ABSTRACT

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Hearing aid benefit is frequently assessed using subjective measures in which the patient is asked to respond to a series of questions regarding how much benefit they feel they are receiving from their hearing aids. Previous research has shown that audiological factors are related to the amount of self-reported benefit from hearing aids, but these factors do not explain all of the variance in hearing aid benefit scores. The purpose of this investigation was to assess the relationship between several non-audiological factors, including personality, mood, and gender, to self-reports of hearing aid benefit.

Measures of hearing aid benefit, personality, and mood were obtained from 20 older adult listeners with sensorineural hearing loss who were experienced hearing aid users. The two measures of hearing aid benefit were the Hearing Aid Performance Inventory (HAPI) (Walden, Demorest, & Hepler, 1984) and the Abbreviated Profile of Hearing Aid Benefit (APHAB) (Cox & Alexander, 1995); the two measures of personality were the Myers-Briggs Type Indicator (Myers & McCaulley, 1985) and the

Keirsey Four Types Sorter (Keirsey, 1998); and the mood assessment was the Positive and Negative Affect Schedule (Watson, Clark & Tellegen, 1988). The results demonstrated significant relationships between extraversion/introversion and self-reported hearing aid benefit, and between mood and self-reported hearing aid benefit. Overall, the measures of mood, Keirsey personality type, and gender were predictors of difficulty communicating in a reverberant environment while wearing hearing aids, and accounted for 71 percent of the variance on this subscale.

The results of this study have provided evidence that self-reported hearing aid benefit is associated with certain non-audiological factors including extraversion/introversion preference, certain Keirsey personality types, mood, and gender. Although these factors explained a relatively small amount of the variance in HAPI and APHAB scores, they still provide support for the notion that the amount of benefit an older adult individual reportedly receives from his or her hearing aids is not entirely dependent on hearing sensitivity, but on other attributes that characterize an individual. The findings suggest that certain dimensions of personality should be considered when developing an individualized treatment plan for a patient prior to hearing aid delivery.

PERSONALITY TYPE AND SELF-PERCEPTION OF HEARING AID BENEFIT

By

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Dedication

I would like to dedicate this Doctoral dissertation to my family and friends for all of the love and support they have given and continue to give me. I would especially like to thank:

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Chapter 1: Introduction

Only 20% of elderly individuals with hearing loss who could benefit from hearing aids actually pursue and purchase them. Of this 20%, only 40-60% are satisfied with their hearing aids (Kochkin, 1993). The most common reason why individuals who own hearing aids do not wear them is that they feel the hearing aids provide minimal-to-no benefit (Kochkin, 2000). According to one recent investigation, Kochkin (2000) found that in addition to dissatisfaction with the benefit provided by hearing aids, many patients reported a variety of other reasons that affect their use and non-use of hearing aids. Some of these reasons include trouble listening in background noise, an uncomfortable fit of the instrument, negative side effects from wearing the instrument (e.g. blisters, rashes, and itching in the ear canal), high price of the instrument, denial of hearing loss, broken or dysfunctional hearing aids, and poor sound quality of the instruments. Thus, the use and non-use of hearing aids seem related to both the actual hearing instruments themselves, as well as to the individual's preferences or beliefs. However, the fact remains that dissatisfaction with the amount of benefit provided by hearing aids is the primary reason people have chosen not to wear them.

Two goals of the clinical audiologist are for patients to receive overall benefit from hearing aids and to use their hearing aids consistently. Based on the statistics of hearing aid use, at least one of these goals is not being met. The effort to determine factors that contribute to a person's success with amplification is perhaps one of the most challenging issues facing audiologists today.

Certain aspects of an individual's hearing loss (e.g. audiometric configuration, degree of hearing loss, type of hearing loss, etc.) influence his or her willingness to use hearing aids (Franks & Beckman, 1985; Garstecki & Erler, 1998; Kochkin, 1996). However, unlike the use and non-use of hearing aids, self-reported benefit from hearing aids does not appear to be related directly to hearing loss characteristics. Patients with relatively similar hearing loss characteristics and ages report different amounts of success with hearing aids (Humes, Halling, & Coughlin, 1996). These results suggest that there are other factors that combine with the characteristics of the hearing loss to influence overall hearing aid benefit. Currently, the extent to which other factors, such as personality and mood, play a role in the reported benefit of hearing aids is not well defined.

Hearing aid benefit can be assessed by objective means, such as functional gain, probe microphone measures, and speech tests to determine the increase in speech understanding afforded by the hearing aid. However, performing these tests does not provide insight into how the patient feels about the benefit they are receiving from the hearing aids. Several studies have found that speech recognition measures and self-assessment measures are not correlated (Cord, Leek, & Walden, 2000; Rowland, Dirks, Dubno, & Bell, 1985). Thus, individuals who may show good hearing aid benefit through objective measures may not report benefiting from their hearing aids. As Cox, Alexander, and Gray (1999) state, "we still cannot predict with confidence how well anyone will react to amplification until he or she has had the opportunity to try it in daily life" (p. 1). This "subjective benefit" can be assessed through the use of self-assessment questionnaires.

A wide variety of self-assessment measures have been introduced in the past 20 years, particularly in the United States (Bentler & Kramer, 2000). Various measures are available to address issues of disability and handicap that can be associated with a hearing loss, amount of satisfaction a person receives from hearing aids, amount of use of the hearing aids, as well as hearing aid benefit. Because self-assessment measures allow the clinician to learn the opinion of the patient, many clinicians have adopted them as a means of determining how much benefit a patient reports receiving from their hearing aids. Hearing aid benefit measures produce a wide variety of scores. Some individuals report a great deal of hearing aid benefit, while others do not. Some of the factors that influence communication difficulty are severity of hearing loss (Gatehouse, 1991, 1994) and gender (Garstecki & Erler, 1999). Little information is available regarding the extent to which personality and mood play a role in self-reported hearing aid benefit.

Taber's Cyclopedic Medical Dictionary (1997) defines personality as, "The unique organization of traits, characteristics, and modes of behavior of an individual, setting the individual apart from others and at the same time determining how others react to the individual" (p. 1629). Several researchers have hypothesized that certain aspects of personality may play a role in the amount of self-perceived hearing aid benefit (Barry, 2000; Cox, et al., 1999; Crandell, Lewis, & Valente, 2004). Additionally, it seems reasonable to question whether other factors such as mood and gender may also affect an individual's responses on self-assessment scales. Because self-assessment measures are frequently used in many clinics, it is important to explore this phenomenon. The purpose of this study is to examine the relationship between personality and self-perception of

hearing aid benefit in older adults. A secondary objective is to assess the extent to which

gender and mood are related to personality type and self-report of hearing aid benefit in

older adults.

Chapter 2: Review of Literature

Hearing Aid Benefit Measures

The use of outcome measures to assess a hearing aid user's level of subjective benefit has become popular in recent years (American Speech-Language-Hearing Association, 2000, 2003). Self-assessment measures allow the clinician to understand the hearing aid user's perception of benefit derived from the use of the hearing instruments. Some self-assessment tools in use today are the Hearing Handicap Inventory for the Elderly (Ventry & Weinstein, 1982), the Client Oriented Scale of Improvement (Dillon, James, & Ginis, 1997), the Glasgow Hearing Aid Benefit Profile (Gatehouse, 1999), the Abbreviated Profile of Hearing Aid Benefit (Cox & Alexander, 1995) and the Hearing Aid Performance Inventory (Walden, Demorest, & Hepler, 1984).

The Hearing Handicap Inventory for the Elderly (HHIE) was developed by Ventry and Weinstein in 1982 as a tool to assess the effects of hearing impairment on the emotional and social adjustment of elderly people. This measure contains two subscales: the first explores the emotional consequences of hearing impairment (13 items) and the second explores both social and situational effects (12 items). Although the HHIE is a highly reliable measure (Cronbach's *alphas* from 0.88 to 0.85) (Ventry & Weinstein, 1982) and is used by many audiologists, this instrument was designed to examine the magnitude of handicap in a communication situation, and not necessarily the amount of benefit received by the hearing aid user. In order to determine the amount of benefit from hearing aids, the scale must be administered twice (before and after the fitting of

amplification) and a calculation of the difference in the "before" and "after" scores must be made (Newman & Weinstein, 1988).

