of referral is not due specifically to the effects of hearing loss but to anxiety associated with the uncertainty surrounding a hospital visit. Goldberg et al (1976) for example has found that psychological disturbance in general practice attenders (excluding those with psychological problems) is roughly three times as high as for nonattenders.

As far as prediction of MMPI scores from hearing loss is concerned Nett shows what appear to be remarkable relationships which lead her to conclude that they contradict a conclusion reached in a review by Barker et al (1953) that there is no relationship. Nett's correlation matrix is given in Table 6.1.

Table 6.1

How well can we predict MMPI scores from hearing loss ? (from Nett, 1960)

	ETA coefficients				
Hearing loss measures	hs	d	hy	pa	si
Speech reception threshold	52*	51*	56*	56*	57*
Speech discrimination	36	42*	33	49*	39
Weighted % dB loss	71*	78*	72*	79*	77*
Social Adequacy Index	73*	74*	78*	74*	71*

* $p < 0.005$

i. decimal points are excluded

ii. hs - hypochondriasis; d - depression; hy - hysteria; pa - paranoia; si - social introversion

Nett states that the correlation coefficient ETA "was selected to determine association between variables which were continuous and for which the assumption of equal interval scales was made....the choice of ETA was made because we were not sure that linear relationships would be the rule, and the correlation ratio is a good index when a curved regression prevails". Nett then gives the scattergram which describes the relationship between depression and weighted dB loss (Table 6.2).

Table 6.2

Scattergram for relationship between AMA percentage hearing loss (weighted dB loss) and the depression scale of the MMPI (from Nett, 1960) n = 133

weighted dB loss	30-39	40-49	50-59	60-69	70-79	80-89
90-100			1	1	2	
80-89		1		1	1	
70-79				4		2
60-69		4	2	2	1	
50-59	4	3	6	5	2	2
40-49	1	5	4	3	1	
30-39	3	1	7	9	2	2
20-29		6	6	9	6	1
10-19	1	3	8	3		1
1 - 9		2	3	1		1

MMPI depression scale

The ETA coefficient of 0.78 is statistically significant. However, there does not seem on inspection to be any form of relationship between the two variables, neither curvilinear nor of any other form. It seems as if Nett may have chosen ETA for the wrong reason and obtained a spuriously high degree of relationship. There is certainly no a priori reason for believing that there will be any systematic form of variation which is non-linear. Neither does the scattergram provide any. Moreover Nett does not offer any interpretation concerning the nature of the relationship. On the assumption that weighted dB loss and a standardised measure of depression are normally distributed a Pearson Product Moment Correlation was calculated based on analysis of grouped data.

The correlation coefficient obtained was 0.012. This could of course disguise a curvilinear relationship if one existed. As well as no discernible relationship in the scattergram however, there is none if the mean depression score is calculated for different degrees of hearing loss:

weighted dB loss:	1-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-100
mean depression score	60	55	61	60	53	56	55	71	61	57
n =	7	16	28	24	14	22	9	6	3	4

It is obvious from the reanalysis that the use of an ETA coefficient as opposed to a parametric coefficuent was mistaken and led to unwarranted conclusions concerning the relationship between audiological and psychological measures.

It is only fair to state that the bulk of Nett's study is devoted to ascertaining what respondents, friends, family and workmates perceived as critical incidents in their relationships with one another. The main conclusion concerning this part of the study was considerable difficulty arose in group situations. More unexpected was the finding that work proved less stressful than did social and family life.

IV. Myklebust (1964)

Given the pointers for research provided by Welles and others in the 1930s and by psychiatrists in the immediate post war years it is rather surprising that the only published research reported in the following 25 years or so is by Myklebust (1964).

Myklebust compared the different effects of pre-vocational and post-vocational hearing loss on personality. His rationale for the study was as follows:

> "Previous work suggests a relationship between deafness and personality factors. However this has not been extensively explored. Many assumptions have been made by the layman and even by the sophisticated. Psychologists and psychiatrists often have assumed that those who have deafness are suspicious and develop paranoid trends. Is this true or is this only an assumption ? Educators have stated that those who were deaf from early infancy have better emotional adjustment because of their lack of awareness of what it means to hear. Another opinion is that it is those who have become hard-of-hearing who have the greatest emotional disturbance because they are in an ambiguous position of being neither deaf nor normally hearing. To investigate these observations and to explore the emotional effect of deafness in other ways, we inaugurated a study of adults. The population consisted of two groups; one was hard of hearing, with onset of hearing loss in adulthood, while the other was deaf, with onset in early life".

The mean age of the hard-of-hearing sample of 44 males and 83 females was 45. Mean hearing loss was 66 dB and mean age of onset was 18 for the men and 24 for the women. The sample like those of the Welles' study was drawn from a New York Hearing Society concerned with lip reading tuition and various "club" activities. The sample was further biased because there was a high incidence of unmarried persons for both sexes.

The measure used was the MMPI. Myklebust found on all the scales of the MMPI that the hard-of-hearing differed significantly from normals except for the Paranoia scale. The finding that males were significantly more emotionally maladjusted than females runs contrary to most empirical findings concerning psychological wellbeing (Shepherd et al, 1966). The MMPI in common with many psychological inventories may contain items which could classify the deaf as maladjusted. Of the 10 subscales, 4 of them - Social Introversion, Psychopathic Deviate, Introvert and Schizophrenia are likely to yield such misclassifications. Myklebust himself suggests that the total profile found for the hearing impaired on the MMPI must be viewed in the light of this everpresent problem.

The deaf group in the study was drawn from Gallaudet College, a college of higher education mainly for the prelingually deaf. They appeared to be more abnormal than the hard-of-hearing. This may be partly explained by the mean ages of the two groups, 45 for the hard-of-hearing and 21 for the deaf, in that young people are more likely to appear as false positives on inventories relating to psychological adjustment (Shepherd, et al, op cit;Goldberg, 1972). A more plausible explanation is that while the use of personality inventories with the hard-of-hearing is questionable, with the prelingually deaf it is positively misleading. For example, Myklebust found that the deaf group scored high on schizophrenia and extraversion, a direct psychological contradiction.

Finally, it needs stressing that the hard-of-hearing sample represented those atypical people who belonged to a Hearing Society. Of the sample of 211 people interviewed for the study which forms part of this dissertation, only 16 had even heard of any club or society.

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Finally, it needs stressing that the hard-of-hearing sample represented those atypical people who belonged to a Hearing Society. Of the sample of 211 people interviewed for the study which forms part of this dissertation, only 16 had even heard of any club or society.

Of these only 2 were actual members of such a club or society. There was certainly no lack of facilities as almost all respondents were resident in the Greater London Area where there are many hard-of-hearing clubs, mainly those affiliated to the British Association for the Hard-of-Hearing.

Despite the drawbacks the indications from Myklebust's study are that acquired hearing impairment is indeed stressful and probably instrumental in bringing about neurotic symptoms, for to manifest depression or anxiety is unlikely to represent a realistic adjustment for the hard-of-hearing as would be manifestation of social introversion or "schizophrenia" which Myklebust argues is a measure of isolation rather than psychosis where hearing impaired people are concerned.

V. Mahapatra (1974a; 1974b)

The earliest study reported in this country was carried out by Mahapatra (1974a, 1974b) who tested the general hypothesis that the bilaterally deaf would be more liable than unilaterally deaf control subjects to suffer from psychiatric disturbance. The sample consisted of 89 otosclerotic patients consecutively admitted to the ENT ward of a general infirmary for stapedectomy (surgical treatment for conductive deafness). Not one of the patients had any kind of psychiatric history. They were divided into an experimental group of 49 patients (25 female, 24 male) who were bilaterally deaf with a hearing loss in excess of 40 dB at 250 Hz in the better ear, and a control group of 40 (16 female, 24 male) who were unilaterally deaf with a hearing loss in excess of 40 dB in the worse ear at 250 Hz. The mean ages of the groups were 45 and 43 with standard deviations between 11 and 12.

On the day prior to the operation each patient completed the Cornell Index, a psychiatric screening inventory. This was followed immediately by a psychiatric interview with Mahapatra.

The mean Cornell Index scores for the 2 groups were 14.7 (sd: 11.5) for the experimental group and 7.9 (sd: 6.1) for the control group. The difference between these means was statistically significant. Overall, females scored significantly higher than males.

The Cornell Index consists of 101 items. The best cut off score suggested by its authors for discrimination between normals and non-normals is 13. There is no evidence that scores are normally distributed; indeed on most inventories of this nature, where the vast majority of people are normal the distribution of scores is very highly skewed. The difference between the groups is more realistically measured therefore by comparing those who score above the criterion of 13 with those who do not. Mahapatra carried out this analysis (Table 6.3) and showed that the difference between the groups still held.

Table 6.3

Cornell Index Scores of Deaf and Control Groups (Mahapatra, 1974a; 1974b)

Cornell Index Scores	Males		Females		Total	
	deaf	controls	deaf	controls	deaf	controls
Less than 13	26	21	9	12	35	33
13 or more	8	3	16	4	24	7
	ns		$p < 0.005$		$p < 0.005$	

As stated above, every patient had a standard psychiatric interview with the author. At the time of the interview Mahaptra was unaware of the Cornell Index Score. Overall, the findings based on the psychiatric interviewed confirmed those obtained with the Cornell Index with regard to differences between the two groups. Moreover there was a high degree of agreement between the Cornell Index Score and the clinical interview, at least for the 24 deaf patients diagnosed as psychiatrically disturbed, 18 of whom had a Cornell Index score of 13 or over. No information is given concerning agreement between interview and Cornell Index for the control group. Of the 10 patients with losses in excess of 70 dB, 5 had a Cornell Index score of 13 or more but only 2 were diagnosed as psychiatrically ill at the subsequent interview.

The research design for this study is ingenious, and despite the minor criticisms mentioned above, does appear to illustrate a strong link between hearing loss and psychiatric disturbance. Unfortunately there are number of profound weaknesses in the study which are not considered by the author.

Firstly, the patients were examined on the day prior to surgery, which for those with bilateral deafness would be critical in its consequences. The unilaterally deaf control group had functionally normal or near normal hearing; for these patients successful surgery would result in minor improvement in hearing only. Hence the difference between the two groups, while valid, might only reflect an artefactual relationship to hearing loss, the main causal factor being concern over critical surgery and not the experience of living with acquired deafness.

Secondly, there are at least 14 items in the inventory which might be checked by psychologically normal people who are hearing impaired. While it is possible that

Mahapatra was aware of the danger of misclassifying hearing impaired people he does not refer to it, neither in relation to the Cornell Index nor the subsequent psychiatric interview. No consideration was given to any form of item analysis.

The third point concerns the apparent lack of knowledge of deafness on the part of the author. This is not to say that a researcher need necessarily be an expert in any area he chooses to investigate. In this case, however, the lack of understanding has resulted in poor research design and misleading interpretation. Poor research design results from using dB loss at the frequency of 250 Hz only as the criterion for deafness. This frequency is outside the speech range and has little significance for functional ability. Normal practice is to take 1000 Hz as a single frequency or the mean or weighted mean of three or more of 0.5, 1, 2, 3 and 4 kHz. Moreover, the frequency of 250 Hz is rather low and susceptible to masking by ambient noise. Misleading interpretation arises in the discussion of results where Mahapatra states that his findings "are contrary to the conclusion Furth (1966) drew when he reported that the adult deaf did not differ in any way from the adult with normal hearing". Mahapatra does not grasp that Furth is referring to the prelingually deaf and noting that despite their very poor language and educational attainment they still somehow grow up, get married (and divorced), have children, steady jobs, mortgages and so on. The point Furth wishes to make is that the growth of thought processes without the aid of normal language (the reference refers to his book called "Thinking without Language"), nevertheless results in a normal ability to cope with the exigencies of adult life and that this is best explained in terms of Piagetian formulations in which the growth of intelligence is shown to be largely independent of oral language development.

Finally, it is possible that comparison of the Cornell Index score with the subsequent psychiatric examination leads only to a spurious validity. While the interviews were conducted blind they were carried out very soon after the administration of the Cornell Index, the content of which must have been familiar.

Despite the major drawbacks of the study it has to be commended as the first ever investigation in this country which has attempted a systematic examination of the relatinn-ship between psychological disturbance and deafness.

VI. Other Studies

A study which bears some relation to that of Mahapatra's was carried out in the United States by Gildston and Gildston (1972) who examined "personality changes associated with surgically corretted hypoacusis". The Guilford-Zimmerman Temperament Survey (Guilford et al, 1949) was administered 2 or 3 weeks before and 3 months after surgery to a group of 34 hard-of-hearing patients. They found on first administration of the inventory that the patients showed negative qualities relating to the traits of ascendance, sociability, emotional stability and objectivity when compared with the normal hearing population. Postoperative measures however showed significant changes toward normality for all the aforementioned measures.

To a limited extent it may be said that these findings support Mahapatra's, especially given the fact that pre-operative measures were obtained well before actual surgery. Nevertheless, there are still no means of differentiating negative psychological effect due to an impending operatinn from that due to a hearing loss which had been present for some time.

Stephens (1978) reports a study in which 353 hearing impaired patients were administered the Eysenck Personality Inventory and the Middlesex Hospital Questionnaire. The respondents were patients referred to the Audiology Unit of the Institute of Sound and Vibration Research at the University of Southampton.

The group as a whole was found to be significantly introverted and neurotic when compared with the normal population. They also deviated significantly (in the predicted direction) from the norms on all but one of the scales of the Middlesex Hospital Questionnaire which measures obsessionality, anxiety, phobic anxiety, somatic preoccupation, depression and hysteria; the exception was for the hysteria scale. The most pronounced deviation was for the anxiety scale.

This study serves as a very useful pointer to the possible effect of hearing loss on psychological wellbeing. It must be borne in mind however that the Audiology Unit at the Institute of Sound and Vibration Research deals almost exclusively with problem cases which are specially referred.

Weir and Stephens (1976) found in a study of ENT outpatients that people with a sensorineural hearing loss did not differ significantly from other classes of ENT outpatients with respect to Middlesex Hospital Questionnaire scores. Only 11 of the sample had a hearing impairment however.

Cattell et al (1970) reported the administration of the 16PF to groups of subjects with certain physical disabilities including a group of 37 people who were "deaf" or had "serious" hearing disorders". In that they were classified as "duller" than any of the other groups one might speculate that the group was partly composed of prelingually deaf subjects. Apart from this, the group as a whole turned out to be more shy.

sensitive and submissive than the other groups, yet at the same time shrewd, astute and socially aware. Clearly, little confidence can be placed in such contradictory findings based on a very small and ill defined group.

While all the studies discussed so far in this chapter have many serious drawbacks which detract from the confidence which can be placed in them, taken together they may be said to constitute the basis for a powerful hypothesis concerning the psychological consequences of acquired deafness.

A very recent, and very brief review of the psychology of an acquired hearing impairment (Rosen, 1979) concludes that:

> "The hearing impaired as a group have not been established to differ from the general population on psychiatric or psychological variables".

This claim is at variance with the findings of the studies reviewed so far in this chapter. The question at issue in fact is whether the findings which are significant are genuine given the methodological weaknesses. Rosen also points out that studies are "clearly limited both by the choice of subjects and by the inadequacy of the audiological information". The present writer would concur with this only adding that (a) the psychological instruments used may themselves have been inappropriate, and (b) that it is desirable to allow a period for adjustment following referral and also to allow time to become accustomed to wearing a hearing aid before quantifying psychological disturbance.

VII. Paranoia

Kraepelin (1915) first reported on a link between paranoid psychosis and deafness. An implicit belief in the validity of the link has persisted ever since even though largely unsupported by concrete evidence. The possible existence of a link between suspiciousness related to deafness and suspiciousness as a major component of paranoia is appealing. However, both personality and psychiatrically oriented studies of hearing impaired people (covered in the previous sections of this chapter) have failed to substantiate the claim that hearing loss is associated with paranoia. As Knapp (op cit) reported, following a large number of clinical observations of deafened war veterans:

> "one consequence was suspicion of other people, although ideas of reference, traditionally so common, were found only in 25% of this group. When present they often appeared practical and realistic rather than delusional".

It is interesting however that despite inconclusive or contradictory evidence, [illegible] researchers have continued to believe that the relationship must exist and that it is the measuring instruments which are at fault. Altshuler et al (1958) for example reported that while "schizophrenia in the deaf is basically the same clinical entity as in the hearing... there is no evidence for a preponderance of paranoid symptoms". Nevertheless, Levine (op cit) in quoting Altshuler's finding, adds:

> "It is the present writer's (Levine's) impression that while deafness does not itself produce mental illness, it does by its very nature provoke paranoid ideas in sensitive individuals by keeping them from direct contact with what others in the immediate environment are saying and thinking, thus laying the foundation for suspicion".

Hence it is that whatever the empirical evidence the notion of the link between paranoia and deafness is preserved.

Cooper (1976) in a review of the literature on the relationship between deafness and psychiatric disorder states that while clinicians have agreed that depression is the most common symptom encountered, that there has been much less agreement on the incidence of paranoid symptoms. One of his conclusions is "that the mode of action of deafness in paranoid psychosis is probably one in which changes in social functioning and social adaptation take place slowly and progressively over a prolonged period". His evidence for this statement stems from two sources. The first concerns studies based on hearing impaired samples and the second on paranoid samples where degree of deafness has been established after the diagnosis of paranoid psychosis.

(i) Hearing impaired samples:

Cooper quotes Ramsdell, Denmark and Mahapatra as clinicians "who have commented on the marked suspiciousness and hostility in these patients, some of whom were frankly psychiatric". However the evidence is far from conclusive or objective. The only reference Denmark makes to "paranoia" is to state that "suspicion and hostility are not uncommon experiences in sensitive personalities" (Denmark, 1976). Ramsdell (1962) similarly gives little space to the treatment of paranoia. After making a point similar to Denmark's he goes on to explain paranoia because the term "is often used, perhaps erroneously, to characterise the hypersensitivity of the deaf". What he does suggest, and there is evidence to support it from Cooper and his co-workers, is that "deafness seems to be a powerful stimulus to any latent paranoid trend in the personality". Given that paranoid psychosis is extremely rare (Minsky, 1973) it is fair to assume that there are correspondingly few people with a strong and unnatural

predisposition to the illness. What Ramsdell seems to suggest is that deafness in such people may well serve as a precipitating factor. To be vigilant for the possibility of deafness (and treatment of deafness) for those who present paranoid reactions is perhaps important, but to extend this to looking for paranoid reactions among the hearing impaired will possibly lead to misdiagnosis. Mahapatra's study (op cit) was the only source cited by Cooper where actual cases were reported. In view of the shortcomings of Mahapatra's study discussed above, the diagnosis of 5 out of 49 of Mahapatra's subjects awaiting curative surgery as "paranoid schizophrenics" must be open to question.

(ii) Paranoid samples:

Other studies, reviewed by Cooper, and for which he shared responsibility, in which samples of paranoid psychotics are tested audiometrically, are far more pertinent. They found (Kay et al, 1976) that "social deafness is one of a number of premorbid characteristics which independently discriminate between groups of patients with paranoid and affective psychoses". This finding places the role of hearing loss in the development of paranoid psychosis in perspective. As Cooper concludes:

> "The suggestion that hearing loss may lead to the development of paranoid psychosis in later life through interference with attention, perception and communication processes is more speculative".

Given the fact that depression is held by clinicians and researchers to be very common amongst the hard-of-hearing it is strange that deafness does not discriminate affective psychosis from paranoid psychosis with deafness significantly associated with depression rather than with paranoia. As Denmark points out: "The commonest feelings are those of isolation, insecurity and depression". Ramsdell was also convinced of the predominance of depression amongst

psychological reactions to loss of hearing following observation of hundreds of patients. These clinical observations are supported by empirical evidence in the studies by Myklebust (op cit) and Stephens (op cit) described in the first section of this chapter. On this basis there should be more deafness among those with affective rather than with paranoid psychosis. It must also be stressed that deafness was only one factor which discriminated the paranoid from the affective group (Kay et al, op cit), the others being a "schizoid personality" factor, number of surviving children, precipitating events, family history and social class. In total they predicted 40% of the variance which implies that the part played by deafness is very small. Thus the role of deafness is very unclear. A more comprehensive and detailed study is required before anything definite can be said concerning the part played by longstanding deafness in the onset of psychosis whether affective or paranoid.

A possibility which Kay and his associates do not consider is the extent to which it is possible to obtain reliable audiometric data from diagnosed paranoid psychotics. It may be that deafness encountered in a psychologically abnormal group of this type is nonorganic, what Chaiklin and Ventry (1963) describe as functional deafness. While such deafness may be disabling it will almost certainly be the result of psychosis rather than the cause of it.

A worthwhile extension of the studies discussed in this section would be the measurement of hearing amongst psychiatric patients in general. Denmark has suggested the need for this because "psychiatrists often fail to appreciate in a particular case the benefits which may accrue from otological examination and treatment" (Denmark, 1969). An investigator who has actually done this is Jeter (1976) who screened 221 psychiatric patients for hearing loss. Of

them 18% could not be tested. Of the rest, 60 were screened as hearing impaired, about one third of the sample tested. Details of the age breakdown are not given and so it may be that degree of impairment was not significantly higher than that found in the population at large, especially when the sample is skewed heavily for age as Jeter's seems to have been, inferred from the finding that a very large number appeared to suffer from organic brain damage. Given the interference of deafness with both individual and group therapy sessions, audiological assessment of psychiatric patients would appear to be highly desirable.

PART THREE

METHODOLOGICAL CONSIDERATIONS

CHAPTER SEVEN

RESEARCH DESIGN

I. Measure of Psychological Disturbance

The best validated and most widely used instrument for measuring and classifying psychological disturbance is the Present State Examination (Wing et al, 1974); it is a standardised semi-structured psychiatric interview. However, the precise diagnostic categorisation which would result seemed inappropriate for a group of people, the majority of whom might exhibit no psychological abnormalities whatsoever. Furthermore, in the context of a broad based study designed to cover social and psychological consequences of an acquired hearing loss it would have taken up a disproportionate amount of time, as it can take at least an hour to administer.

The use of a personality inventory was also considered. The shortcomings of such a measure for a study of this nature have already been discussed in detail in Chapter 6. The main problem concerned the possible misclassification of people who are deaf but normal. An item analysis might have overcome this problem but it would have been cumbersome and the possible exclusion of a number of items would have left scores which would have been difficult to interpret. It was decided therefore to use a short psychiatric screening device.

A number of such measures are available, the Cornell Index (Weider et al, 1948), the Middlesex Hospital Questionnaire (Crown and Crisp, 1970), the General Health Questionnaire (Goldberg, 1972) and the short version of the Delusions Symptom Sign Inventory (Bedford and Foulds, 1978). The disadvantages of the Cornell Index have already been discussed in Chapter 6; it is moreover an instrument which was developed and standardised with young male American conscripts in World War II. The

Middlesex Hospital Questionnaire was ruled out because of the large number of questions which could possibly misclassify the deaf and because at the time no norms were available for the general population, a shortcoming which has since been rectified (Crisp et al, (1978a).

The General Health Questionnaire is by far the best developed and most rigorously standardised. The main disadvantage which precluded its use in the present study was the method of scoring used. For most questions the respondent has to indicate degree of severity along the dimensions: "none, same as usual, more than usual, always". The problem is that the respondent does not score unless he indicates "more than usual". This is because Goldberg is looking for evidence of change in psychological wellbeing. For a target sample that has been deaf for a minimum of between one and seven years at least, the General Health Questionnaire was obviously inappropriate. Goldberg in fact admits that the Questionnaire does not identify those with a longstanding disorder (Goldberg, 1979). Another weakness in the General Health Questionnaire concerns the point that many items, especially the early ones, are not necessarily psychiatric in content. This is intentional on the part of the author who wished to leave the most overtly psychiatric questions till nearer the end. However, all items score equally. It would thus be possible to reach the criterion for classification as disordered on eleven of the following 15 items out of the total of 60 in the Questionnaire: 'Recently (over the past few weeks)' has -

> been feeling perfectly well and in good health - less than usual.
>
> been feeling in need of a good tonic - more than usual.
>
> been feeling run down and out of sorts - rather more than usual.
>
> felt that you are ill - rather more than usual.
>
> been able to concentrate on whatever you're doing - less than usual.

been feeling mentally alert and wide awake - less alert than usual.

been getting out of the house - less than usual.

felt on the whole you were doing things well - less well than usual.

spent much time chatting with people - less than usual.

been able to enjoy your normal day-to-day activities - less so than usual.

been late getting to work or getting started with your housework - rather later than usual.

been feeling full of energy - less energy than usual.

been managing to keep yourself busy and occupied - rather less than usual.

felt capable of making decisions about things - less so than usual.

felt that you are playing a useful part in things - less useful than usual.

Goldberg has not reported on item analysis which examines the part played by items such as these. They certainly seem to indicate that the criterion for classification as disordered is not as severe as for the Bedford and Foulds inventory (Appendix B) which does not contain introductory items which are not psychiatric in content.

The Bedford and Foulds inventory chosen for this study consists of the scales for Anxiety and Depression which form part of the Delusions Symptom Sign Inventory. It is referred to for the sake of convenience as the SAD (Scales of Anxiety and Depression). As in Goldberg's General Health Questionnaire, emphasis is placed upon recency of symptoms, but it was felt that the method of scoring would be less likely to lead to misclassification than would be the method of scoring used by Goldberg described above.

The SAD consists of 14 questions, 7 on anxiety and 7 on depression. It is self administered and takes 5-10 minutes to complete. Each question has levels of severity 0, 1, 2 and 3 resulting in a maximum possible score of 14 x 3 = 42. None of

the questions are social in nature or concerned with communication. The SAD was therefore deemed highly suitable as it should not misclassify psychologically normal people as disordered simply because they were deaf and therefore answering questions related to communication or social situations in a manner indicative of abnormality.

The cut-off point recommended by the authors of the inventory is a score of 7, which is obtained by 5% of the general population as opposed to 75% of psychiatric patients, based on 200 and 480 subjects respectively. It is emphasised that any quantification of psychological handicap based on this screening inventory will probably be conservative, for the items are overtly psychiatric which means that milder psychiatric symptoms may be missed. Studies using the General Health Questionnaire for example have found 12% of the general population to be disordered (Goldberg et al, 1976) and in an Australian study 16% (Finlay-Jones et al, 1977).

The SAD contains items on anxiety and depression only but it fits into a hierarchical model of psychological illness described in detail by Foulds and Bedford (1975). Briefly, they have shown that people with more serious forms of disorder such as personality disturbance and psychotic disorder will be identified with this measure which is at the psychoneurotic level only.

The validity of the SAD was tested against judgment of inventory items by experienced psychologists and psychiatrists as well as against psychiatric interviews. The devife was especially relevant for this study in that a measure of depression was included as this is the most often referred to reaction to hearing loss reported by clinicians and researchers, as described in the previous two chapters.

The usefulness of the type of psychological measure employed is underlined by Ingham et al (1976) who argue that statements concerning "Prevalence of the type x% of the general

population are mentally ill imply a concept of prevalence that is difficult to apply operationally...a more generally useful type of statement compares the frequency distribution of severity for declared cases with that for the rest of the population". The normative data for the SAD conform to this view.

The SAD does have a number of weaknesses, the most serious of which is that the "normal" respondent s have not been given a psychiatric examination so that no statement concerning either false positives of false negatives is possible. It is also the case that norms are not age related which may affect comparisons with the predominantly middle aged sample in the present study. The general population sample used by Bedford and Foulds is rather young with a mean age of 30 years with a standard deviation of 10. This difference however should only affect results in the contra-hypothesis direction, for false positions have been found to be more common in young adults (Shepherd et al, 1966; Goldberg, 1972).

Finally, while the SAD is by no means wholly suitable, Goldberg in a review of instruments similar to his own commented that the SAD "would appear to be an instrument of acceptable validity, and is indeed in many ways comparable to the present (Goldberg's) questionnaire. Each instrument has its own advantages and limitations and consideration of these will indicate which should be chosen for any particular research design".

The administration of the SAD preceded other health/ psychological sections and questions concerning family and social life. Thus the measure was not "contaminated" by other sections of the questionnaire which might be considered to be emotive.

II. Paranoid Tendency

The problems associated with measures of clinical paranoia are numerous. Firstly, some of the questions related to the state are likely to misclassify the deaf e. g. :

No one seems to understand me.
I am sure I am being talked about.
Even when I am with people I feel lonely much of the time.
I do not often notice my ears ringing or buzzing.
I tend to be on guard with people who are somewhat more friendly than I expected. (MMPI)

Secondly, some items tend to be rather extreme: thus a population which is assumed to be normal might well take exception to questions such as:

"There have been people trying to poison me or do me very great harm" (DSSI - full version, Bedford and Foulds, 1978).

The Paranoia scale of the MMPI contains many items such as these which while possibly acceptable when interspersed throughout a personality questionnaire containing 399 items, might have seemed offensive taken together as could have been the case had the scale been "lifted" from the MMPI e.g.:

Evil spirits possess me at times.
Someone has been trying to poison me.
I believe I am being plotted against.
I believe I am being followed.

For these reasons, and practical ones concerning limits of time and over-fragmentisation of the questionnaire, it was decided not to attempt to obtain a clinical measure of paranoia. Fortunately, the Quality of Life Study, from which questions relating to psychological wellbeing and health were obtained, contained a measure of suspiciousness which significantly discriminated between black and white people in a national "Quality of American Life Survey" (Campbell et al, 1976). The measure consists of the following 3-part question:

a) Generally speaking would you say that most people can be trusted or that you can't be too careful in dealing with people ?

b) Would you say that most of the time people try to be helpful, or that they are mostly just looking out for themselves ?

c) Do you think that most people would try and take advantage of you if they got the chance or would they try to be fair ?

The authors report that responses to each part of the question "interrelate rather strongly" (r's ranging from 0.49 to 0.53). Apart from discriminating blacks from whites the measure was also found to distinguish between subsamples of blacks: "Black people at the lowest rung of the class ladder are least trustful of people, and trust increases among people of higher status. Black people who are divorced or separated also have high levels of distrust".

The authors then argue in conclusion that "all of this seems to make good intuitive sense; those people who have been least successful in their encounters with society have the least reason to feel trustful of it. And this reasoning gains weight when we find that very much the same pattern we have seen amongst blacks also characterises whites".

While no special claim is made for the measure it does have an appealing face validity. And it does seem to select those people who, once again "have been least successful in their encounters with society (and) have the least reason to feel trustful of it". Intuitively, there is every reason to believe that this will apply to people with an acquired hearing loss.

It may also be seen that the measure is related conceptually to the MMPI measure of paranoid tendency as evidenced by the similarity of three questions taken from the MMPI:

> Most people inwardly dislike putting themselves out to help other people.
> I tend to be on guard with people who are somewhat more friendly than I expected.
> Most people will use somewhat unfair means to gain profit or an advantage rather than to lose it.

The measure, as part of a United Kingdom Quality of Life Survey, has been administered to a large random sample of adults in this country, thus providing a very useful baseline comparison group.

III. Hearing Loss Measurement

Three measures of hearing were obtained in order to quantify objective, functional and subjective dimensions of acquired deafness respectively:

a) Pure tone audiometry was restricted to air and bone conduction across the speech frequencies (0.5, 1, 2 and 4 kHz) in the better ear only. While a fairly accurate measure of hearing threshold for air conduction was required only a crude estimate of type of hearing loss was needed and so "masking" was not carried out. If the respondent was in doubt as to which was the better ear, thresholds were established for both ears. Type of hearing loss was classified as conductive, mixed or sensorineural.

b) Speech audiometry consisted of speech discrimination ability using phonetically balanced word lists (Boothroyd, 1968). The lists consist of 10 monosyllabic words, each containing three phonemes. They were presented at 65 dB (A)* output from a tape recorder placed one metre from the respondent who adjusted his hearing aid to a comfortable listening level prior to testing. Two lists were administered, one with an aid and one without.

c) A self estimate of hearing loss was obtained using an adaptation of the scale used by Wilkins (1948). Respondents were asked to place themselves at the appropriate point on the scale both with and without a

* slightly above a normal conversational level

hearing aid. The full question is the first one on the interview schedule in Appendix A. Details of procedure and instrumentation are contained in Appendix D.

IV. Control Data for Discrete Questions

Questions concerning health, general psychological well-being, and suspiciousness were included partly in order to complement the psychiatric screening device (SAD) and partly to validate it. The areas of employment, social and family life were also covered in order to probe those life domains most affected by hearing loss.

Questions concerning the effect of loss of hearing at work, general state of health, family and social life also provide useful information when analysed in conjunction with a standardised measure of psychological disturbance. Such information enables the life domains associated with psychological stress to be distinguished. Analyses of this kind suffer from a major drawback however, for while responses to health, social, family or work questions may vary concomitantly with SAD scores, the extent to which such responses indicate a significant degree of stress in their own right will not be known. Because of this, a number of questions were asked of respondents in relation to social, health, family and work life in which no mention was made of hearing loss, thus allowing them to be adequately controlled on the general population. Control information of this nature was obtained from three sources. Questions on work life were obtained from the Multipurpose Survey (SSRC Survey Unit, 1975a) and on general health and suspiciousness from the Quality of Life Survey (SSRC Survey Unit 1975b). An extensive search of recent social surveys in this country did not yield social and family questions deemed suitable for this study. Such questions were therefore devised specifically for the project, some adapted from Bradburn (1969) from a survey on psychological wellbeing conducted in the USA. A survey was commissioned specifically to control for these questions.

The Multipurpose Survey was carried out on a quasirandom sample of 1500 adults in the United Kingdom mainland south of the Caledonian Canal. The Quality of Life Survey was conducted in a similar manner except that the sample of 1000 adults was confined to urban areas.

The specially commissioned survey covering social and family life was carried out on a sample of the Greater London population matched for area of residence, age, sex and economic activity. The size of the sample was almost exactly double that of the hearing impaired group. It was carried out by the Social Research Division of National Opinion Polls Ltd. in April 1978. A few questions from the Quality of Life Survey were also included in the National Opinion Poll Survey where they served to orientate the respondent to the nature of the interview. A spin off from this was that the reliability of the questions could be ascertained when subjected to different sampling and interview procedures. (See Appendix C for the questionnaire).

Thus control information was obtained from norms for the general population and psychiatric cases in the case of the SAD, from two national samples and from a matched control sample. The use of a number of sources for the purpose of controlled comparison should enable greater confidence to be placed in the findings than would have been the case had total reliance been placed on a single control source.

V. Statistical Analyses

The Statistical Package for the Social Sciences (SPSS) was used for cross tabulations, regression type analyses, and for testing the significance of differences between means.

Chi square (Siegel, 1956) was used for comparing the hearing impaired with the National Opinion Polls matched control group for social and family variables, as well as for a number of within sample analyses. The significance of differences between proportions was used for comparing the hearing impaired sample with SAD norms (Ferguson, 1966).

Comparison between the hearing impaired group and the Quality of Life and Multipurpose Surveys are much more complex however, mainly because of the massive age bias in the hearing impaired group. As the data was categorical in nature analyses based on parametric techniques were not appropriate thus precluding covariance type analyses which could have controlled for age.

Following statistical consultation with the Polytechnic of North London statistical advice centre it was decided to use GLIM (General Linear Interactive Modelling), an interactive computer programme which is capable of multivariate analysis of categorical data (Goodman, 1970; Nelder and Wedderburn, 1972). The manual for interactive computer use is written by Nelder (1975) under the sponsorship of the Royal Statistical Society. For a detailed discussion of GLIM see O'Muircheartaigh and Payne (1977).