A study conducted by Mulrow, Tuley, and Aguliar (1992) evaluated the amount of functional status improvement experienced by individuals (n = 192) after being fit with a hearing aid. The HHIE was administered as a baseline measure and then again four months post-hearing aid fitting. The results of their study revealed that the majority of subjects experienced over a 50% improvement in social and emotional function following hearing aid fitting. These results show the success of using the HHIE as a benefit measure. However, administering the questionnaire twice is time consuming and increases the variability associated with a given score (i.e. multiple administrations leads to independent measurement errors associated with each administration) compared to a test that is administered only once.

The Client Oriented Scale of Improvement (COSI) was created by Dillon, et al. (1997) as a client-centered self-assessment tool. Prior to hearing aid fitting, the audiologist asks the patient to nominate up to five specific listening situations in which he or she would like to cope better. Each of the five specific situations is categorized into one of 16 general categories listed on the COSI form (e.g. conversation with one or two in quiet, television/radio at normal volume, unfamiliar speaker on the phone, or listening in church or meeting). The patient is then asked to determine which of the five situations is most important, second most important, and so on. Following fitting of the hearing aid(s) (generally one to two weeks later), the audiologist reads the specific situations back to the patient and the patient is asked to rate the degree of change for each situation.

One of the major disadvantages of the COSI is that it is a more difficult measure to use for comparison across patients than other, more traditional measures (Dillon et al., 1997). This is due in part to the open-ended nature of the questions and the variety of possible responses. Bentler and Kramer (2000) point out that even though open-ended questionnaires such as the COSI can be useful clinically, they are not well suited for research designs requiring more structured, quantitative measures.

The Glasgow Hearing Aid Benefit Profile (GHABP) was created by Gatehouse in 1999 to assess aspects of disability/handicap and perceived hearing aid benefit. The measure contains four pre-specified listening situations (TV, one-on-one in quiet, one-on-one in noise, and listening in a group of people) and up to four client-specified listening situations. These situations are rated on six dimensions: degree of difficulty experienced (initial disability), effect on life (handicap), the extent to which the hearing aid is used (use), the extent to which problems have been reduced in each situation (benefit), the extent to which problems remain (residual disability), and the extent to which the patient has been satisfied with the intervention (satisfaction). The patient is asked to rate each pre-specified situation on a five-point scale. The choices for the five-point scale vary depending upon which of the six dimensions the particular question addresses.

The GHABP has many of the same benefits of the COSI in that it allows the patient to nominate specific situations in which he or she experiences difficulty hearing (Alpiner & McCarthy, 2000). However, it also has the same disadvantage as the COSI in that it is primarily an open-ended questionnaires. Unlike the COSI though, the GHABP does contain four close-ended items which can be used more easily for comparison purposes.

In addition to the self-assessment questionnaires described above, two measures that exclusively address hearing aid benefit (as opposed to also addressing issues of handicap and disability) are the Abbreviated Profile of Hearing Aid Benefit (APHAB) (Cox & Alexander, 1995) and the Hearing Aid Performance Inventory (HAPI) (Walden, Demorest, & Hepler, 1984). These assessments contain questions that examine, in different ways, specific listening situations in order to assess hearing aid benefit.

The APHAB was derived from two earlier self-assessment scales: the Profile of Hearing Aid Performance (PHAP) (Cox & Gilmore, 1990) and the Profile of Hearing Aid Benefit (PHAB) (Cox, Gilmore, & Alexander, 1991). Cox and Gilmore (1990) created the PHAP to quantify the effects of hearing aid use in everyday life. This questionnaire consists of items that address different experiences encountered by the hearing aid user while wearing hearing aids. However, the PHAP measures only performance with a hearing aid, and, therefore, does not allow for determination of hearing aid benefit. In order to truly determine the benefit associated with the use of hearing aids, measures of both unaided and aided performance must be addressed. The authors developed the PHAB to broaden the scope of the questionnaire to include measures of unaided performance. Both the PHAP and the PHAB are 66-item questionnaires that are divided into four scales with three of the scales further divided into two subscales each. Scale SA (speech communication under relatively favorable conditions) is further divided into subscales FT (Familiar Talkers) and EC (Ease of Communication). Scale SB (speech communication under unfavorable conditions that are not primarily due to background noise) contains the subscales RV (Reverberation) and RC (Reduced Cues). Scale ES (perception of Environmental Sounds) is divided into subscales AV (Aversiveness) and

DS (Distortion) (Cox & Alexander, 1995). Finally, scale SC (speech communication under unfavorable noisy conditions) is the one scale that is not divided into subscales. These two measures have been used in many research studies (e.g. Cox, et al., 1991; Cox & Rivera, 1992; Nelson & Palmer, 1994; Ricketts & Bentler, 1992). However, many clinicians found the PHAP and the PHAB too time-consuming to be useful clinically. For this reason the authors developed an abbreviated version to be used in clinical settings: the Abbreviated Profile of Hearing Aid Benefit (APHAB) (Cox & Alexander, 1995).

The APHAB includes a subset of 24 items from the original PHAB and typically requires 10 minutes to complete. The authors chose to eliminate several of the subscales from the PHAB for the purposes of creating a more abbreviated questionnaire. The FT, RC, and DS scales were eliminated entirely. The authors felt that the relatively easy listening situations assessed in the FT condition might be limited by ceiling effects. Additionally, the RC and DS subscales were shown to have low internal consistency and lower test-retest correlations than the other subscales. The APHAB produces scores for unaided and aided performance, in addition to an overall score of hearing aid benefit. The hearing aid benefit score is obtained by determining the difference between the unaided and aided scores (Cox & Alexander, 1995). The four subscales of the APHAB include Ease of Communication (EC), Reverberation (RV), Background Noise (BN), and Aversiveness (AV). The EC subscale contains items describing the effort involved in communication under relatively easy listening conditions. Items in the RV subscale describe speech understanding in moderately reverberant rooms while those in the BN subscale contain items describing speech understanding in the presence of multitalker

babble or other environmental competing noise. The AV subscale contains items describing negative reactions to environmental sounds (Cox & Alexander, 1995).

Administration of the APHAB can be completed in either a paper and pencil format or through computer software available from the authors (Cox & Alexander, 1995). Separate inventory scores are obtained for speech communication in favorable, reverberant, and noisy environments, and for aversiveness of loud sounds.

The test-retest reliability of the APHAB in the aided and unaided conditions has been established for experienced users of linear amplification (unaided range from 0.65 to 0.89; aided range from 0.67 to 0.81) (Cox & Alexander, 1995). While these published norms are available for experienced hearing aid users, there are no comparable data for new hearing aid users. This is a limitation of the questionnaire, because the applicability of the normative data (e.g., percentile scores) to new hearing aid users is unknown.

The Hearing Aid Performance Inventory (HAPI) was created in 1984 by Walden, Demorest, and Hepler. It consists of 64 items that address four situations confronted by the hearing aid user: noisy situations (29 items), quiet situations (22 items), situations with reduced signal information (17 items), and situations with non-speech stimuli (11 items). Fifteen of the items are used in more than one of the subscales. The patient is asked to rate the amount of help given by the hearing aid in a particular communication situation by selecting one of the following choices, "Very Helpful," "Helpful," "Very Little Help," "No Help," or "Hinders Performance." The HAPI provides a post-fitting assessment of subjective hearing aid benefit and is one of the few measures that was designed specifically for use in the hearing instrument verification process. This self-assessment instrument has excellent internal consistency reliability (*alpha* = 0.96)

(Walden, et al., 1984). However, it is quite long to administer and contains items that may not be appropriate for an elderly population (Newman & Weinstein, 1988). Schum (1992) developed a shortened version of the HAPI for use with elderly people in response to these concerns. This newer questionnaire was termed the Shortened Hearing Aid Performance Inventory or SHAPI.

The SHAPI contains 38 of the original 64 items from the HAPI which are most applicable to elderly patients. Unlike the original HAPI, which was normed on a group of individuals ranging in age from 19 to 87 years, the SHAPI was normed on a group ranging in age from 65 to 80 years. Test-retest reliability data have never been established for the HAPI. However, Schum (1993) assessed the test-retest reliability using the SHAPI for a group of 64 elderly hearing aid users. These individuals ranged in age from 65-87 years (mean age of 74 years, SD = 5.6 years); two thirds of the sample were males and one third were females. Test-retest Pearson r correlation for the overall SHAPI ratings was 0.80 (range = 0.70 to 0.85) and reached statistical significance ($p <$ .001).

While the SHAPI appears to be a good measure to assess hearing aid benefit in elderly people, it only contains three of the four situations of the original HAPI. It does not include items addressing situations with non-speech stimuli. Schum (1993) pointed out that the original version of the HAPI would be more appropriate to use if the audiologist is interested in whether or not the hearing aid helps the user in specific situations. The original version of the HAPI may also be more applicable to a somewhat younger sample of hearing aid users because it has been normed on a wider age range.

Based on this review it can be seen that there are several questionnaires available to assess self-reported hearing aid benefit. All of these measures seek information about an individual's reaction to their hearing aids. Some of the questionnaires do this by assessing hearing handicap and others by specifically assessing hearing aid benefit. They all ask questions or seek information in a variety of different ways. The APHAB and the HAPI are good measures to use for this study because they were specifically designed to determine self-reported hearing aid benefit (as opposed to hearing handicap or satisfaction). Additionally, they provide closed-ended questions answered in a Likert scale format (Likert, 1932) which can easily be compared across participants. Finally, both of these tools are used commonly in clinical practice.

Although the APHAB and the HAPI are useful in determining benefit associated with the use of hearing aids, they obviously were not designed to determine an individual's personality type, nor how that personality type may affect self-perception of hearing-aid benefit. Additionally, the other self-assessment questionnaires in use today, such as the HHIE (Ventry & Weinstein, 1982), the COSI (Dillon, et al., 1997) and the GHABP (Gatehouse, 1999) fail to address aspects of personality. According to Traynor (1997), as useful as these measures are, they tell us nothing about a patient's personal reaction to hearing impairment or to the use of amplification.

Personality Measures

Personality can be thought of as encompassing a variety of different attributes of a person. Keirsey (1998) claims that there are essentially two sides to personality: temperament and character. He further describes that temperament has more to do with

an individual's underlying likes or preferences, while character has more to do with a person's set of behaviors, which are based upon his or her temperament.

The use of personality measures is considered by many to be controversial (e.g. Kline, 2000; Mastrangelo, 2005). Little tangible research is available to validate these measures and an individual's results on a single inventory can vary between administrations. Despite these limitations, several tools are available to explore different aspects of an individual's personality. The NEO-Five-Factor Inventory (Costa & McCrae, 1992), The Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975), The Myers-Briggs Type Indicator (MBTI) (Myers & McCaulley, 1985) and the Keirsey Four Types Sorter (Keirsey, 1998) are commonly used tests for this purpose. All of these measures assess the strength of certain personality traits. However, the MBTI and the Keirsey Four Types Sorter can also be used to categorize people into different personality types.

Personality type has been discussed and studied for centuries. Around the year 370 B.C., Hippocrates made the first proposal that people are highly formed at birth with fundamentally different temperaments or predispositions (Keirsey, 1998; Myers & McCaulley, 1985). Since that time, many other individuals have attempted to explain human personality types. One popular way to describe personality is by using the five-factor model of personality. This model is based on research indicating that an individual's basic personality is comprised of five fundamental traits or factors that remain stable across the lifespan after approximately age 30 (Costa & McCrae, 1997). The five-factor model seeks to describe personality based on the strength of responses on

five different domains: neuroticism, extraversion, openness, agreeableness, and conscientiousness.

The Neuroticism domain seeks information regarding negative emotions such as anger, embarrassment, and guilt. Individuals who score high on this domain are thought to be predisposed to these emotions. They tend to be more hostile and do not cope well in stressful situations. People who are high in Neuroticism also tend to have low self-confidence and blame others for their problems. However, those who score low on Neuroticism are more relaxed and calm, and are better able to cope with stressful situations in their lives (Costa & McCrae, 1997).

Individuals who score high on the Extraversion domain are more outgoing, enthusiastic, optimistic, and self-confident, while those who score low on this dimension tend to be more reserved and independent. They are, however, not necessarily unhappy or pessimistic. Instead, they keep more to themselves and do not enjoy other people and large social gatherings compared to those individuals who score higher on Extraversion (Costa & McCrae, 1997).

People who score high on the Openness factor are more curious and enjoy variety in their lives. They have been described as insightful, broad-minded, and ready to try something new. Those individuals who score low on this factor tend to prefer routine and familiar situations, and are more conventional (Costa & McCrae, 1997).

The Agreeableness domain seeks to measure information regarding how trusting people are. Those who score high on this factor tend to be trusting, peaceable, and warm-hearted. They want to help other people and other people tend to want to help them in

return. People who score low on this factor are more suspicious, assertive, shrewd, skeptical, and demanding (Costa & McCrae, 1997).

Individuals who score high on the Conscientiousness domain enjoy planning and carrying out activities in an organized way. They tend to be methodical, thorough, and determined to succeed. Those who score low on this factor are more absent-minded, impatient, and careless (Costa & McCrae, 1997).

The NEO-Five-Factor Inventory (NEO-FFI) is a version of the Revised NEO Personality Inventory that was developed by Costa and McCrae (1992) to measure the five personality dimensions that are considered by many psychologists as including the major areas of personality (McCrae & Costa, 1997). As noted above, these domains are: Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. The NEO-FFI contains 60 items and takes approximately 10 to 15 minutes to complete. Scores on the NEO-FFI measure can range from 0 to 48 for each of the five factors. It was normed on a group of 500 men and 500 women ranging in age from 21 to 96 years who were carefully selected to match the U.S. Census projections for 1995. The NEO-FFI has internal consistency ranging from 0.86 to 0.90 (Costa & McCrae, 1992). This questionnaire was not intended to provide a definite measurement of the five different personality domains, but rather to serve as a brief measure to provide estimates of the factors, primarily for the purpose of exploratory research (McCrae & Costa, 2004).

The five-factor model of personality has been highly criticized by some researchers (Boyle, Stankov, & Cattell, 1995; Eysenck, 1992) due to the structure of the model. The five factors themselves are not independent, with the agreeableness, openness, and conscientiousness domains being highly correlated. However, it is a useful

measure for research into the structure of personality because it is so widely used and is easily comparable to previous research (Kline, 2000). Another major drawback of this measure is that it is not readily available for use outside of the psychology community. Certain qualifications and certifications, such as a degree in psychology, are required to obtain and administer the NEO-FFI. Therefore, it would not be an appropriate measure for an audiologist to administer to a clinical population.

Other personality measures are based on the work of Eysenck. He theorizes that personality is based primarily on physiology and genetics. His work specifically focuses on three biologically based categories of temperament which he considers to be the most important personality dimensions: Extraversion/Introversion, Neuroticism/Stability, and Psychoticism/Socialization. One of the most popular tools related to his theories is the Eysenck Personality Questionnaire (EPQ) (Eysenck & Eysenck, 1975). This questionnaire contains 90 items and typically takes 10 to 15 minutes to complete. It measures Extraversion (E) (21 items); Neuroticism (N) (23 items); and Psychoticism (P) (25 items). A Lie (L) (21 items) scale is also included to screen out those individuals who may be responding to the questionnaire in a socially desirable way, rather than with true responses. Each item requires a yes-no response. A continuous score is generated for each of the four subscales with a positive response (an answer of "yes") to each items being weighted with a score of one. A higher score indicates more tendency for the particular dimension being measured. This questionnaire has been normed on a general population of 5000 individuals encompassing all social classes (Kline, 2004). The internal consistencies of each subscale are all greater than 0.70, and the validity of the scales assessed is the best supported of any personality measure (Kline, 2004).

One limitation of this measure for the audiologist is that it examines areas that may be handled best by a professional trained in psychology. The P scale, for example, was designed to measure behavior patterns that might be considered schizoid or psychopathic (Eysenck & Eysenck, 1975). Abnormal psychology is not an area in which audiologists have sufficient training to respond to problems or questions that may arise during test administration. Additionally, several studies have reported problems with the factor structure and low reliability of the scores, particularly on the P scale (Block, 1977; Goh, King, & King, 1982; Helmes, 1980).

Several other theories pertaining to personality are based on the work of Carl Jung. In 1920, Jung wrote his book on psychological types which revolutionized the way that other researchers looked at "type theory." Jung believed that people were born with a natural tendency for either extraversion or introversion and that this tendency combined with a preference for thinking, feeling, sensation, or intuition. Two tools that are based on the work of Jung are the Myers-Briggs Type Indicator (MBTI) (Myers & McCaulley, 1985) and the Keirsey Four Types Sorter (Keirsey, 1998).