Conceptually GLIM is very simple to grasp: it is the computational procedures which are extremely complex. As its use in the present research is confined to categorical data so will the explanation of GLIM be confined to this usage. It may equally of course be used for parametric analyses.

Perhaps the best way of describing what GLIM does is through an illustrative example concerning whether hearing impaired people are more likely to suffer from a further disabling impairment than are the general population. Given the age bias a straight Chi Square is meaningless especially in that many disabilities are age related. With GLIM it is possible to control for age and other "nuisance" variables before testing the extent to which the two groups can be distinguished on the variable of physical disability alone. In this example the other "nuisance" variable taken into account is sex, mainly because of its possible interaction with age. The data is fed into the computer as the following table with all factors and levels of factors specified:

SURVEY ONE: (Hearing Impaired Group)

	Male		Female	
age	physically disabled	not disabled	physically disabled	not disabled
≤ 39	X	X	X	X
40-49	X	X	X	X
50-59	X	X	X	X
60-64	X	X	-	-

SURVEY TWO : (Quality of Life Control Group)

	Male		Female	
age	physically disabled	not disabled	physically disabled	not disabled
≤ 39	X	X	X	X
40-49	X	X	X	X
50-59	X	X	X	X
60-64	X	X	X	X

X = number of respondents in each cell.

The age imbalance in the table is due to the exclusion of 60-64 year old females who are post retirement age. It is possible to cater for this imbalance within a GLIM analysis.

The computer programme then yields a Grand Deviance Score (analogous to Total Sum of Squares) which accounts for the main effects of survey (2 levels, control and experimental), sex (2 levels), age (4 levels) and disability (2 levels, disabled and not disabled). As well as the main effects all possible interactions are taken into account, 5 two-way, and 4 three-way. The 1 four-way interaction exhausts the deviance. The Grand Deviance is then reduced step by step. Firstly, the deviance due to the main effects are deducted from the Grand Deviance. The amount of deviance which each step accounts for is virtually equivalent to a Chi Square value and can be consulted in a Chi Square significance table.

The main effects taken singly are of little interest as they are design effects only. For example the deviance arising from the main effect of age will be extremely significant because of the built in age bias. In this example the important deviance is that resulting from the interaction between disability and survey which answers the research question: What is the difference between surveys for different levels of disability ? All the other 2-way interactions are first obtained thus controlling for age, sex, survey and disability. Finally the interaction between survey and disability is computed and tested for statistical significance.

Following on from this any three way interactions may be quantified in order to test for higher order interactions which seem conceptually plausible; in this example it could be argued that sex might interact significantly with disability differentially for hearing and deaf people. Such interactions may be complex and difficult to grasp. Nevertheless they do allow quantification of subtle inter-relationships which are not evident in the lower order measures.

The use of GLIM in the present study thus resembles that of a "multiway" Chi Square. What this system does, according to a recent article on the analysis of categorical data in the Annual Review of Psychology (Keith Smith, 1976).

> "is to provide a nearly complete analogue in contingency analysis of the multifactorial analysis of variance. The difference is that the dependent variable is treated formally like the independent or design variables. What it does even further, however, is to allow the use of a number of dependent variables, and in the limit it becomes similar to a correlational analysis when all factors are considered dependent variables."

In a limited number of analyses, GLIM will be used to probe relationships between variables in a manner broadly comparable to multiple stepwise regression.

CHAPTER EIGHT

FIELDWORK

I. Sampling

The sample was obtained from the Hearing Aid Clinics of three large hospitals in the Greater London Area. One was an inner London teaching hospital; the others were general hospitals located in the inner and outer suburbs respectively.

All new patients who had been issued with a hearing aid between 1970 and 1976 inclusive constituted the target sample.

As there is no sampling frame for people with acquired deafness it was decided to sample from hearing aid clinic records in order to yield the closest possible approximation to an unbiased sample. Clubs for the hard-of-hearing, lipreading classes and voluntary organisations were used for piloting purposes but not for obtaining respondents for the main sample. This procedure was vindicated in that virtually no one in the main sample had heard of clubs or classes let alone enrolled as a participant.

A substantial number of hearing aid owners are known to have bought their aids through private dispensers. This is an extremely difficult area to sample although the writer shared the supervision of a small scale study of private hearing aid users (Stevenson and Dawtrey, 1979). As far as the present study is concerned, 58 of the final sample of 211 owned a private hearing aid as well as a National Health Service model. People who only own private hearing aids however are not included.

Also not included in the sample are those with untreated deafness, believed to constitute a significant proportion of hearing impaired people. D'Souza et al (1975) for example surveyed the middle aged residents in a general practice in Kent. They found that around 5.8% (± 0.5%) people between 40 and 64 years of age suffered a significant hearing loss, only a quarter of whom owned

a hearing aid. It was decided not to attempt to sample those with an untreated hearing loss, partly because to do so would have been very expensive both in time and money, and partly because it would have been somewhat artificial to interview such people given that a hearing aid is universally available under the National Health Service. This is not to deny of course that a study of the psychological consequences of hearing loss for such a comparison group would be of considerable interest.

In restricting the study to London very many people who would have suffered noise induced deafness from working in noisy industrial environments (steelworkers, boilermen, millworkers and shipyard workers for example) will presumably be under-represented.

The study was restricted to people of employment age because its scope would have been far too wide had the elderly been included. Much of the coverage of work and family life is only relevant to those of employment age; restriction of physical mobility, visual handicap and other age related infirmities, a change in life style and possibly bereavement would have to be taken into account in a study which included the elderly.

As the sample constituted all patients issued with a hearing aid all types and degrees of loss were therefore included. Opinion varied as to whether those with conductive losses should be included. It was decided that they should be for there is no concrete evidence concerning adjustment to different types of loss. The same argument underlay the decision to include all degrees of loss, it having been argued that even a slight hearing loss can have an adverse psychological effect (e.g. Myklebust, 1964).

The original intention had been to draw a representative sample of hearing impaired people from all Greater London Hearing Aid Clinics north of the Thames. Unsuitable methods of record keeping, lack of interviewing facilities, complex procedures for obtaining permission and even lack of cooperation made this intention impractical.

One of the Hearing Aid Clinics appeared to offer a service of high quality. The staff at the Clinic also gave the assurance that there should be no difficulty in obtaining a total sample of 300 people of employment age. It was decided to draw the whole sample from this hospital where a poor standard of treatment would not be expected to contribute to psychological disturbance.

Even at this hospital however sampling directly from the hospital records was not allowed, even though they consisted only of audiogram, name, age and address, and date of issue of hearing aid. It was not until interviewing was well underway that it became apparent that no more than 200 names or so would be obtained and that there was a marked social class bias. Also, the response rate was only 45% which meant that the aim of reaching a total of 300 would not be reached.

An outer London hospital was therefore approached. At this hospital examination of hospital records was permitted. Given the expected low response rate an inner suburban hospital was approached in order to complete the sample. Thus the final sample is characteristic rather than representative of Greater London.

At two of the three Hearing Aid Clinics access to records was refused. In one of these, due to a misunderstanding, patients too deaf to wear a hearing aid were excluded. In the other, the Senior ENT consultant himself carried out the selection of respondents with the specific intention of excluding those deemed to have social and psychological problems which were felt to make them unsuitable for interview by non-medical personnel. Unfortunately it has not been possible to find out how many were excluded on this basis.

The final sample therefore was determined by practical exigencies and constraints rather than by scientific requirements.

II. Pilot Work

The questionnaire (Appendix A) was constructed following extensive informal unstructured interviewing of hearing impaired people. The writer became a member of a club for the hard-of-hearing and also gained a number of insights into the effects of hearing loss from extended conversations with hearing impaired students and social workers studying at the Polytechnic of North London for a post qualifying Certificate in Deafness Studies. The first version of the questionnaire was then piloted on hearing impaired students at the Polytechnic.

Research workers, social workers, audiological scientists, a psychiatrist, psychologists, sociologists and representatives of major voluntary organisations were then consulted. The second version of the questionnaire was then tried out with volunteers at an annual conference of the British Association of the Hard-of-Hearing.

The third version of the questionnaire was administered to a hospital based sample. The fourth revision following this piloting stage was tested on a group of people from lipreading classes, selected by their teachers because they were believed to have social and psychological problems. The final version of the questionnaire followed on a final hospital based pilot study.

During the first hospital pilot stage it became apparent that the response rate would be between 40 and 50%, so it was decided, with hospital permission, to attempt to contact the non-responders at home. No factor was found which obviously distinguished non-responders apart from the finding that they tended to be younger. Many of them had moved away, a few had died and almost all the rest who were contacted at home agreed to be interviewed at home. There were 2 refusals among the 22 non-responders contacted; both employees of the hospital in question. It is not certain of course that non-responders did not differ systematically from those who agreed to be interviewed, given the small numbers

and the fact that only one hospital was involved. An extensive follow up of non-responders was not undertaken, mainly because participation in the study was voluntary and there were strong reservations concerning an invasion of privacy which knocking on doors would entail.

It is stressed that this small scale follow up study of non-responders at home was undertaken to find out why they had not responded and not to obtain a comparison group. Because of reservations concerning this exercise only the blander sections of the questionnaire were administered to those who agreed to be interviewed.

III. Procedure

Each respondent was invited to interview by letter, and was specifically asked to bring his hearing aid whether it was in use or not. In the case of the inner-London teaching hospital, interviewing was carried out at the Royal National Institute for the Deaf which was nearby. The reason for this was lack of interviewing facilities at the hospital itself. For both the other hospitals, interviewing facilities were provided by the Hearing Aid Clinics. The interview lasted between an hour and an hour and a half. The interview session consisted (in the order shown) of:

a) pure tone and speech audiometry.

b) self evaluation of hearing loss.

c) questions concerned with onset of hearing loss; adjustment to, and benefit obtained from the hearing aid; knowledge and use of services for hearing impaired people.

d) questions relating to work.

e) self completion of the SAD.

f) a cup of tea.

g) questions on social and family life.

h) questions on general psychological wellbeing and health.

Full details of procedure, copies of letters to respondents, apparatus used, instruction to respondents at interview etc., are given in Appendix D.

Interviewing of the main sample took place between November 1976 and July 1977. In all 236 people were interviewed, excluding about 60 interviewed during the pilot stage. In all 25 had to be excluded from the study, mainly because they were too old but in 3 cases they were deemed unsuitable as they had attended schools for the deaf although they appeared as new patients on hospital records.

It became evident at the hospital where sampling was undertaken by the researchers that a number of patients with a significant hearing loss had not been issued with a hearing aid. A random sample of these patients were invited for interview. In the main it was found that an aid had been issued but that the issue had not been recorded. Some considered they did not need an aid. The rest had obtained an aid in the private sector. Only one person was deemed to be in real need of a hearing aid but still refused one.

PART FOUR

FINDINGS

CHAPTER NINE

THE SAMPLE

I. The Structure of the Sample

The final sample comprised 211 adults of employment age who, from Hearing Aid Clinic records were new patients who had been issued with a National Health Service hearing aid between 1970 and 1976 inclusive. The age and sex distribution of the sample is given in Table 9.1. The age bias, while expected, is still rather large and shows that acquired deafness, even when restricted to people of employment age, is highly skewed for age. The mean age for men was 53 (sd = 10) and for women 48 (sd = 10).

Table 9.1

Age and sex distribution of the sample

	16-29	30-39	40-49	50-59	60-64	Totals
Male	7	7	17	52	37	120 (57%)
Female	5	12	23	51	-	91 (43%)
Totals	12 (6%)	19 (9%)	40 (19%)	103 (49%)	37(17%)	211
SSRC Quality of Life	48% →		25%	23%	4%	

If the males of 60-64 are excluded then the sex distribution is roughly equal.

Seven (3%) of the hearing impaired sample were separated or divorced. A GLIM analysis controlling for age and sex showed that this proportion did not differ significantly from that in the SSRC Quality of Life national survey. Moreover, the rate for the NOP matched control sample was 4.3% which is actually higher than that for the hearing impaired sample, though not significantly so. There is therefore no support for the opinion that acquired deafness leads to marital breakdown.

The unemployment rate for the hearing impaired sample was 6.2%. This was found not to differ from the SSRC Multi-purpose national survey when a GLIM analysis was carried out which controlled for age and sex. With a sample biased towards the upper age group it is possible that unemployment might be disguised under the headings of "retired" and "permanently sick and disabled", or "housewife full time". A better guide to the effect of hearing impairment on employment might therefore involve a consideration of the proportion who are actually working. For the men, 83% are in employment and for the women 69%. Once again a GLIM analysis found that these proportions did not differ significantly from those obtained by the SSRC Multipurpose National Survey controlling for age. There is thus no evidence that those with acquired deafness are less likely to be economically active.

Workers with the deaf and the deaf themselves have argued that obtaining employment presents little difficulty but that the problem is more likely to be one of underemployment, that is being forced by a hearing loss to take a job not commensurate with educational attainments, abilities and experience. In order to explore this possibility a measure of educational qualifications was included in the study. The measure proved of little use however, probably because of the age bias in the sample, most respondents having left school between 1930 and 1945 when opportunities for obtaining educational qualifications were few. However, the social class bias, based on socio-economic grouping, does suggest that the sample as a whole is not underemployed (Table 9.2).

Table 9.2

Social Class distribution of the sample compared with the Quality of Life survey

Social class		Hearing impaired sample	Quality of Life Survey
I II	professional and intermediate	31%	11%
IIIN	clerical	16%	31%
IIIM	skilled manual	33%	25%
IV V	semiskilled and unskilled	20%	33%

A GLIM Analysis of Deviance which took into account the age difference showed that the hearing impaired sample is significantly biased towards the upper social classes ($p < 0.001$).

II. Onset of Hearing Loss

In order to obtain a guide as to age of onset of hearing loss respondents were simply asked:

> "How old were you when you first had trouble with your hearing ?"

The responses to this question, given in Table 9.3, show that there is no apparent pattern of onset. For two thirds of the sample (142) aged 50 and over at the time of interview, just over half had suffered onset after the age of 40 and nearly a third of them had had a hearing problem before reaching the age of 29. Of those in their forties, half of them had suffered onset before the age of 29. Again, half of those aged 16-39 had suffered onset before leaving school. Table 9.4 illustrates that almost all the "new patients interviewed have had problems with hearing for at least 10 years."

Table 9.3

Relationship between age of onset of hearing loss and age at interview

Age at interview	age of onset 0 - 15	16 - 39	40 - 49	50 - 64
19-39	15 (51%)	14 (49%)	-	-
40-49	10 (25%)	20 (50%)	10 (25%)	-
50-64	25 (17%)	39 (28%)	43 (30%)	35 (25%)
Totals	50 (23%)	73 (35%)	53 (25%)	35 (17%)

NB: Percentages are row percentages

Table 9.4

Pattern of onset of hearing loss

Age at interview	n	Onset	%
16-39	29	0 - 15	51% (15 out of 29)
40-49	40	0 - 29	52% (21 out of 40)
50 - 64	142	0 - 39	45% (64 out of 142)

A possible explanation which is appealing is that the sample divides broadly into 2 groups, those whose hearing loss results from hereditary causes and diseases of childhood and adolescence, and those for whom hearing loss results from the ageing process. In some cases there may also be an interaction between a longstanding minor hearing disorder and age related hearing loss which gradually results in a loss significant enough to cause the sufferer to seek a hearing aid in late middle age.

Any interpretation based on Table 9.3 and Table 9.4 must remain open to question however, because evidence from a complementary question in the interview is contradictory. Respondents were asked to estimate how much time had passed "between feeling you had a hearing loss and going to see your doctor about it ?" (Table 9.5).

Table 9.5

Length of interval between onset of loss and visit to doctor

6 months or less	69	(35%)
7 months to 3 years	59	(30%)
Over 3 years	70	(35%)

It seems logical that those who waited a short time before going to a doctor would have experienced trouble with hearing for the least amount of time. In order to investigate this relationship, the time lapse between first experience of trouble with hearing and issue of a hearing aid was calculated. The comparison is based on two hospitals only due to a minor alteration in the questionnaire following data collection at the first hospital.

It can be seen from Table 9.6 that the discrepancy is considerable, indicating that little confidence can be placed in any statement concerning onset of hearing loss, other than to say that there is some evidence to suggest that many people wait a very long time before doing anything about their hearing loss.

Table 9.6

Comparison of two questions related to onset of hearing loss

Amount of time between realisation of hearing loss and contact with GP		Average length of time between onset of hearing loss and acquisition of a hearing aid
Within 6 months	51 (39%)	11.2 years
7 months to 3 years	44 (34%)	9.4 years
Over 3 years	36 (27%)	20.5 years
	131 (100%)	13.2 years

NB: These figures are based on two hospitals only, as explained in the text.

Difficulty in obtaining reliable information in this area may be due to a variety of reasons which possibly act both independently and interactively. It may be difficult for an individual to know exactly when hearing ceased to be normal, especially if the loss has been insidious. Another possibility is that asking people when they first had trouble with their hearing is not the same as asking them when they realised they had a hearing loss. Many respondents may have experienced trouble with hearing when they were children, which may temporarily have affected their hearing. Such temporary hearing losses may or may not be causally related to the onset of deafness which resulted in the prescription of a hearing aid some years later. Rigorous history taking, or preferably a large scale longitudinal study, would be needed to investigate the course of onset of an acquired hearing loss which leads to the acquisition of a hearing aid in adulthood.

Nevertheless, a significant proportion of the present sample appears to have experienced hearing loss for a considerable number of years before doing anything about it. There is evidence from a study on visual handicap (Abel, 1976) that a considerable time lapse between onset and referral may be a common feature of many handicapping conditions, especially where deterioration is gradual. Abel reported the length of time between onset of visual handicap and date of registration for the 103 respondents in her sample aged 40-64 as:

< 3 years	36 (35%)
3 years-9 years 11 mths.	24 (23%)
10 years +	43 (42%)

Finally, there does not appear to be a marked deterioration in hearing loss between testing 1 to 7 years previously at the hospital, and testing carried out for the present study. A comparison was possibly only at the two hospitals which provided audiograms (Table 9.7).

Table 9.7

Comparison of hearing loss between hospital audiogram and present study

Hospital	Hospital audiogram	Present study	Pearson Product Moment Correlation
No. 1 (n = 78)	46 (sd = 16)	51 (sd = 15)	r = 0.72
No. 2 (n = 89)	54 (sd = 17)	58 (sd = 18)	r = 0.78
Nos. 1 and 2 (N = 167)	50 (sd = 17)	55 (sd = 17)	r = 0.76

Scattergrams for each hospital taken separately and for the two hospitals taken together are given in Figures 9.1, 9.2 and 9.3. Very few people showed improved hearing, only four of more than 10 dB, and only one of these more than 15 dB. As might be expected, the majority show a small deterioration in hearing. Only 7 (4%) showed a deterioration of greater than 20 dB.

The audiometer used was calibrated before and after the study and showed that the readings were accurate. For the vast majority hearing appears to remain remarkably constant. It may even be the case that the small drop in mean dB score simply reflects the fact that audiometry for this study was carried out in quiet rooms while the audiometry for the hospital audiograms was presumably conducted in purpose built and soundproofed testing booths.

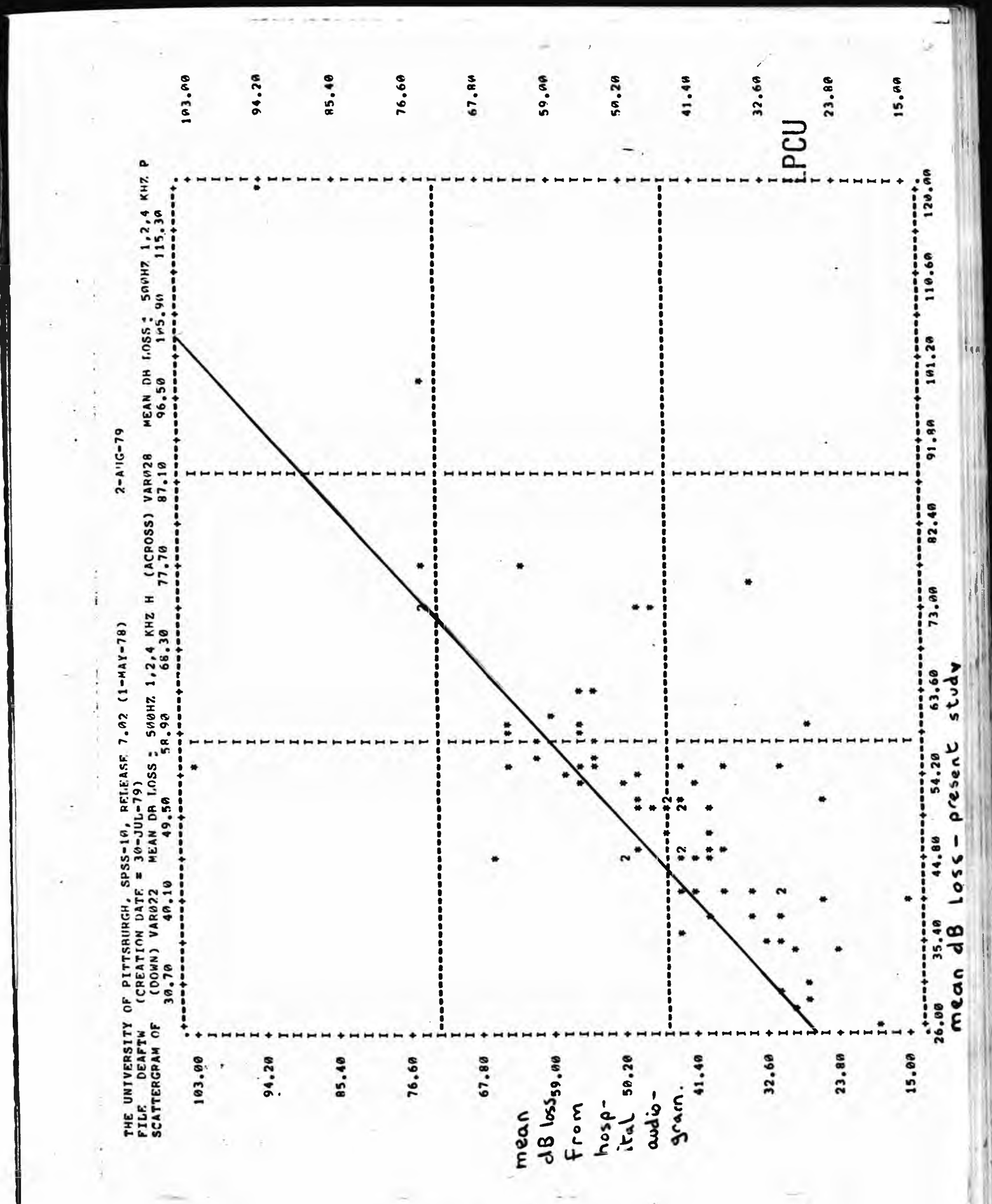

Fig. 9.1 Scattergram for mean dB loss (hospital no. 1) against mean dB loss (present study) : r = 0.72

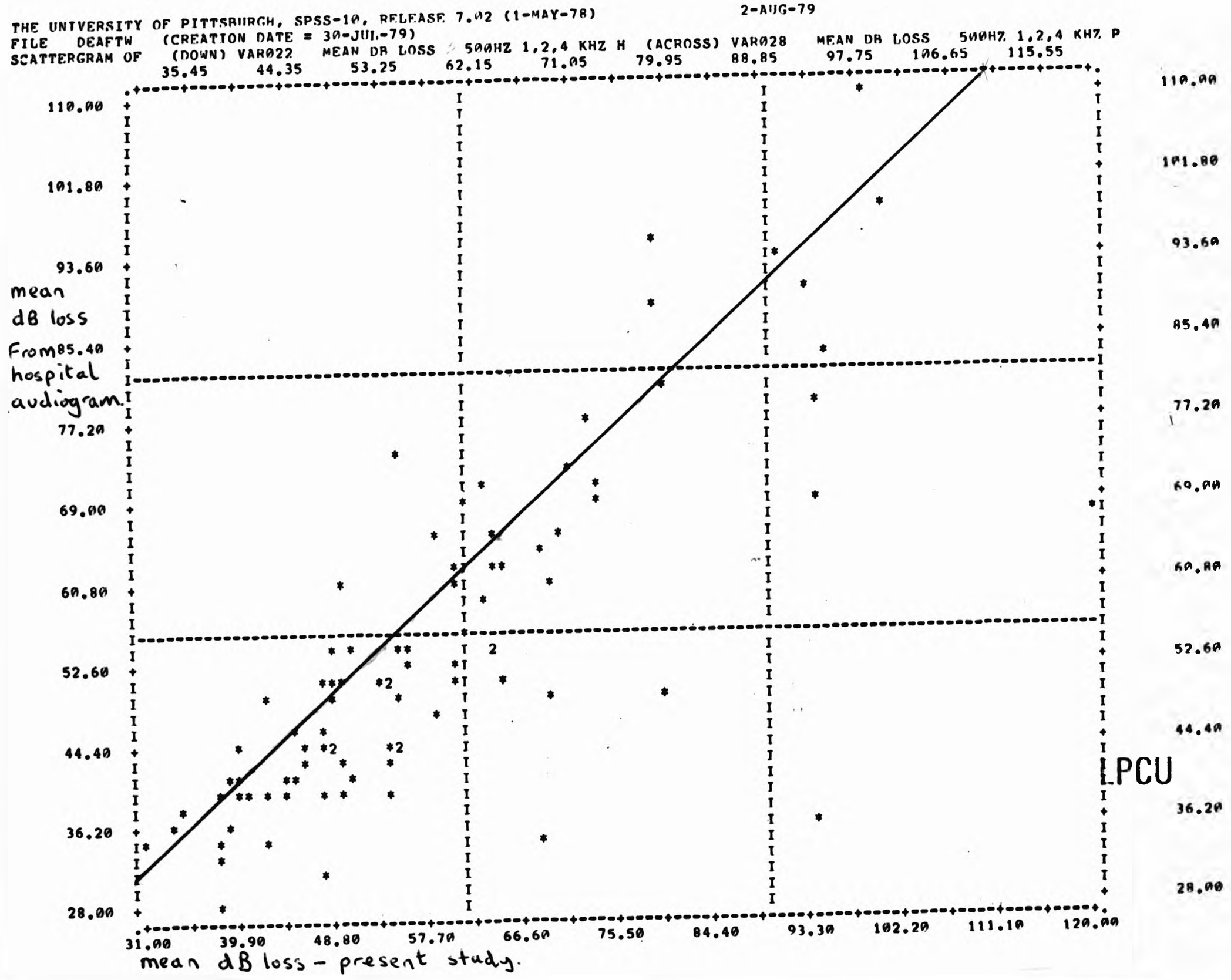

Fig. 9.2 Scattergram for mean dB loss (hospital no. 2) against mean dB loss (present study): r = 0.78

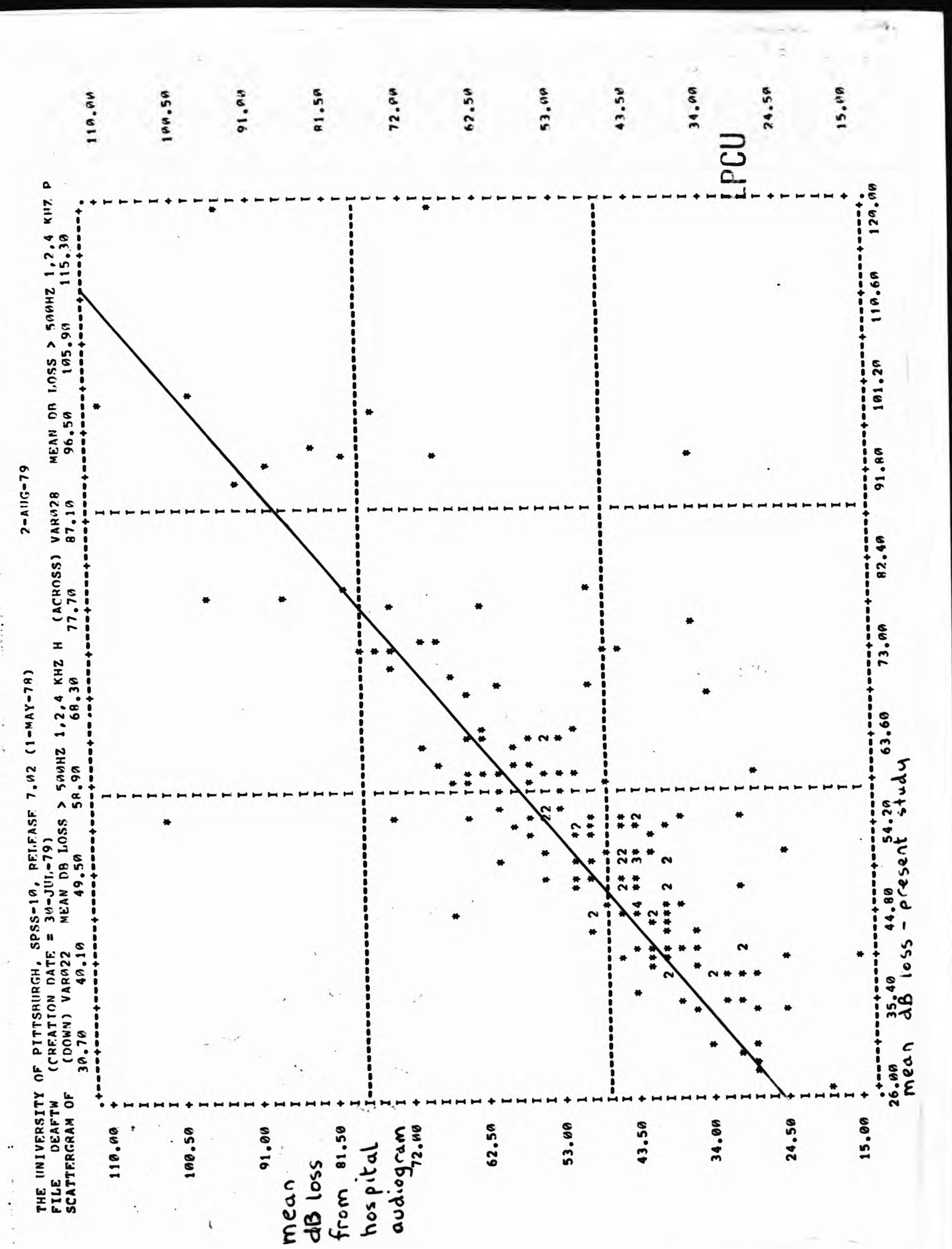

Fig. 9.3 Scattergram for mean dB loss (both hospitals) against mean dB loss (present study): r = 0.76

III. Measures of Hearing Loss

(i) Mean pure tone loss

Three measures of hearing loss were used, pure tone losses averaged over the speech frequencies, speech discrimination ability and a self estimate of hearing loss. Table 9.8(a) describes the mean pure tone loss distribution across the speech frequencies. Two thirds of the sample (140) may be described as moderately deaf, i.e. with a mean loss of between 40 dB and 69 dB. 16% of respondents were borderline deaf and 17% severely deaf with a mean loss of 70 dB or greater. Distribution of severity of loss is described in Table 9.8(b). It is interesting to note that while 11 men were profoundly deaf, only two women fell into this category. Otherwise the male and female ratios do not differ very greatly. The overall mean dB loss was 55 dB (sd = 18), for men 56 dB and for women 54 dB. Even this very small difference largely disappears if the men aged 60 to 64 are removed. It seems as if noise induced deafness for males who are more likely to work in a noisy environment is not an important factor, at least in this London based sample. Further evidence for this derives from the fact that social class is not related to dB loss if as it might be expected those in lower socio-economic groups are more likely to be working in a noisy environment (see Appendix E.1. for relevant Analysis of Variance).

Table 9.8(a)

Mean dB loss across the frequencies 0.5, 1, 2, and 4 kHz

	0-39	40-49	50-59	60-69	70-79	80-89	90+
Male	22	22	38	18	7	2	11
Female	12	30	21	11	12	3	2
Total	34	52	59	29	19	5	13
Cumulative (%)	26%	41%	69%	83%	92%	95%	100%

Table 9.8(b)

Distribution of severity of hearing loss

	Female	Male	Total
"Borderline" (≤ 39 dB)	12 (13%)	22 (18%)	34 (16%)
"Moderate" (40-69 dB)	62 (68%)	78 (65%)	140 (66%)
"Severe" (70-89 dB)	15 (17%)	9 (8%)	24 (12%)
"Profound" (90 dB+)	2 (2%)	11 (9%)	13 (6%)
	91 (100%)	120 (100%)	211 (100%)

The mean and standard deviations for dB loss at each frequency tested is given in Table 9.9. The overall mean loss was 55 dB (sd = 18 dB). Despite the fact that the sample was highly skewed for age, the dip at 4 kHz is not very marked. The correlation between age and mean dB loss at 4 kHz only was statistically significant ($p < 0.025$) but was still very small ($r = 0.14$).* The probable explanation for this is that the hearing impaired group is homogeneous with regard to age. Table 9.9 also shows that the slope of loss is significant at each frequency. Given the large standard deviations however any interpretation based on these differences would be of little value.

Table 9.9

Mean dB loss at each frequency tested (N = 211)

Frequency	0.5 kHz	1 kHz	2 kHz	4 kHz
Mean	49	51	55	63
s.d.	20	20	20	22
t tests:	$p < 0.05$		$p < 0.001$	$p < 0.001$

* The overall correlation between mean dB loss and age was 0.03.

(ii) Speech discrimination ability

Speech discrimination ability was measured with and without a hearing aid. Procedural details are given in Appendix D. The distribution of percentage phoneme scores is given in Table 9.10 both without the hearing aid and with the aid adjusted to a comfortable listening level.

Table 9.10

Frequency distribution of percentage phoneme scores on Boothroyd's PB Word Lists

	0-40%	41-70%	71-90%	91-100%	Total	Mean (sd) score
Without an aid	68 (32%)	50 (24%)	56 (27%)	35 (17%)	209 (100%)	56 (35)
With an aid	17 (9%)	29 (15%)	77 (41%)	65 (35%)	188 (100%)	79 (25)

NB: 23 people did not bring their hearing aid to the interview, 2 of whom were not tested in the "without an aid" condition.

There is no evidence that sex or social class is related to ability to discriminate speech, either in the aided or unaided condition (see Appendix E, 2 and 3 for Analysis of Variance).

(iii) Self estimate of hearing loss

The self estimate of hearing loss scale used was adapted from Wilkins (1948). Respondents were asked to estimate their hearing loss with and without an aid, on the "scale" in Table 9.11. The only real differentiation in the scale is (a) for those whose hearing is more or less normal suggesting that the scale may be useful as a screening device for those with hearing impairment, and (b) for some of those with very severe losses. Otherwise, the means for almost all the points on the scale fall well within one standard deviation from the overall mean of 55 dB (sd = 18).

Table 9.11

Self estimate of hearing loss with and without a hearing aid

		without aid	mean dB loss	with aid	mean dB loss
1.	Can you hear a whispered voice ?	5(2%)	29	37(18%)	47
2.	(Can you) hear easily in a hall, a cinema, or theatre?	5(2%)	46	53(26%)	56
3.	(Can you) hear easily in a group, where a few people are chatting together ?	11(5%)	50	28(14%)	50
4.	(Can you) hear easily someone facing you when they are speaking in a normal voice?	96(46%)	48	76(37%)	55
5.	(Can you) hear easily someone facing you when they are speaking in a loud voice?	74(35%)	60	9(4%)	83
6.	You cannot hear speech at all ?	20(10%)	78	1(1%)	98
		211		204*	

* Seven people stated that they never used their hearing aid.