Myers and Briggs created a questionnaire to identify the personality types described previously by Jung. This questionnaire was titled The Myers-Briggs Type Indicator (MBTI) (Myers, 1962). The MBTI is intended to make the theory of psychological types described by Jung (1923) understandable and useful in people's lives (Myers & McCaulley, 1985). The MBTI is based on Jung's theories concerning perception and judgment and shows how these theories apply to different types of people. The individual responds to a set of questions and statements that are presented in a forced-choice format. This format is intended to sort people into type categories, rather

than to measure strengths of individual traits or degrees of type development. The results of the MBTI consist of a four-letter code to indicate the personality type of the individual. All possible combinations produce 16 different personality types based on responses to questions in four different domains: Extraversion-Introversion (EI), Sensing-Intuition (SN), Thinking-Feeling (TF) and Judgment-Perception (JP). All four indices are dichotomous, as people tend to develop one preference on the scale at the expense of the other. For scoring, points are accumulated for each dimension. The dimension containing the most points (E or I, S or N, T or F, J or P) is the respondent's preferred way of interacting with the outside world.

The EI index assesses choices of Extraversion (E), an orientation toward the outer world, focusing on people and things, or Introversion (I), an orientation mainly toward the inner world of concepts and ideas. The SN index (Sensing or iNtuition) assesses the type of perception an individual prefers. Sensing perception (S) uses the physical senses of seeing, hearing, tasting, touching, and smelling while iNtuition (N) perceives through the use of subtle, usually unconscious senses, sometimes referred to as a "sixth" sense. The TF index (Thinking or Feeling) assesses the type of judgment an individual favors when making a decision. Thinking judgment (T) involves making decisions objectively and impersonally, based on laws, principles, and factual information. Feeling judgment (F) entails formatting decisions subjectively and personally, based on relationships and values (both one's own and those of others). The JP index (Judgment or Perception) assesses choices as to whether to deal with the outer world in the Judging (J) attitude or the Perceptive (P) attitude (Myers & McCaulley, 1985, Myers & Myers, 1995). Each index reflects one of four basic preferences which, under Jung's theory, direct the use of

perception and judgment. The preferences affect not only what people attend to in any given situation, but also how they draw conclusions about what they perceive (Keirsey, 1998).

The MBTI is available in several different formats, depending on the purpose of the testing. Form M, the standard form, consists of 93 items which, according to the authors, contains the newest items, the most precise scoring procedure, and the most current standardization data (Myers, McCaulley, Quenk, & Hammer, 2003). The MBTI is commonly used for understanding personality type in such areas as counseling and psychotherapy, career management, management and leadership, team development, education, learning and cognitive styles, health, stress, and coping. This test is written at an eighth grade reading level and is appropriate for both adults and high school students.

The MBTI has been used in thousands of research studies, many of them examining its reliability and validity. The current test manual (Myers et al., 2003) provides internal consistency reliability data consistent with those of other personality inventories (0.89 to 0.92). Additionally, test-retest reliabilities of type categories show consistency over time (Myers & McCaulley, 1985). When a change in type does occur over time, it is most likely to occur in only one preference, and generally in scales where the original preference was low.

The MBTI appears to have some value as a tool for helping people to understand individual differences in personality type. However, despite the usefulness and popularity of the MBTI, the results are still considered by some to be controversial and lacking in psychometric validity and reliability (Hicks, 1984; McCrae & Costa, 1989). The MBTI is best used in situations where basic information regarding personality is

being presented to lay individuals for the purpose of self-understanding, as is the case in the field of audiology. The use of the MBTI may be somewhat limited for audiologists due to the specific certification that is involved for its administration and scoring. However, most audiologists should qualify to administer this test based on their graduate coursework. There are, however, other personality assessments that are based upon the same principles as the MBTI and are more readily available to the general population. One of these measures is the Keirsey Four Types Sorter (Keirsey, 1998).

The Keirsey Four Types Sorter (Keirsey, 1998) is also based on the work of Jung (1923) and is similar to the format of the MBTI. However, the responses correspond to the four basic personality types characterized by Keirsey: Artisans, Idealists, Guardians, or Rationals.

Among the four Keirsey personality types, Artisans value freedom and spontaneity. They dislike constraint and want to be able to act on their impulses. They enjoy arts and crafts, acquiring new techniques, and working with equipment. Artisans are often composers, performers, operators, and promoters. Keirsey estimates that 35 to 40% of the population of the United States are Artisans (Keirsey, 1998).

Idealists value personal growth, authenticity, and integrity. They are interested in fostering growth within other individuals and are frequently empathetic and benevolent. Idealists find themselves in teaching, counseling, and healing positions. Keirsey estimates that 5 to 10% of the population of the United States are Idealists (Keirsey, 1998).

Guardians value belonging to a group or community. They maintain stability through responsible, conservative, traditional behavior. They tend to hold positions

where they are supervisors, inspectors, providers, and protectors. Keirsey estimates that 40 to 45% of the population of the United States are Guardians (Keirsey, 1998).

Rationals value competence and intelligence. They strive to learn, know, predict, and control the resources in their environment and enjoy working with machines and organisms. They are engineers, biologists, and coordinators. Keirsey estimates that 5 to 10% of the population of the United States are Rationals (Keirsey, 1998).

The Keirsey Four Types Sorter contains 16 questions, each of which has four possible responses. The participant is asked to rank the four responses to each item according to his or her preference. A rank of one indicates the participant's strongest preference, two the next strongest preference, and so on. The responses correspond to the four basic personality types characterized by Keirsey. The strongest preference indicated by the participant is considered his or her predominant personality type.

Perhaps the largest drawback to the Keirsey Four Types Sorter is the lack of statistical data regarding its reliability and validity. The fact that this information is lacking suggests that the person administering this measure should be cautious in interpreting the findings. Despite this, The Keirsey Four Types Sorter is the most readily available personality type measure and requires no formal training or certification to administer. Moreover, this measure provides useful information to help understand an individual's personality type when used as it was intended: as a self-help tool.

Hearing aid users likely represent all four of Keirsey's personality types. However, it is possible that certain personality types might affect self-perceived hearing aid benefit more than others. For example, relative to the other types, Artisans may tend to report greater hearing aid benefit due to their general interest in trying new things and

working with equipment. Alternatively, Idealists may report less hearing aid benefit than the other types because of their possibly unrealistic expectations for an "ideal" hearing aid fitting. They may become disappointed when their expectations are not met, therefore leading to a report of less hearing aid benefit. It may be predicted that Guardians would tend to report less hearing aid benefit when compared to the other personality types because of their conservative and traditional nature. Rationals may also report less hearing aid benefit, relative to the other personality types, because of their desire to control the resources in their environment. Wearing hearing aids does not always allow the user a great deal of control.

Mood Assessment

Researchers have examined the potential effects of anxiety on self-perceived hearing aid benefit (e.g. Garstecki & Erler, 1998; Gatehouse, 1994). Mood can be defined as a predominant way of feeling. In a more extreme situation, mood will affect an individual's actual perception of external events (Puri, 2004). Positive affect and negative affect are the terms that have been used most extensively in the self-report mood literature (Watson et al., 1988).

Positive affect is the extent to which a person feels enthusiastic, active and alert. High positive affect is a state of high energy, full concentration, and pleasurable engagement. Low positive affect is characterized by sadness and lethargy (Watson, Clark, & Tellegen, 1988). Positive affect corresponds to an extroverted personality type (Watson & Clark, 1984). Previous research has indicated that high positive affect is related to social activity and satisfaction while low positive affect is related to the increased perceived frequency of unpleasant events (Clark & Watson, 1988).

Negative affect includes a variety of aversive mood states, including anger, contempt, disgust, guilt, fear, and nervousness. High negative affect is a state of subjective distress and unpleasurable engagement (Watson, Clark, & Tellegen, 1988). Low negative affect is a state of calmness and serenity and corresponds to anxiety or neuroticism (Watson & Clark, 1984). Previous research has indicated that negative affect is related to self-reported stress and poor coping skills (Wills, 1986), health complaints (Watson & Pennebaker, 1989), and perceived frequency of unpleasant events (Stone, 1981).

There are several measures available that assess positive and negative affect. Two of the newer measures include the Global Mood Scale (Denollet, 1993), and the Positive and Negative Affect Schedule (PANAS) (Watson et al., 1988).

The Global Mood Scale (GMS) (Denollet, 1993) was first created and validated with a group of patients with coronary heart disease. The format of the questionnaire is self-report, paper-and-pencil and contains 20 items. Ten of the items contain positive mood terms, while the remaining 10 contain negative mood terms. The positive mood items are characterized by energy and engagement (e.g. lively, dynamic). The negative mood items comprise terms that are characterized by feeling of malaise (e.g. wearied, listless). Terms used in this measure are commonly reported by non-psychiatric individuals (Denollet, 1993). The items are scored on a five-point Likert scale ranging from 0 "not at all" to 4 "extremely." The respondent is asked to answer the extent to which he or she has experienced each mood state lately. Scores on both the negative affect and positive affect scales range from 0 to 40. Both scales are internally consistent,

with Cronbach's alphas of 0.94 and 0.91 for the positive and negative affect scales, respectively (Denollet, 1993).