NB: Respondents are allocated to the first question on the scale to which they answer "yes".

When a hearing aid is worn it appears that only 10 people claim to have problems when facing people in a 1:1 situation. It was certainly the impression of the interviewers that very few respondents experienced great problems for this kind of communication, although of course the interviewing conditions were near ideal, the subject matter was familiar and of obvious interest to the respondent. The figure of 10 is therefore likely to be realistic; the problems of course arise when communication is not of this kind and most of interpersonal communication is not. This is where any attempt at scaling becomes difficult because the scale is

perhaps an amalgam of two dimensions, one for general social situations and communication in which people are not facing each other and the other for the less typical situation with two participants face to face. Clearly it would have been more realistic to treat group situations separately and introduce a "quiet voice" between a whispered voice and a normal one. This was in fact attempted with the matched control group and as can be seen in Table 9.12, the progression from good to poor hearing is nearer to what might be expected especially if categories 2 and 3 are combined.

Table 9.12

Self estimate of hearing ability (NOP Matched Control Sample)

Category			
1.	Hearing is normal	284	68%
2.	Not normal but can easily hear a quiet voice	56	14%
3.	Can easily hear a normal voice but not a quiet voice	64	15%
4.	Can easily hear a loud voice but not a normal voice	10	2%
5.	Has great difficulty in hearing any speech	4	1%
		418	100%

Those who, in the NOP matched control group, admitted to some hearing difficulty were asked if they had "ever seen anyone" concerning their hearing. Their answers are given in Table 9.13. Interestingly, the scale does have face validity in that consultation concerning hearing loss increased with severity. A unidimensional scale of this kind would possibly have yielded a better distribution of scores in the hearing impaired sample.

Table 9.13

Respondents in NOP Matched Control Group (with a hearing problem) who had consulted someone concerning their hearing

Category		n	consulted someone: yes	no
2.	Hearing not normal but can easily hear a quiet voice	56	17 (30%)	39
3.	Can easily hear a normal voice but not a quiet voice	64	35 (59%)	26
4.	Can easily hear a loud voice but not a normal voice	10	7 (70%)	3
5.	Has great difficulty in hearing any speech	4	4 (100%)	0
		134	66 (49%)	68

NB: Seven respondents had a hearing aid. Three of them were in Category 5, three in Category 4 and one in Category 3.

On the other hand the possible danger of using self estimates of any handicap has been underlined by Cullinan (1977) who concluded that:

> "no question, open or closed, directive or non-directive, can be used to estimate with any accuracy either distant or near visual acuity".

It must be remembered though that the main purpose of the self estimate in this study concerns its relationship with social and psychological variables and not so much the extent to which it relates to other indices of hearing loss.

(iv) Relationship between hearing loss measures

From Table 9.14 it will be seen, despite the drawbacks described above, that there are reasonable correlations between mean dB loss and self estimate without a hearing aid, and between unaided speech discrimination and self estimate without a hearing aid. The correlation between aided speech discrimination and self estimate with a hearing aid is much lower. It seems therefore that a self

estimate scale based on Wilkins may not be very useful as a measure of hearing ability for hearing aid wearers, as indeed it was not intended to be.

Table 9.14

Correlations between self estimate and other measures of hearing loss

(Pearson Product Moment Correlations)

Self estimate without a hearing aid	by mean dB loss:	r = 0.51
	by unaided speech discrimination:	r = 0.54
Self estimate with a hearing aid	by mean dB loss:	r = 0.26
	by aided speech discrimination:	r = 0.30

Pure tone audiometry and speech discrimination testing were carried out in quiet rooms and not in audiometric booths. This could arguably have led to lesser reliability of the measures used. However, the correlation of 0.76, described earlier in this Chapter, between hospital audiograms and audiograms carried out as part of this study shows that testing under such conditions does appear to be reliable, especially when allowance is made for the fact that between 1 and 7 years had elapsed between testing. Further evidence for the reliability of testing derives from a comparison with a study carried out by Tonning (1978). He explored the relationship between speech discrimination and mean dB loss under far more rigorous conditions than were employed in the present study (including testing in a soundproofed room). For his study the output of the speakers was 65 dB SPL (compared with 65 dBA for this study) but Tonning used two speakers whereas in the present study only one was used which was incorporated within a tape recorder. The findings from the two studies are compared in Table 9.15. The correlations for the present study are based on 0.5, 1 and 2 kHz only, as were Tonning's. Excluding the frequency of 4 kHz made very little difference however for the correlations which included 4 kHz were r = 0.72 without an aid and r = 0.63 with an aid. (See Figures 9.4 and 9.5 for the relevant scattergrams).

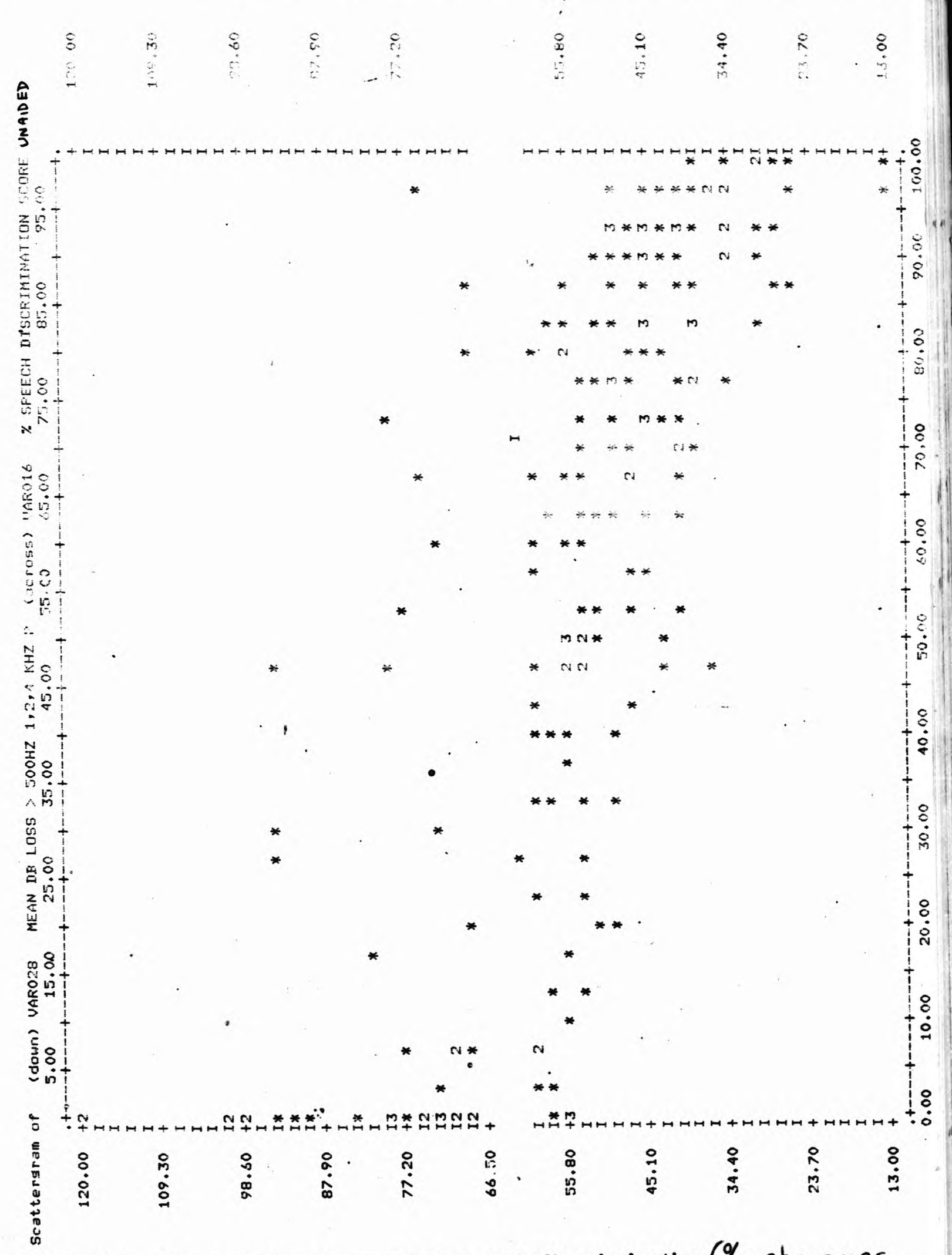

Fig. 9.4. Mean dB loss by unaided speech discrimination (% phonemes on Boothroyd Word Lists)

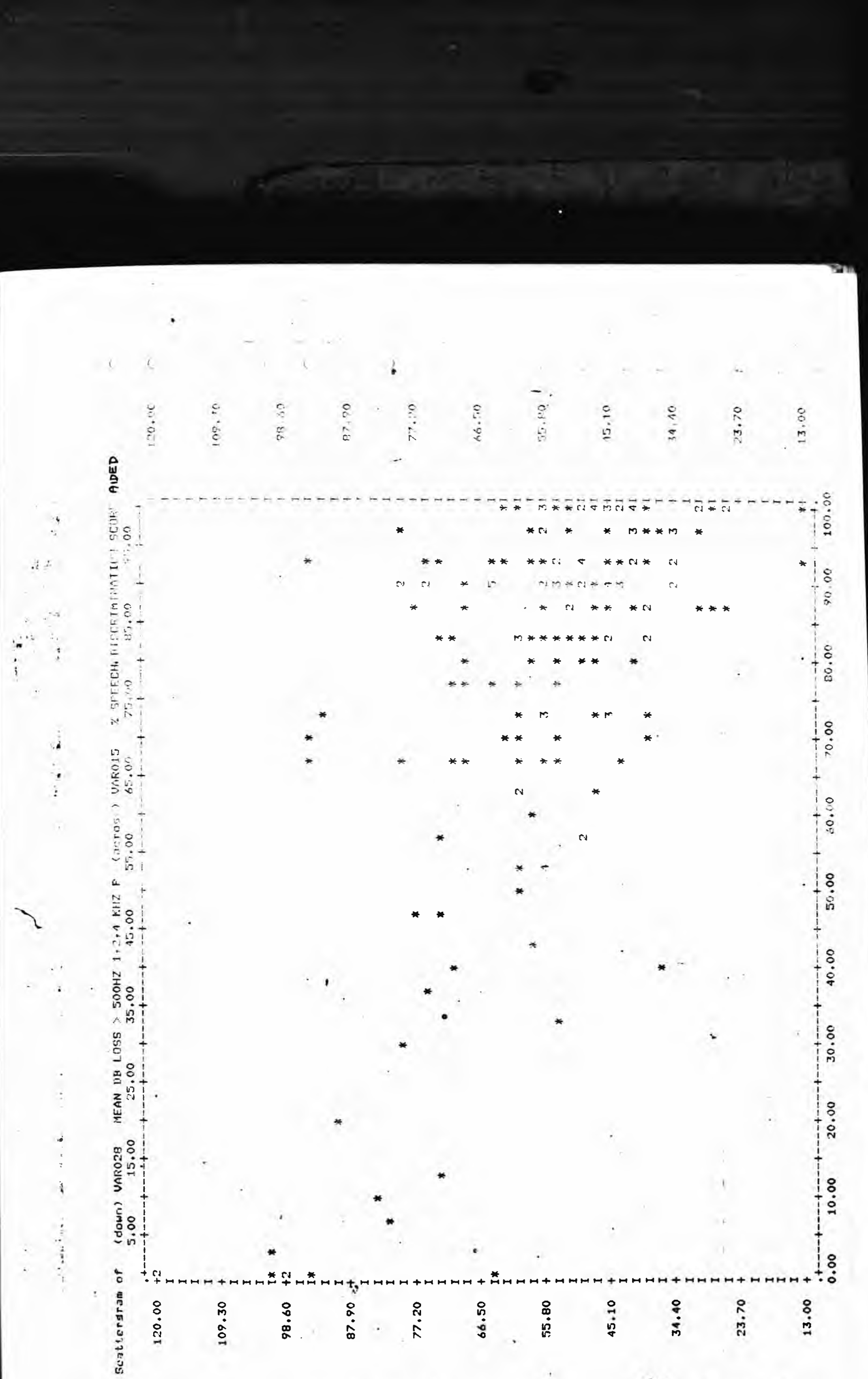

Fig. 9.5. Mean dB loss by aided speech discrimination (% phonemes on Boothroyd Word Lists)

Table 9.15

Comparisons of correlation coefficients between mean dB loss and speech discrimination (free field) for Tonning (1978) and this study

Without hearing aid:	Tonning	r = 0.72
	This study	r = 0.68
With a hearing aid:	Tonning	r = 0.58
	This study	r = 0.57

The correlation between aided and unaided speech discrimination ability in the present study was r = 0.56.

While meticulous measurement of degree of hearing loss was not the central purpose of this study it seems from the above that, with the possible exception of self estimate, the audiometric data is reliable despite not being obtained under laboratory type conditions.

IV. The Hearing Aid

At the time of interview 111 respondents possessed a postaural hearing aid and 100 a bodyworn one. Of the total sample, 58 respondents also owned a private hearing aid. Table 9.16 shows how the introduction of the postaural aid has increased the amount of time the aid is worn. An analysis of Variance (Appendix E, 4) shows that the amount of time an aid is worn is significantly related to mean dB loss ($p < 0.001$), controlling for type of loss, type of aid, sex and age. While statistically significant however, the differences do not appear large enough to allow for any conclusive interpretation.

Table 9.16

Amount that a hearing aid is worn for NHS bodyworn aid owners, and postaural aid owners

Aid	Always	Often	Some-times	Rarely	Never	Mean dB loss
NHS bodyworn (n = 98)	10%	17%	21%	16%	35%	59 dB
NHS postaural (n = 111)	38%	21%	25%	12%	5%	51 dB
Mean dB loss	64	53	52	51	49	

The amount of time that an aid is worn is not necessarily indicative of genuine hearing aid benefit. A different approach entailed the measure of improvement in speech discrimination ability when a hearing aid is worn.

For the sample as a whole the following results were obtained:

21 (10%) heard worse with an aid than without.

29 (9%) obtained no increment in their ability to discriminate speech when wearing an aid.

38 (18%) obtained an increment of 10% phoneme discrimination ability or less with an aid (this was based on a maximum score of 83% without the aid).

Thus 37% of the 188 respondents who brought their aid to the interview appeared not to benefit, or to benefit little from its use. Of the 29 of these who had a conductive loss only 5 (17%) appear to obtain little or no benefit, suggesting that, as might be expected, conductive hearing loss is more amenable to hearing aid amplification. When those with a conductive loss are excluded from this analysis, 159 respondents with mixed and sensorineural loss remain, 74 (47%) of whom obtain little or no benefit from a hearing aid.

V. Type of hearing loss and speech discrimination ability

An analysis of the audiograms was carried out in order to establish type of hearing loss. See Appendix D for procedural details. The distribution of type of hearing loss was as follows:

type of loss	n	mean dB loss
Sensorineural	125 (59%)	53 dB
"Mixed"	57 (27%)	53 dB
Conductive	29 (14%)	57 dB

Those with a conductive impairment did not have a significantly greater mean dB loss. (Appendix E, 17).

The relationship between type of hearing loss and speech discrimination ability was examined. Table 9.17 gives the mean speech discrimination score for each type of loss, with and without a hearing aid.

Table 9.17

Mean speech discrimination score by type of hearing loss

	mean speech discrimination score (% phonemes)	
type of loss	unaided	aided
sensorineural	56	78
"mixed"	54	82
conductive	43	85

An Analysis of Variance (Appendix E, 5) was carried out on the gain scores, with the following factors and covariates:

Factors:	type of deafness
	type of hearing aid
	amount of time hearing aid is worn
	sex
Covariates:	age
	mean dB loss

The only significant main effect was due to type of deafness. Mean dB loss was, as expected, a highly significant covariate: age was not. There was no significant interaction involving type of deafness. The mean gain scores, adjusted for independent factors and covariates were as follows:

sensorineural:	23%
"mixed":	26%
conductive:	40%

While those with a conductive hearing loss are expected to make better use of a hearing aid, it is a little surprising that their performance without an aid is almost significantly worse ($p < 0.1$) though with an aid it is significantly better ($p < 0.01$), once again controlling for age and mean dB loss (see Appendix E, 6 and 7).

It is possible that the analyses described above are affected by the inclusion of those with marginal or very severe hearing losses. The former will have very little difficulty in discriminating speech, even in the unaided condition; the latter will consist of respondents with predominantly sensorineural losses who will have extreme difficulty, even in the aided condition. It will be recalled from Table 9.10, that 9% of the sample heard less than 40% phonemes in the aided condition, and that 17% scored over 90% in the unaided condition. Gain scores for these respondents might not be very meaningful.

In order to examine the relationship between type of hearing loss and speech discrimination ability on a more homogeneous sample, results for the 140 respondents with losses between 40 and 69 dB were analysed. Mean dB loss by type of loss was as follows:

sensorineural (n = 77)	52 dB (sd = 7)
"mixed" (n = 43)	53 dB (sd = 8)
conductive (n = 20)	53 dB (sd = 7)

Table 9.18 gives the mean speech discrimination score for each type of loss, with and without a hearing aid.

Table 9.18

Comparison of speech discrimination scores, with and without a hearing aid, for those with conductive, mixed and sensorineural hearing losses (sample restricted to those with mean loss between 40 and 60 dB)

a) without a hearing aid

Type of loss	n	mean speech discrimination score (% phonemes)	
conductive	20	39	(sd = 35)
mixed	42	61	(sd = 31)
sensorineural	77	59	(sd = 27)

t - tests: conductive/mixed, $t = 2.46$, $p < 0.02$
conductive/sensorineural, $t = 2.49$, $p < 0.02$
mixed/sensorineural, $t = 0.48$, NS.

b) with a hearing aid

Type of loss	n	mean speech discrimination score (% phonemes)	
conductive	19	88	(sd = 13)
mixed	39	85	(sd = 18)
sensorineural	66	85	(sd = 16)

t - tests: conductive/mixed, $t = 1.08$, NS
conductive/sensorineural, $t = 1.71$, NS
mixed/sensorineural, $t = 0.28$, NS

An Analysis of Variance (Appendix E, 8) of gain scores (adjusted as for the analysis pertaining to the whole sample) was as follows:

sensorineural:	27%
"mixed":	24%
conductive:	44%

thus confirming the finding for the sample as a whole, described above.

Once again, the finding that those with a conductive loss score less in the unaided condition is confirmed, significantly so. Given that speech output was at 65 dB (A) at one metre it may simply reflect the possibility that for a number of respondents

with conductive losses, speech was simply at a level below threshold for the unaided condition. For those with a loss between 40 and 54 dB, mean speech discrimination score was 63 (n = 10) ; for those with a mean loss of between 55 and 69 dB the mean speech discrimination score was 14 (n = 10), thus supporting the notion of a simple threshold. The trend while similar was not so marked for those with a sensorineural loss. Those with a sensorineural loss of between 40 and 54 dB had a mean speech discrimination score of 68 (n = 39) and those with a mean dB loss between 55 and 69 dB had a mean speech discrimination score of 41. The trend appears to be the same though not so clear cut as for those with conductive losses.

A substantial proportion of the sample obtained little or no benefit from hearing aid usage, most of whom had sensorineural or mixed losses (see previous section). It was possible that respondents with sensorineural/mixed losses divided into two distinct groups, those who gained little or nothing and those who gained a great deal possibly as much as those with conductive losses. An Analysis of Variance, similar to the above, was carried out on the section of the sample with mean losses between 40 and 69 dB, further restricted by the exclusion of those who obtained little or no benefit from their aid. The effect of type of hearing loss was still almost identical.

To summarise, those with a conductive hearing loss obtain much greater benefit from a hearing aid than do those with a mixed/sensorineural hearing loss, though only when benefit is measured in gain scores between unaided and aided speech discrimination. In the unaided condition those with conductive losses have poorer speech discrimination scores; in the aided condition mean scores for those with conductive and mixed/sensorineural losses are virtually identical.

CHAPTER TEN

PSYCHOLOGICAL IMPLICATIONS OF ACQUIRED DEAFNESS

I. Psychological Disturbance

Out of the sample of 211 hearing impaired adults of employment age 205 completed the short version of the Delusions Symptom Sign Inventory, the SAD, which consists of the subscales of anxiety and depression (Bedford and Foulds, 1978). Of the 6 who did not complete the inventory 2 could not follow the instructions, 2 were illiterate and 2 refused. A summary distribution of scores, which includes a comparison with normative data, is given in Table 10.1, classified according to Bedford and Foulds' suggestions; thus a score of 0 - 2 indicates normality, a score of 3 - 6 is intermediate and a score of 7+ indicates psychological disturbance. It will be noted that 19% may be described as disturbed with a further 20% in the intermediate category. The criterion score of 7+ is the one which best discriminates the general population from psychiatric patients. The complete distribution of scores is given in Figure 10.1.

Table 10.1

Frequency distribution of scores on the psychiatric inventory (SAD)

Psychiatric inventory score	General population	Psychiatric patients	Hearing impaired respondents	
0 - 2	81%	12%	61%	(125)
3 - 6	14%	14%	20%	(41)
7+	5%	75%	19%	(39)

The proportion screened disturbed in the hearing impaired sample with a score of 7+ was found to differ significantly from the general population in the normative study (Chi square = 37.4, $z = 4.66$, $p < 0.001$).

FIGURE 10·1

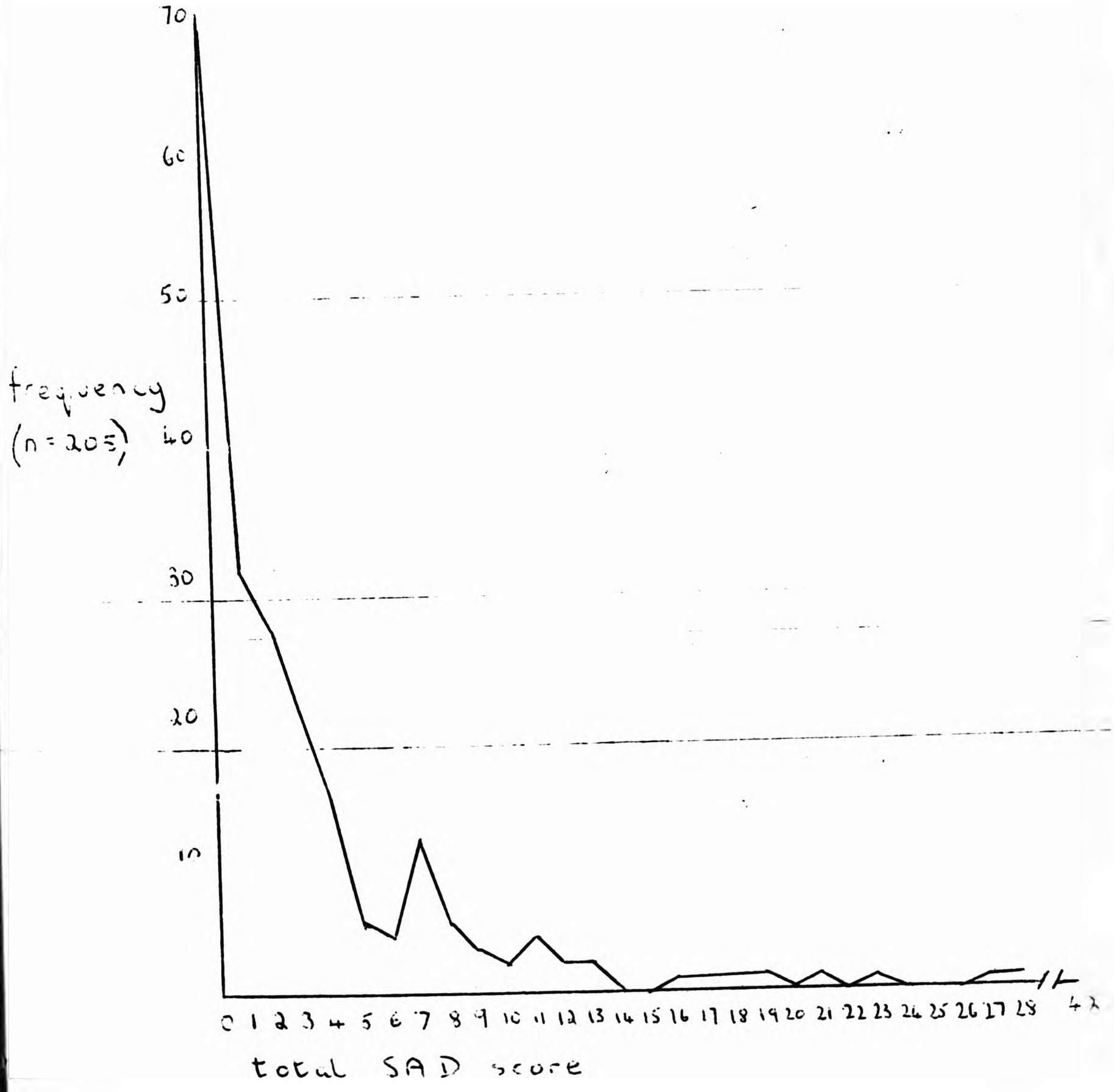

Fig. 10.1 **Frequency distribution of total SAD scores**

As mentioned above, the SAD consists of the two sub-scales of anxiety and depression. The distribution of scores for these two scales taken separately is given in Figure 10.2. They were found to intercorrelate highly (r = 0.70) which compares with an intercorrelation of 0.69 in the normative study. The correlations between the anxiety score and the overall SAD score was 0.92 and between the depression scale and the SAD score, 0.93.

demographic factors

The proportion of psychologically disturbed patients in each age group, taking sex into account, is given in Table 10.2. Unfortunately, Bedford and Foulds do not provide age related normative data, other than to give the mean age of the normal sample as 30.4 (sd = 10.2). Thus two thirds of the normative sample are probably between 20 and 40 while two thirds of the hearing impaired sample are known to be over 50. However, Shepherd et al (1966) in a general practice study found the proportion of psychological illness to be fairly constant between 25 and 65. Similarly Goldberg (1972) found no relationship between psychiatric disturbance and age in a major normative study of 553 adults between the ages of 15 and 74.

In a recent validation study of the Middlesex Hospital Questionnaire (Crisp et al, 1978b) it was found that scores on a scale for anxiety did not change with age for males, but decreased with age for females after reaching a peak between 30 and 39 years of age; with regard to depression however there was a gradual increase in scores with age.

The studies of Shepherd, Crisp and Goldberg, taken together give no support to the possibility that psychological disturbance might increase with age, with the exception of Crisp's depression scale. The depression scale in the Middlesex Hospital Questionnaire consists of 8 items including:

FIGURE 10·2

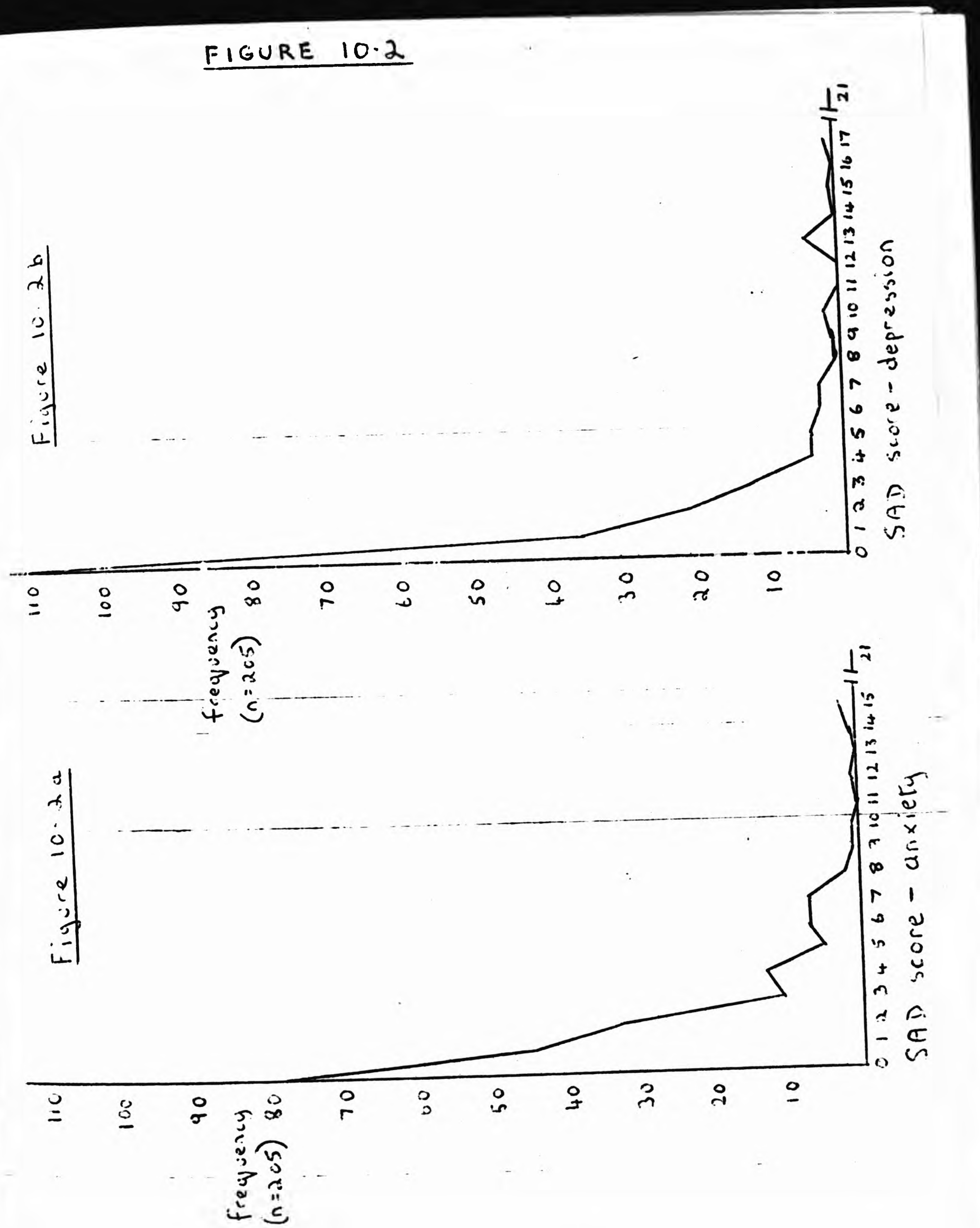

Fig. 10.2a. Frequency distribution for SAD anxiety scores.

Fig. 10.2b. Frequency distribution for SAD depression scores.

a) Can you think as quickly as you used to ?

b) Do you regret much of your past behaviour ?

The mean scores for depression varied between 2 for younger and 4 for older respondents, so it is distinctly possible that the above items contributed to the relationship with age.

It appears therefore that the age bias in the hearing impaired sample should not prejudice comparison with norms based on a predominantly younger group. In fact it is likely that any error arising from such a comparison will be contra-hypothesis, for Goldberg (1972) found that his General Health Questionnaire selected a disproportionate number of young normals as false positives. This means that the 5% of the general population identified by the SAD as psychologically disturbed may represent an exaggeration.

Table 10.2

Proportion psychologically disturbed by age by sex

Age	Sex: Male	Female
16 - 29	3 out of 6 (50%)	2 out of 5 (40%)
30 - 59	9 out of 73 (12%)	20 out of 84 (24%)
60 - 64 (male only)	5 out of 37 (14%)	

The problem of comparison with normative data is also complicated by the sex distributions of the SAD normative sample and the hearing impaired sample. For while the male/female ratio for the SAD normative sample is 1:1, in the hearing impaired sample it is 1:2, at least for the majority (77%) between 30 and 59 years of age. Shepherd, Goldberg and Crisp et al have also found the proportion of females to be significantly higher. With regard to normative data for the present study it is not known whether males are overrepresented or females underrepresented.

It will be recalled from Chapter Nine that there is a highly significant social class bias towards the upper social classes in the hearing impaired sample. Crisp et al (op cit) found that people in the lower social classes had higher scores on most of the Middlesex Hospital Questionnaire scales, including anxiety and depression; the difference was significant for males only for the depression scale and females only for the anxiety scale. In an American based study with the General Health Questionnaire, Goldberg (1972) found that psychiatric disturbance was signifcantly less prevalent in upper social classes, though there was no difference in a London-based study.

For the hearing impaired sample there was no relationship between social class and psychological disturbance for the three levels of psychological disturbance against social class (Appendix E, 9). When the table is collapsed 20% the social classes I to III N and 22% of social classes III M to V are psychologically disturbed (Chi Square = < 1, NS).

Overall then, it seems unlikely that demographic biases in the hearing impaired sample contribute to the proportion of respondents identified as psychologically disturbed.

Other factors affecting the proportion of psychologically disturbed respondents:

There are a number of reasons for believing that the proportion identified as psychologically disturbed in the hearing impaired sample may be an underestimate.

Firstly, the SAD stresses recency of signs and symptoms thus possibly missing longstanding disorders, a drawback shared with Goldberg's General Health Questionnaire, discussed in Chapter Seven.

Secondly, at one of the hearing aid clinics from which the sample was drawn, the senior ENT consultant believed that patients known already to have social and psychological problems should not be interviewed by non-medical personnel. They were thus excluded from the sample lists which the hearing aid clinic provided for the study. Unfortunately it has not been possible to find out how many were excluded on this basis.

Thirdly, the SAD (as mentioned in Chapter 7) appears more overtly psychiatric than the General Health Questionnaire (Goldberg, 1972). As might be expected it identifies 5% of the general population while the General Health Questionnaire has been shown to identify 16% in a community prevalence study in Australia (Finlay-Jones et al, 1977) and 12% in this country (Goldberg et al, 1976).

It may of course be the case that the proportion of 19% who are disturbed may in part reflect the fact that hearing impaired people are "patients". For example, outpatients and general practice attenders are known to be more psychologically disturbed than the general population (Goldberg et al, 1976). However, almost all of the hearing impaired sample had ceased to be patients in the usual sense, contact with the hearing aid clinics being maintained for practical rather than medical reasons, for replacement and repair of aids and for the issue of batteries.

item analysis:

A more serious argument concerns the possibility that items which purport to measure psychological disorder will mistakenly include psychologically normal people who have a hearing loss. This issue was dealt with at some length in Chapter 6. Before the main fieldwork stage was carried out a number of people, both professional and lay, were asked if they thought that any of the items on the SAD might contribute to a mis-classification. The only item mentioned was no. 9:

> "Recently I have had a pain or tense feeling in my neck or head".

Before examining the effect of this item on the scale it is necessary to understand the scoring system used for the SAD. In all there are 14 questions and each question has four levels of severity: 0, 1, 2 and 3. A score of 0 indicates that the symptom is not present. Each item which is then agreed is true is further graded for severity from 1 to 3 with 3 being the most severe. Thus the maximum score is 14 x 3 = 42. The cut off used in this study is 7, the criterion which best discriminates the general population from psychiatric patients.

Unfortunately, Bedford and Foulds have not published an item analysis so it is not possible to know the extent to which the item contributes to psychological disorder in the general population. Nevertheless, it can be seen from Table 10.3 that for the whole sample, the Item (no. 9) does figure prominently. Overall it is checked to the same extent as is item no. 5, which is concerned with depression, and is believed by many to be the most common psychological consequence of an acquired hearing loss:

> Item 5: "Recently I have been depressed without knowing why".

Table 10.3

Frequency distribution of scores for the SAD (N = 205)

Degree of severity	Item no. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 (least severe)	34	20	29	28	47	10	20	23	48	21	34	9	20	9
2 (moderately severe)	15	10	5	11	12	4	10	10	16	10	13	13	7	4
3 (most severe)	3	0	2	3	6	0	0	2	3	6	1	1	2	2
Totals	72	40	45	59	89	18	40	49	89	59	63	38	40	23

NB: Totals are weighted, e.g.: the item 1 total of 72 is made up of 34 x 1, + 15 x 2, + 3x3.

It is possible then that item 9 on head pains might be agreed by hearing impaired people because of pains due to disorders associated mainly with hearing loss rather than psychosomatically associated with psychological disturbance.

However, when the 39 respondents screened as psychologically disturbed are treated as a separate subsample, item 9 does not figure prominently (Table 10.4), contributing less than item 5 and roughly the same as items 1, 4 and 10.

Table 10.4

Frequency distribution of scores of 7+ for the SAD (n = 39)

Degree of severity	Item no. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
1(least)	14	12	13	10	18	9	14	12	14	7	10	3	13	9
2	11	9	5	9	9	4	10	8	9	9	9	13	7	4
3(most)	2	0	3	5	0	0	2	3	6	1	1	1	2	2
Totals	42	30	29	37	51	17	34	34	41	41	31	32	29	23

More to the point, an attempt was made to see what would happen if item 9 were excluded for those who were psychologically disturbed. When this was done, 10 respondents ended up with a SAD score of 6 or less. However, if an item is taken out then it will presumably influence the cut off score. Because of this the criterion was reduced the least possible, by 1 point to 6. The result of this was that only 4 respondents now entered the normal category. However there were a further 2 respondents who were originally screened normal who had now become "abnormal" with a score of 6 which did not include a contribution from item no. 9. The net loss would therefore have been 2.

Overall, then, the exclusion of item 9 would have led to 37 disturbed respondents (18%) instead of 39 (19%). In a similar vein, the exclusion of item 5 (on depression) would have led to a loss of 2 disturbed cases. Again, the exclusion of item 1 which had the most similar pattern of severity of responses as item 9, would have led to the exclusion of a single case only. Thus item 9 is not one which contributes to the selective misclassification of hearing impaired people as psychologically disturbed insofar as this study is concerned.

Finally, for the sample taken as a whole the total score for item 9 was 89, for those who were identified as disturbed with a score of 7+ the total score was 41. This means that 54% of the total score for item no. 9 was attributed to those who were subsequently classified as psychologically normal. For the rest of the items taken together only 32% of the total score was attributable to the sector of the sample classified as normal. This difference is highly significant (Chi Square = 15.2, $p < 0.001$). It seems therefore that those who are deaf but psychologically normal are significantly more likely to agree item 9; this does not however lead to a greater probability of being identified as disturbed.

This analysis of the effect of item 9 serves to vindicate the choice of the SAD, for in an inventory with many such items the likelihood of misclassification might have been considerable.

II. Validity of the SAD in relation to other areas of the present study

In order to ensure that the inventory is in fact measuring psychological stress its relationship to other psychological variables in the study is examined. Then the relationship to everyday life domains is investigated. Finally in order to show that the relevant independent variable is hearing loss, the part played by physical disabilities and health trouble other than deafness is quantified.

Table 10.5 shows how the answers differed between the 166 screened normal and the 39 screened psychologically disturbed with regard to discrete questions in the interview schedule covering general psychological wellbeing. In a similar vein Table 10.6 compares the responses of the disturbed and normal sections of the sample with regard to indicators of stress in everyday life domains.

Table 10.5

Relationship between SAD and discrete questions related to psychological wellbeing

Question	Normal section of sample	SAD cases
Worry about being near to a nervous breakdown (Q. 68)	8% (13 out of 166)	46% (18 out of 39)
Consulted a doctor about a nervous problem (Q. 70)	30% (49 out of 166)	61% (23 out of 38)
Worry "a great deal" in general (Q. 69)	41% (63 out of 155)	84% (32 out of 39)
Sleep:		
a) trouble getting to sleep (Q. 64a)	10% (16 out of 165)	41% (16 out of 39)
b) trouble staying asleep (Q. 64b)	13% (21 out of 163)	33% (13 out of 39)

NB: In each case a x^2 was significant, $p < 0.01$

Table 10.6

Relationship between SAD and stress in everyday life domains

Domain	Question	Normal section of sample	SAD cases
Health	Dissatisfaction with state of health (Q. 66)	30% (49 out of 166)	69% (27 out of 39)
Social	Having no friends (Q. 44)	1% (2 out of 165)	24% (9 out of 38)
Family	Deafness adversely affects marriage (Q. 59)	20% (26 out of 130)	60% (15 out of 25)
Work	Hearing loss affects work (Q. 36)	13% (17 out of 133)	42% (11 out of 26)
At interview	Rated by interviewer as upset (p. 22 of questionnaire	10% (16 out of 164)	31% (11 out of 39)

NB: In each case a Chi Square was highly significant, $p < 0.01$.

It is clear that the SAD score is closely related to other psychological variables and perhaps more importantly, to everyday life domains. This is rather important in that it lends credibility to the interpretation of differences between the hearing impaired and general population control samples for the discrete questions contained in the questionnaire. The point is that it is obviously difficult to gauge the magnitude of any differences found between the hearing impaired sample and national or matched control groups in the areas of employment, social, and family life and for health and general wellbeing. While many of the differences may be shown to be statistically significant the degree of psychological or social significance will remain unknown. If those respondents who appear to enjoy a poorer quality of life (in the various life domains) are significantly more likely to be psychologically disturbed however, then it can be inferred with greater confidence that the differences are behaviourally as well as statistically significant.

The part played by independent variables other than deafness is now considered. The point is that deafness may not be the causal factor, or may be one of a number of factors related to psychological disturbance in this sample. The Quality of Life Sample were asked:

> Do you yourself have any longstanding physical disability or health trouble ? (Q. 63)

The hearing impaired sample were asked the same question except that they were instructed to exclude hearing impairment. The GLIM analysis is summarised in Table 10.7. As might be expected there is a significant age/physical disability interaction. In other words, as respondents get older they are more likely to suffer a further physical disability or health trouble. Even after this has been taken into account however there is still a

highly significant interaction between survey and physical disability or health trouble. Thus the hearing impaired are more likely to suffer a second disability or health trouble than the general population are to suffer a first one.

Table 10.7

GLIM analysis of differences in presence of physical disability or health trouble between the Hearing Impaired Group and the Quality of Life sample (control group)

Interaction effects	df	Deviance (Chi Square)	Level of significance
Sex/physical disability or health trouble	2	3.9	NS
Age/physical disability or health trouble	6	75.91	0.001
Survey/physical disability or health trouble	2	25.13	0.001

NB: The higher order 3-way interactions were all insignificant.

Given this difference it was now important to investigate the relationship between the second disability or health trouble and the SAD score. A self estimate of eyesight ability was also taken into account in the GLIM analysis on the basis that visual impairment might contribute to psychological disorder. In Table 10.8 all the two way and three way interactions which include the SAD score are given. It is obvious that the only interaction which stands out is that between the SAD and mean dB loss. Furthermore this interaction appears to exhaust the deviance in that the three way interactions are insignificant. It seems fair to conclude that psychological disturbance is related to deafness and not to any other form of physical disability or health trouble and not to eyesight. As has been pointed out however, self assessment of eyesight is rather unreliable (Cullinan, op cit).

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Table 10.8

GLIM analysis of physical disability (2 levels), SAD score (3 levels), mean dB loss (3 levels) and eyesight (2 levels)

Effects	df	Deviance (Chi square)	Level significance
SAD/physical disability	1	0.08	NS
SAD/eyesight	1	2.12	NS
SAD/mean dB loss	2	11.04	0.01
SAD/mean dB loss/ eyesight	2	0.34	NS
SAD/physical disability/ eyesight	1	3.09	NS
SAD/physical disability/ mean dB loss	2	0.03	NS

Finally, the response pattern to certain items of the SAD serves to underline its validity. The two most overtly psychiatric items were agreed almost exclusively by those who were classified as psychologically disturbed:

Item 6: Recently I have gone to bed not caring if I never woke up.

Item 14: Recently I have been so depressed that I have thought of doing away with myself.

Item 6 was agreed by 14 respondents and item 14 by 10. Only one person of those who were classified normal agreed to item 6 and not one to item 14.

To summarise, the SAD measure does appear valid in that it is related firstly to questions in the interview schedule on psychological wellbeing, and to ones indicative of stress in everyday life. Other physical disabilities or health troubles, although more prevalent than in the general population, do not appear to influence the SAD score. Finally, the most overtly psychiatric items are agreed only by those who were classified as psychologically disturbed.

III. Psychological disturbance and degree of deafness

The criterion of deafness for inclusion in the sample was based solely on the issue of a hearing aid. The range of hearing loss was therefore very wide and a central question concerned the relationship between degree of loss and psychological disturbance. An Analysis of Variance on mean dB loss (Appendix E, 10) shows psychological disturbance as a significant main effect ($p < 0.02$). When scores are adjusted for age, sex and social class, the mean hearing loss for those who are psychologically disturbed with a SAD score of 7+ is 61 dB. For those who are not psychologically disturbed the mean is 51 dB. Table 10.9 gives a more detailed breakdown of the relationship between mean dB loss across the speech frequencies and the SAD.

Table 10.9

The relationship between mean dB loss and the SAD

Result of SAD		mean dB loss ≤49(mild)	50-69(moderate)	70+(severe)
	(norm)			
normal	(20)	72	75	19
SAD cases	(380)	14	12	13
Totals	(400)	86	87	32
% SAD cases	(5%)	17%	14%	41%

The proportion of SAD cases with a severe pure tone loss differed significantly from those with mild and moderate losses taken together (Chi Square = 11.48, $p < 0.001$).

It is obvious that the relationship is not linear. However, the proportion of psychologically disturbed cases only increases for those with a mean loss in excess of 70 dB. An Analysis of Variance of mean dB loss confined to those with a mean hearing loss of less than 70 dB showed no evidence whatsoever of a relationship between degree of loss and psychological disturbance (Appendix E, 11).

Analyses of Variance (Appendix E, 12 and 13) on unaided and aided speech discrimination ability showed that psychological disturbance was a significant factor. However when the covariate of mean dB loss was introduced into the analysis the part played by the SAD score was found to be insignificant (Appendix E, 14 and 15). Neither was the SAD score a significant factor in an Analysis of Variance of speech discrimination gain scores (Appendix E, 16).

For aided speech discrimination the level of significance was $p < 0.15$ suggesting that there might possibly be an effect related to a subsample, obscured by analysis based on the whole sample. The relationship between aided speech discrimination ability and psychological disturbance is broken down in Table 10.10. The breakdown suggests that "poor" speech discrimination is associated with psychological disturbance.

Table 10.10

Relationship between speech discrimination ability and the SAD

	Speech discrimination ability (aided)		
Result of SAD	"good" 91-100% phonemes correct	"fair" 71-90% phonemes correct	"poor" ≤70% phonemes correct
normal	54	63	31
SAD cases	9	13	13
Total	63	76	44
% SAD cases (norm = 5%)	14%	17%	30%

NB: The proportion of "poor" discriminators who were SAD cases did not differ significantly from that for the "fair" ones. It did however differ significantly from the proportion of SAD cases among the "fair" and "good" discriminators taken together: Chi Square = 4.06, $p < 0.05$. Those who did not bring an aid to the interview are not included in this table. In all there were 22 such people, 4 (18%) of whom were found to be psychologically disturbed.

In order to investigate the relationship between mean dB loss, speech discrimination and the SAD in greater depth, a two-way Analysis of Variance was carried out on aided speech discrimination scores with the SAD and degree of hearing loss as main factors. Both main effects were found to be significant, though the SAD factor was only significant at the 0.1 level. The interaction between mean dB loss and the SAD was also significant (Appendix E, 19). The following breakdown enables us to see the main source of the interaction - it is the SAD cases with a loss of 70 dB or greater who have lower speech discrimination scores:

	mean dB loss				
result of SAD	≤39	40-49	50-59	60-69	70+
normal	91	90	81	77	62
SAD cases	88	91	85	74	36

NB: The variable which is averaged is percentage speech discrimination score when wearing a hearing aid.

This interpretation was confirmed by a repeat Analysis of Variance which excluded those with mean hearing losses of 70 dB+. From this analysis it will be seen that the SAD factor loses its significance as does the 2-way interaction between degree of hearing loss and the SAD (Appendix E, 20). It appears therefore that the relationship between the SAD and speech discrimination holds only for those with severe dB losses.

In order to measure the combined effect of severe pure tone loss and poor speech discrimination on the SAD the 32 people with a mean dB loss of 70 or more were examined. (In all, 37 respondents had a loss of 70 dB or more but 5 of them did not complete the SAD). Of the entire 32, 9 who appeared to have a surprisingly good speech discrimination score of more than 70% phonemes correct were then excluded. Twenty three were left who had a severe loss which was not compensated adequately by a hearing aid. Of these, two were illiterate and did not complete the inventory. The results for the other 21 are given in Table 10.11 along with two comparison groups, (a) of people with a moderate mean dB loss and good aided speech discrimination and (b) those who had EITHER a severe dB loss OR a poor speech discrimination score, but not both.

Table 10.11

Effect of combined measures of dB loss and aided speech discrimination ability on the SAD

Result of SAD	mild to moderate loss AND good speech discrimination	severe mean dB loss OR poor speech discrimination	severe mean dB loss AND poor speech discrimination
normal	109	32	9
SAD Cases	20	3	12
Total	129	35	21
% SAD cases (norm = 5%)	16%	9%	57%

The proportion of SAD cases of 57% differed significantly from that of 16% in the first column (Chi Square = 8.66, $p < 0.01$). The middle column was not included in the statistical analysis for reasons discussed in the text. Its exclusion decreased the possibility of obtaining a statistically significant difference.

The proportion of psychological disturbance increases dramatically for those who have a severe dB loss compounded by poor speech discrimination ability. For those who appear able to compensate for severe pure tone losses with reasonable speech discrimination scores it is understandable that they may not be disordered. Those with moderate pure tone losses and poor speech discrimination scores, are not disturbed - a finding which is puzzling and difficult to interpret. However, the relationship between "severe deafness" (as defined) and the SAD score still stands, and is the major finding of the study. This group of 23 people, defined by a combined measure of mean dB loss and speech discrimination ability are examined in greater detail in Section 7 of this chapter.

IV. Psychological disturbance and other deafness variables

(i) Type of deafness:

Sensorineural deafness may be accompanied by tinnitus, vertigo or recruitment. It is also commonly associated with sound distortion. It is therefore reasonable to expect that it will result in greater stress than will conductive hearing loss which attenuates rather than distorts sound and is therefore better compensated by a hearing aid, as demonstrated in the last chapter. In fact, a national survey aimed at assessing the need for rehabilitative provision for acquired deafness specifically excluded conductive hearing loss from its terms of reference (Ballantyne, 1975). Taking these considerations into account it is interesting that in the present study there is no evidence that conductive deafness is less stressful (Table 10.12). The interaction between type of loss and the SAD score in an Analysis of Variance of mean dB loss controlling for age was found to be insignificant (Appendix E, 17).

Table 10.12

Relationship between type of deafness and the SAD

Result of SAD	Type of deafness: Sensorineural	Mixed	Conductive
normal	101	42	22
SAD cases	22	10	7
Total	123	51	29
% SAD cases	18%	20%	24%

The proportion of SAD cases with sensorineural and conductive losses were not significantly different (Chi Square < 1).

Mahapatra (1974a; 1974b) found a significant degree of psychiatric disturbance amongst patients with bilateral conductive deafness who were awaiting curative surgery. While the measure used and the conditions under which the study was carried out are both open to question (see Chapter 6) it is nevertheless significant that such disturbance should have been found independently in this supposedly lesser handicapped group.

(ii) Tinnitus:

In all, 89 respondents suffered tinnitus, 17 (19%) of whom were identified by the SAD, the same proportion as for the sample overall. While it is obviously stressful to be subjected to "noises in the head" it does not seem that such stress leads to psychological disturbance. No attempt was made to quantify severity of tinnitus which could of course be a major factor in stress related to the condition.

(iii) Onset of hearing loss:

As Table 10.13 illustrates there is no apparent relationship between time of onset of hearing loss and the SAD.

Table 10.13

Relationship between years of trouble with hearing and the SAD

Years of trouble with hearing	n	SAD cases	% SAD cases
0 - 10	73	14	19%
11 - 30	79	17	22%
31 +	48	8	17%

The proportion of SAD cases did not differ significantly (Chi Square < 1).

These figures concerned with onset are very crude of course in that some respondents who had been deaf say for 20 years will have had a hearing loss since childhood while others will have been deaf only since their 30's. Nevertheless there seems to be no discernible pattern which distinguishes the psychologically disturbed from the rest of the sample. It is difficult to believe that the time since onset of hearing loss is unimportant for psychological well-being. However, the data relevant to onset of hearing loss did not appear valid when analysed in the previous chapter and so no conclusion concerning the relationship can be drawn.

(iv) Self estimate of hearing loss

Table 10.14a

The relationship between self estimate of hearing loss (Q.1) and the SAD

Result of SAD	Without hearing aid		With hearing aid	
	Categories 1-4 (lesser impairment)	Categories 5-6 (greater impairment)	Categories 1-3 (lesser impairment)	Categories 4-5 (greater impairment)
normal	99	67	100	62
SAD cases	18	21	17	19
Total	117	88	117	81
% SAD cases	15%	24%	15%	23%
	(Chi Square = 2.43, NS)		(Chi Square = 2.56, NS)	

Table 10.14b

Breakdown of relationship between self estimate of hearing loss and the SAD, controlling for mean dB loss

	without an aid			with an aid		
Self estimate	n	SAD cases	mean loss	n	SAD cases	mean loss
1. can hear whisper	5	1 (20%)	29 dB	36	3(8%)	47 dB
2. can hear in hall etc.	5	0 (0%)	46 dB	53	10 (19%)	56 dB
3. can hear in group	11	2 (18%)	50 dB	28	4 (14%)	50 dB
4. can hear normal voice face to face	96	15 (16%)	48 dB	73	15 (21%)	53 dB
5. can hear loud voice face to face	71	14 (20%)	59 dB	8	4 (50%)	84 dB
6. cannot hear speech	17	7 (41%)	78 dB	-	-	-
(i) overall % of SAD cases = 19%						
(ii) mean dB loss = 54 dB						

In Chapter Nine it was concluded that the self estimate scale did not differentiate very well between dB losses, and that aided speech discrimination ability was very poorly correlated to self estimate of hearing loss when wearing an aid ($r = 0.26$). However, the possibility remains that the self estimate may have a validity independent of dB loss and speech discrimination ability. Table 10.14a shows that if this is the case then such validity is not related to psychological disturbance. The detailed analysis in Table 10.14b shows that the non-significant tendency in Table 10.14a is due to those who estimate their hearing loss as very severe, and even this can be seen to be the result of the known relationship between mean dB loss and psychological disturbance.

(v) **Hearing aid usage:**

Respondents who admitted that they made little use of their hearing aids (Q. 7) were not significantly more likely to show evidence of stress (measured by the SAD) than those who made regular use of their aids (Table 10.15).

Table 10.15

Relationship between hearing aid usage and the SAD

	Hearing aid used often or always	Hearing aid used sometimes, rarely or never
normal	74	91
SAD cases	15	23
Total	89	114
% SAD cases	17%	25%

(Chi Square < 1, NS)

(vi) **Hearing aid benefit:**

An attempt was made to measure hearing aid benefit using speech discrimination scores with and without an aid. It will be recalled from Section IV of Chapter Nine that 79 (37%) of the respondents appeared to obtain little or no benefit from the hearing aid. Of the 79, 4 did not complete the SAD. Sixteen (21%) of the remaining 75 were SAD cases. This proportion is very close to the 19% for the sample as a whole. Those who obtained a significant benefit from their hearing aid were therefore as likely to be identified by the SAD as psychologically disturbed as those who did not.

Similarly, it will be recalled from Section III of this chapter that the SAD was found to be an insignificant factor in an Analysis of Variance of speech discrimination gain scores.

V. Suspiciousness

Three very simple questions were asked which constituted the measure of suspiciousness (Q. 71):

1. Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people ?

2. Would you say that most of the time people try to be helpful, or that they are generally just looking out for themselves ?

3. Do you think that most people would try to take advantage of you if they got the chance or would they try to be fair ?

These questions had been asked of the general population on the Quality of Life Survey (SSRC Survey Unit, 1975a). A GLIM analysis which controlled for age and sex was used. No significant differences were found, nor even any indication of a difference, between the hearing impaired sample and the sample from the general population. It is highly unlikely that the answers to these questions were the result of any systematic response set because health and "wellbeing" questions asked just prior to the ones on suspicion were found to yield statistically significant differences when compared with the general population.

After treating each question separately and finding no differences, those who had answered all three questions in the "suspicious" direction were examined. Amongst the hearing impaired, 34 (17%) fell into this category. In the Quality of Life Survey, 135 (17%) did so. It seems that for this measure the hearing impaired group and the general population are indistinguisable. This straight comparison was possible because there were no age/survey or sex/survey interaction for each of the items taken separately in the GLIM analysis.

It may be of course that the measure is not valid. However, a greater tendency was found for this "suspicious" group to be psychologically disturbed as shown in Table 10.16 although this tendency was not quite statistically

significant. Also, the questions which make up the measure are similar in content to those in the Paranoia Scale of the MMPI as shown in Chapter 7. Further evidence that the measure may be indicative of a paranoid tendency derives from the way in which the "suspicious" group answered other discrete questions in the interview schedule which might be expected to relate to suspiciousness (Table 10.17).

Table 10.16

Relationship between a measure of suspiciousness and the SAD

Result of SAD	"Suspicious" group	Rest of sample
normal	24	42
SAD cases	10	29
Total	34	171
% SAD cases	29%	17%

(Chi Square = 2.85, $p < 0.1$).

Table 10.17

Comparison between "suspicious" group and rest of sample on other related questions

Question area	"Suspicious" group	Rest of sample	Level of significance
Belief in ability to do a more demanding job (Q. 37)	46% (12 out of 26)	23% (31 out of 136)	Chi Square = 6.1 $p < 0.02$
Claimed to have changed job due to deafness (Q. 33a)	19% (5 out of 27)	10% (14 out of 137)	Chi Square = 1.5 NS
Claimed that deafness had affected family life a lot (Q. 62)	17% (5 out of 30)	4% (6 out of 168	Chi Square = 8.3 $p < 0.01$
Extremely worried about health (Q. 68d)	18% (6 out of 34)	4% (7 out of 174)	Chi Square = 9.0 $p < 0.001$

It seems then that this group does exhibit suspiciousness tendencies though to what extent the measure may be indicative of anything approaching the clinical state of paranoia is of course not known.

Finally, it may be of interest to examine a sample of the spontaneous comments written by the interviewers on the questionnaires of 6 of the 10 SAD cases who were also in the "suspicious" group. They underline the possibility that some of the SAD cases may, as well as having a psychoneurotic disturbance measured by the SAD, further suffer from a personality disturbance, possibly related to a paranoid tendency:

1. has had a nervous breakdown and is now on valium (male, 61).
2. under a psychiatrist (male, 25).
3. brought in by son-in-law who says he is very difficult to get on with (apart from a man who needed actual physical help to attend this was the only male to be accompanied; he was 57 years old).
4. husband committed suicide one year previously (female, 55).
5. very aggressive and unpleasant - nearly in tears at times (male, 28). NB: Of the whole sample, only 3 people were uncooperative.
6. hearing went when first wife kicked him in the jaw - has had a hard life but is willing to fight his way through (male, 60).

Incidentally, given the finding that deafness discriminates paranoid from affective psychoses (Cooper, 1976 - discussed in Chapter 6) it would be very interesting to know the extent to which the "paranoid" group in the Quality of Life Survey might be hearing impaired. If the "suspicious" group in the general population were hearing impaired they would not of course be expected to have hearing aids because, as the above analysis has shown, people with hearing aids are not more suspicious than are the general population.

It is just possible of course that those with a paranoid tendency will deny being handicapped by hearing loss. In the next chapter (p.173) it is shown however that those who obtain the maximum score on the suspiciousness scale are significantly more likely to admit to being handicapped by hearing loss (Q.20). In order to investigate the possibility still further however, the mean suspiciousness scores were calculated for those who admitted to being handicapped ($\bar{X}$ = 1.32) and those who did not ($\bar{X}$ = 1.16). This clearly confirms the finding that those who admit to being suspicious are more likely to admit to being handicapped and not the reverse . Finally, degree of hearing loss was taken into account:

a) mean dB loss: ≤ 39 dB

	suspiciousness score			
	0	1	2	3
admits to being handicapped by deafness	4	3	1	1
does not admit to being handicapped by deafness	8	4	10	1

X^2 = 3.4, p = 0.3

b) mean dB loss: 40-69 dB

	suspiciousness score			
	0	1	2	3
admits to being handicapped by deafness	20	21	12	16
does not admit to being handicapped by deafness	21	20	15	10

X^2 = 1.7, p = 0.6

c) mean dB loss: 70 dB+

	suspiciousness score			
	0	1	2	3
admits to being handicapped by deafness	3	8	3	4
does not admit to being handicapped by deafness	7	2	3	1

X^2 = 6.36, p = 0.1

Once again, there is no evidence that those who do not admit to feeling handicapped are more likely to be suspicious, this time controlling for degree of hearing loss. If anything the reverse is true, as suggested above. It is possible of course that respondents who are in fact suspicious do not admit to being so. The investigation of such a possibility was outside the scope of this study.

To summarise, there is some evidence that the measure of suspiciousness used is valid and may be measuring a paranoid tendency. Support for this derives from its relationship with other variables and from the similarity of the questions to some of those contained in the paranoia scale of the MMPI described in Chapter 7. But there is no evidence whatsoever that the hearing impaired, at least those who have hearing aids, are more suspicious than the general population.

VI. Other areas indicative of psychological wellbeing

(i) Health

In this section everyday indications of psychological wellbeing which complement the SAD measure are examined. The actual questions asked were obtained from the SSRC Quality of Life Survey (1975a). They divide into two general areas. The first area contains questions indicative of general state of health. The second area concerns worry.

General Health:

It is plain that hearing loss adversely affects well known indicators of the general state of psychological health. Table 10.18 summarises GLIM analyses in which the different responses of the hearing impaired and Quality of Life samples are tested when age and sex are controlled. The GLIM analysis for the final item in the table is given in detail in Table 10.7.

Table 10.18

Result of GLIM Analyses of Deviance between the Quality of Life and Hearing Impaired samples on questions of general health

Question area	Level of significance
Getting to sleep (Q. 64a)	NS
Staying asleep (Q. 64b)	$p < 0.005$
Enough energy for day to day activities (Q. 64)	$p < 0.01$
Consulted doctor concerning a nervous problem (Q. 70)	$p < 0.005$
Overall satisfaction with state of health (Q. 66)	$p < 0.001$
Suffering a further disability or health trouble (Q. 63)	$p < 0.01$

Three questions contained in Table 10.18, obtained from the Quality of Life Survey, were also included in the NOP control questionnaire. They were asked of the matched control group partly in order to create a suitable interviewing ambience and partly to validate the use of the Quality of Life Survey data for control purposes. The results of the comparison of the hearing impaired group with the NOP matched control group for these 3 questions are described in Table 10.19.

Table 10.19

Comparison between Hearing Impaired with NOP Matched Control Group concerning 3 questions which were also asked of the Quality of Life Survey sample

	Hearing Impaired Group	NOP Control Group
Suffering a further disability or health trouble (Q. 63)	28% (58 out of 208) Chi Square = 20.4, $p < 0.001$	13% (55 out of 418)
Not having enough energy for day to day activities (Q. 65)	48% (100 out of 207) Chi Square = 27.2, $p < 0.01$	17% (114 out of 418)
Consulting a doctor or anyone else concerning a nervous problem (Q. 70)	36% (75 out of 207) Chi Square = 5.88, $p < 0.02$	27% (112 out of 418)

The questions concerning medical consultation for a nervous problem and physical disability or health trouble deserve special mention. The actual wording of the Quality of Life question concerning medical consultation for a nervous problem was:

> Have you ever consulted your doctor or anyone else to seek help about a nervous problem, either for yourself or another member of your family ?

The wording on the present survey did not allow for consultation concerning another family member. In order to obtain a more accurate comparison, the question without reference to other family members was asked of the NOP matched control group. Unfortunately, no information was obtained as to whether the doctor had considered a possible connection between the nervous problem and hearing loss.

With regard to the question concerning a further disability or health trouble, the question was phrased so as to include hearing impairment for the hearing impaired group. Thus the hearing impaired are more likely to suffer from a disability or health trouble over and above that of deafness than are the Quality of Life sample to suffer from any disability or health trouble whatsoever.

It is obvious that the significant difference found between the hearing impaired sample and the Quality of Life sample also applies when the hearing impaired group are compared with the NOP matched control group. Thus the confidence which can be placed in the use of Quality of Life survey data for control purposes is increased as is the use of GLIM as a statistical tool.

Worry:

Table 10.20 describes the result of GLIM analyses of "worry" questions. Once again it is plain that hearing impaired people are far more prone to worry than are the general population. It is unlikely that response bias has played any significant part for there was no trend away from the general population for the question concerning worry about getting old, and the item concerning with "getting on with neighbours" did not discriminate between the two groups.

Table 10.20

GLIM Analyses of Deviance between Quality of Life control survey and the Hearing Impaired sample concerning worry in given areas

Worry about (Q. 68):	Level of significance
Money for day to day living	$p < 0.01$
Getting on with neighbours	NS
Health	$p < 0.001$
Family	$p < 0.005$
Work	$p < 0.025$
Growing old	NS
Having a nervous breakdown	$p < 0.05$
Worry in general	$p < 0.005$

People were also asked to what extent they worried about their deafness. Although a considerable number (about a quarter of the sample) admitted they worried a great deal about deafness, worry about deafness by no means stood out in comparison with worry about the other life domains described in Table 10.20. On the face of it this seems surprising, in that the "worry" questions came near the end of the interview and it is possible that if anything worry about deafness would be exaggerated as it had been the subject of a battery of measures and a barrage of questions.

(ii) Employment

Control information for this section was obtained from the SSRC Multipurpose Survey (1975b). GLIM analyses were used, once again controlling for age and sex. The findings are summarised in Table 10.21.

Table 10.21

Comparison between the Hearing Impaired and Multipurpose Survey Control Group on questions relating to employment, using GLIM Analyses of Deviance controlling for age and sex

Question area	Level of significance
Proportion unemployed (Q. 26)	NS
Present job right for abilities (Q. 37)	NS
Likelihood of promotion (Q. 38	NS
Likelihood of changing jobs in the future (Q. 41)	NS
Happiness with job (Q. 42)	$p < 0.01$
Worry about work (Q. 68f) (from Table 10.20)	$p < 0.025$

Items concerning the subjective attitude to work are the only ones which differentiate the two groups. This finding is supported by the proportion of those who are unhappy at work who are also SAD cases. It is also supported by the proportion of those who have changed jobs due to deafness or who admit that hearing loss adversely affects their work who are SAD cases (Table 10.22).

Table 10.22

Relationship between psychological disturbance and subjective aspects of employment

	Section of sample	
Question	Normal	SAD cases
Unhappiness at work (Q. 42)	24% (32 out of 132)	54% (14 out of 26)
Changed jobs due to deafness (Q. 33a)	14% (19 out of 140)	37% (7 out of 19)
Hearing loss affects work a lot (Q. 36)	13% (17 out of 133)	42% (11 out of 26)

NB.: In each case Chi Square was significant, $p < 0.01$

It appears that neither unemployment nor underemployment are associated with acquired deafness. Nor are promotion prospects affected. Nevertheless, the work situation does appear stressful in that the hearing impaired group is less happy at work and worries more about work when compared with the general population (Table 10.21). Moreover, unhappiness at work is associated with psychological disturbance as measured by the SAD (Table 10.22). Finally, the other 2 items in Table 10.22, which could not be controlled because of reference to hearing loss, show evidence of stress in that they are associated with the SAD.

(iii) Social activity

The hearing impaired sample were found to be more lonely, to have less friends, and to find it more difficult to make friends in comparison with the NOP matched control group. They were not, however, less likely to enjoy casual chat with friends, workmates, neighbours and so on (Table 10.23).

Table 10.23

Comparison between the Hearing Impaired and the NOP matched control group on questions relating to social life

Question	Hearing Impaired	NOP
a) Feeling lonely (Q. 47a)	24% (49 out of 208)	15% (61 out of 418)
	Chi Square = 7.7, $p < 0.01$	
b) Having few or no friends (Q. 44)	40% (82 out of 208)	25% (104 out of 418)
	Chi Square = 14.1, $p < 0.001$	
c) Finding it difficult or very difficult to make friends (Q. 45)	40% (84 out of 211)	15% (64 out of 418)
	Chi Square = 46.8, $p < 0.001$	
d) Does not enjoy casual chat or passing the time of day with friends and workmates, neighbours and so on (Q. 46)	26% (53 out of 205)	20% (85 out of 418)
	Chi square = 2.43, NS	

Table 10.24 shows the relationship between psychological disturbance and questions concerned with social life. The first question on loneliness should perhaps not have been included in this section in that it may measure personal wellbeing rather than social isolation. In fact, the preamble to the question made explicit the point that being a lonely person "may have very little to do with the number of friends you have or the number of people you know". It is also the only question which is obviously related to psychological disturbance. Of the other three questions contained in Table 10.24, and which seem to be conceptually related, only one is just significantly related to psychological disturbance.

Table 10.24

Relationship between psychological disturbance and social life

Question	Section of sample: Normal	SAD cases
Being a lonely person (Q. 47a)	15% (25 out of 165) Chi Square = 37, 2, p < 0.001	62% (24 out of 39)
Having few or no friends (Q. 44)	36% (60 out of 165) Chi square = 4.6, p < 0.05	55% (21 out of 38)
Difficult or very difficult to make friends (Q. 45)	39% (64 out of 166) Chi Square = 1.4, NS	49% (19 out of 39)
Does not enjoy casual chat or passing the time of day with friends and workmates, neighbours and so on (Q. 46)	26% (43 out of 166) NS	26% (10 out of 39)

This finding provides tentative support for those who claim that questions on social life can be misleading when administered to those with a hearing impairment, for while the hearing impaired group are significantly different from the general population on the two friendship questions, there is not much evidence that this is in any way stressful, in that it is associated with psychological disturbance. That the hearing impaired group enjoy casual chat just as much as the NOP matched control group is somewhat puzzling. It may be that casual chat is highly predictable and redundant in content and therefore does not prove difficult for hearing impaired people.

(iv) Family Life

Insofar as family life is concerned there was no objective evidence of marital breakdown. Indeed, the proportion who were separated or divorced was actually slightly lower than in the matched control group, as described in Chapter 9.

The quality of marital life is notoriously difficult to assess. For the present study respondents were simply asked whether they tended to have rows concerning various aspects of married life. As Table 10.25 shows, there is no obvious pattern.