The major limitation of this measure is the sample on which it was normed. Research with this questionnaire has been conducted exclusively on male participants with coronary heart disease. Therefore, it is unknown whether the results of this measure are consistent with other measures of mood, and whether the results would be applicable to female individuals or to people without coronary heart disease.

The PANAS is a short questionnaire of 20 items that is internally consistent and stable (Watson, et al., 1988). The PANAS can be administered using one of six types of instructions, each of which delineates a different time frame in which the respondent experiences the feelings represented by each item (moment, today, past few days, past few weeks, year, general). The respondent is asked to circle the answer that best corresponds with how he or she is feeling. Ten of the 20 items assess positive affect, while the remaining 10 items assess negative affect. This measure was originally developed using a group of undergraduate students as participants. Using this group, Watson et al. (1988) demonstrated that the PANAS has strong internal reliability with Cronbach's alphas ranging from 0.86 to 0.90 for positive affect and 0.84 to 0.87 for negative affect based on the type of instructions used. Watson, et al. (1988) also reported that the PANAS has adequate 8-week test-retest reliability with correlation coefficients ranging from 0.47 to 0.68 for positive affect and 0.39 to 0.71 for negative affect. Additional normative data were collected from a group of adults which yielded comparable results to those obtained from the undergraduate students.

The positive affect and negative affect dimensions are, reportedly, independent measures (Watson et al., 1988). This is the most controversial characteristic of the PANAS, with some arguing that this independence is contrary to all other measures of affect developed prior to the PANAS (Crawford & Henry, 2004). Watson et al. (1988) have reported low to moderate correlations between positive affect and negative affect scales (range -0.12 to -0.23).

The GMS and the PANAS measure similar aspects of mood (positive and negative affect). However, the usefulness of the GMS in non-cardiac individuals and in women has not been examined. Therefore, the PANAS appears to be more appropriate for a group of older adult male and female hearing aid users.

Certain predictions can be made regarding the relationship between mood and performance on hearing aid benefit measures. One could expect that those with high negative affect would report lower benefit on the APHAB and the HAPI because negative affect is related to self-reported stress, poor coping skills (Wills, 1986), health complaints (Watson & Pennebaker, 1989), and frequency of unpleasant events (Stone, 1981). Those individuals with high positive affect would report higher benefit on the hearing aid benefit measures because high positive affect is related to a feeling of satisfaction and generally pleasurable engagement (Watson et al., 1988).

Other Questionnaires Examining Personality and Mood

Locus of control. Locus of control is an individual's belief about the control they have over their lives. According to Rotter (1966), it ranges from a belief that such outcomes are controllable (internal locus of control), to a belief that outcomes are generally beyond personal control (external locus of control). The Levenson generalized

Internality, Powerful Others, and Chance scales (Levenson, 1981) is a 24-item measure, with three subscales corresponding to three independent dimensions of locus of control. The respondent obtains a score for belief in internal control, control by Powerful Others, and control by chance events or fate (Levenson, 1981). The Internality (I) scale measures the extent to which an individual believes that he or she has control over their own life. The Powerful Others (P) scale assesses the respondent's belief that other persons control the events in his or her life. The chance (C) scale measures the degree to which one believes that fate or luck affects one's experiences and outcomes. Scores can range from 0 to 48 on each scale. A higher score on a scale is indicative of greater belief in that source of control over one's life. Both internal consistency and test-retest reliabilities for these scales vary between 0.64 and 0.79 (Levenson, 1981).

The disadvantages of this test are its poor construct validity, and its brevity. Research on this measure has shown no clear factorial evidence of what each of the items actually measures. This scale may not be appropriate to be used to measure locus of control with any level of confidence (Kline, 2000). Furthermore, each of the three subscales contains only eight items. This short length is considered to be unsatisfactory to measure the dimensions it purports to be measuring (Kline, 2000).

Coping strategies. Coping strategies are behaviors that people use to help manage stressful situations. The Coping Strategy Indicator (Amirkhan, 1990) contains 33 items, and separates coping into three independent dimensions: problem solving, support-seeking, and avoidance (11 items in each category). The problem solving dimension involves activities such as setting goals and weighing options. The support seeking dimension includes items pertaining to confiding in friends and seeking

reassurance. Finally, the avoidance dimension includes behaviors such as distracting oneself, avoiding people, and fantasizing. The respondent reports on how he or she actually used these coping strategies in a recent and important stressful event. Responses on each of the 33-items are indicated by means of a three point scale: a lot = 3, a little = 2, or not at all = 1. Subscale scores are calculated by summing responses to appropriate items (range 0 to 33), with higher scores indicating greater use of the strategy. Cronbach's alpha coefficients indicate adequate internal consistency for each of the subscales ranging from 0.86 to 0.98 for Problem Solving, 0.89 to 0.98 for Seeking Social Support and from 0.77 to 0.96 for Avoidance (Amirkhan, 1990).

There are two major drawbacks to the Coping Strategy Indicator. During the development of the questionnaire, only responses to specific events stressors were measured. This is a drawback in that it is not clear whether this tool measures an individual's coping ability to stress from more chronic situations. Also, the normative data sample was skewed toward females, younger individuals, and those with higher incomes. Thus, the results may not be comparable to other samples of individuals (e.g. males, older adult hearing aid users, lower income individuals).

Anxiety. Anxiety can be viewed in two different ways: state anxiety (temporary or transient feelings of worry or nervousness that occur as a result of a particularly stressful situation) or trait anxiety (a consistent predisposition to feelings of worry, nervousness, or apprehension in response to everyday situations). The State-Trait Anxiety Inventory (Spielberger, 1983) is a well-known instrument that measures both transient (state) and enduring (trait) levels of anxiety. It assesses how the respondent feels at the moment or felt in the recent past, or how he or she anticipates feeling in a

specific situation that is likely to be encountered in the future, or in a variety of hypothetical situations. The questionnaire contains 40 items and is scored on four levels of anxiety intensity from 1 = "not at all" to 4 = "very much." The scores can range from 20 to 80. A score of greater than 39-40 is typically used to define clinically significant symptoms of a state of anxiety. This measure has been widely used in both clinical and research settings across a wide variety of disciplines.

Personality and Self-Reported Hearing Aid Benefit

There is evidence that certain aspects of a person's personality and temperament can influence the ability to cope with stress. Amirkhan, Risinger, and Swickert (1995) found that an individual's personality type strongly influences his or her outlook on life. Other studies (Parkes, 1986; Rim, 1987) have reported that both neuroticism and extraversion can be linked to different coping strategies. Further research has examined how stress relates to perceived success with hearing aids and a person's reaction to hearing loss. A patient's expectations and attitudes about hearing aids and hearing loss may affect perceived success with hearing aids (Eriksson-Mangold & Carlsson, 1991; Garstecki & Erler, 1998).

A recent study by Cox, Alexander, and Gray (2005) examined the personality traits, sense of personal control, and preferred coping strategies of individuals seeking hearing aids and compared the results to norms from the general population. The primary goal of the study was to assess whether individuals who chose to pursue amplification were significantly different from the general population in terms of their personality, sense of personal control, or preferred coping strategies. A secondary objective was to determine if hearing aid seekers in a private practice setting had different personalities,

sense of personal control, or preferred coping strategies from those in the public health system.

Participants included 230 individuals (151 VA patients and 79 private practice patients) with bilateral, symmetrical, sensorineural, mild to moderately-severe hearing impairment who were current users of hearing aids. All of the participants from the VA hospital were men (151). Of the 79 participants from the private practice clinic, 26 were men and 53 were women. The average age of the VA participants was 72 (SD = 7.15) years and the average age of the private practice participants was 75 (SD = 7.93)years. Overall, 41% of these individuals were previous users of hearing aids, and the remaining 59% were new users. Each individual completed a personality assessment (NEO Five-Factor Inventory, Costa & McCrae, 1992), a locus of control measure (Levenson generalized Internality, Powerful Others, and Change scales, Levenson, 1981), and a questionnaire assessing coping style (Coping Strategy Indicator, Amirkhan, 1990).