Questions concerning the effect of deafness on marriage and family life could not of course be controlled on the general population. It is interesting that while psychological disturbance is significantly related to the overall effect of deafness on family and married life, it is not related to having rows (Table 10.26), supporting the lack of difference between the hearing impaired sample and general population where rows over other areas of married life are concerned. A more sensitive approach to data collection would be necessary to find out in what way deafness affects married and family life. Closed questions of the type used in the present questionnaire appear unsuitable.

Table 10.25

Comparison between the Hearing Impaired and NOP matched control group for rows concerning various aspects of married life (Q. 58)

Area of married life	Hearing Impaired	NOP matched group
a) deciding whether to see friends together	24% (37 out of 157)	16% (52 out of 320)
	Chi square = 3.7, NS	
b) getting on with neighbours	6% (10 out of 156)	11% (35 out of 321)
	Chi square = 2.5, NS	
c) being overtired	35% (54 out of 156)	33% (105 out of 322)
	Chi square = < 1, NS	
d) getting on with in-laws	24% (36 out of 149)	19% (52 out of 273)
	Chi square = 1.5, NS	
e) disciplining children	41% (42 out of 102)	36% (74 out of 205)
	Chi square = < 1, NS	
f) spouse not listening	37% (57 out of 156)	35% (114 out of 322)
	Chi Square = < 1, NS	
g) going out together	17% (27 out of 156)	17% (53 out of 321)
	Chi Square = < 1, NS	
h) one partner not showing enough affection	27% (42 out of 156)	19% (60 out of 322)
	Chi Square = 4.3, p < 0.05	
i) about nothing in particular	35% (55 out of 156)	43% (138 out of 321)
	Chi Square = 2.6, NS	

Table 10.26

Relationship between the SAD and discrete questions concerning marriage and family life

Questions	Normal	SAD cases
Having rows arising from deafness (Q. 58j)	40% (52 out of 129) Chi Square = < 1, NS	48% (12 out of 25)
Deafness adversely affects marriage (Q. 59)	20% (26 out of 130) Chi Square = 17.2, p < 0.001	60% (15 out of 25)
Deafness significantly affects family life (Q. 62)	30% (48 out of 158) Chi Square = 11.4, p < 0.01	54% (20 out of 37)

(v) Overall life satisfaction

As might be expected, overall life satisfaction, in the past, present or future was more likely to be rated negatively by the hearing impaired sample (Table 10.27). Interestingly the hearing impaired group did not feel that they had lacked opportunity in life, once again demonstrating the lack of any tendency to suspiciousness for people with acquired hearing loss.

Table 10.27

Comparison of overall life satisfaction between the Hearing Impaired sample and Quality of Life Survey using GLIM Analyses of Deviance, controlling for age and sex

Question 73:	Significance level
a) Satisfaction with life 5 years ago	p < 0.001
b) Satisfaction with life now	p < 0.001
c) Satisfaction with life in 5 years' time	p < 0.005
Opportunity in life (Q. 72)	NS

VII. The "Severely Deaf"

The relationship between degree of deafness and the SAD score was dealt with in Section III of this chapter. It was found that 23 people fell into the category which was defined as having a mean pure tone loss of 70 dB or over which was not compensated with a hearing aid in that speech discrimination ability was 70% phonemes or less scored on the Boothroyd Word Lists (Boothroyd, 1968). It will be recalled that 12 (57%) of the 21 people in the group who completed the SAD were identified as psychologically disturbed. This section will be devoted to a more detailed examination of results concerning this subsample of the "severely deaf" as defined above.

The demographic structure of the group is given in Table 10.28. The age distribution does not differ markedly from the age distribution of the sample as a whole in that 57% are over the age of 50, compared with 66% for the sample as a whole. The small imbalance is due mainly to more young females than would be expected in the "severely deaf" group. If men over 60 years of age are excluded the ratio of women to men is exactly 2:1 while for the sample as a whole the distribution is roughly equal, This imbalance is probably due to the high proportion of SAD cases. It will be recalled from Section I of this chapter that the SAD sex ratio for the sample as a whole was also roughly 2:1. There is no social class bias.

Table 10.28

a) Age and sex distribution of the "severely deaf" group

	16-39	40-49	50-59	60-64	Total
male	1	2	3	5	11
female	5	2	5	-	12
Total	6	4	8	5	23

b) Social class distribution

	I	II	IIIN	IIIM	IV	V
n	2	4	5	5	3	2

Table 10.29 gives the distribution of (a) the "severely deaf" across the three hearing aid clinics and (b) the distribution of SAD cases in the "severely deaf" group for each hearing aid clinic taken separately. The differences between the sources which constitute the "severely deaf" group do not appear to be marked.

Table 10.29

Distribution of the "severely deaf" amongst the three hearing aid clinics which constituted the sample

Hospital	Percentage of "severely deaf"	Distribution of SAD cases
1 (inner London)	8% (6 out of 79)	3 out of 5
2 (inner suburb)	11% (10 out of 89)	4 out of 9
3 (outer suburb)	16% (7 out of 43)	5 out of 7
Overall	11% (23 out of 211)	12 out of 21

(Chi Square for percentage of "severely deaf" in each hearing aid clinic = 1.98 with 2 df (NS)).

NB: "Severely deaf" defined as mean dB loss $\geq$ 70 dB and speech discrimination score 4 $\leq$ 70%.

Eighteeen of the severely deaf group had sensorineural losses, 3 had mixed and 2 had conductive losses. Mean pure tone loss ranged from 70 dB to 120 dB; the distribution is given in Table 10.30.

Table 10.30

Distribution of mean pure tone hearing loss for the "severely deaf" group

mean dB loss			
70-79	80-89	90-99	100+
10	3	5	5

Within this range of 70 dB - 120 dB there was no relationship between degree of loss and psychological disturbance. Neither was age of onset related to the SAD score. A rather surprising finding for this group relates to hearing aid usage. Eleven (48%) of the 23 owned a postaural aid in the BE series (BE 11 or BE 12) despite the intention that these aids are not designed for people with severe losses. The proportion of postaural aid owners is in fact similar to the rest of the sample, 53% of whom owned a BE hearing aid.

Using the same criteria for quantifying the benefit obtained from wearing an aid as described in Chapter 9, it was found that 61% (14 out of 23) obtained little or no benefit from thei r hearing aid. This compares with 47% (88 out of 188) for the rest of the sample (Chi Square < 1, NS).

As might be expected, the "severely deaf" group differ from the rest of the sample in the predicted direction on almost all variables measured in the study. Out of the 42 psychological, social and health variables, only 5 are not significantly different in the predicted direction. In comparison with the rest of the sample, the severely deaf are <u>not</u>:

1. more likely to be unemployed.
2. more likely to be left out of family decision making.
3. more likely to suffer a further physical disability or health trouble.
4. more likely to have consulted a doctor concerning a nervous problem.
5. less likely to have enough energy for day to day activities.

The other 37 measures all support the finding that the "severely deaf" are indeed an extreme group.

Table 10.31 gives 13 of the 37 discrete questions which showed a rather large degree of difference between the "severely deaf" group and the rest of the sample.

Table 10.31

Comparison of the "Severely Deaf" with the rest of the sample on certain social and psychological questions

	"Severely deaf"	Rest of sample
Employment:		
1. Changed job due to deafness (Q. 33a)	24%	10%
2. Hearing loss affects work a lot (Q. 36)	38%	16%
3. Job dissatisfaction (Q. 42)	63%	26%
Social:		
1. No friends (Q. 44)	17%	4%
2. Difficult to make friends (Q. 45)	18%	5%
Family:		
1. Separated/divorced (Q. 22)	13%	2%
2. Deafness affects marriage (Q. 59)	53%	24%
Health:		
1. Trouble in getting to sleep (Q. 64a)	55%	35%
2. Worry a great deal in general (Q. 69)	52%	22%
3. Worry about a nervous breakdown (Q. 68i)	24%	6%
As rated by interviewer (at end of questionnaire):		
1. Poor emotional state	35%	12%
2. Poor cooperation at interview	13%	2%
3. Hearing loss interfered severely with communication	57%	13%

All the comparisons shown in this table are significant at 0.01 or greater.

It is important to bear two points in mind regarding the "severely deaf" group. Firstly the numbers are small. Secondly, many of those in the group appeared to have adjusted satisfactorily to their hearing loss as measured by the wide range of social and psychological questions used as well as not being identified by the SAD.

Finally, although the interview schedule consisted almost entirely of closed questions, the interviewers did from time to time add spontaneous comments of their own. The following is a selection of such comments made on those respondents who were eventually placed in the "severely deaf" group. They help to give life to information which is obtained from a structured questionnaire made up of closed questions:

> Had a feeling he did not understand and answer all the questions properly. (man, 61, normal).
>
> She believes you have to be really deaf before you realise what it's like to be deaf. Had to change her job from nursery nurse because she could not understand the children. (woman, 51, SAD case).
>
> He was very aggressive and unpleasant at first - but gradually became chatty and sorry for himself - he was nearly in tears several times. (man, 28, SAD case).
>
> The son-in-law brought this patient to the hospital - says he is very difficult to get on with. (man, 57, SAD case).
>
> Extremely worried about his deafness and is desperate to have an operation to put everything right again. Seems to be pinning all his hopes on a miracle cure. (man, 55, SAD case).
>
> She does not appear to realise the severity of her deafness... she does not hear and tries to compensate by guessing - it was difficult to assess whether she really understood some of the questions - sometimes she answered with some totally irrelevant remark. (woman, 51, SAD case).

Very little communication with anyone apart from her employer - an intelligent and very articulate person very much in need of friends and companionship. (woman, 28, SAD case).

Deafness caused her to fail her clerical examination- has had to change (her job) for less responsibility and less money. (woman, 28, SAD case).

In past seven years has tried all sorts of ways of seeking help with his problem, from faith healing to acupuncture. Now accepts he is permanently deaf and has learned to control his anger and aggression - and channels his energy into learning, reading and writing. (man, 44, SAD case).

As suggested above however, some of the "severely deaf" group appeared to have adjusted satisfactorily:

(i) A man with few worries and few responsibilities (man, 44, normal).

(ii) A good lipreader - has worked as a "Samaritan" and still does ! (man, 61, normal).

CHAPTER ELEVEN

THE HANDICAP OF ACQUIRED DEAFNESS

Acquired deafness appears to result in psychological disturbance which may be present some years after a hearing aid has been prescribed and the rehabilitation process completed. The first section of this chapter shows how psychological factors have begun to assume greater importance in the assessment of handicap in general; the second section discusses some of the empirical studies which have been done with special reference to one on physical handicap in which an earlier version of the SAD was used; the third section is devoted to a consideration of the handicapping nature of acquired deafness.

I. Recent theoretical developments concerning the nature of handicap

In her major study of handicapped people in Great Britain Harris (1971) distinguishes between impairment, disability and handicap, giving the term "handicap" a specific meaning as distinct from the one usually employed. For Harris, impairment means "lacking part or all of a limb, or having a defective limb, organ or mechanism of the body". Disablement is defined as "the loss or reduction of functional ability" and handicap as "the disadvantage or restriction of activity caused by the disability". While the distinction between impairment and disability is relatively clear cut, that between disability and handicap is less so. Harris gives an example which attempts to draw out this latter distinction:

> "A man has had a leg amputated. Therefore he is impaired, and since he would have a reduction in his locomotor ability, he is disabled. If, however, he has a satisfactory prosthesis, a sedentary job, a car adjusted to hand controls and leisure activities which are not too active, he might well not be restricted in activity and therefore not handicapped".

This example does not go far enough for it does not tell us what effect the impairment has had on the personal wellbeing of the individual, or on the quality of his social and family relationships which might be said to contribute to the "disadvantage or restriction of activity caused by the disability".

Shakespeare (1975) sees a clear distinction between practical and personal adjustment. For Shakespeare, the criteria for successful practical adjustment include having somewhere to live, being able to look after oneself, being able to keep out of trouble and not depending too much on social agencies.

In the area of personal adjustment Shakespeare stresses the importance of "not behaving in a bizarre fashion or socially inappropriate manner". She also stresses the need to maintain adequate personal relationships in order "to avoid extensive loneliness and to avoid rejection through being unaware of other people's reactions; not interrupting or monopolising conversations or addressing strangers in a familiar manner...being able to contribute to friendship as well as receiving". Shakespeare's concern is aimed at physically disabled people who develop inappropriate social styles in reaction to their disability. For those with acquired deafness, examples of such maladaptive behaviour may occur even when genuine attempts are made to interact with others in a socially acceptable manner. Any tendency to behave in a bizarre or inappropriate manner may therefore be greatly reinforced.

Several writers have appealed for more attention to social and psychological consequences of handicap. Brattgard (1974) for example argues that adequate rehabilitation of the physically disabled population is impossible unless social and psychological factors are taken into account for:

"a disabled person runs the risk of isolation in the community and segregation from other people... if he lacks stimulating contacts with other human beings..."

Similarly, Delafield (1976) has argued for more "relevant and interesting measures pertaining to the effects of blindness, i.e. areas such as morale, attitude, family relationships, somatic symptoms, depression, employment, withdrawal, communication and attitudes of trust or paranoid tendencies.

The areas of importance stressed by the above include those which have been investigated in the present study. Measures concerning areas such as mobility, self care and so on have little relevance for hearing loss. However, an emphasis on the psychological consequences of physical disability makes possible a comparison with the effects of acquired deafness.

II. Empirical studies of the psychological consequences of physical disability and visual impairment

The quality of research carried out on the psychological consequences of physical disability has not been of a high standard. As Meyerson (1957) lamented:

> "The popular and didactic writings of psychologists, psychiatrists, social workers and disabled autiobiographers often seem rich in both insightful leads for investigation and nonsense. Sometimes these insights have high face validity and are widely honoured. They gain acceptance by consensus and result directly in changes in practice without benefit of experimental study. More frequently insights are only partial and conflict with other partial insights. The result is heated controversy without the experimental research that might lead to resolution".

Criticisms such as these resulted in a considerable number of empirical investigations which concentrated on the relationship between physical disability and personality. In a review of subsequent empirical studies Shontz (1970) concluded:

> "Psychologists with an objective interest in the study of disability and personality have expended a good deal of effort to assess the merit of these entrenched and appealing notions. It is not generally realised how firmly and with what consistency the notions have been discredited by the evidence (for) basic personality structure appears to be stable even when somatic change is severe".

The only part of the present study related to personality was concerned with the measure of suspiciousness; no evidence was found for any association whatsoever between heightened suspiciousness and hearing loss.

Of greater interest are those studies which have assessed emotional reactions to physical disability. Even within this area however many studies have reflected theoretical standpoints which have since been discredited. For example, as McDaniel (1976) points out, "there is much literature to the effect that chronic illness produces some change in the person's inferred body image, but none whatever that this has any relation to his adjustment, recovery and rehabilitation". Similarly, the importance of mourning following onset of disability has often been put forward though, as McDaniel notes, "the psychological value of mourning has yet to be confirmed".

While McDaniel questions the validity of much rsearch on the psychological consequences of physical disability he nevertheless concludes that "virtually all writers on the subject agree that physical disability often leads to emotional problems and difficulties in personal adjustment". He has reviewed a number of studies in which the MMPI was administered to a wide range of disabled and chronically ill groups covering rheumatoid arthritis, multiple sclerosis, spinal cord injury, intestinal cancer, coronary heart disease, back and limb injuries and severe disability groups. All of these groups scored at least

one standard deviation higher on the three MMPI scales of hypochondriasis, depression and hysteria. McDaniel concludes that the highly consistent results obtained yield what he terms the "neurotic triad" of reactions to physical disability.

The finding that many disabilities and chronic illnesses are associated with psychoneurotic reaction parallel the findings obtained from the present study. However, the studies reviewed by McDaniel appear without exception to have been carried out soon after onset, during treatment or rehabilitation. His concern with the period during which the disabled individual is under medical care is underlined by the following quotation:

> "If illness is of a chronic nature, balance is restored once the early shock, anxiety and emotional stress have abated. Although the value system and responsiveness of the patient may stabilise in time, this does not mean that the process of adjustment is complete. Rather, it is at this point that environmental influences within the institutions, hospital or rehabilitation centre become critical".

In the present study, administration of the psychological inventory took place not only a long time after onset, but also a considerable time after treatment and rehabilitation.

McDaniel also suggests that social isolation, which results from interference with communication and mobility experienced by the physically disabled, may produce emotional distress, in a manner similar to that which has been demonstrated for sensory isolation. He argues that "social isolation would not easily be overcome for those individuals who are confined to bed, home, hospitals or other institutions for extended periods of time" mainly because the sufferers may be deprived of normal patterns of human interaction. He believes that research on those confined to home would reveal "significant behavioural disturbances" attributable to sensory isolation. Relevant to the study of

acquired deafness is the belief expressed by McDaniel that in order to illustrate his views on social isolation he has to turn to isolation resulting from "permanent, partial or total loss of a receptor system"; unfortunately his consideration of the effects of such a loss is only speculative.

With regard to the other sensory handicap of blindness, Baker (1973) laments that research into the psychology of blindness has become fixated at the level of assessing the personality of those who are blind, and is thus in keeping with most research on the psychological consequences of physical disability and chronic illness. One study similar to the present one on acquired hearing loss was carried out by Fitzgerald (1970). He studied 65 adults of employment age who had been certified as blind during the previous year and for whom the median duration of blindness was 1.2 years.

For 61 (92%) of the subjects interviewed Fitzgerald reported a major dysphoric reaction in which:

> "as disbelief and protest gave way, these seemed to be replaced gradually, suddenly, intermittently, or concomitantly, with depression and other intrapsychic stresses. This varied in intensity from moderate upset to the frequent and severe incapacitating states in which depression with suicidal ideation, anxiety, weight loss, sleep disturbance and even paranoid thinking occurred.... recovery from depression or other distress began at various times after onset".

Fitzgerald devised a four point scale of psychiatric disability. No information is given concerning the validity of the scale; neither are results described quantitatively; they are only illustrated in the form of a graph which appears to show that approximately 20-25% of the sample suffered significant psychiatric stress. While the study is not very systematic the proportion of psychological disturbance is similar to that found in the present study.

Garrad (1974) defines impairment and disability in terms similar to those of Harris (op cit). Also like Harris she does not specifically refer to a psychological measure which would complete the impairment-disability-handicap chain. In a survey she conducted she defined disability as the:

> "limitation of performance in one or more activities which are generally accepted as essential basic components of daily living, such that inability to perform them necessitates dependence on another person. The severity of dependence is thus proportional to the degree of dependence. The areas of essential activity are mobility... self care... domestic duties... and/or occupation".

In order to obtain further psychological data Garrad followed up a subsample of her survey. (Garrad, 1975; van Dongen-Garrad, 1978). This study is singled out as of special interest because respondents were asked to complete an earlier version of the psychological inventory used in the present study (Foulds and Hope, 1968). Table 11.1 presents a comparison of the two studies. For those who are physically disabled with little or no restriction of mobility the proportion of psychological disturbance is similar to that for the hearing impaired sample with "moderate" hearing loss as defined in Chapter Ten. Those with a "severe" hearing loss appear to be at least as likely to be psychologically disturbed as those for whom physical handicap results in severe restriction of mobility. Moreover, both findings confirm McDaniel's belief, quoted above, that research on those confined to home would reveal "significant behavioural disturbances" attributable to sensory isolation.

Table 11.1

The comparative effects of physical disability and acquired deafness on psychiatric disorder

a) physical disability (using an earlier version of the SAD)

	general population based on normative data	moderate restriction on mobility	severe restriction on mobility
Proportion screened psychiatrically disturbed by the SAD	8%	19% (16 out of 83)	37% (43 out of 115)

b) acquired deafness (present study)

	general population based on normative data	"moderately" deaf	"severely" deaf
Proportion screened psychiatrically disturbed by the SAD	5%	15% (27 out of 182)	57% (12 out of 21)

NB: The "severely" deaf are the subsample which has a mean loss of 70 dB or more and a speech discrimination score of 70% or less.

III. The handicapping nature of acquired deafness

It is commonly held that those who hear normally do not appreciate the extent to which hearing loss is a handicap and may therefore be hostile toward the hard-of-hearing or even ridicule them. It is certainly not difficult to cite instances in support of this claim.

Wing et al (1974) are the authors of the Present State Examination, an inventory widely used in psychiatric diagnosis. It contains a section on physical illness and handicap with the following instruction for the person administering the examination:

> "If no significant illness or handicap present, rate (0). If mild but significant illness or handicap (e.g. influenza or limp), rate (1). If there is some more serious illness or handicap but it is not incapacitating or threatening to life (e.g. deafness or duodenal ulcer), rate (2). If it is severely handicapping or threatening (e.g. blindness or carcinoma), rate (3)".

Barker et al (1953, op cit) found that deafness was the third most popular disability in a survey of collections of jokes. The very popular children's cartoon strip Tin-Tin by Herge has its stereotype hard-of-hearing professor. Perhaps the best, or worst example is found in a recent leader of a prestigious medical journal (British Medical Journal, 1977) in which reference is made, not to hearing aids but to deaf aids, a term with stigmatising connotations. It is not surprising that in a study of fear of various disabilities, reported by Barker, students placed deafness in eighth place out of ten.

It seems that hearing loss is not treated very seriously, even by professional workers. In order to investigate general population attitudes, respondents in the control survey in the present study were asked to rate seven handicapping conditions on a seven point scale, (1) being very severe and (7) very mild. The mean rankings for 418 respondents were as follows:

Losing sight:	1.4
Losing hearing:	3.1
Losing a hand:	3.6
Being frequently depressed:	4.1
Going lame:	4.4
Having no sense of taste:	5.6
Getting very fat:	5.8

The rank occupied by hearing loss does not lead to any straightforward conclusion. On the one hand it ranks second in importance to loss of sight. On the other hand it is ranked nearer to 3 of the other handicaps than it is to loss of sight. This suggests that the general population seem unsure of the extent to which hearing loss is a handicap. The main finding of this study is that it <u>does</u> constitute a significant handicap, at least when the dependent variable is psychological disturbance. In order to examine the extent to which the hearing impaired themselves perceived acquired hearing loss as a handicap, respondents in the present study were asked whether they considered themselves to be handicapped persons:

> People have different ideas about what makes somebody a handicapped person. Someone who is confined to a wheelchair is obviously handicapped while someone who needs a walking stick may or may not be handicapped.
>
> A person who is completely blind is handicapped while someone who is prevented from having a driving licence because of poor eyesight may or may not be thought of as handicapped.
>
> Do you consider that having a hearing loss makes you yourself a handicapped person ? (Q. 20).

From Table 11.2 it will be seen that the question divides the sample roughly into two halves, 43% admitting to handicap. There is no relationship however between feeling handicapped due to hearing loss and psychological disturbance. It was hoped that something would be learnt of the handicapping nature of acquired hearing loss by relating this question to other measures. This was not the case however, for even its relationship with mean dB loss while statistically significant, was minimal. Adjusted mean dB loss (controlling for age, sex and social class) was 58 dB for those who admitted to handicap and 52 dB for those who did not (Appendix E, 18). The same held for aided speech discrimination ability, controlling for dB loss, 76% phonemes for those who considered themselves handicapped and 82% for those who did not. While not large the trends are at least consistent. (Appendix E, 2).

Table 11.2

Relationship between feeling handicapped by hearing loss and psychological disturbance measured by the SAD.

	Whether or not handicapped	
Result of SAD	Yes	No
Normal section of sample	77	88
SAD cases	21	18
Total	98 (43%)	106 (57%)
% SAD cases	21%	17%

Chi Square < 1, NS

From Table 11.2 it can be seen that while the "handicap" question divides the sample roughly into two halves, there is no relationship between feeling handicapped due to hearing loss and psychological disturbance.

Table 11.3 examines the extent to which two rather extreme groups feel handicapped, the "severely deaf" and "suspicious" groups as defined in Chapter Ten. Each group is compared with the respective sections of the sample left when the group is excluded.

Table 11.3

Proportions of two subsamples who consider themselves handicapped

Whether or not feels handicapped by deafness	"suspicious" group	"severely deaf" group
Yes	21 (64%)	13 (62%)
No	12 (36%)	8 (38%)

(i) For "suspicious" group vs. remainder of sample, Chi Square = 3.96, $p < 0.05$.

(ii) For "severely deaf" vs. remainder of sample, Chi Square = 1.60, NS

The handicap measure has a certain amount of validity in that it distinguishes a subsample which might be thought of as extreme, although the extremity is not related to hearing loss, for the amount of suspiciousness in the hearing impaired sample is

equal to that found in the general poulation as described in Chapter Ten. The "severely deaf" subsample however, are not significantly more likely to consider themselves handicapped.

That there is no relationship between "severe deafness" or psychological disturbance on the one hand and feeling handicapped on the other, is difficult to interpret. One possibility is that people with acquired hearing loss are not fully aware of the effect that hearing loss has on their lives. While this interpretation is rather tentative, there is some supporting evidence from the study. It is likely that people may see themselves as handicapped if their disability has caused unemployment or marital breakdown. On objective measures related to work and marital status however, the hearing impaired are indistinguishable from the general population; therefore they may not see themselves as handicapped. Moreover, with few exceptions they maintain total independence in the traditional areas associated with handicap, i.e. mobility, self care and carrying out domestic chores. One has to turn to subjective measures in order to see where the effects of acquired deafness manifest themselves.

In the area of employment the hearing impaired sample are not more likely to be unemployed or under-employed, to change jobs or to feel less able to do their job well or to have less opportunity of promotion; but they are less happy at work and they are more likely to worry about work. They are not more likely to live alone but they are more likely to feel lonely, to feel that they have few friends and to find it difficult to make friends. Such findings are supported by responses to "worry" questions and questions related to subjective aspects of state of health; most of all, people with an acquired hearing loss are far more likely to suffer psycho-pathological depression and anxiety. The only area which does not fit into this framework concerns family life as there is no evidence of marital disharmony, at least insofar as having rows is concerned.

It seems then that the consequences of deafness may not be fully appreciated unless its effects on social and psychological wellbeing are taken into account. While this interpretation is not clear cut by any means there does seem to be enough evidence to formulate a hypothesis that adults with an acquired hearing loss do not fully comprehend the effect the handicap has on their lives. People with acquired hearing loss possibly attribute the stress they experience not to hearing loss but to factors such as ageing, disillusion with work, reduction in social contacts, or problems which are specific to the individual.

A number of measures in current use purport to quantify the effects of hearing loss, discussed in detail in Chapter Four. With the possible exception of The Hearing Measure Scale (Noble and Atherley, 1970) scant attention is paid to psychosocial factors. The Hearing Measure Scale does contain a subscale entitled "emotional reaction" but as the items all include reference to hearing loss they cannot be controlled on the general population. The Hearing Measure Scale also has a "social interest" scale but data pertaining to this scale have yet to be published.

A scale which has received little attention but which does aim to quantify social and psychological stress related to hearing loss was published by Bronfenbrenner (1945). It has an appealing face validity. Moreover, most of the items appear unlikely to misclassify on the basis of everyday superficial social interactions which must necessarily be modified by hearing loss, e.g.:

> being hard of hearing is worse than other handicaps;
>
> because I'm hard of hearing I'm always worried;
>
> I would rather not know what is going on than admit I am hard of hearing;
>
> I let my hearing trouble get the best of me;

because I'm hard of hearing I'm no good to anybody;

being hard of hearing won't stop me having a happy life;

I can't stand having people asking me about my hearing;

because of my hearing trouble I don't like people;

being hard of hearing makes me feel sad most of the time.

There is a little known Handicap Problems Inventory (Remmers and Wright, 1960) intended to measure the effects of a wide range of handicaps. Questions are of the form: "Does your handicap prevent you from....". It contains four scales covering personal, social, family and vocational problems. The manual contains norms for many forms of handicap including "the deaf" but does not say who "the deaf" are. Because the inventory is directed at handicapped people it is once again not possible to know what the scores really mean.

Research directed at quantifying the degree of stress or psychological disturbance measured by these hearing and handicap scales would be very useful. One approach might be to use such scales in conjunction with an inventory such as the SAD.

PART FIVE

SUMMARY AND CONCLUSIONS

CHAPTER TWELVE

SUMMARY OF FINDINGS

The purpose of this chapter is to provide a succinct summary of the findings described in detail in Chapters Nine, Ten and Eleven. In the interests of brevity the mode of presentation is telegraphic.

Demographic

source of sample	3 London Hearing Aid Clinics drawing mainly on the northwest quadrant of Greater London.
criteria for inclusion in sample	(i) to be of employment age, up to 60 years for women and 65 for men; (ii) to have been issued with a hearing aid for the first time between 1 and 7 years previously; (iii) to be living within reasonable travelling distance of the Hearing Aid Clinic.
size of sample	211
age and sex distribution	a marked age bias, two thirds of the sample being over 50 years of age. The sexes were equally represented when men between 60 and 64 were excluded.
social class	a bias towards the upper social classes.
economic activity	no evidence of unemployment.
marital status	no evidence of higher separation/divorce rate.

Audiological

onset	estimates of time of onset of hearing loss appear unreliable; however, it does seem that many respondents waited a considerable number of years with a hearing loss before consulting a doctor about it.

relationship between original hospital audiogram and audiogram obtained in present study	(i)	mean dB loss correlation: r = 0.76 (based on 167 respondents only)
	(ii)	overall there was a small deterioration in hearing between tests;
	(iii)	only 7 out of 167 respondents suffered a deterioration in hearing of greater than 20 dB.
mean dB loss	men, 56 dB (sd = 19) women, 54 dB (sd = 15)	
severity of loss	≤ 39 dB 16% 40 - 69 dB 66% 70 - 89 dB 12% 90 dB + 6%	
mean dB loss at each frequency	a statistically significant though not marked deterioration: 0.5 kHz 49 dB 1 kHz 51 dB 2 kHz 55 dB 4 kHz 63 dB	
speech discrimination - (Boothroyd PB word lists, Boothroyd, 1968)	mean score with hearing aid: 79% (sd = 25) mean score without hearing aid: 56% (sd = 25)	
self estimate of hearing loss (based on Wilkins, 1948)	suitability questioned - (a) the scale may not be unidimensional, (b) does not relate strongly to other measures. A derivative of the scale, used on a general population matched control group (N = 418), is discussed.	
relationship between hearing loss measures	(i)	<u>dB loss and speech discrimination</u>
	(a)	mean dB loss and unaided speech discrimination, r = 0.72.

(b) mean dB loss and aided speech discrimination, r = 0.63.

The above correlations are virtually identical with those obtained in a separate study undertaken in a laboratory setting (Tonning, 1978).

(ii) <u>dB loss and self estimates</u>

(a) mean dB loss x self estimate without hearing aid, r = 0.51.

(b) mean dB loss x self estimate with hearing aid, r = 0.26.

(iii) <u>speech discrimination and self estimates</u>

(a) unaided speech discrimination x self estimate without hearing aid, r = 0.54.

(b) aided speech discrimination x self estimate with hearing aid, r = 0.30.

the hearing aid

almost half the sample had a bodyworn aid, half of whom rarely or never wore it.

amount of time the aid is worn - by degree of hearing loss

always	often	sometimes	rarely	never
64 dB	53 dB	52 dB	51 dB	49 dB

hearing aid benefit

(i) almost half of those with mixed and sensorineural losses obtained little or no increment in speech discrimination ability when wearing a hearing aid;

(ii) those with conductive losses gain significantly more between unaided and aided speech discrimination than do those with sensorineural or mixed losses.

result of administration of inventory designed to detect psychological disturbance (SAD)	39 people (19%) were found to be psychologically disturbed; this proportion is roughly four times greater than that found in the general population
demographic biases	no evidence that age and social class biases in the sample affect the proportion found to be psychologically disturbed.
item analysis of SAD, undertaken to examine role of one item which could lead to misclassification	no evidence that the item in question contributed to misclassification of psychologically normal people who have a hearing loss
validity of SAD	(i) SAD cases were significantly more likely to answer discrete questions on psychological wellbeing, taken from elsewhere in the interview schedule, in the predicted direction; (ii) the same held for discrete questions related to health, social, family and work life and to interviewer's assessment of respondent's emotional state.
effect of other disabilities on the SAD	(i) the sample as a whole was significantly more likely to suffer from a second disability over and above that of hearing loss than was the general population to suffer from a single disability; (ii) the presence of a second disability was not related to the SAD

SAD and mean dB loss	no linear relationship, rather a threshold, around 70 dB, beyond which the likelihood of being a SAD case increased markedly
SAD and speech discrimination ability	(i) overall significant relationship disappears when controlled for mean dB loss, though there is a tendency for poor speech discrimination ability to be associated with being a SAD case; (ii) SAD and speech discrimination gain scores not related
SAD and combined mean dB loss and speech discrimination ability	32 respondents had a dB loss of 70 dB or greater, 9 of whom appeared to compensate with a speech discrimination score of over 70%; of the 23 left 2 did not complete the SAD because they were illiterate; of the other 21, 12 were SAD cases (57%). The likelihood of being an SAD case in this subsample of "severely deaf" respondents is very high
SAD and type of hearing loss	no relationship
SAD and tinnitus	no relationship
SAD and onset of hearing loss	no relationship (but measure of onset may not be reliable)
SAD and self estimate	no relationship other than that which can be explained in terms of mean dB loss
SAD and hearing aid usage	no relationship
SAD and hearing aid benefit	no relationship

SAD and speech discrimination gain scores	no relationship
suspiciousness	no evidence whatsoever of an association between heightened suspiciousness and hearing loss

Other indicators of psychological wellbeing

The items referred to in this section are discrete questions taken from the interview schedule. Those on general health, worry and employment are controlled on national surveys of the general population. Items on social and family life were administered to a matched control group. Where items make reference to hearing loss it is not possible to control them on people with normal hearing. In such cases the only form of control is the SAD.

domain	source of control	result
general health	(i) Quality of Life Survey	significant differences for 5 out of 6 items; exception concerns "getting to sleep"
	(ii) matched control group	3 of above 6 items were also asked of this matched control group; all resulted in significant differences
worry	Quality of Life Survey	significant differences for 6 out of 8 items; exceptions concern "worry about getting old" and "worry about neighbours"
employment	(i) Multipurpose Survey (ii) SAD	no difference except for item concerning happiness at work; significantly related to "changed jobs due to deafness" and "hearing loss affects work a lot", two items which could not be controlled on a normally hearing population

social activity	matched control group	significant differences for 3 out of 4 items; exception concerns enjoyment of "casual chat or passing the time of day with friends and workmates, neighbours and so on"
family life	(i) matched control group	no difference
	(ii) SAD	significantly related to 2 out of 3 items in which reference is made to hearing loss; exception concerns "having rows arising from deafness"
overall life satisfaction	Quality of Life Survey	significant differences for all 3 items

Overall, it appears that findings concerning the effects of work, social and family life are not clear cut.

The "Severely Deaf" subsample

demographic	(i)	the proportion of 57% SAD cases do not appear to be affected by demographic biases;
	(ii)	all three hospital sampling sources contributed to the "severely deaf" subsample
comparison with rest of sample		for 37 out of a total of 42 discrete items in the questionnaire the "severely deaf" are significantly different from the rest of the sample in the predicted direction

Acquired deafness as a handicap

(i) Acquired deafness results in as much psychological disturbance as does physical disability.

(ii) Only half the hearing impaired sample considered themselves handicapped people. Admitting to being handicapped did not relate more than marginally to audiological or psychological measures. A tentative interpretation of this is offered, it being suggested that respondents were possibly unaware of the extent to which hearing loss had affected the quality of their lives.

CHAPTER THIRTEEN

CONCLUSIONS
(including suggestions for further research)

1. Acquired deafness results in significant psychological disturbance for at least one fifth of those who have owned a National Health Service hearing aid for a number of years. This conclusion is supported by evidence from discrete questions concerning every-day life domains which are controlled on the general population. Discrete questions also serve to discriminate the psychologically disturbed from the rest of the sample. Further support for the conclusion derives from comparison with a study designed to assess psychological disturbance associated with physical disability.

2. There is no evidence that acquired hearing loss leads to heightened suspiciousness, a finding which contradicts the time honoured belief recently enshrined in an official policy statement published by the British Society of Audiology (Markides et al, 1979).

3. The simple issue of a hearing aid is clearly insufficient for adults with an acquired hearing loss if they are to learn to live and cope with their disability. Further research is needed if a better understanding of the handicapping nature of acquired deafness is to be achieved. An action research approach appears the most appropriate, preferably one in which rehabilitative programmes are individually designed, so that a person can be helped to cope with his own hearing disability given his particular life style, work situation and family commitment.

4. Those who have a severe dB loss combined with poor speech discrimination ability constitute a severely handicapped subsample, at least half of whom are psychologically disturbed. Perhaps rehabilitation for such people should be along Scandinavian lines where residential facilities are provided if necessary. Unfortunately, an evaluation of the effectiveness of such provision in Scandinavia has not yet been reported.

A follow up study based on the finding relating to the "severely deaf" subsample is at present underway. It aims to study in greater depth the handicapping nature of acquired hearing loss for those with 70 dB hearing losses or greater. It is hoped to achieve this by examining the inter-relationship between measures of hearing disability across the following continuum: dB loss - hearing for phonemes and for whole words (Boothroyd, 1968) - audiovisual perception of words in sentences (Kalikow et al, 1977) - self assessment of hearing handicap (Noble and Atherley, 1970) - effect on psychological wellbeing as measured by the SAD (Bedford and Foulds, 1978) and on personality as measured by the EPQ (Eysenck and Eysenck, 1975). The research is supported by a Medical Research Council grant.

5. Albrecht (1976) argues that while most research on disability has concentrated on the individual as the primary unit of analysis, "physical disability can be conceived of as an attribute of the whole family which dramatically affects family interaction patterns". An investigation of the effect hearing loss has on families is to be undertaken as part of the follow up study mentioned above. The structured research approach adopted in the present study appears inappropriate for research on communication within a family. Methodological problems will therefore be considerable for, as Hinde (1978) points out, the study of the quality of interpersonal relationships is still in quest of a science.

6. The effect of hearing loss on work life is not clear and needs to be explored in greater detail than was possible in the present study. The follow up study will attempt to do this.

7. There is evidence to support a tentative interpretation that this predominantly middle aged group are not fully aware of the effect that hearing loss has on their lives. Whether this is specific to hearing loss is not known; as Albrecht (1976) suggests, people are prepared to suffer injury or disease at some point in their lives and to need medical or surgical treatment - "but they also expect they will soon be able to resume their normal levels of activity. The fact is that a large percentage...experience sustained disability for which they are not prepared". It may therefore be the case that any chronic disability, which is age related and of gradual onset, will be associated with psychological disturbance.

8. The prevalence of hearing loss and mental disorder are known to increase with age. The relationship between hearing loss and mental health in the elderly population is the subject of a separate follow up study supported by the Nuffield Foundation.

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APPENDICES

A. The questionnaire

B. The SAD inventory

C. The control questionnaire for items in the main questionnaire related to social and family life

D. Procedural details

E. Details of certain statistical analyses

F. Statement of advanced studies undertaken in connection with the programme of work (CNAA requirement)

APPENDIX A. THE QUESTIONNAIRE

POLYTECHNIC OF NORTH LONDON DEPARTMENT OF APPLIED SOCIAL STUDIES EL 1976

SOCIAL AND PSYCHOLOGICAL IMPLICATIONS OF ACQUIRED DEAFNESS FOR ADULTS OF EMPLOYMENT AGE

		CARD ONE
Name _____ Address _____		
Case No.	☐☐☐☐	1 - 4
Interviewer	A 1, B 2, K 3, M 4, 5	6
Date of interview		
Age	☐☐	7 - 8
Sex	M 1, F 2	9
Year of 1st appointment	☐☐	10 - 11
Length of interview excluding audiometry and speech discrimination in minutes	☐☐☐	12 - 14
Questionnaire complete	1	15
Incomplete	2	
Question numbers: (See notes)		
Type of deafness:		16
sensori-neural	1	
conductive	2	
mixed	3	
other	4	
Tinnitus:		17
none	1	
high pitch	2	
low pitch	3	
other	4	
Personal Disturbance Scale: (DSSI/sAD) sA	☐☐	20 - 21
sD	☐☐	22 - 23
sAD	☐☐	24 - 25

		CARD ONE
Self Estimate of Deafness: without hearing aid	☐	30
with hearing aid	☐	31
Speech Discrimination Result: phonemes % aided	☐☐☐	35 - 37
% unaided	☐☐☐	38 - 40
dB loss / Hospital		
250 Hz	☐☐☐	50 - 52
500 Hz	☐☐☐	53 - 55
1k Hz	☐☐☐	56 - 58
2k Hz	☐☐☐	59 - 61
4k Hz	☐☐☐	62 - 64
mean dB loss excluding 250 Hz	☐☐☐	65 - 67
E L 1		78 - 80

		CARD TWO
PNL		
250 Hz	☐☐☐	5 - 7
500 Hz	☐☐☐	8 - 10
1k Hz	☐☐☐	11 - 13
2k Hz	☐☐☐	14 - 16
4k Hz	☐☐☐	17 - 19
mean dB loss excluding 250 Hz	☐☐☐	20 - 22
ear tested: left 1, right 2		35
Sample source		

Time started ☐

CARD TWO

1. I'd like to start our discussion by asking you a few questions about your hearing aid and things to do with your hearing in particular.
Here is a scale. GIVE CARD A. I'd like you to show me where you would place yourself upon it. In other words where would you first say, 'Yes, this is me'. First of all <u>all without</u> your aid and then when you <u>wear</u> your aid. CLARIFY WHERE NECESSARY.

<u>Can you</u>:-	without aid	with aid
1. Hear a whispered voice?	1	1
2. Hear easily in a hall, cinema or theatre?	2	2
3. Hear easily in a group, where a few people are chatting together?	3	3
4. Hear easily someone facing you when they are speaking in a normal voice?	4	4
5. Hear easily someone facing you when they speak in a loud voice?	5	5
6. You cannot hear speech at all	6	6

TAKE BACK CARD A.

2. Could you tell me how old you are? ———

3. How old were you when you first had trouble with your hearing? ☐☐ 36 - 37

3.a. Difference between q.2 and q.3 ☐☐ 38 - 39

4. Who was it who suggested to you that you should do something about it? 40

self	1
school	2
spouse	3
family	4
para medical worker	5
g.p.	6
commercial dealer	7
someone at work	8
other	9

CARD TWO

5. And how much time do you think passed between feeling you had a hearing loss and going to see your doctor about it?

DO NOT PROMPT BUT CODE ANSWER

immediately	1	
less than 3 mths	2	
4-6 months	3	
7-11 months	4	41
1-3 years	5	
more than 3 years	6	
n.a.	7	

6. Now let's talk about your NHS aid.

a) What type of NHS hearing aid have you got?

postaural	BE11	1	
	BE12	2	
body worn	OL56	3	
	OL58	4	
	OL63	5	42
	OL67	6	
	other	7	
	none	8	

b) IF BODY WORN - Do you know that a behind the ear aid is available on the NHS?

yes	1	43
no	2	

7. People vary in the amount of time they wear their hearing aid. Do you wear your NHS aid?

always	1	
often	2	
sometimes	3	44
rarely	4	
never	5	

8. Some people feel that maybe there is not enough time spent on explaining how to use their NHS aid, so that when they get home they are not quite sure how to make the best use of it. At the time when you were given your NHS hearing aid, did you feel that you were given enough advice and guidance on how to use your aid or would you have liked to have had more?

enough	1	
wanted more	2	45
n.a.	3	

CARD TWO

9. What were the main problems you had in getting used to your NHS aid once you got home?

no problems	1	46
problems	2	

(open ended)

	yes	no	
A	1	2	47
B	1	2	48
C	1	2	49

10 a) Have you ever had a hearing aid from a commercial hearing aid dealer?

yes	1	50
no	2	

IF YES

b) I'd like to talk now about your commercial aid. Do you wear your commercial aid .....

always	1	
often	2	
sometimes	3	51
rarely	4	
never	5	

c) How did the commercial and NHS service compare?

PROMPT (open ended)

NHS better	1	
comm. better	2	52
no difference	3	
other	4	

d) How many commercial aids have you ever had?

IF MORE THAN FOUR CODE 4

1	
2	
3	57
4	

e) Do you wear two hearing aids - that is, one in each ear?

yes	1	58
no	2	

CARD TWO

11 a) Can I ask you if you have ever been to see a doctor or specialist in private practice about your hearing loss?

yes	1	59
no	2	

IF YES

b) Who paid for it?

self	1	
employer	2	60
other	3	

12 a) Have you ever had any other help or advice from any other person or worker who knows about hearing loss?

yes	1	61
no	2	

PROMPT

IF YES (open ended)

b) Who was it? _____

_____

_____

_____

social worker	1	
expert on deafness	2	
teacher	3	62
club member	4	
deaf person	5	
other	6	

13. Do you think your hearing loss has in any way caused you to rely on lipreading?

yes	1	
no	2	64
d.k.	3	

14. Did the hearing aid clinic give you any information about lipreading classes?

yes	1	65
no	2	

15. Have you ever been to lipreading classes?

yes	1	66
no	2	

IF YES

a) Are you attending now?

yes	1	67
no	2	

b) How long have you attend Did you attend?

up to 3 mths	1	
3-6 mths	2	
6-11 mths	3	
1-5 yrs	4	68
more than 5 yrs	5	

CARD TWO

c) How helpful did you/do you find the classes?

very helpful	1
quite helpful	2
not very helpful	3

69

d) And how much have the classes improved your lipreading?

a lot	1
a fair amount	2
a little	3
not at all	4

70

ONLY ASK FOR THOSE INTERVIEWED AT RNID

16 a) Had you ever heard of the RNID before we got in touch with you to come here today?

yes	1
no	2

71

IF YES

b) Had you got in touch with the RNID for any reason or not?

yes	1
no	2

72

E L	2

78–80

CARD THREE

17 a) Can you tell me the names of any (other) group, association or organisation however small, which helps people with a hearing loss?

b) and which ones have you ever been in touch with?

DO NOT PROMPT

(5–12)

		5 RNID	6 BAHOH	7 BDA	8 NDCS	9 City Lit	10 Link	11 Loc Soc	12 other
a.	not heard of	1	1	1	1	1	1	1	1
b.	heard of only	2	2	2	2	2	2	2	2
c.	heard of and been in touch	3	3	3	3	3	3	3	3

CARD THREE

18. People often find that they can get some help in their day to day lives by having technical aids in their homes, like special fitments to the doorbell, flashing alarm clocks and so on. What special aids have you heard of and which have you got?

type of aid	not heard of	heard of	heard of and got	
T.V.	1	2	3	15
phone	1	2	3	16
doorbell	1	2	3	17
alarm clock	1	2	3	18
baby alarm	1	2	3	19
other	1	2	3	20

19. Does your hearing loss prevent you from using the telephone?

yes	1	21
no	2	

20. People have different ideas about what makes somebody a handicapped person. Someone who is confined to a wheelchair is obviously handicapped while someone who needs a walking stick may or may not be thought of as handicapped.

A person who is completely blind is handicapped while someone who is prevented from having a driving licence because of poor eyesight may or may not be thought of as handicapped.

Do you consider that having hearing loss makes you yourself a handicapped person?

yes	1	22
no	2	

21 a) Do you tend to tell people that you are deaf fairly soon after meeting them, or do you not?

tends to	1	25
tends not to	2	

b) Why is that so? (open ended)

_____

_____

_____

_____

_____

_____

tend to

	yes	no	
A	1	2	26
B	1	2	27
C	1	2	28

tends not to

D	1	2	29
E	1	2	30
F	1	2	31

CARD THREE

22. Could I ask you? Are you married, widowed, single, separated or divorced?

married	1
widowed	2
single	3
separated	4
divorced	5

32

IF NOT MARRIED, SKIP TO QUESTION 25

IF MARRIED, PLEASE ASK

23. Is this your first marriage?

yes	1
no	2

33

24. Has your husband/wife ever been recommended to wear a hearing aid?

yes	1
no	2

34

Now I'd like to talk about your schooling.

MP Q3

25. Did you pass any recognised examinations as part of your education or training? Did you complete an apprenticeship? (ONLY RING CODE IF ANSWER GIVEN CORRESPONDS EXACTLY TO THE WORDING ON THE PRECODES. IF IT DOES NOT, RING 'OTHER' AND RECORD DETAILS USING WORDS NOT INITIALS. NO MULTICODES POSSIBLE. IF MORE THAN ONE APPLIES RING THE HIGHEST CODE)

No/none	0
CSE	1
GCE 'O' level/Ordinary National Certificate/ Ordinary National Diploma RSA/City & Guilds/ Ordinary School Certificate/ Matriculation	2
Full Industrial Apprentice -ship	3
GCE 'A' level/SRN/Higher School Certificate	4
Teachers Training Cert	5
Higher National Cert/ Higher National Diploma	6
University Degree	7
Other (SPECIFY)	

40

CARD THREE

MP Q5

26. Now I'd like to know something about your employment. Are you at present working for pay? (IF NO, PROBE) Are you a housewife, student, retired, sick or unemployed? (CODE ANYONE WHO DOES A PAID JOB FOR MORE THAN 8 HOURS PER WEEK AS EMPLOYED, EVEN IF A HOUSEWIFE, RETIRED, OR SELF-EMPLOYED)

Yes, employed (including sick who are still on full pay)	1
Unemployed but actively seeking employment (registered at Labour Exchange)	2
Temporarily sick(not receiving pay at present but has job to return to	3
Retired	4
Housewife (full-time)	5
Student	6
Permanently sick, disabled, or unemployed not seeking employment	7
Other (SPECIFY)	8

41

IF CODED 2 OR 4 ABOVE PLEASE ASK Q.27 ABOUT RESPONDANT'S LAST MAIN JOB AND USE THE PAST TENSE) MAKE SURE EVERY QUESTION IS ASKED.

FOR THOSE WORKING ONLY (i.e. CODED 1, 2 or 3 IN PREVIOUS QUESTION)

MP Q6

27. What job do you do? What does that actually involve? Do you hold any particular position, any rank or title for instance? (IF STILL NOT VERY CLEAR PROMPT) Can you give me an idea of what you do in an average day at work? (WRITE DOWN AS DETAILED A DESCRIPTION AS POSSIBLE)

42

27 A Derived variable: socioeconomic grade

1	1
11	2
111n	3
111m	4
1V	5
V	6

CARD THREE

MP Q8 28 a) Are you self-employed or do you work for someone else?

self-employed	1
employee	2

45

IF SELF-EMPLOYED ASK

b) How many employees do you have?

None	1
Less than 10	2
10-24	3
25-49	4
50-99	5
100-500	6
501-1000	7

46

DO NOT ASK

29. ASSESSMENT OF JOB SUITABILITY:- (including noise)

0 1 2 3 4 5 6

47

TO BE COMPLETED POST HOC

COMMENTS

30-32 ARE INCLUDED FOR SEG CODING ONLY. ASK OF ALL WOMEN WHO ARE MARRIED/ SEPARATED/WIDOWED.

MP 30. I would like to know something about your husband's employment. Is he at present working for pay? (IF WIDOWED ASK IN PAST TENSE)

Yes, employed (including sick who is still on (full) pay)	1
Unemployed but actively seeking employment (registered at Labour Exchange)	2
Temporarily sick (not receiving pay at present but has job to return to)	3
Retired	4

48

IF CODED 2 or 4 ABOVE. PLEASE ASK ABOUT HUSBAND'S LAST MAIN JOB AND USE PAST TENSE.

CARD THREE

MP 31. What job does he do? What does that actually involve? Does he hold any particular position, any rank or title for instance? (IF STILL NOT VERY CLEAR PROMPT) Can you give me an idea of what he does in an average day at work? (WRITE DOWN AS DETAILED A DESCRIPTION AS POSSIBLE)

CODE SEG AT Q.27

MP 32 a) Is he self-employed or does he work for someone else?

self-employed	1
employee	2

51

IF SELF-EMPLOYED

b) How many employees does he have?

None	1
Less than 10	2
10-24	3
25-49	4
50-99	5
100-500	6
501-1000	7

52

FOR THOSE NOT WORKING ADMINISTER DSSI AND TURN TO QUESTION 44.

FOR THOSE WORKING ONLY

Now let's talk about your work.

33 a) Has your deafness ever made you think of giving up your job, or has it actually made you change your job recently?

	thought of it	actually changed
Yes	1	3
No	2	4

53

IF ACTUALLY CHANGED JOB ASK

b) Did this change of job, due to your deafness, mean less responsibility for you?

yes	1
no	2
dk	3

54

34. Have you yourself made any real attempt to alter or re-arrange your present job so that you can manage better?

yes	1
no	2
na	3

55

CARD THREE

35. Have the people you work with made any real attempt to alter or re-arrange your job so that you can manage better? — 56

yes	1
no	2
na	3

36. All in all, how much does your hearing loss affect you at work? — 57

a lot	1
from time to time	2
almost never	3
not at all	4

MP Q26

37. Do you think you could do a more demanding job, would you prefer a less demanding job or do you think that your present job is about right for your abilities? — 58

could do more demanding	1
would prefer less demanding	2
present job about right	3

FOR SELF-EMPLOYED SKIP TO QUESTION 41

MP Q28

38. And how likely do you think it is that you will be promoted in the next five years? Is it .....?
ONLY CODE NA IF VOLUNTEERED — 59

very likely	1
quite likely	2
rather unlikely	3
very unlikely	4
na	5

39 a) People say that no one understands what it's like to be hard of hearing. Do you think that your present employer shows any understanding of what it's like to be hard of hearing or not? — (60-61)

b) and what of your colleagues?

	60 empl's	61 coll
yes	1	1
no	2	2
unaware	3	3
na	4	4

40. If your hearing gets any worse, do you think you will get any help from your employer or not? — 62

yes	1
no	2
dk	3
na	4

CARD THREE

MP Q31

41. Do you expect that you will stay in your present job for the next five years or do you intend to try to change jobs?
Changing jobs means changing employers.
(IF CHANGE INTENDED ASK)
Is that because you are unhappy with something about your present job or would it be part of your career plans?
ONLY CODE NA IF VOLUNTEERED.

stay/not change	1
change because unhappy	2
change because career plans	3
na	4

63

MP Q21

SHOW CARD B

42. Here is a scale. We want to use it now to measure how happy or unhappy you are with your job. 10 represents very happy and 0 represents very unhappy. Which number on the scale comes closest to how happy or unhappy you are with your job?
TAKE BACK CARD B

ENTER BOX NO. ☐☐

IF NECESSARY YOU MAY PROMPT WITH THIS VERTICAL SCALE '5 is exactly between very happy and very unhappy' DO NOT USE ANY PROMPTS OTHER THAN THIS OR RE-READING THE QUESTION

64–65

43. In general terms, from your experience would you say that most people who become deaf have a very difficult/ quite difficult/ fairly easy task in adjusting themselves to their work (including housework)?

very difficult	1
quite difficult	2
fairly easy	3

66

E | L | 3

78–80

COFFEE BREAK AND PSYCHIATRIC SCREENING DEVICE

14.

Now I'd like to talk about friendship

CARD FOUR

44. Some people feel that they have a lot of friends and some people feel that they don't. What would you say of yourself?
That you have:

more than most people	1	5
as many as most people	2	
fewer than most people	3	
none	4	

45. Some people find it more difficult than others to make new friends. Generally speaking do you find making friends very easy, fairly easy, quite difficult, or very difficult?

very easy	1	6
fairly easy	2	
quite difficult	3	
very difficult	4	

46. Some people like chatting or passing the time of day with casual friends, neighbours, workmates and so on, and some people don't. In general do you enjoy this or not?

enjoys	1	7
doesn't enjoy	2	

47 a) We all have different ideas about what being lonely is. It may have very little to do with the number of friends you have or the number of people you know. Would you describe yourself as a lonely person?

yes	1	8
no	2	

ASK EITHER B or C.

b) IF NO
Even though you're not a lonely person, most people do have lonely patches from time to time. Would you say that you feel that way often?, sometimes?, rarely?, or never?

often	1	9
sometimes	2	
rarely	3	
never	4	

c) IF YES
How often would you say that you feel that way? Always?, often?, sometimes?, rarely?, or never?

always	1	10
often	2	
sometimes	3	
rarely	4	
never	5	

48 a) Do you think that those nearest to you understand what it is like to lose one's hearing and have to wear an aid or not?

yes	1	15
no	2	

IF NO

b) Is there anyone you know who you feel understands what it is like?

yes	1	16
no	2	

49 a) Who do you mainly turn to for support in your day tc day life?

no one	1	17
spouse	2	
family	3	
deaf person	4	
friend	5	
other	6	

IF SUPPORTED ASK

b) If it wasn't for this person who would you turn to?

someone	1	18
no one	2	
dk	3	

SPECIFY IF SOMEONE (open ended)

_____	1	19
_____	2	
_____	3	
_____	4	
_____	5	

50 a) Do you think it would be a good thing if someone helped you to explain to your family what it is like to manage with poor hearing?

yes	1	20
no	2	
na	3	

IF YES

b) What kind of person do you think that should be?

DO NOT PROMPT

other: _____

_____

_____

dk	1	21
social worker	2	
deaf person	3	
other SPECIFY	4	

CARD FOUR

51 a) How many other people do you know fairly well who have a hearing loss?

6 or more	1
4 - 5	2
2 - 3	3
1	4
none	5

23

IF NONE

b) Do you think it would help you to be put in touch with others who have similar problems?

yes	1
no	2
dk	3

24

I expect your deafness is important in the family. Can we discuss it?

52. Many people say that within a family one member or the other may get left out of discussions and decision making. Would you say that was true of you or not?

true	1
not true	2

25

FOR THOSE WHO HAVE EVER BEEN MARRIED

53. How many children have you got?
IF MORE THAN NINE CODE 9

[ ] 26

54 a) Can you tell me how many people live with you regularly in your household including any children. That is, the people who are catered for by the same person as caters for you.

(interviewers check)

no in house hold	

28-29

CARD FOUR

b) Could you tell me the age of each person (and if relevant ask for sex) you have mentioned.

FIRST ESTABLISH WHO IS THE HEAD OF THE HOUSEHOLD

Person No.	Age	Sex M.F.	Rel to H.O.H.
1			Head of H'hold
2			
3			
4			
5			
6			
7			
8			
9			

H.O.H.	1	30
Not HOH	2	

responsible (scale) ↓ dependent

		31
	1	
	2	
	3	
	4	
	5	

A	1	2	3	4	5	32
B	1	2	3	4	5	33
C	1	2	3	4	5	34
D	1	2	3	4	5	35

RING PERSON NO. OF RESPONDANT INTERVIEWED

FOR MARRIED PEOPLE ONLY/ FOR ALL OTHERS SKIP TO 60 or 62

55. How much time do you think you spend doing things together with your wife/husband?

quite a lot	1	40
a moderate amount	2	
a little time	3	

NB 56. Generally speaking, do you tell your (wife/husband) about what went on during your day?

always	1	41
usually	2	
about half the time	3	
seldom	4	
never	5	

NB 57. What about your (wife/husband)? Does (she/he) usually tell you what went on during (her/his) day?

always	1	42
usually	2	
about half the time	3	
seldom	4	
never	5	

58. Every husband and wife tend to fall out from time to time. For example, if I was to ask you if you and your husband/wife tend to have rows about irritating personal habits I am sure you would be quite likely to say "yes, we do tend to have rows about that". I'm going to read you out a list of things that we have found some people disagree about, and I want you to say whether generally speaking they cause you and your husband/ wife to have rows or not.

	yes	no	n.a	
A. Deciding whether to see friends together	1	2	3	43
B. Getting on with your neighbours	1	2	3	44
C. You being over tired	1	2	3	45
D. Getting on with your in-laws	1	2	3	46
E. Disciplining the children	1	2	3	47
F. Your husband/wife not listening to what you're saying	1	2	3	48
G. Going out together	1	2	3	49
H. One of you not showing enough affection	1	2	3	50
I. About nothing in particular	1	2	3	51
J. About situations arising from your deafness	1	2	3	52

59. All in all, how do you think your hearing impairment has affected your marriage .....?

a lot	1	53
from time to time	2	
almost never	3	
not at all	4	

FOR THOSE WITH CHILDREN/ FOR THOSE WITH NO CHILDREN SKIP TO 62

NB 60. How much time would you say you spend doing things with your child(ren).....?

quite a lot	1	60
moderate amount	2	
relatively little	3	

61. Do you tend to enjoy the company of your children's friends or not?

tends to	1	61
tends not	2	

CARD FOUR

FOR EVERYONE

62. I'd like to ask you (again) how much you think your hearing impairment has affected your family life .....?

a lot	1
from time to time	2
almost never	3
not at all	4
na	5

62

HEALTH

Now I would like to ask you a few questions about your health.

QL QE2 63. Do you, yourself, have any long standing physical disability or health trouble other than your hearing impairment?

IF YES ASK:

Does it keep you from doing things you might like to do?

No trouble	1
Yes-not limited	2
Yes-limits me	3

70

QL QE5 SHOW CARD C

64 a) To what extent, if any, do you have trouble getting to sleep at night nowadays?

b) .... and to what extent, if any, do you have trouble staying asleep?

(TAKE BACK CARD C)

	Not at all	A little	Quite a lot	A great deal	DK/ NA	
a)	1	2	3	4	9	71
b)	1	2	3	4	9	72

QL QE6 65. In general, do you have enough energy to do all the things that you would like to do?

yes	1
no	2

73

QL QE7 SHOW CARD D

66. All things considered, how satisfied or dissatisfied are you overall with your present state of health?

TAKE BACK CARD D.

ENTER BOX NO - [ ][ ] 74-75

E L 4 78-80

CARD FIVE

67. How good would you rate your eyesight (with glasses on if wears them) Excellent, fairly good, not very good or poor?

excllent	1
fairly good	2
not very good	3
poor	4

5

QL QE16 68. Most people these days have something they worry about, some times big things, sometimes quite small things. To what extent, during the past few weeks have you -

(SHOW CARD E)

	CODE ENTER BOX CODES BELOW	
a. worried about: not having enough money for day-to-day living		6 - 7
b. worried about: financial debts such as HP, mortgage etc		8 - 9
c. worried about: relations with neighbours		10 - 11
d. worried about: your health		12 - 13
e. worried about: your family		14 - 15
f. worried about: how things are going at (work/your husband's work)		16 - 17
g. worried about: Britain's future		18 - 19
h. worried about: growing old		20 - 21
i. worried: that you might have a nervous breakdown		22 - 23

QL QE17 69. And how much do you worry about your deafness? In general, how much would you say you worry these days? 24 - 25 26 - 27

TAKE BACK CARD E.

QL QE18 70. Have you ever consulted a doctor or anyone else to seek help about a nervous problem for yourself?

IF YES

Was that once or more than once?

No	1
Yes - once	2
Yes-more than once	3

30

QL QF3 71 a) Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?

Most people can be trusted	1
Can't be too careful	2

31

CARD FIVE

21.

b) Would you say that most of the time, people try to be helpful, or that they are mostly just looking out for themselves?

Try to be helpful	1	32
Look out for themselves	2	

c) Do you think that most people would try to take advantage of you if they got the chance or would they try to be fair?

Take advantage	1	33
Try to be fair	2	

QL
QF2D 72. Do you think you have had a fair opportunity to make the most of yourself in life, or have you been held back in some ways?

Fair opportunity	1	34
Held back	2	

QL
QG4 SHOW CARD D. CODE 99 FOR 'DON'T KNOW'

73 a) All things considered, how satisfied or dissatisfied are you overall with your life as a whole these days? 40 - 41

b) And where would you put yourself as you were five years ago? 42 - 43

c) And where do you expect you will be in five years time? 44 - 45

TAKE BACK CARD D

74. We've been talking a lot about the problems of losing your hearing. Now let's look at it from the other side. Has loss of hearing led to any actual gains in your life as a whole? (open ended)

no		1
yes	A	2
yes	B	3
yes	C	4
yes	D	5

50

THANK RESPONDANT AND DEAL WITH EXPENSES.

TIME COMPLETED

PLEASE COMPLETE INTERVIEWER'S ASSESSMENT ON NEXT PAGE.

Interviewer's Assessment

1. Emotional State (5 point scale)
   5 = very composed
   1 = very upset
   ☐ 60

2. Co-operation
   5 = very co-operative
   1 = very uno-operative
   ☐ 61

3. Interference of Hearing Impairment with interview
   5 = very good communication
   1 = very poor communication
   ☐ 62

4. Reasons for incomplete interview:

   E L 5 78 - 80

   a) Audiogram

   b) Speech Discrimination

   c) Questionnaire

   d) SSI

5. Any other comments.

Private and Confidential

FOULDS AND BEDFORD P.D. INVENTORY AND SCALES

D.S.S.I./sAD

Please supply the following details about yourself:-

Full Name ..... Sex.....

Date of Birth .....Today's Date..... Age .....

Marital Status.....

Occupation .....

INSTRUCTIONS

This booklet contains descriptions of how you may have felt, thought, or acted *recently*.

If you had marked 'False' with a circle you would just go on to read the next statement.

Your answers will be regarded as strictly confidential.

After reading each statement you have to put a circle round either 'False' or 'True' depending upon which is the correct answer for you. On the occasions when you have marked 'True' you then have to indicate how much this *upset* you. Do this by putting a circle round the *one* phrase or word which best explains this.

EXAMPLES

1. Recently I have been getting frequent headaches.

False (True) If true, this has upset me:

Unbearably (A lot) A bit

The first example would mean that recently you have been getting frequent headaches which upset you a lot.

2. Recently my concentration has been poor.

False (True) If true, this has upset me:

(A bit) A lot Unbearably

The second example would mean that recently your concentration has been poor, which upset you a bit.

3. Recently people have been getting on my nerves.

(False) True If true, this has upset me:

Unbearably A lot A bit

The third example would mean that recently people have not been getting on your nerves.

4. Recently I have worried about family troubles.

False (True) If true, this has upset me:

A bit A lot (Unbearably)

The fourth example would mean that recently you had worried about family troubles which had upset you unbearably.

If you are not sure what to do please ask *now*. Otherwise begin overleaf.

[anxiety items (A); depression items (D)]

(A) 1. Recently I have worried about every little thing.

False True If true, this has upset me:

A bit A lot Unbearably

(D) 2. Recently I have been so miserable that I have had difficulty with my sleep.

False True If true, this has upset me:

Unbearably A lot A bit

(A) 3. Recently I have been breathless *or* had a pounding of my heart.

False True If true, this has upset me:

A bit A lot Unbearably

(A) 4. Recently I have been so 'worked up' that I couldn't sit still.

False True If true, this has upset me:

Unbearably A lot A bit

(D) 5. Recently I have been depressed without knowing why.

False True If true, how depressed?

Fairly Very Extremely

(D) 6. Recently I have gone to bed not caring if I never woke up.

False True If true, how serious was this?

Desperately Very Fairly

(A) 7. Recently, for no good reason, I have had feelings of panic.

False True If true, this has upset me:

A bit A lot Unbearably

(D) 8. Recently I have been so low in spirits that I have sat for ages doing absolutely nothing.

False True If true, this has upset me:

Unbearably A lot A bit

(A) 9. Recently I have had a pain *or* tense feeling in my neck or head.

False True If true, this has upset me:

A bit A lot Unbearably

(D) 10. Recently the future has seemed hopeless.

False True If true, how hopeless?

Completely Very A bit

(A) 11. Recently worrying has kept me awake at night.

False True If true, this has upset me:

A bit A lot Unbearably

(D) 12. Recently I have lost interest in just about *everything*.

False True If true, how much loss?

Complete A lot A bit

(A) 13. Recently I have been so anxious that I couldn't make up my mind about the simplest thing.

False True If true, how anxious?

Fairly Very Extremely

(D) 14. Recently I have been so depressed that I have thought of doing away with myself.

False True If true, how seriously?

Completely Very Not very

NOP/3283
(1-4)

SERIAL No. 0308
(6 - 9)

INTERVIEWER No. _____
(10 - 13)

HEALTH AND FAMILY

(14)
Sex Male ---------- 1
Female ---------- 2

(15)
Class: A ---------- 1
B ---------- 2
C1 ---------- 3
C2 ---------- 4
D ---------- 5
E ---------- 6

(T4-16)

Office Use (16)
I 1
II 2
IIIN 3
IIIM 4
IV 5
V 6

Household Composition

Spouse	Child(ren) 0-5	Child(ren) 6-10	Child(ren) 11-16	Other Adult(s)
(17)	(18)	(19)	(20)	(21)
1	1	1	1	1
	2	2	2	2
	3	3	3	3
	4	4	4	4
	5	5	5	5
	6	6	6	6
	7	7	7	7
	8	8	8	8
	9	9	9	9

(17-23)

TOTAL NO. OF PEOPLE IN HOUSEHOLD

(22) (23)
[ ][ ]

Q.1 Good morning/afternoon. I am from NOP Market Research Limited and we are conducting a survey on behalf of the Polytechnic of North London supported by the Medical Research Council on certain aspects of people's general health and family life.
Firstly, however, I would like to ask you a few questions about yourself to make sure we get a good cross-section of the public.
Do you work full time, part time or don't you work?

(24)

(24)
Full time (30 hrs+) ---------- 1 ASK Q2
Part time (8-29 hrs) ---------- 2
Do not work (less than 8 hrs) ---- 3 GO TO Q3

Q.2 What is your occupation?

Q.3 What is the occupation of your head of household?

Q.4 Which of these age categories do you come in? SHOWCARD A

(25)

Under 16	1 NOT ELIGIBLE	
16 - 29	2	(25)
30 - 39	3	
40 - 49	4	
50 - 59	5	
60 - 64	6	
65+	7 NOT ELIGIBLE	

INVITE ELIGIBLE RESPONDENTS INTO HALL.

MAIN QUESTIONNAIRE

Now I would like to ask you a few questions about your health.

Q.1(a) Do you, yourself, have any long standing physical disability or health trouble? (26)

	(26)	
Yes	1	GO TO Q1b
No	2	GO TO Q2

(26)

IF YES

Q.1(b) Does it keep you from doing things you might like to do?

	(27)	
Yes	1	
No	2	

(27)

ASK ALL

Q.2 In general, do you have enough energy to do all the things that you would like to do?

	(28)	
Yes	1	
No	2	

(28)

Q.3(a) Have you ever consulted a doctor or anyone else to seek help about a nervous problem for yourself?

	(29)	
Yes	1	GO TO Q3(b)
No	2	GO TO Q4

(29)

Q.3(b) Was that once or more than one?