The results of this study revealed that the personality characteristics of individuals who seek hearing aids differ from the personality characteristics of adults in the general population. Through the use of a one-way ANOVA, it was determined that the hearing aid seekers in this study revealed lower Neuroticism scores ($F(1,1228) = 8.8$, $p = 0.003$) and lower Openness scores ($F(1,228) = 51.1$, $p < 0.001$) when compared to the norms for adults in the general population. Individuals in the private practice group scored higher than average norms on Agreeableness ($F(1,1077) = 5.86$, $p = 0.016$). On the locus of control measures, the individuals in the study exhibited higher scores than the general elderly population on the Internal control scale ($F(1,330) = 16.46$, ; $p < 0.001$) and essentially identical results on the Powerful Others and Chance scales. Hearing aid

seekers felt that they were better able to cope with the challenges of life as compared to the general population as evidenced by lower scores than the general elderly population on all three of the strategies that were measured: Problem Solving, Social Support, and Avoidance.

The major drawback of this study was in the characteristics of the sample of participants. While a large number of individuals participated in the study (230 total people), the majority of them were males from a VA hospital. There was clearly an unequal distribution of men and women (177 men and 53 women). This sample does not accurately represent individuals seeking hearing aids in the general population. Another potential drawback of this study is the assumption that people included in the general population norms did not have hearing loss, and that the presence of hearing loss in the study sample was an irrelevant factor when comparing the two groups. Also, those individuals who received services at the VA hospital received their hearing aids for free. This is not representative of the general population and could account for some of the differences between the two groups. Despite these drawbacks to the study, the results support the hypothesis that an individual's personality might affect his or her motivation to obtain a hearing aid.

To date, little research addressing personality and subjective benefit from hearing aids is available. Cox, et al. (1999) examined the relationship between extraversion-introversion, locus of control, and self-reported hearing aid benefit in 83 individuals with sensorineural hearing loss. Each of these individuals had mild-to-moderate hearing loss that was more pronounced in the high frequencies. Each individual had been wearing a hearing aid for a period of time ranging from less than one year to greater than 10 years.

Participants completed the APHAB and three measures of personality; the State-Trait Anxiety Inventory (STAI) (Spielberger, 1983), the MBTI (Myers & McCaulley, 1985), and a measure of locus of control (Levenson, 1981). The results of a series of stepwise multiple regression analyses indicated that extraversion-introversion (as measured with the MBTI) appeared to be the best predictor of hearing aid benefit (9.5% of the variance on the Ease of Communication subscale, 20% of the variance on the Reverberation subscale, and 10% of the variance on the Background Noise subscale). More extraverted individuals reported greater hearing aid benefit on these three subscales of the APHAB than the more introverted individuals. In addition, individuals who reported greater anxiety also reported more problems communicating as measured on the aided condition of the Ease of Communication subscale of the APHAB (Cox et al., 1999).

This study by Cox et al. (1999) is limited for several reasons. While the study sample was reasonably large in number (86 individuals), the distribution of men and women was unequal (with 75% of the participants being male). No mention was made of hearing aid type, style, or circuitry (digital or analog), or whether the participants were fit monaurally or binaurally. There was wide variability in the amount of hearing aid experience. Furthermore, current audiograms were not obtained on the subjects prior to participation in the study (86% were obtained within one year).

A study conducted by Barry (2000) assessed the relationship between personality and the ease of aided communication. She administered the Keirsey Four Types Sorter (Keirsey, 1998) and the Ease of Communication sub-scale of the APHAB (Cox & Alexander, 1995) to 16 male veterans between 60 and 75 years of age. Each of the participants had worn binaural hearing aids for a period of at least one year. One

participant was classified as Artisan, three as Idealist, eight as Guardian, and three as

Rational. A statistically significant negative correlation ($r = -0.935$, $p < 0.001$) was noted

between the Idealist personality type and Ease of Communication, indicating that

individuals with an Idealist personality type may have unrealistically high expectations

regarding hearing aid benefit and may react negatively when these expectations are not

met.

A follow-up study was conducted by Barry and Barry (2002) to further explore

the issue of personality and hearing aid benefit with a larger sample of participants

spanning a larger age range using the complete APHAB. The Keirsey Four Types Sorter

was administered, together with a complete version of the APHAB, to a group of 40 male

veterans between the ages of 45 to 75 years. All participants had been binaural users of

hearing aids for at least one year.   Of the 40 participants, two were classified as Artisan,

two as Idealist, 22 as Guardian, and 14 as Rational. The results of this study were

consistent with the previous study by Barry (2000), indicating a negative correlation

between the Idealist personality type and the results of hearing aid benefit as reported on

the APHAB. No other statistically significant correlations were found (also consistent

with the previous study).

The major drawback of these studies was the limited participant sample. The

participants were a small number of male veterans who are not representative of the

population of hearing aid users as a whole for several reasons. First, men are not the only

users of hearing aids in the general population. Second, hearing loss typically found in

veterans is caused by noise exposure, and not necessarily caused by aging, as would more

likely be the case in the population of hearing aid users as a whole. Finally, it is

reasonable to assume that personality characteristics of a military population will be different from those of the general population. Therefore it is difficult to make generalizations regarding the results of this study. In addition, the only significant correlations were found with the Idealist personality type, even though there were very small numbers of participants that actually sorted into this category.

Crandell, Lewis, and Valente (2004) examined the relationship between personality status using the Keirsey Temperament Sorter (Keirsey, 1998), locus of control using Levenson's Locus of Control scale (Levenson, 1981), and patient-reported hearing aid benefit using the APHAB (Cox & Alexander, 1995). Forty-six participants were assessed at two different test sites (the University of Florida and the Washington University School of Medicine) prior to binaural hearing aid fitting with digital Phonak Claro 311 dAZ behind-the-ear hearing aids, and at various points post-fitting. These authors reported similar results to those of Cox et al. (1999). Certain personality types were moderately to highly correlated to self-perceived hearing aid benefit at the University of Florida test site. However, no significant correlations were found when data were collapsed across both test sites. The authors concluded that these data suggest that certain personality characteristics (specifically extraversion and external locus of control) may influence self-perceived hearing aid benefit. The fact that no significant correlations were found when data were collapsed across both test sites seems to disagree with the findings of Barry (2000), Barry and Barry (2002), and Cox et al. (1999). Differences could be associated with some unique situation (e.g. climate of the different regions, testers, etc.) that was present at one test site versus the other. Therefore, these results may not be applicable to the general population of hearing aid users.

In summary, the previous research has found that the extraversion personality dimension and the Idealist personality type are related to self-reported hearing aid benefit. Those individuals who are more extraverted report greater amounts of hearing aid benefit on certain subscales of the APHAB. Additionally, those individuals who are more strongly of the Idealist personality type report less benefit from their hearing aids as measured on the APHAB.

Although each of the studies mentioned above found significant interactions between certain personality characteristics and reported benefit on the APHAB, very little is known about the relationship between mood or gender and a given individual's report of hearing aid benefit. A study conducted by Garstecki and Erler (1999) reported that women assign greater importance to communication in social situations, use nonverbal communication strategies more frequently, and perceive more difficulty with personal adjustment to hearing loss than men. This finding suggests that gender may be an important factor influencing perceived hearing aid benefit.

The previous literature review underscores the observation that the only hearing aid benefit measure that has been studied in conjunction with personality type is the APHAB. None of the studies examined how the results might vary when using a different measure of hearing aid benefit than the APHAB. Other measures of hearing aid benefit assess different dimensions of hearing aid use and communication than the APHAB. Thus, it would be important to determine if the relationships between personality and self-reported hearing aid benefit as measured with the APHAB generalize to other scales of perceived hearing aid benefit that are in common clinical use.

Knowing different aspects of an individual's personality, as well as his/her mood, might help audiologists to predict the patient's success with hearing aids. As Hickson, Hamilton, and Orange (1986) state, "The importance of understanding the factors associated with the use and non-use of hearing aids cannot be underestimated. If the clinician could predict, to some extent at least, which clients would successfully make use of aid, this may influence the entire rehabilitation process" (p. 37).

Chapter 3: Experimental Questions and Hypotheses

Self-report questionnaires that assess subjective hearing aid benefit do not address how non-audiological factors such as mood, personality type, or gender affect the amount of hearing aid benefit a person reports receiving. The currently available literature suggests that certain personality factors may influence self-reported hearing aid benefit, but these studies are lacking in sufficient evidence to lead to a change in clinical practice. In particular, many of these previous studies were conducted on samples comprised primarily of men, individuals who receive hearing aids for free (from a VA hospital), and on individuals who may be skewed for a certain personality type because of voluntary military service. Thus, the findings of these previous studies may be specific to a subset of hearing aid users and may not apply to the general population of adult hearing aid users. Previous literature has focused only on one measure of self-reported hearing aid benefit, and has not addressed how non-audiological factors may influence the performance on more than one measure.