	(30)	
Once	1	
More than once	2	

(30)

Q.4 We are interested in how people feel about physical and other disabilities. Looking at these cards, I would like you to sort them so that you have the three which you consider the hardest for you personally, to live with. GIVE CARDS TO RESPONDENT AND ALLOW TIME TO SORT. TAKE 4 NOT CHOSEN AWAY. Now from these three, which do you consider would be the hardest to live with? And which second? And which third? GIVE OTHER FOUR BACK TO RESPONDENT. Now I would like you to sort these four cards in the same way. Which of these four do you think would be hardest? And which second? And which third? RECORD ONE TO SEVEN BELOW.

	FIRST PILE			SECOND PILE				
	Hardest	2nd	3rd	1st	2nd	3rd	4th	
Going Lame	1	2	3	4	5	6	7	(31)
Losing your sight	1	2	3	4	5	6	7	(32)
Losing your hand	1	2	3	4	5	6	7	(33)
Becoming very fat	1	2	3	4	5	6	7	(34)
Losing your hearing	1	2	3	4	5	6	7	(35)
Having no sense of taste	1	2	3	4	5	6	7	(36)
Being frequently depressed	1	2	3	4	5	6	7	(37)

Q.5 We know that people often have trouble with their hearing but find that either they're not aware of it or find it difficult to admit it. Would you be so kind as to estimate your hearing ability for me. Here is a scale SHOWCARD B. I'd like you to show me where you would place yourself on it. In other words, where would you first say, "Yes this is me".

(38)

You can easily hear a whispered voice and therefore believe that your hearing is normal	1 GO TO Q12	
You can easily hear someone talking in a quiet voice	2	
You can easily hear someone talking in a normal voice	3 GO TO Q6	(38)
You can easily hear someone talking in a loud voice	4	
You find great difficulty in hearing speech	5	
You cannot hear speech at all	6	

Q.6 You say that you cannot easily hear a whispered voice.
How long has this been so?
WRITE IN NUMBER OF YEARS, OR IF LESS THAN ONE YEAR, THE NUMBER OF MONTHS.
IF RESPONDENT SAYS "Ever since I can remember" or "Ever since I was a child" etc. LEAVE THE BOXES EMPTY AND WRITE IN EXACT WORDS USED BY RESPONDENT.

(39-42)

(39) (40) (41) (42)

YEARS MONTHS

(43)
1 2 3 4
5 6 7 8
9 0 X Y

Q.7 Have you ever been to see anyone about your loss of hearing?
IF NECESSARY: I mean about you not being able to easily hear a whispered voice.

(44)

Yes	1 GO TO Q8	(44)
No	2 GO TO Q10	

Q.8 Do you have a hearing aid supplied by the National Health Service?

(45)

Yes	1 GO TO Q10	(45)
No	2 GO TO Q9	

Q.9 Do you have any other kind of hearing aid?

(46)

Yes	1	(46)
No	2	

Q.10 Does your hearing loss interfere with your family life?

(47)

Yes	1	(47)
No	2	
No family life at all	3	

Q.5 We know that people often have trouble with their hearing but find that either they're not aware of it or find it difficult to admit it. Would you be so kind as to estimate your hearing ability for me. Here is a scale SHOWCARD B. I'd like you to show me where you would place yourself on it. In other words, where would you first say, "Yes this is me".

(38)

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Q.6 You say that you cannot easily hear a whispered voice. How long has this been so?
WRITE IN NUMBER OF YEARS, OR IF LESS THAN ONE YEAR, THE NUMBER OF MONTHS.
IF RESPONDENT SAYS "Ever since I can remember" or "Ever since I was a child" etc. LEAVE THE BOXES EMPTY AND WRITE IN EXACT WORDS USED BY RESPONDENT.

(39) (40) (41) (42) (39-42)

YEARS		MONTHS	

(43)
1 2 3 4
5 6 7 8
9 0 X Y

Q.7 Have you ever been to see anyone about your loss of hearing?
IF NECESSARY: I mean about you not being able to easily hear a whispered voice.

(44) (44)

Yes	1 GO TO Q8
No	2 GO TO Q10

Q.8 Do you have a hearing aid supplied by the National Health Service?

(45) (45)

Yes	1 GO TO Q10
No	2 GO TO Q9

Q.9 Do you have any other kind of hearing aid?

(46) (46)

Yes	1
No	2

Q.10 Does your hearing loss interfere with your family life?

(47) (47)

Yes	1
No	2
No family life at all	3

IF WORKING AT Q.1 ASK Q11 - OTHERS GO TO Q.12.

Q.11 Does your hearing loss make your job more difficult? (48)

		(48)
Yes	1	
No	2	

ASK ALL

Q.12 Are you married, single, widowed, divorced or separated? (49)

		(49)
Married	1 GO TO Q13	
Single	2	
Widowed	3 GO TO Q14	
Divorced	4	
Separated	5	

Q.13 Has your husband/wife ever been recommended to wear a hearing aid? (50)

		(50)
Yes	1	
No	2	

Q.14 Now I would like to ask you some questions about you and how you get on with other people.
Some people feel that they have a lot of friends and some people feel that they don't. What would you say of yourself, that you have ...

READ OUT (51)

		(51)
More than most people	1	
As many as most people	2	
Fewer than most people	3	
None	4	

Q.15 Some people find it more difficult than others to make new friends. Generally speaking do you find making friends very easy, fairly easy, quite difficult, or very difficult? (52)

		(52)
Very easy	1	
Fairly easy	2	
Quite difficult	3	
Very difficult	4	

Q.16 Some people like chatting or passing the time of day with casual friends, neighbours, workmates and so on, and some people don't. In general do you enjoy this or not? (53)

		(53)
Enjoys	1	
Doesn't enjoy	2	

Q.17(a) We all have different ideas about what being lonely is. It may have very little to do with the number of friends you have or the number of people you know. Would you describe yourself as a lonely person? (54)

Yes	1 GO TO Q17(c)	
No	2 GO TO Q17(b)	

IF NO

Q.17(b) Even though you're not a lonely person, most people do have lonely patches from time to time. Would you say that you feel that way often? Sometimes? Rarely? Or never?

(55)

Often	1
Sometimes	2
Rarely	3
Never	4

(55)

IF YES

Q.17(c) How often would you say that you feel that way? Always? Often? Sometimes? Rarely? Or never?

(56)

Always	1
Often	2
Sometimes	3
Rarely	4
Never	5

(56)

ASK ALL

Q.18 Who do you mainly turn to for support in your day to day life?

(57)

No one	1 GO TO Q20
Spouse	2
Family	3 GO TO Q19
Friend	4
Other	5

(57)

Q.19 If it wasn't for this person who would you turn to?

(58)

Someone	1
No one	2
Don't know	3

(58)

Q.20 Many people say that within a family one member or the other may get left out of discussions and decision making. Would you say that was true of you or not?

(59)

True	1
Not True	2
No family whatsoever	3

(59)

CHECK WHETHER RESPONDENT IS MARRIED OR NOT(Q12) IF MARRIED GO TO Q21

IF SINGLE GO TO FILTER BEFORE Q27

IF DIVORCED/SEPARATED/WIDOWED GO TO Q25(a)

Q.21 How much time do you think you spend doing things together with your wife/husband? READ OUT

(60)

Quite a lot	1
A moderate amount	2
A little time	3

(60)

Q.22 Generally speaking, do you tell your wife/husband about what went on during your day? READ OUT

(61)

Always	1	(61)
Usually	2	
About half the time	3	
Seldom	4	
Never	5	

Q.23 What about your wife/husband? Does she/he usually tell you what went on during her/his day? READ OUT

(62)

Always	1	(62)
Usually	2	
About half the time	3	
Seldom	4	
Never	5	

Q.24 Every husband and wife tend to fall out from time to time. For example, if I was to ask you if you and your husband/wife tend to have rows about irritating personal habits I am sure you would be quite likely to say "Yes, we do tend to have rows about that". I'm going to read you out a list of things that we have found some people disagree about, and I want you to say whether generally speaking they cause you and your husband/wife to have rows or not? READ OUT

	Yes	No	Not Applicable	
A. Deciding whether to see friends together	1	2	3	(63)
B. Getting on with your neighbours	1	2	3	(64)
C. You being over tired	1	2	3	(65)
D. Getting on with your in-laws	1	2	3	(66)
E. Disciplining the children (if no children code 3)	1	2	3	(67)
F. Your husband/wife not listening to what you're saying	1	2	3	(68)
G. Going out together	1	2	3	(69)
H. One of you not showing enough affection	1	2	3	(70)
I. About nothing in particular	1	2	3	(71)

Q.25(a) Do you have any children?

(72)

Yes	1 GO TO Q25(b)	(72)
No	2 GO TO FILTER BEFORE Q27	

Q.25(b) How much time would you say you spend doing things with your child(ren)? READ OUT

(73)

Quite a lot	1	(73)
A moderate amount	2	
Relatively little	3	
None	4	

Q.26 Do you tend to enjoy the company of your child(ren)'s friends or not?

(74)

Tends to	1	(74)
Tends not	2	
Not Applicable	3	

ASK ALL WHO HAVE PROBLEMS WITH THEIR HEARING (CODES 2-6 AT Q5)

Q.27 Would you be willing to be re-interviewed at some time in the future?

(75)

Yes ---------- 1 ASK NAME ADDRESS AND TEL.No.
No ---------- 2 Close

(75)

Name: (Mr/Mrs/Miss) ----------

ADDRESS (in full): ----------

TELEPHONE No: ----------

THANK RESPONDENT FOR HIS/HER TIME. GO TO PERSONAL DETAILS.
ASSURE CONFIDENTIALITY

APPENDIX D

PROCEDURAL DETAILS

(i) **Correspondence**

a) Initial invitation to attend for an interview:

Dear

We understand from the ENT department that you had your hearing tested there some time ago.

We are carrying out an enquiry into how people manage with hearing problems whether slight or severe and what differences they may make to their lives. This enquiry is sponsored by the Medical Research Council and the Royal National Institute for the Deaf and is being carried out under the ENT department of the hospital. Its aim is to obtain information which we hope will eventually improve services to people with hearing problems.

Many people who are or have been patients at the ENT department are being asked to attend an interview lasting about one hour at the _____ on _____. Public transport expenses will be re-imbursed as will a subsistence allowance of up to 50p.

Would you please confirm that you can attend on the enclosed slip. A stamped and addressed envelope is enclosed. If for any reason you cannot attend at the time stated or you have any other questions could you please contact _____ _____ using the enclosed slip or by telephoning _____.

Could you please bring your hearing aid with you, whether you use it or not.

Yours sincerely,

b) Follow up letter

You may remember that we wrote to you recently asking if you could help us with our enquiry. We are sorry that the date we gave you was obviously inconvenient so we are writing to you again in the hope that we may meet you.

To refresh your memory - we are carrying out an enquiry into how people actually manage with a hearing aid and what a difference it might make to their lives to have a hearing loss. We are also just as interested in those people who rarely or never make use of their aid, or have lost or mislaid it even. If you have a commercial aid now we would still appreciate you coming. This enquiry is sponsored by the Medical Research Council and the Royal National Institute for the Deaf and is being carried out under the ENT department of the hospital. Its aim is to obtain information which we hope will eventually improve services to the hard of hearing.

We would be most grateful if you could kindly phone _____ _____ to make your own appointment. Alternatively, you might like to write to us saying what day and time is most convenient for you.

Either way we look forward to hearing from you.

Yours sincerely,

c) "Thank you" letter

Dear

This is just to say thank you for giving up your time to attend for an interview. We hope you found it interesting.

Yours sincerely,

(ii) Instructions for Interviewers

a) General

The interviews were conducted by 6 interviewers, 5 female and 1 male; two were the project investigators, two were research assistants and two were specifically appointed to the project as interviewers. Briefing was detailed. In addition all were trained to carry out simple audiometry by the same qualified audiometrician.

The audiometer used was an Amplivox 84 on loan from the Royal National Institute for the Deaf. Word lists for the speech discrimination test were obtained from the RNID and played on a Ferrograph Tape Recorder (Type 4A) owned by the RNID. Output was set at 65 dB (A) one metre from the single speaker incorporated in the tape recorder. Background noise varied between 25 dB (A) and 35 dB (A).

b) **When respondent arrives:**

Thank respondent for coming and make him feel at ease. Say that the general aims of the research are to find out how people cope with a hearing loss and that the information obtained will be useful for those who wish to improve services for hearing impaired people. Say that the interview session will consist of:

- testing of hearing (tones and words);
- questions about hearing loss;
- questions about work (if applicable);
- a cup of tea or coffee (while a very short questionnaire is completed);
- finally, questions which have to do with various other aspects of day to day life.

Ask if there are any questions but while being friendly be as brief as possible in answering.

c) **Pure tone audiometry:**

Ask respondent which is better ear. If he is in doubt test both but record better ear only. Say: "I am going to test your hearing now. You will hear different tones; some loud, some faint. Every time you hear a sound I want you to press this knob and let it go again. The sounds will get fainter and fainter - if you hear, press; if you don't hear, don't press".

If necessary give a simple demonstration. Then fit headphones. At commencement of test give the respondent a sign of encouragement that he is doing the right thing. Then test in earnest, starting roughly 30 dB above threshold for each frequency.

Order of presentation: 1, 2, 4, 0.5 kHz; then repeat 1 kHz, taking the second reading as the correct one if the difference is 10 dB or less; if it is 15 dB or greater do the whole test again.

Starting from roughly 30 dB above threshold come down in 10 dB steps until near threshold and then in 5 dB steps. If a response first time to stimulus come down one step. If no response repeat until 2 out of 4 correct, then go down a step. If less than 2 out of 4 correct responses then go up a step and check for 2 out of 4. Threshold is the lowest step at which 2 out of 4 correct responses are given. If in any doubt, or if a mistake is made, go back to 30 dB above threshold and come down again.

Bone conduction:

Say: "Now I am going to do exactly the same again, but this time behind your ear". Use same procedure as for air conduction.

d) Speech discrimination:

Say: "And now I'd like you to listen to some words on the tape recorder. First would you please adjust your aid to what is normally comfortable for you. Now you will hear someone talking on tape". Play 'The Story' which lasts a minute and allows the respondent to accustom himself to the voice of the speaker. Then say: "Now you will hear lists of short words (cat, dog, man, etc.). I want you to repeat each word you hear. If you don't hear the complete word just repeat part of it. If you are not sure still have a guess at it. The first list will be a practice one - for you to get used to the idea - then there will be a list with your aid on followed by another list without the aid (or vice versa). Please have a go at each word however little you hear".

Odd case numbers - aided condition first.
Even case numbers - unaided conditions first.
If there is any interference (e.g. loud noise) use spare lists as necessary.

e) SAD

During the coffee break ask the respondent to complete the SAD. Go through the examples to ensure he knows what is entailed.

(iii) Cnntrol survey

The control survey was conducted by the Social Research Division of National Opinion Polls Ltd. The quota sampling method was used, with age, sex, economic activity and area of residence as criteria for inclusion. Respondents were contacted in the street and invited into a rented hall for the interview.

Interviewing was carried out mainly on Fridays and Saturdays in the spring of 1978. Interviewers were extensively briefed by the investigators, both before and after pilot interviews andwere de-briefed after the main interviewing session.

(iv) Classification of hearing loss

If the air-bone gap was 15 dB or greater over two or more frequencies it was considered significant. Given this difference, if dB loss for bone conduction was 35 dB or less across three frequencies the loss was classified as conductive. If not it was classified as mixed.

APPENDIX E

STATISTICAL ANALYSES

* * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * *

VAR028 MEAN DB LOSS > 500HZ 1;2;4 KHZ PNL AUDIO
by VAR087 DERIVED SOCIOECONOMIC GRADE
VAR004 SEX
with VAR003 AGE

* *

Source of variation	Sum of Squares	df	Mean Square	F	Signif of F
Main effects	2460.278	7	351.468	1.145	0.337
VAR087	2209.698	5	441.940	1.440	0.212
VAR004	197.261	1	197.261	0.643	0.424
VAR003 (covar)	13.024	1	13.024	0.042	0.837
2-way interactions	1953.030	5	390.606	1.272	0.277
VAR087 VAR004	1953.030	5	390.606	1.272	0.277
Explained	4413.309	12	367.776	1.198	0.287
Residual	60164.193	196	306.960		
Total	64577.501	208	310.469		

Covariate	Raw regression coefficient
VAR003	0.026

211 cases were processed.
2 cases (0.9 %) were missing.

*** M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S ***

VAR028 MEAN DB LOSS > 500HZ 1;2;4 KHZ PNL AUDIO
by VAR087 DERIVED SOCIOECONOMIC GRADE
VAR004 SEX
with VAR003 AGE

* *

Grand mean = 54.65

Variable + category	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for independents Dev'n	Adjusted for independents Beta	Adjusted for independents + covariates Dev'n	Adjusted for independents + covariates Beta
VAR087							
1 I	16	-3.71				-3.92	
2 II	47	-2.52				-2.66	
3 III N	34	-0.09				0.43	
4 III M	70	-0.34				-0.31	
5 IV	31	2.45				2.19	
6 V	11	11.71				11.55	
			0.19				0.18
VAR004							
1 MALE	119	0.93				0.88	
2 FEMALE	90	-1.23				-1.16	
			0.06				0.06
Multiple R squared							.039
Multiple R							.195

E2

* * * * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * * *

VAR015 % SPEECH DISCRIMINATION SCORE **AIDED**
by VAR075 FEELS HANDICAPPED DUE TO HEARING LOSS
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
VAR003 AGE

* *

Source of variation			Sum of Squares	df	Mean Square	F	Signif of F
Main effects			44282.913	6	4920.323	15.452	0.000
VAR075			1282.211	1	1282.211	4.027	0.046
VAR004			155.945	1	155.945	0.490	0.485
VAR087			478.350	5	95.670	0.300	0.912
VAR028	(covar)		36121.094	1	36121.094	113.439	0.000
VAR003	(covar)		47.820	1	47.820	0.150	0.699
2-way interactions			7971.494	11	724.681	2.276	0.013
VAR075	VAR004		2660.729	1	2660.729	8.356	0.004
VAR075	VAR087		4368.916	5	873.783	2.744	0.021
VAR004	VAR087		1572.776	5	314.555	0.988	0.427
3-way interactions			3746.117	5	749.223	2.353	0.043
VAR075	VAR004	VAR087	3746.117	5	749.223	2.353	0.043
Explained			56000.523	25	2240.021	7.035	0.000
Residual			50310.343	158	318.420		
Total			106310.870	183	580.934		

Covariate	Raw regression coefficient
VAR028	-0.826
VAR003	0.054

211 cases were processed
27 cases (12.8 %) were missing.

---

* * * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * * *

VAR015 % SPEECH DISCRIMINATION SCORE **AIDED**
by VAR075 FEELS HANDICAPPED DUE TO HEARING LOSS
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
VAR003 AGE

* *

Grand mean = 79.28

Variable + category	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for independents Dev'n	Adjusted for independents Beta	Adjusted for independents + covariates Dev'n	Adjusted for independents + covariates Beta
VAR075				-2.83			
1 YES	87	-5.14		2.54			
2 NO	97	4.61	0.20				0.11
VAR004				-0.81			
1 MALE	108	-1.40		1.15			
2 FEMALE	76	1.99	0.07				0.04
VAR087				-0.33			
1 I	15	1.06		1.79			
2 II	40	3.55		-1.12			
3 III N	29	-1.14		-0.25			
4 III M	63	0.74		1.29			
5 IV	27	-0.17		-5.31			
6 V	10	-16.68	0.18				0.07
Multiple R squared							.417
Multiple R							.645

* * * * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * * *

VAR016 % SPEECH DISCRIMINATION SCORE **UNAIDED**
by VAR075 FEELS HANDICAPPED DUE TO HEARING LOSS
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ FNL AUDIO
VAR003 AGE

* *

Source of variation			Sum of Squares	df	Mean Square	F	Signif of F
Main effects			115563.030	9	12840.226	22.069	0.000
	VAR075		839.747	1	839.747	1.443	0.231
	VAR004		1175.068	1	1175.068	2.020	0.157
	VAR087		4821.186	5	964.237	1.657	0.148
	VAR028	(covar)	97518.690	1	97518.690	167.610	0.000
	VAR003	(covar)	34.799	1	34.799	0.060	0.807
2-way interactions			8736.765	11	794.251	1.365	0.194
	VAR075	VAR004	665.903	1	665.903	1.145	0.286
	VAR075	VAR087	7706.060	5	1541.212	2.649	0.025
	VAR004	VAR087	340.568	5	68.114	0.117	0.988
3-way interactions			992.443	5	198.489	0.341	0.887
	VAR075	VAR004 VAR087	992.443	5	198.489	0.341	0.887
Explained			125291.240	25	5011.650	8.614	0.000
Residual			91927.627	158	581.820		
Total			217218.870	183	1186.988		

Covariate	Raw regression coefficient
VAR028	-1.357
VAR003	0.046

211 cases were processed.
27 cases (12.8 %) were missing.

---

* * * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * * *

VAR016 % SPEECH DISCRIMINATION SCORE **UNAIDED**
by VAR075 FEELS HANDICAPPED DUE TO HEARING LOSS
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ FNL AUDIO
VAR003 AGE

* *

Grand mean = 53.87

Variable + category	N	Unadjusted Dev'n	Eta	Adjusted for independents Dev'n	Beta	Adjusted for independents + covariates Dev'n	Beta
VAR075							
1 YES	87	-5.80				-2.29	
2 NO	97	5.20				2.05	
			0.16				0.06
VAR004							
1 MALE	108	0.70				2.22	
2 FEMALE	76	-0.99				-3.15	
			0.02				0.08
VAR087							
1 I	15	5.46				1.58	
2 II	40	8.58				5.32	
3 III N	29	5.99				7.55	
4 III M	63	-3.50				-4.63	
5 IV	27	-5.17				-3.74	
6 V	10	-23.87				-6.30	
			0.23				0.15
Multiple R squared							.532
Multiple R							.729

* * * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * *

VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL-AUDIO
by VAR004 SEX
VAR008 TYPE OF DEAFNESS
VAR034 TYPE OF NHS AID
VAR036 AMOUNT OF TIME NHS AID WORN
with VAR003 AGE

* *

Source of variation	Sum of Squares	df	Mean Square	F	Signif of F
Main effects	6780.400	10	678.040	2.760	0.004
VAR004	44.746	1	44.746	0.182	0.670
VAR008	188.790	2	94.395	0.384	0.682
VAR034	1876.424	2	938.212	3.819	0.024
VAR036	3092.487	1	1272.122	5.183	0.001
VAR003 (covar)	37.683	1	37.683	0.153	0.696
2-way interactions	5489.397	26	211.131	0.859	0.663
VAR004 VAR008	181.719	2	90.859	0.370	0.692
VAR004 VAR034	348.318	2	174.159	0.709	0.494
VAR004 VAR036	226.304	4	56.576	0.230	0.921
VAR008 VAR034	1149.619	4	287.405	1.170	0.327
VAR008 VAR036	2608.973	8	326.122	1.328	0.235
VAR034 VAR036	1280.808	8	213.468	0.869	0.520
3-way interactions	6035.700	21	287.414	1.170	0.287
VAR004 VAR008 VAR034	208.831	3	69.610	0.283	0.837
VAR004 VAR008 VAR036	2741.736	7	391.677	1.594	0.142
VAR004 VAR034 VAR036	2042.921	5	408.584	1.663	0.148
VAR008 VAR034 VAR036	961.075	6	160.179	0.652	0.688
4-way interactions	1556.785	3	518.928	2.112	0.101
VAR004 VAR008 VAR034 VAR036	1556.785	3	518.928	2.112	0.101
Explained	19862.282	60	331.038	1.348	0.079
Residual	33899.748	138	245.650		
Total	53762.030	198	271.525		

* * * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * * *

VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
by VAR004 SEX
VAR008 TYPE OF DEAFNESS
VAR034 TYPE OF NHS AID
VAR036 AMOUNT OF TIME NHS AID WORN
with VAR003 AGE

* *

Grand mean = 54.59

Variable + category	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for independents Dev'n	Adjusted for independents Beta	Adjusted for independents + covariates Dev'n	Adjusted for independents + covariates Beta
VAR004							
1 MALE	115	0.62				0.42	
2 FEMALE	84	-0.84	0.04			-0.58	0.03
VAR008						-0.75	
1 SENSORINEURAL	117	-1.58				0.07	
2 CONDUCTIVE	27	1.70				1.56	
3 MIXED	55	2.52	0.12				0.06
VAR034						-2.97	
1 BE11	92	-2.15				-4.31	
2 BE12	18	1.80				3.95	
3 OL56	89	1.86	0.12				0.22
VAR036						9.47	
1 ALWAYS	51	7.74				-1.39	
2 OFTEN	39	-1.80				-2.58	
3 SOMETIMES	48	-2.74				-3.90	
4 RARELY	29	-3.04				-5.99	
5 NEVER	32	-3.28	0.28				0.35
Multiple R squared							.126
Multiple R							.355

* * * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * *

VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL-AUDIO
by VAR004 SEX
VAR008 TYPE OF DEAFNESS
VAR034 TYPE OF NHS AID
VAR036 AMOUNT OF TIME NHS AID WORN
with VAR003 AGE

* *

Source of variation				Sum of Squares	df	Mean Square	F	Signif of F
Main effects				6780.400	10	678.040	2.760	0.004
	VAR004			44.746	1	44.746	0.182	0.670
	VAR008			188.790	2	94.395	0.384	0.682
	VAR034			1876.424	2	938.212	3.819	0.024
	VAR036			3092.487	4	1273.122	5.183	0.001
	VAR003	(covar)		37.683	1	37.683	0.153	0.696
2-way interactions				5489.397	26	211.131	0.859	0.663
	VAR004	VAR008		181.719	2	90.859	0.370	0.692
	VAR004	VAR034		348.318	2	174.159	0.709	0.494
	VAR004	VAR036		226.304	4	56.576	0.230	0.921
	VAR008	VAR034		1149.619	4	287.405	1.170	0.327
	VAR008	VAR036		2608.973	8	326.122	1.328	0.235
	VAR034	VAR036		1280.808	6	213.468	0.869	0.520
3-way interactions				6035.700	21	287.414	1.170	0.287
	VAR004	VAR008	VAR034	208.831	3	69.610	0.283	0.837
	VAR004	VAR008	VAR036	2741.736	7	391.677	1.594	0.142
	VAR004	VAR034	VAR036	2042.921	5	408.584	1.663	0.148
	VAR008	VAR034	VAR036	961.075	6	160.179	0.652	0.688
4-way interactions				1556.785	3	518.928	2.112	0.101
	VAR004	VAR008	VAR034 VAR036	1556.785	3	518.928	2.112	0.101
Explained				19862.282	60	331.038	1.348	0.079
Residual				33899.748	138	245.650		
Total				53762.030	198	271.525		

* * * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * * *

VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
by VAR004 SEX
VAR008 TYPE OF DEAFNESS
VAR034 TYPE OF NHS AID
VAR036 AMOUNT OF TIME NHS AID WORN
with VAR003 AGE

* *

Grand mean = 54.59

Variable + category	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for independents Dev'n	Adjusted for independents Beta	Adjusted for independents + covariates Dev'n	Adjusted for independents + covariates Beta
VAR004							
1 MALE	115	0.62				0.42	
2 FEMALE	84	-0.84				-0.58	
			0.04				0.03
VAR008							
1 SENSORINEURAL.	117	-1.58				-0.75	
2 CONDUCTIVE	27	1.70				0.07	
3 MIXED	55	2.52				1.56	
			0.12				0.06
VAR034							
1 BE11	92	-2.15				-2.97	
2 BE12	18	1.80				-4.31	
3 OL56	89	1.86				3.95	
			0.12				0.22
VAR036							
1 ALWAYS	51	7.74				9.47	
2 OFTEN	39	-1.80				-1.39	
3 SOMETIMES	48	-2.74				-2.58	
4 RARELY	29	-3.04				-3.90	
5 NEVER	32	-3.28				-5.99	
			0.28				0.35
Multiple R squared							.126
Multiple R							.355

E5

* * * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * *

DIFFWORD (SPEECH GAIN SCORE FROM UNAIDED TO AIDED)
by VAR034 TYPE OF NHS AID
VAR008 TYPE OF DEAFNESS
VAR004 SEX
VAR036 AMOUNT OF TIME NHS AID WORN
with VAR003 AGE
VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO

* *

Source of variation			Sum of Squares	df	Mean Square	F	Signif of F
Main effects			32614.212	11	2964.928	4.612	0.000
VAR034			653.265	2	326.632	0.508	0.603
VAR008			5474.165	2	2737.083	4.257	0.016
VAR004			223.452	1	223.452	0.348	0.557
VAR036			4648.509	4	1162.127	1.808	0.132
VAR003	(covar)		440.536	1	440.536	0.685	0.409
VAR028	(covar)		11454.717	1	11454.717	17.816	0.000
2-way interactions			21177.469	26	811.518	1.262	0.197
VAR034	VAR008		390.290	4	97.573	0.152	0.962
VAR034	VAR004		3892.302	2	1946.152	3.028	0.052
VAR034	VAR036		8243.569	6	1373.928	2.137	0.054
VAR008	VAR004		915.825	2	457.913	0.712	0.493
VAR008	VAR036		5168.478	8	646.060	1.005	0.436
VAR004	VAR036		5196.529	4	1299.132	2.021	0.096
3-way interactions			18411.209	21	876.724	1.364	0.151
VAR034	VAR008	VAR004	2722.602	7	907.534	1.412	0.203
VAR034	VAR008	VAR036	7371.598	7	1053.085	1.638	0.131
VAR034	VAR004	VAR036	5645.156	5	1129.031	1.756	0.127
VAR008	VAR004	VAR036	3632.190	6	605.365	0.942	0.468
4-way interactions			1936.678	3	612.226	0.952	0.418
VAR034	VAR008	VAR004	1836.678	3	612.226	0.952	0.418
	VAR036						
Explained			74039.566	61	1213.763	1.888	0.002
Residual			75866.092	118	642.933		
Total			149905.660	179	837.462		

* * * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * * *

DIFFWORD
by VAR034 TYPE OF NHS AID
VAR008 TYPE OF DEAFNESS
VAR004 SEX
VAR036 AMOUNT OF TIME NHS AID WORN
with VAR003 AGE
VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO

* *

Grand mean = 26.27

Variable + category	N	Unadjusted Dev'n	Eta	Adjusted for independents Dev'n	Beta	Adjusted for independents + covariates Dev'n	Beta
VAR034							
1 BE11	88	-2.32				-2.13	
2 BE12	16	7.17				1.93	
3 OL56	76	1.18				2.07	
			0.10				0.07
VAR008							
1 SENSORINEURAL	102	-4.72				-3.42	
2 CONDUCTIVE	27	16.02				13.87	
3 MIXED	51	0.96				-0.51	
			0.25				0.21
VAR004							
1 MALE	105	-1.24				-0.99	
2 FEMALE	73	1.74				1.38	
			0.05				0.04
VAR036							
1 ALWAYS	50	11.27				6.78	
2 OFTEN	38	1.81				1.90	
3 SOMETIMES	44	-6.84				-4.00	
4 RARELY	26	-2.70				0.69	
5 NEVER	22	-11.86				-11.51	
			0.28				0.20
Multiple R squared							.218
Multiple R							.466

E6

* * * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * *

VAR016 % SPEECH DISCRIMINATION SCORE UNAIDED
by VAR034 TYPE OF NHS AID
VAR008 TYPE OF DEAFNESS
VAR004 SEX
with VAR003 AGE
VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO

* *

Source of variation			Sum of Squares	df	Mean Square	F	Signif of F
Main effects			106639.270	7	15234.181	25.753	0.000
VAR034			561.308	2	280.654	0.474	0.623
VAR008			2822.727	2	1411.363	2.386	0.095
VAR004			327.057	1	327.057	0.553	0.458
VAR003	(covar)		104.011	1	104.011	0.176	0.676
VAR028	(covar)		99266.807	1	99266.807	167.811	0.000
2-way interactions			5142.115	8	642.764	1.087	0.375
VAR034	VAR008		1496.632	4	374.158	0.633	0.640
VAR034	VAR004		764.769	2	382.384	0.646	0.525
VAR008	VAR004		2142.189	2	1071.094	1.811	0.167
3-way interactions			2273.229	3	757.743	1.281	0.283
VAR034	VAR008	VAR004	2273.229	3	757.743	1.281	0.283
Explained			114054.610	18	6336.367	10.712	0.000
Residual			95237.940	161	591.540		
Total			209292.550	179	1169.232		

Covariate	Raw regression coefficient
VAR003	-0.087
VAR028	-1.444

211 cases were processed.
31 cases (14.7 %) were missing.

---

* * * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * * *

VAR016 % SPEECH DISCRIMINATION SCORE UNAIDED
by VAR034 TYPE OF NHS AID
VAR008 TYPE OF DEAFNESS
VAR004 SEX
with VAR003 AGE
VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO

* *

Grand mean = 53.62

Variable + category	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for independents Dev'n	Adjusted for independents Beta	Adjusted for independents + covariates Dev'n	Adjusted for independents + covariates Beta
VAR034						0.92	
1 BE11	88	3.70				-5.63	
2 BE12	16	-7.18				0.12	
3 OL56	76	-2.77					0.05
			0.11				
VAR008						0.46	
1 SENSORINEURAL	102	2.40				-9.05	
2 CONDUCTIVE	27	-10.65				3.88	
3 MIXED	51	0.83					0.12
			0.13				
VAR004						1.19	
1 MALE	105	0.82				-1.66	
2 FEMALE	75	-1.15					0.04
			0.03				
Multiple R squared							.510
Multiple R							.714

E7

* * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * *

VAR015 % SPEECH DISCRIMINATION SCORE AIDED
by VAR034 TYPE OF NHS AID
VAR008 TYPE OF DEAFNESS
VAR004 SEX
with VAR003 AGE
VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO

* *

Source of variation			Sum of Squares	DF	Mean Square	F	Signif of F
Main effects			37056.473	7	5293.782	15.651	0.000
VAR034			44.421	2	22.210	0.066	0.936
VAR008			3079.463	2	1539.732	4.553	0.013
VAR004			58.008	1	58.008	0.171	0.679
VAR003	(covar)		154.220	1	154.220	0.456	0.500
VAR028	(covar)		35140.337	1	35140.337	103.891	0.000
2-way interactions			3927.749	8	490.969	1.452	0.179
VAR034	VAR008		2895.594	4	723.898	2.140	0.078
VAR034	VAR004		160.314	2	80.157	0.237	0.789
VAR008	VAR004		683.281	2	341.641	1.010	0.366
3-way interactions			1196.423	3	398.808	1.179	0.320
VAR034	VAR008	VAR004	1196.423	3	398.808	1.179	0.320
Explained			42180.645	18	2343.369	6.928	0.000
Residual			54457.133	161	338.243		
Total			96637.777	179	539.876		

Covariate	Raw regression coefficient
VAR003	0.105
VAR028	-0.859

211 cases were processed.
31 cases (14.7 %) were missing.