Two measures of self-reported hearing aid benefit were chosen for this study, the APHAB and the HAPI, because these two measures seek information in different ways by asking questions addressing different listening situations. Both measures seek the amount of benefit a person reports receiving from their hearing aids in quiet and in the presence of background noise. The HAPI contains additional subscales specifically addressing speech without the use of visual cues and non-speech stimuli, while the APHAB contains additional subscales addressing communication in reverberant environments, and the participant's reaction to aversive sounds. In addition to the types

of listening situations each questionnaire assesses, the way that the two measures seek the information is quite different. For example, the APHAB provides specific listening situations and asks the participant to respond with the how often they experience difficulty communicating both without and with their hearing aids.   The HAPI asks the participant to respond to questions by providing a situation and asking for a response pertaining to how helpful the hearing aids are in that given situation. It was important to examine two separate measures to determine if the results that have been found in previous research are generalizable to another measure of self-reported hearing aid benefit.

The two personality measures selected for this study, the MBTI and the Keirsey Four Types Sorter, were chosen because of their availability to audiologists and because of their popularity. The reliability of these measures is approximately the same as that of other personality measures. Additionally, they are used in a wide variety of situations not associated with pathology. Although they are controversial measures, this critique applies to most measures of personality.

The PANAS was chosen as a measure of mood. This questionnaire was used primarily because of its availability and its ease of administration. Additionally, the instrument is valid and reliable, and is considered by many researchers to be a useful tool to examine both the positive and negative aspects of mood.

The principal purpose of this study was to examine the relationship between personality and self-perception of hearing aid benefit. A secondary objective was to assess the extent to which gender and mood are related to personality type and self-report of hearing aid benefit. A third objective was to determine if associations between

personality, gender, mood, and hearing aid benefit are specific to the hearing aid benefit measure used.

Experimental questions. The specific experimental questions that were addressed include:

1.   a. Is the personality dimension of extraversion/introversion related to the amount of hearing aid benefit as measured on the HAPI?

    b. Is the personality dimension of extraversion/introversion related to the amount of hearing aid benefit as measured on the APHAB?

2.   a. Is current mood related to the amount of reported hearing aid benefit on the HAPI?

    b. Is current mood related to the amount of reported hearing aid benefit on the APHAB?

3.   a. Do women or men report a greater amount of hearing aid benefit as measured on the HAPI?

    b. Do women or men report a greater amount of hearing aid benefit as measured on the APHAB?

4.   a. Do people with different Keirsey personality types perceive a different amount of hearing aid benefit as measured on the HAPI?

    b. Do people with different Keirsey personality types perceive a different amount of hearing aid benefit as measured on the APHAB?

5.   a. Which factors, extraversion/introversion personality dimension, current mood, gender, high frequency pure tone average, aided speech recognition

score, Keirsey personality type, or age most strongly predict hearing aid benefit as measured with the HAPI?

b. Which factors, extraversion/introversion personality dimension, current mood, gender, high frequency pure tone average, aided speech recognition score, Keirsey personality type, or age most strongly predict hearing aid benefit as measured with the APHAB?

Hypotheses. The specific hypotheses are as follows:

1. Individuals with a more extraverted personality type are expected to report greater hearing aid benefit on both the HAPI and the APHAB than people with a more introverted personality type, consistent with reports by Cox et al. (1999) and Crandall et al. (2004).

2. The mood attribute of affect will be correlated with hearing aid benefit as measured on the self-assessment questionnaires. Higher positive affect will correlate with greater reported hearing aid benefit and higher negative affect will correlate with less reported hearing aid benefit.

3. Women will report more perceived benefit from hearing aids compared to men. Garstecki and Erler (1998) reported that women have greater locus of control (the individual's belief in his or her ability to have control over what happens to him or her) compared to men. Thus, women may be more likely to take an active role in adjusting to their hearing aids, and therefore, more likely to report benefit from them.

4. People with different Keirsey personality types will report different levels of hearing aid benefit. It is assumed that the majority of participants will fall

into the personality types of either Artisan or Guardian based on Keirsey's estimates of the percentage of the general population represented in each of the four groups (Keirsey, 1998). It is expected that the Artisans will derive more benefit from hearing aids due to their interest in trying new things and working with equipment. Guardians may report less hearing aid benefit because they appear to be more conservative and less adventurous. Additionally, it is hypothesized that Idealists will report more hearing aid benefit because of the value they place in personal growth. Rationals will report less hearing aid benefit because of their desire to control the resources in their environment. Wearing hearing aids does not always allow the user a great deal of control.

5. The strongest predictor of perceived hearing aid benefit will be the extraversion/introversion personality dimension, with less variance accounted for in hearing aid benefit scores by mood (positive or negative affect), gender, high frequency pure tone average, aided speech recognition score, Keirsey personality type, or age. This prediction is made based on previous research (Cox et al., 1999; Crandall et al., 2004) that indicated the extraversion/introversion personality dimension was the strongest predictor of self-reported hearing aid benefit.

The discovery of a significant correlation between personality type, mood, gender, and self-assessed hearing aid benefit would support the notion that factors, other than the characteristics of the hearing impairment, influence an older adult's reaction to

the hearing aid benefit they receive. It is hoped that, with this information, audiologists

might be better able to predict who will benefit from amplification and rehabilitation.

Chapter 4: Methodology

A total of 20 individuals participated in this study (11 men and nine women). Each participant was recruited from the case files at the University of Maryland College Park Hearing Clinic. They were sent a letter inviting them to participate in the study (see Appendix A) and received a follow-up telephone call. Each individual was between the ages of 55 to 82 years (mean 69 years, SD = 7.1) and had a bilateral, symmetrical sensorineural hearing loss that was normal or mild in degree in the low frequencies, sloping to moderately-severe in the high frequencies. Figures 1 and 2 present the mean audiograms of the male and female participants, respectively. Initial examination of these figures shows that, in general, the men who participated in this study had poorer hearing sensitivity than the women, especially in the higher frequencies. Results of independent samples t-tests indicated a significant gender difference between thresholds at 4000 Hz in the left ear. These results are summarized in Table 1. This finding is consistent with previous observations of gender differences between males and females in high frequency hearing sensitivity (Jerger, Chmiel, Stach, & Spretnjak, 1993). Older participants (55-85 years) were selected because they represent the majority of the clinical population of hearing aid users. Each participant had normal middle ear function as indicated by the presence of Type A tympanograms (peak pressure at or near 0 daPa) and acoustic reflex thresholds, and the absence of air-bone gaps on the audiogram (bone conduction thresholds within 5 dB HL of air conduction thresholds at each test frequency). The site of lesion was primarily cochlear, based on the absence of acoustic reflex adaptation, the presence of acoustic reflex thresholds at levels expected for the