---

* * * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * * *

VAR015 % SPEECH DISCRIMINATION SCORE AIDED
by VAR034 TYPE OF NHS AID
VAR008 TYPE OF DEAFNESS
VAR004 SEX
with VAR003 AGE
VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO

* *

Grand mean = 79.89

Variable + category	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for independents Dev'n	Adjusted for independents Beta	Adjusted for independents + covariates Dev'n	Adjusted for independents + covariates Beta
VAR034						0.16	
1 BE11	88	1.38				1.32	
2 BE12	16	-0.01				-0.47	
3 OL56	76	-1.60					0.02
			0.06				
VAR008						-3.62	
1 SENSORINEURAL	102	-2.32				7.41	
2 CONDUCTIVE	27	5.37				3.32	
3 MIXED	51	1.80					0.19
			0.12				
VAR004						0.50	
1 MALE	105	-0.42				-0.70	
2 FEMALE	75	0.59					0.03
			0.02				
Multiple R squared							.383
Multiple R							.619

* * * * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * * *

DIFFMID (SPEECH GAIN SCORE FOR Ss with $\bar{x}$ dB loss of 40 to 69 dB)
by VAR004 SEX
VAR008 TYPE OF DEAFNESS
VAR034 TYPE OF NHS AID
VAR036 AMOUNT OF TIME NHS AID WORN
with VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
VAR003 AGE

* *

Source of variation			Sum of Squares	df	Mean Square	F	Signif of F
Main effects			37522.478	11	3411.134	6.026	0.000
VAR004			293.631	1	293.631	0.519	0.474
VAR008			4666.950	2	2333.475	4.122	0.020
VAR034			3092.376	2	1546.188	2.731	0.072
VAR036			5061.087	4	1265.272	2.235	0.074
VAR028	(covar)		16643.605	1	16643.605	29.400	0.000
VAR003	(covar)		91.264	1	91.264	0.161	0.689
2-way interactions			14694.478	24	612.270	1.082	0.386
VAR004	VAR008		2775.958	2	1387.979	2.452	0.094
VAR004	VAR034		4111.985	2	2055.992	3.632	0.032
VAR004	VAR036		4758.525	4	1189.631	2.101	0.090
VAR008	VAR034		543.806	4	135.952	0.240	0.915
VAR008	VAR036		3852.634	7	550.376	0.972	0.458
VAR034	VAR036		1815.189	5	363.038	0.641	0.669
3-way interactions			8279.523	17	487.031	0.860	0.620
VAR004	VAR008	VAR034	1563.520	2	781.760	1.381	0.258
VAR004	VAR008	VAR036	3249.604	6	541.601	0.957	0.461
VAR004	VAR034	VAR036	562.711	3	187.570	0.331	0.803
VAR008	VAR034	VAR036	3664.824	6	610.804	1.079	0.384
Explained			60496.479	52	1163.394	2.055	0.003
Residual			39628.120	70	566.116		
Total			100124.600	122	820.693		

* * * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * * *

DIFFMID
by VAR004 SEX
VAR008 TYPE OF DEAFNESS
VAR034 TYPE OF NHS AID
VAR036 AMOUNT OF TIME NHS AID WORN
with VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
VAR003 AGE

* *

Grand mean = 28.72

Variable + category	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for independents Dev'n	Adjusted for independents Beta	Adjusted for independents + covariates Dev'n	Adjusted for independents + covariates Beta
VAR004							
1 MALE	70	-0.22				-1.42	
2 FEMALE	53	0.30				1.88	
			0.01				0.06
VAR008							
1 SENSORINEURAL	65	-3.03				-1.48	
2 CONDUCTIVE	19	19.80				15.11	
3 MIXED	39	-4.60				-4.90	
			0.30				0.23
VAR034							
1 BE11	58	-3.41				-5.95	
2 BE12	11	2.64				1.42	
3 OL56	54	3.13				6.11	
			0.11				0.20
VAR036							
1 ALWAYS	33	11.61				8.45	
2 OFTEN	28	3.81				2.19	
3 SOMETIMES	33	-9.48				-6.24	
4 RARELY	14	-1.08				4.38	
5 NEVER	15	-10.79				-13.05	
			0.31				0.26
Multiple R squared							.375
Multiple R							.612

E9

CROSSTABULATION OF SADSCORE by VAR087 DERIVED SOCIOECONOMIC GRADE

Controlling for: VAR004 SEX

Value = 1. MALE

SADSCORE	VAR087 I (1.)	II (2.)	III N (3.)	III M (4.)	IV (5.)	V (6.)	Row Total
0-I (1.)	7 / 63.6	16 / 55.2	9 / 69.2	28 / 75.7	12 / 63.2	4 / 66.7	76 / 66.1
2-6 (2.)	2 / 18.2	8 / 27.6	2 / 15.4	8 / 21.6	1 / 5.3	1 / 16.7	22 / 19.1
7+ (3.)	2 / 18.2	5 / 17.2	2 / 15.4	1 / 2.7	6 / 31.6	1 / 16.7	17 / 14.8
Column Total	11 / 9.6	29 / 25.2	13 / 11.3	37 / 32.2	19 / 16.5	6 / 5.2	115 / 100.0

Chi square = 11.82589 with 10 Degrees of freedom Significance = 0.2969

Value = 2. FEMALE

SADSCORE	VAR087 I (1.)	II (2.)	III N (3.)	III M (4.)	IV (5.)	V (6.)	Row Total
0-I (1.)	2 / 40.0	9 / 50.0	12 / 57.1	16 / 53.3	6 / 60.0	3 / 75.0	48 / 54.5
2-6 (2.)	1 / 20.0	5 / 27.8	5 / 23.8	6 / 20.0	2 / 20.0	0 / 0.0	19 / 21.6
7+ (3.)	2 / 40.0	4 / 22.2	4 / 19.0	8 / 26.7	2 / 20.0	1 / 25.0	21 / 23.9
Column Total	5 / 5.7	18 / 20.5	21 / 23.9	30 / 34.1	10 / 11.4	4 / 4.5	88 / 100.0

Chi square = 2.87440 with 10 Degrees of freedom Significance = 0.9842

Number of missing observations = 8

CROSSTABULATION OF SADSCORE by VAR087 DERIVED SOCIOECONOMIC GRADE

S SCORE	VAR087 I (1.)	II (2.)	III N (3.)	III M (4.)	IV (5.)	V (6.)	Row Total
0-I (1.)	9 / 56.3	25 / 53.2	21 / 61.8	44 / 65.7	18 / 62.1	7 / 70.0	124 / 61.1
2-6 (2.)	3 / 18.8	13 / 27.7	7 / 20.6	14 / 20.9	3 / 10.3	1 / 10.0	41 / 20.2
7+ (3.)	4 / 25.0	9 / 19.1	6 / 17.6	9 / 13.4	8 / 27.6	2 / 20.0	38 / 18.7
Column Total	16 / 7.9	47 / 23.2	34 / 16.7	67 / 33.0	29 / 14.3	10 / 4.9	203 / 100.0

Chi square = 6.73825 with 10 Degrees of freedom Significance = 0.7499

Number of missing observations = 8

* * * * * * * * * * A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * * * *

VAR028 MEAN DB LOSS 500HZ 1,2,4 KHZ FNL AUDIO
by VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
SADSCORE
with VAR003 AGE

* *

Source of variation	Sum of Squares	df	Mean Square	F	Signif of F
Main effects	4159.228	9	462.135	1.673	0.099
VAR004	245.411	1	245.411	0.888	0.347
VAR087	1595.151	5	319.030	1.155	0.334
SAD SCORE	2324.983	2	1162.491	4.209	0.016
VAR003 (covar)	165.973	1	165.973	0.601	0.439
2-way interactions	3984.838	17	234.402	0.849	0.635
VAR004 VAR087	804.769	5	160.954	0.583	0.713
VAR004 SAD SCORE	159.000	2	79.500	0.288	0.750
VAR087 SAD SCORE	3082.738	10	308.274	1.116	0.353
3-way interactions	3151.150	9	350.128	1.268	0.258
VAR004 VAR087 SAD SCORE	3151.150	9	350.128	1.268	0.258
Explained	11295.207	35	322.720	1.168	0.256
Residual	46128.479	167	276.218		
Total	57423.686	202	284.276		

Covariate	Raw regression coefficient
VAR003	0.095

211 cases were processed.
8 cases (3.8 %) were missing.

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* * * M U L T I P L E   C L A S S I F I C A T I O N   A N A L Y S I S * * *

VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ FNL AUDIO
by VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
SADSCORE
with VAR003 AGE

* *

Grand mean = 53.75

Variable + category	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for independents Dev'n	Adjusted for independents Beta	Adjusted for independents + covariates Dev'n	Adjusted for independents + covariates Beta
VAR004							
1 MALE	115	0.69				1.01	
2 FEMALE	88	-0.90				-1.32	
			0.05				0.07
VAR087							
1 I	16	-2.82				-3.50	
2 II	47	-1.63				-1.83	
3 III N	34	0.81				1.88	
4 III M	67	-0.44				-0.07	
5 IV	29	0.38				-0.81	
6 V	10	11.25				10.59	
			0.16				0.17
SADSCORE							
1 0-I	124	-1.03				-1.31	
2 2-6	41	-2.97				-2.61	
3 7+	38	6.56				7.10	
			0.19				0.20
Multiple R squared							.072
Multiple R							.269

E II

* * * * * * * * * * A N A L Y S I S   O F   V A R I A N C E * * * * * * *
* * * *

VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
by **SADSCORE**
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR003 AGE

* *
* * * *

Source of variation	Sum of Squares	DF	Mean Square	F	Signif of F
Main effects	476.204	9	52.912	0.448	**P<** 0.908
SADSCORE	1.025	2	0.512	0.004	**P<** 0.996
VAR004	13.960	1	13.960	0.118	**P<** 0.732
VAR087	287.734	5	57.547	0.485	**P<** [illegible]
VAR003 (covar)	121.384	1	121.384	1.024	**P<** 0.31[illegible]
2-way interactions	[illegible]	14	1[illegible].471	1.262	**P<** [illegible]
SADSCORE VAR004	244.893	2	122.447	1.033	**P<** 0.359
SADSCORE VAR087	880.417	9	97.824	0.825	**P<** [illegible]
VAR004 VAR087	1664.467	5	332.893	2.808	**P<** 0.019
3-way interactions	387.631	8	48.454	0.409	**P<** [illegible]
SADSCORE VAR004 VAR087	387.631	8	48.454	0.409	**P<** [illegible]
Explained	3258.565	33	98.744	0.833	0.725
Residual	16362.335	138	118.568		
Total	19620.900	171	114.742		

* * * M U L T I P L E   C L A S S I F I C A T I O N   A N A L Y S I S * * *

VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
by **SADSCORE**
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR003 AGE

* *
* * * *

Grand mean = 48.39

Variable + category	N	Unadjusted Dev'n	Eta	Adjusted for independents Dev'n	Beta	Adjusted for independents + covariates Dev'n	Beta
SADSCORE							
1 0-I	108	0.03				-0.06	
2 **2-6**	38	-0.21				0.05	
3 7+	26	0.19				0.16	
			0.01				0.01
VAR004							
1 MALE	99	0.38				0.25	
2 FEMALE	73	-0.51				-0.34	
			0.04				0.03
VAR087							
1 I	14	-1.03				-1.06	
2 II	42	-1.53				-1.66	
3 III N	27	-0.87				-0.30	
4 III M	57	0.84				0.79	
5 IV	26	2.34				2.10	
6 V	6	-1.06				-1.21	
			0.13				0.12

Multiple R squared .024
Multiple R = **·156**

E 12

* * * * * * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * * * * *

VAR015 % SPEECH DISCRIMINATION SCORE AIDED
BY SADSCORE
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
WITH VAR003 AGE

* *

Source of Variation			Sum of Squares	DF	Mean Square	F	Signif of F
Main effects			10308.191	9	1145.355	2.178	0.027
	SADSCORE		5941.543	2	2970.772	5.648	0.004
	VAR004		544.773	1	544.773	1.036	0.310
	VAR087		4767.060	5	953.412	1.813	0.114
	VAR003	(covar)	0.838	1	0.838	0.002	0.968
2-way interactions			11535.896	17	678.582	1.290	0.206
	SADSCORE	VAR004	178.337	2	89.169	0.170	0.844
	SADSCORE	VAR087	9740.360	10	974.036	1.852	0.056
	VAR004	VAR087	2698.159	5	539.632	1.026	0.405
3-way interactions			2362.978	8	295.372	0.562	0.808
	SADSCORE	VAR004 VAR087	2362.978	8	295.372	0.562	0.808
Explained			24207.055	34	711.972	1.354	0.113
Residual			77842.823	148	525.965		
Total			102049.880	182	560.714		

Covariate	Raw regression coefficient
VAR003	0.007

211 cases were processed.
29 cases (13.3 %) were missing.

---

* * * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * * *

VAR015 % SPEECH DISCRIMINATION SCORE AIDED
by SADSCORE
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR003 AGE

* *

Grand mean = 79.40

Variable + category	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for independents Dev'n	Adjusted for independents Beta	Adjusted for independents + covariates Dev'n	Adjusted for independents + covariates Beta
SADSCORE						2.82	
1 0-1	111	2.22				2.61	
2 2-6	38	3.34				-12.13	
3 7+	34	-10.99					0.25
			0.22				
VAR004						-1.55	
1 MALE	106	-0.90				2.13	
2 FEMALE	77	1.24					0.08
			0.04				
VAR087						2.72	
1 I	15	0.93				4.18	
2 II	40	3.43				-1.65	
3 III N	29	-1.26				-0.35	
4 III M	63	0.62				1.77	
5 IV	27	0.93				-20.68	
6 V	9	-19.84					0.22
			0.20				
Multiple R squared							.101
Multiple R							.318

E 13

* * * * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * * * *

VAR016 % SPEECH DISCRIMINATION SCORE UNAIDED

by SADSCORE
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR003 AGE

* *

Source of variation			Sum of Squares	df	Mean Square	F	Signif of F
Main effects			19858.067	9	2206.452	1.875	0.060
SAD SCORE			9583.096	2	4791.548	4.072	0.019
VAR004			417.435	1	417.435	0.355	0.552
VAR087			9625.515	5	1925.103	1.636	0.154
VAR003	(covar)		503.173	1	503.173	0.428	0.514
2-way interactions			12764.216	17	750.836	0.638	0.857
SAD SCORE	VAR004		2759.260	2	1379.630	1.003	0.369
SAD SCORE	VAR087		10104.955	10	1010.496	0.859	0.573
VAR004	VAR087		4482.997	5	896.599	0.762	0.579
3-way interactions			5023.834	8	627.979	0.534	0.830
SAD SCORE	VAR004	VAR087	5023.834	8	627.979	0.534	0.830
Explained			37646.117	34	1107.239	0.941	0.567
Residual			174163.200	148	1176.778		
Total			211809.310	182	1163.787		

Covariate	Raw regression coefficient
VAR003	-0.179

211 cases were processed.
28 cases (13.3 %) were missing.

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* * * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * * *

VAR016 % SPEECH DISCRIMINATION SCORE UNAIDED

by SAD SCORE
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR003 AGE

* *

Grand mean = 54.34

Variable + category	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for independents Dev'n	Adjusted for independents Beta	Adjusted for independents + covariates Dev'n	Adjusted for independents + covariates Beta
SAD SCORE						1.24	
1 0-I	111	0.43				8.89	
2 2-6	38	9.92				-13.98	
3 7+	34	-12.49					0.22
			0.21				
VAR004						1.36	
1 MALE	106	1.25				-1.87	
2 FEMALE	77	-1.72					0.05
			0.04				
VAR087						5.46	
1 I	15	4.99				8.36	
2 II	40	8.11				5.61	
3 III N	29	5.52				-4.79	
4 III M	63	-3.98				-3.20	
5 IV	27	-4.42				-21.17	
6 V	9	-21.01					0.22
			0.21				
Multiple R squared							.094
Multiple R							.306

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* * * * * * * * * * A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * *

VAR015 % SPEECH DISCRIMINATION SCORE **AIDED**
by VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
SAD SCORE
with VAR003 AGE
VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO

* *

Source of variation	Sum of Squares	df	Mean Square	F	Signif of F
Main effects	41270.740	10	4127.[illegible]	11.635	0.000
VAR004	209.235	1	209.235	0.590	0.444
VAR087	1283.233	5	256.647	0.723	0.607
SAD SCORE	1347.854	2	673.927	1.899	0.153
VAR003 (covar)	200.631	1	200.631	0.565	0.453
VAR028 (covar)	30982.549	1	30982.549	87.305	0.000
2-way interactions	7404.195	17	435.541	1.227	0.250
VAR004 VAR087	2796.074	5	559.215	1.576	0.170
VAR004 **SADSCORE**	188.173	2	94.086	0.265	0.767
VAR087 **SADSCORE**	4698.586	10	469.859	1.324	0.223
3-way interactions	1187.906	8	148.488	0.418	0.909
VAR004 VAR087 **SADSCORE**	1187.906	8	148.488	0.418	0.909
Explained	49882.841	35	1425.224	4.016	0.000
Residual	52167.037	147	354.878		
Total	102049.880	182	560.714		

Covariate	Raw regression coefficient
VAR003	0.113
VAR028	-0.796

211 cases were processed.
28 cases (13.3 %) were missing.

---

* * * M U L T I P L E   C L A S S I F I C A T I O N   A N A L Y S I S * * * **AIDED**

VAR015 % SPEECH DISCRIMINATION SCORE
by VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
SADSCORE
with VAR003 AGE
VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO

* *

Grand mean = 79.40

Variable + category	N	Unadjusted Dev'n	Eta	Adjusted for independents Dev'n	Beta	Adjusted for independents + covariates Dev'n	Beta
VAR004							
1 MALE	106	-0.90				-0.96	
2 FEMALE	77	1.24	0.04			1.32	0.05
VAR087							
1 I	15	0.93				0.37	
2 II	40	3.43				2.30	
3 III N	29	-1.26				-0.59	
4 III M	63	0.62				-0.22	
5 IV	27	0.93				1.19	
6 V	9	-19.84	0.20			-10.94	0.11
SADSCORE							
1 0-I	111	2.22				1.92	
2 2-6	38	3.34				-0.69	
3 7+	34	-10.99	0.22			-5.50	0.12

Multiple R squared	.405
Multiple R	.636

* * * * * * * * * * A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * * *

	VAR016	% SPEECH DISCRIMINATION SCORE UNAIDED
by	VAR004	SEX
	VAR087	DERIVED SOCIOECONOMIC GRADE
	SADSCORE	
with	VAR003	AGE
	VAR028	MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO

* *

Source of variation	Sum of Squares	df	Mean Square	F	Signif of F
Main effects	110064.970	10	11006.497	17.861	0.000
VAR004	1260.206	1	1260.206	2.045	0.155
VAR087	4498.721	5	899.744	1.460	0.206
SADSCORE	617.496	2	308.748	0.501	0.607
VAR003 (covar)	0.060	1	0.060	0.000	0.992
VAR028 (covar)	90206.902	1	90206.902	146.387	0.000
2-way interactions	8721.363	17	513.021	0.833	0.654
VAR004 VAR087	934.520	5	186.904	0.303	0.910
VAR004 SADSCORE	2906.130	2	1453.065	2.359	0.098
VAR087 SADSCORE	6837.323	10	683.732	1.110	0.359
3-way interactions	2438.199	8	304.775	0.495	0.859
VAR004 VAR087 SADSCORE	2438.198	8	304.775	0.495	0.859
Explained	121224.530	35	3463.558	5.621	0.000
Residual	90584.781	147	616.223		
Total	211809.310	182	1163.787		

Covariate	Raw regression coefficient
VAR003	0.002
VAR028	-1.358

211 cases were processed.
28 cases (13.3 %) were missing.

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* * * M U L T I P L E   C L A S S I F I C A T I O N   A N A L Y S I S * * *

	VAR016	% SPEECH DISCRIMINATION SCORE UNAIDED
by	VAR004	SEX
	VAR087	DERIVED SOCIOECONOMIC GRADE
	SADSCORE	
with	VAR003	AGE
	VAR028	MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO

* *

Grand mean = 54.34

Variable + category	N	Unadjusted Dev'n	Eta	Adjusted for independents Dev'n	Beta	Adjusted for independents + covariates Dev'n	Beta
VAR004							
1 MALE	106	1.25				2.36	
2 FEMALE	77	-1.72				-3.25	
			0.04				0.08
VAR087							
1 I	15	4.99				1.44	
2 II	40	8.11				5.14	
3 III N	29	5.52				7.41	
4 III M	63	-3.98				-4.57	
5 IV	27	-4.42				-4.18	
6 V	9	-21.01				-4.55	
			0.21				0.15
SADSCORE							
1 0-I	111	0.43				-0.30	
2 2-6	38	9.92				3.27	
3 7+	34	-12.49				-2.66	
			0.21				0.06
Multiple R squared							.520
Multiple R							.721

* * * * * * * * * * A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * * * *

DIFFWORD (SPEECH GAIN SCORE FROM UNAIDED TO AIDED)
by SAD SCORE
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR003 AGE
VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO

* *

Source of variation	Sum of Squares	df	Mean Square	F	Signif of F
Main effects	23929.525	10	2392.952	3.297	0.001
SAD SCORE	1364.109	2	682.054	0.940	0.393
VAR004	2496.437	1	2496.437	3.440	0.066
VAR087	4417.405	5	883.481	1.217	0.304
VAR003 (covar)	193.775	1	193.775	0.267	0.606
VAR028 (covar)	15456.961	1	15456.961	21.298	0.000
2-way interactions	15172.378	17	892.493	1.230	0.248
SAD SCORE VAR004	2291.786	2	1145.893	1.579	0.210
SAD SCORE VAR087	10398.512	10	1039.851	1.433	0.171
VAR004 VAR087	3412.315	5	682.463	0.940	0.457
3-way interactions	4278.568	8	534.821	0.737	0.659
SAD SCORE VAR004 VAR087	4278.569	8	534.821	0.737	0.659
Explained	43380.472	35	1239.442	1.708	0.015
Residual	106684.980	147	725.748		
Total	150065.460	182	824.535		

Covariate	Raw regression coefficient
VAR003	0.111
VAR028	0.562

211 cases were processed.
28 cases (13.3 %) were missing.

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* * * M U L T I P L E   C L A S S I F I C A T I O N   A N A L Y S I S * * *

DIFFWORD
by SAD SCORE
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR003 AGE
VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO

* *

Grand mean = 25.05

Variable + category	N	Unadjusted Dev'n	Eta	Adjusted for independents Dev'n	Beta	Adjusted for independents + covariates Dev'n	Beta
SAD SCORE							
1 0-I	111	1.79				2.22	
2 2-6	38	-6.58				-3.95	
3 7+	34	1.50	0.12			-2.84	0.10
VAR004							
1 MALE	106	-2.15				-3.32	
2 FEMALE	77	2.96	0.09			4.57	0.14
VAR087							
1 I	15	-4.05				-1.07	
2 II	40	-4.68				-2.84	
3 III N	29	-6.78				-8.00	
4 III M	63	4.60				4.35	
5 IV	27	5.35				5.38	
6 V	9	1.17	0.17			-6.39	0.17
Multiple R squared							.159
Multiple R							.399

E 17

* * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * *

VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
by VAR008 TYPE OF DEAFNESS
SADSCORE
with VAR003 AGE

* *

Source of variation	Sum of Squares	df	Mean Square	F	Signif of F
Main effects	3036.756	5	607.351	2.309	0.046
VAR008	482.927	2	241.463	0.918	0.401
SADSCORE	2229.698	2	1114.849	4.239	0.016
VAR003 (covar)	475.429	1	475.429	1.808	0.180
2-way interactions	2153.207	4	538.302	2.047	0.089
VAR008 SADSCORE	2153.207	4	538.302	2.047	0.089
Explained	5189.963	9	576.663	2.193	0.024
Residual	51024.077	194	263.011		
Total	56214.040	203	276.916		

Covariate	Raw regression coefficient
VAR003	0.156

211 cases were processed.
7 cases (3.3 %) were missing.

* * * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * * *

VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
by VAR008 TYPE OF DEAFNESS
SADSCORE
with VAR003 AGE

* *

Grand mean = 54.10

Variable + category	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for independents Dev'n	Adjusted for independents Beta	Adjusted for independents + covariates Dev'n	Adjusted for independents + covariates Beta
VAR008							
1 SENSORINEURAL	123	-1.07				-1.15	
2 CONDUCTIVE	29	2.90				3.19	
3 MIXED	52	0.92				0.95	
			0.09				0.09
SADSCORE							
1 0-1	124	-0.96				-1.01	
2 2-6	41	-3.32				-3.22	
3 7+	39	6.54				6.59	
			0.20				0.20
Multiple R squared							.054
Multiple R							.232

* * * * * * * * * * A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * *

VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
by VAR075 FEELS HANDICAPPED DUE TO HEARING LOSS
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR003 AGE

* *

Source of variation	Sum of Squares	DF	Mean Square	F	Signif of F
Main effects	3682.530	8	460.316	1.484	0.167
VAR075	1255.191	1	125[illegible]	[illegible]	0.046
VAR004	100.693	1	100.693	0.325	0.570
VAR087	2159.621	5	431.924	1.393	0.230
VAR003 (covar)	71.507	1	71.507	0.231	0.632
2-way interactions	3227.026	11	293.366	0.946	0.498
VAR075 VAR004	203.910	1	203.910	0.658	0.419
VAR075 VAR087	1517.210	5	303.442	0.979	0.433
VAR004 VAR087	1622.496	5	324.499	1.046	0.392
3-way interactions	402.041	5	80.408	0.259	0.935
VAR075 VAR004 VAR087	402.041	5	80.408	0.259	0.935
Explained	7311.597	24	304.650	0.982	0.492
Residual	49303.964	159	310.088		
Total	56615.562	183	309.375		

Covariate	Raw regression coefficient
VAR003	0.065

211 cases were processed.
27 cases (12.8 %) were missing.

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* * * M U L T I P L E   C L A S S I F I C A T I O N   A N A L Y S I S * * *

VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
by VAR075 FEELS HANDICAPPED DUE TO HEARING LOSS
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR003 AGE

* *

Grand mean = 54.80

Variable + category	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for independents Dev'n	Adjusted for independents Beta	Adjusted for independents + covariates Dev'n	Adjusted for independents + covariates Beta
VAR075							
1 YES	87	2.81				2.76	
2 NO	97	-2.52				-2.48	
			0.15				0.15
VAR004							
1 MALE	108	0.86				0.65	
2 FEMALE	76	-1.22				-0.92	
			0.06				0.04
VAR087							
1 I	15	-2.53				-2.97	
2 II	40	-2.27				-2.60	
3 III N	29	0.13				0.72	
4 III M	63	-0.78				-0.55	
5 IV	27	1.53				1.20	
6 V	10	13.30				12.99	
			0.20				0.20
Multiple R squared							.065
Multiple R							.255

* * * * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * * *

VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
by VAR075 FEELS HANDICAPPED DUE TO HEARING LOSS
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR003 AGE

* *

Source of variation			Sum of squares	DF	Mean square	F	Signif of F
Main effects			3692.530	8	461.316	1.484	0.167
VAR075			1232.201	1	1232.201	3.963	0.048
VAR004			100.693	1	100.693	0.325	0.570
VAR087			2159.621	5	431.924	1.393	0.230
VAR003	(covar)		71.507	1	71.507	0.231	0.632
2-way interactions			3227.026	11	293.366	0.946	0.498
VAR075	VAR004		203.910	1	203.910	0.658	0.419
VAR075	VAR087		1517.219	5	303.442	0.979	0.433
VAR004	VAR087		1622.496	5	324.499	1.046	0.392
3-way interactions			402.041	5	80.408	0.259	0.935
VAR075	VAR004	VAR087	402.041	5	80.408	0.259	0.935
Explained			7311.597	24	304.650	0.982	0.492
Residual			49303.964	159	310.089		
Total			56615.562	183	309.375		

Covariate	Raw regression coefficient
VAR003	0.065

211 cases were processed.
27 cases (12.8 %) were missing.

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* * * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * * *

VAR028 MEAN DB LOSS > 500HZ 1,2,4 KHZ PNL AUDIO
by VAR075 FEELS HANDICAPPED DUE TO HEARING LOSS
VAR004 SEX
VAR087 DERIVED SOCIOECONOMIC GRADE
with VAR003 AGE

* *

Grand mean = 54.80

Variable + category	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for independents Dev'n	Adjusted for independents Beta	Adjusted for independents + covariates Dev'n	Adjusted for independents + covariates Beta
VAR075						2.76	
1 YES	87	2.81				-2.48	
2 NO	97	-2.52	0.15				0.15
VAR004						0.65	
1 MALE	108	0.86				-0.92	
2 FEMALE	76	-1.22	0.06				0.04
VAR087						-2.97	
1 I	15	-2.53				-2.60	
2 II	40	-2.27				0.72	
3 III N	29	0.13				-0.55	
4 III M	63	-0.78				1.20	
5 IV	27	1.53				12.99	
6 V	10	13.30	0.20				0.20
Multiple R squared							.065
Multiple R							.255

* * * * * * * * * * A N A L Y S I S   O F   V A R I A N C E * * * * * * * * * *
VAR015 % SPEECH DISCRIMINATION SCORE AIDED
by SAD
HLOSS
* *

Source of Variation	Sum of Squares	df	Mean Square	F	Signif of F
Main Effects	33900.041	5	6780.008	18.345	0.000
SAD (SAD cases, normals)	1026.549	1	1026.549	2.778	0.097
HLOSS (≤39, 40-49, 50-59, 60-69, 70+)	28877.266	4	7219.317	19.533	0.000
2-way Interactions	3846.402	4	961.600	2.602	0.038
SAD HLOSS	3846.402	4	961.600	2.602	0.038
Explained	37746.443	9	4194.049	11.348	0.000
Residual	64309.163	174	369.593		
Total	102055.610	183	557.681		

211 cases were processed.
27 cases (12.8 %) were missing.

The University of Pittsburgh, SPSS-10, Release 7.02 (1-May-78) 24-May-
File DSAFTW (Creation date = 14-Sep-79)

* * * M U L T I P L E   C L A S S I F I C A T I O N   A N A L Y S I S * * *
VAR015 % SPEECH DISCRIMINATION SCORE AIDED
by SAD
HLOSS
* *

Grand mean = 79.39

Variable + category	N	Unadjusted Dev'n	Eta	Adjusted for independents Dev'n	Beta	Adjusted for independents + covariates Dev'n	Beta
SAD							
1	150	2.49		1.14			
2	34	-10.97		-5.12			
			0.22		0.10		
HLOSS							
1	29	10.89		10.60			
2	46	10.72		10.52			
3	51	2.12		1.95			
4	28	-2.64		-3.12			
5	30	-28.12		-26.77			
			0.57		0.54		

Multiple R squared	.332
Multiple R	.576

E 20

* * * * * * * * * * A N A L Y S I S O F V A R I A N C E * * * * * * * * * *
VAR015 % SPEECH DISCRIMINATION SCORE AIDED (excluding Ss with mean loss of 70dB+)
by SAD
HLOSS
* *

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Main effects	4554.912	4	1138.728	4.944	0.001
SAD (SAD cases, normals)	23.021	1	23.021	0.100	0.752
HLOSS (30-39, 40-49, 50-59, 60-69)	4513.356	3	1504.452	6.532	0.000
2-way interaction	137.481	3	45.827	0.199	0.897
SAD HLOSS	137.481	3	45.827	0.199	0.897
Explained	4692.393	7	670.342	2.910	0.007
Residual	33627.743	146	230.327		
Total	38320.136	153	250.458		

211 cases were processed.
57 cases (27.0 %) were missing

26-May

The University of Pittsburgh, SPSS-10* Release 7.02 (1-May-78)
File DEAFTW (Creation date = 14-Sep-79)

* * * M U L T I P L E C L A S S I F I C A T I O N A N A L Y S I S * * *
VAR015 % SPEECH DISCRIMINATION SCORE AIDED
by SAD
HLOSS
* *

Grand mean = 84.84

Variable + category	N	Unadjusted dev'n	Eta	Adjusted for independents dev'n	Beta	Adjusted for independents + covariates dev'n	Beta
SAD							
1	132	-0.21		.16			
2	22	1.37		0.93			
			0.03		0.02		
HLOSS							
1	29	5.41		5.42			
2	14	3.25		5.28			
3	51	-3.35		-3.37			
4	25	-2.11		-2.07			
			0.34		0.34		
Multiple R squared					.119		
Multiple R					.335		

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APPENDIX F

STATEMENT OF ADVANCED COURSES UNDER TAKEN IN CONNECTION WITH THE PROGRAMME OF WORK (CNAA REQUIREMENT)

(i) Postgraduate courses

a) three week summer school on survey research methodology, run by the SSRC Survey Unit at the University of Reading;

b) one evening a week for two terms - course on analysis of categorical data using a log-linear approach; Mathematics department of Polytechnic of North London.

(ii) Other courses

Attendance at courses of lectures given by a psychiatrist, psychologist, medical sociologist and others which form part of the one year post experience course leading to the Certificate in Deafness Studies at the Polytechnic of North London.

(iii) Ancillary courses

a) Three day course on hearing aids at the Royal National Institute for the Deaf;

b) Three day course on audiometry at the Royal National Institute for the Deaf;

c) one week course in data processing at the Computer Centre of the Polytechnic of North London;

d) one evening a week for one year in British Sign Language, at the City Literary Institute Centre for the Deaf, London.

(iv) Relevant courses taught by the writer

a) Psychosocial aspects of deafness, a course which is part of the one year course leading to the Certificate in Deafness Studies mentioned above - 3 hours a week from 1974 to 1980;

b) Methods of Educational Enquiry - An Empirical Approach - an Open University half credit course; intended both for advanced undergraduates and for those with professional experience - part time tutor from 1973 to 1980;

c) The Handicapped Person in the Community; Open University half credit course as above - part time tutor, 1975;

e) Lectures on the psychology of hearing loss to various groups, courses and societies, professional, academic and lay.

(v) Advanced study tour

The writer was awarded a grant by the British Council to spend 3 weeks in Denmark to discuss research and provision concerning adults with acquired hearing loss in 1976.

(vi) Conferences attended

Attendance at numerous conferences run by:

a) voluntary societies;
b) British Society of Audiology;
c) British Psychological Society.

In 1975 attendance at Congress of the World Federation of the Deaf in Washington, made possible by a grant from the Chase Charity trustees, London.

(viii) Publications

1. Thomas, A. (1975). So you want to carry out a research project on deafness ? Paper presented at conference of Social Workers with the Deaf, 1975 and subsequently published in Sound Base, National Council of Social Workers with the Deaf, Birmingham.

2. Thomas, A. and Gilhome, K.R. (1976). Deaf trident at the Poly, Hearing, 31: 2-4.

3. Cox, D., Davis, C., Kennedy, M., Thomas, A. and Wordley, T. (1979). The Introduction of Total Communication into a Primary School for the Deaf. Journal of the British Association of Teachers of the Deaf, 3: 92-95.
(The present writer was responsible for advising on the project and for writing the paper).

4. Thomas, A. and Herbst, K.R.G. (1980). Social and Psychological Implications of Acquired Deafness for Adults of Employment Age. British Journal of Audiology, in press.

5. Thomas, A. and Herbst, K.R.G. (1980). Acquired deafness and Psychological Disorder. Paper presented at IIId Congress of the British Society of Audiology, 1979, and to be published as part of the proceedings.

6. Thomas, A. (1980). Acquired hearing loss: to what extent is it a handicap ? Hearing (in press).

(ix) Research proposals

During the course of the project the following research proposals were approved:

1. Total acquired deafness: Implications for mental health; two-year project funded by the Medical Research Council (Alan Thomas and Katia Gilhome Herbst).

2. The relationship between deafness and mental health in the elderly living at home; two-year project funded by the Nuffield Foundation (Katia Gilhome Herbst and Alan Thomas).

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END