degree of hearing loss (Silman & Gelfand, 1981), and symmetrical hearing loss as indicated by the audiogram results. Each participant exhibited a score of fair (70%) or better on unaided speech recognition measures using NU-6 words presented at 85 dB HL in quiet. Participants also performed at a level of 80% or better for NU-6 words presented in quiet in the soundfield at a normal conversation level (50-55 dB HL) while using binaural amplification. These results are summarized in Table 2.
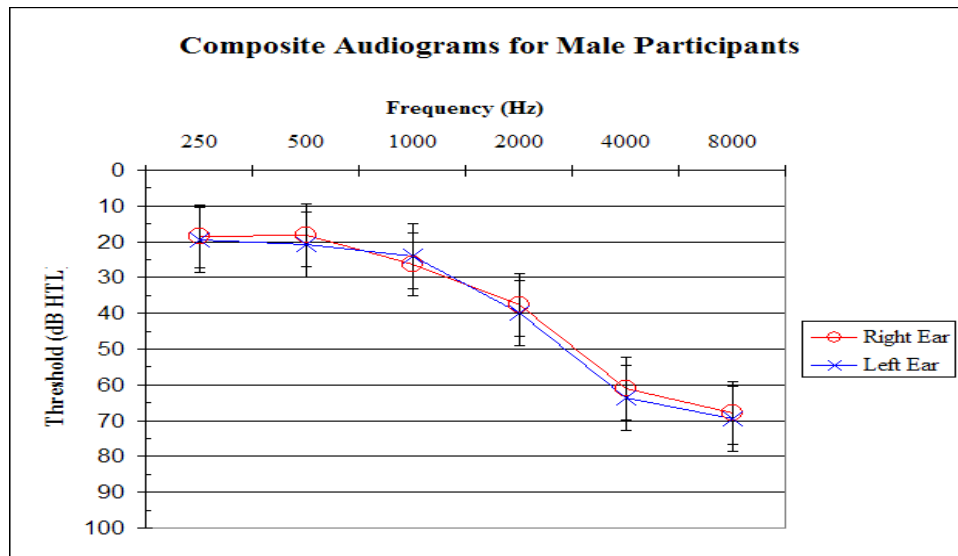
Figure 1. Mean thresholds in dB HL (re: ANSI, 2004) for each ear of the male participants.
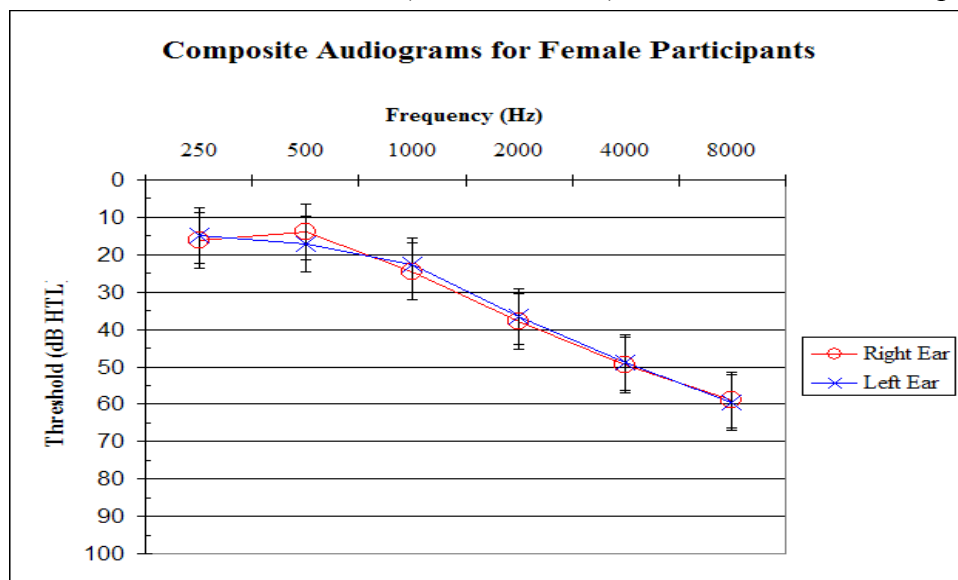
Figure 2. Mean thresholds in dB HL (re: ANSI, 2004) for each ear of the female participants.

Table 1

Results of t-tests examining effect of gender on hearing thresholds at test frequencies between 250-8000 Hz. Values reported are t-values, p-values, and statistical significance.

Frequency (Hz)	*t*-value	*p*-value	Statistical Significance
	Right Ear		
250	0.690	0.499	NS
500	0.929	0.365	NS
1000	0.398	0.696	NS
2000	-0.009	0.993	NS
4000	2.040	0.056	NS
8000	1.310	0.207	NS
	Left Ear		
250	1.100	0.286	NS
500	1.310	0.207	NS
1000	0.264	0.794	NS
2000	0.589	0.563	NS
4000	**3.383**	**0.003**	**p < 0.05**
8000	2.012	0.059	NS

Another criterion for participation was that the individual must have been fit with their hearing aids for at least three months. This time period is usually sufficient to enable the new user a chance to become accustomed to the hearing aids following the fitting (Turner, Humes, Bentler, & Cox, 1996). Each individual had been wearing hearing aids for a period of four months to five years. Hours of daily use ranged from as little as six hours per day to wearing hearing aids during all waking hours. All individuals reported wearing both hearing aids at the same time or no hearing aids at all (no monaural users). Each participant's hearing aids had directional microphone technology. Three different manufacturer's hearing aids were represented in this study, as well as three different hearing aid styles (behind-the-ear, in-the-ear, and in-the-canal style instruments). In summary, all participants elected to use their hearing aids and wore them consistently each day.

Table 2
Speech Recognition Scores of Males and Females

Condition	Mean Score (S.D.)	
	Males	Females
Unaided right	93 (5.31)	89 (5.10)
Unaided left	90 (5.97)	88 (6.32)
Aided	89 (5.88)	94 (4.94)

Each participant was a native speaker of American English. This requirement was necessary in order to accurately conduct speech recognition measures during the

audiometric evaluation. Being a native speaker of American English was also necessary in order to compare measured Keirsey personality types to Keirsey's estimates of the percentage of each personality type, which were based on the population of the United States.

Test Instruments

Personality type. Two separate personality assessments were used to determine each participant's personality type: the Myers-Briggs Type Indicator, Form M (Myers, McCaulley, Quenk, & Hammer, 2003) and the Keirsey Four Types Sorter (Keirsey, 1998) (Appendix B).

The MBTI assesses personality type based on responses to questions in four different domains: Extraversion-Introversion (EI), Sensing-Intuition (SN), Thinking-Feeling (TF), and Judgment-Perception (JP). The entire complement of questions of the MBTI, form M was administered to each participant in order to conform to standardized procedures. However, the Extraversion-Introversion (EI) index was the only dimension used for the purposes of this investigation because it has been studied more than any of the other personality characteristics and correlates with self-perception of hearing aid benefit (Cox et al., 1999; Crandell et al., 2004).

Of the total 93 items from the MBTI, 21 address extraversion-introversion. For scoring, points are accumulated for both extraversion (E) characteristics and introversion (I) characteristics. The dimension containing the most points (E or I) is the respondent's preferred way of interacting with the outside world. Scores can range from 0-21 for extraversion, and 0-21 for introversion. The two dimensions are complementary, with one dimension reflecting the inverse of the other. Therefore, a higher score on one

domain automatically translates to a lower score on the other domain. The published instructions for this test are as follows, "Read each question carefully and indicate your answer by making an "X" in the appropriate box next to the response you select. Use a ballpoint pen and press firmly. Do not spend too much time thinking about any one question. If you cannot decide on an answer, skip that question and return to it later. If you make a mistake, do not erase but blacken in the box marked in error." An example of a question in the extraversion/introversion dimension is, "Do you usually get along better with, a) imaginative people, or b) realistic people?"

The Kiersey Four Types Sorter (Appendix B) is based on the same underlying principles as the Myers-Briggs Type Indicator, but reduces the MBTI into four basic temperaments: Artisan, Idealist, Guardian, and Rational. This test contains 16 items and requires less time to administer than the MBTI but reaches many of the same conclusions (Keirsey, 1998). The published instructions for this measure are as follows, "For each item, rank-order the four choices. Mark the responses most like you as #1; less like you, #2; still less like you, #3; & least like you, #4. Put your numbers next to the corresponding letters." An example of an item found on the Keirsey Four Types Sorter is, "I'd rather study, a) arts and crafts, b) literature and humanities, c) business and finance, d) science and engineering." The respondent is asked to rank each of the four items according to his or her preference. A separate score is derived for each of the four different personality types. The type containing the lowest score is the respondent's predominant Keirsey personality type.

Hearing aid benefit. Two separate measures of subjective hearing aid benefit were utilized for this study: the APHAB (Cox & Alexander, 1995) and the HAPI

(Walden et al., 1984). Although both measures are used to assess subjective hearing aid

benefit, they each examine somewhat different listening situations that hearing aid users

encounter.

The entire APHAB (Cox & Alexander, 1995) was used for this study (see

Appendix C). The participants were asked to answer each of the 24 questions with the

following instructions: "Please circle the answers that come closest to your everyday

experience. Notice that each choice includes a percentage. You can use this to help you

decide on your answer. For example, if a statement is true about 75% of the time, circle

C for that item. If you have not experienced the situation we describe, try to think of a

similar situation that you have been in and respond for that situation. If you have no idea,

leave that item blank" (Cox & Alexander, 1995). An example question was, "When I am

in a crowded grocery store, talking with the cashier, I can follow the conversation." The

participant was asked to circle one of seven choices marked "A" through "G" (A =

Always or 99% of the time, B = Almost Always or 87% of the time, C = Generally or

75% of the time, D = Half-the-time or 50% of the time, E = Occasionally or 25% of the

time, F = Seldom or 12% of the time, and G = Never or 1% of the time). This procedure

was followed for each of six items for each subscale of the test and for both aided and

unaided conditions. The difference between the scores for the aided and unaided

conditions was calculated to form an estimate of benefit from hearing aids (Cox, 1997).

The respondents were verbally encouraged to attempt to answer each of the items

completely. They were told that if they had not experienced a particular situation that

they should try to imagine themselves in that situation and respond to the item

accordingly. The examiner verified that each participant answered each item of the APHAB in its entirety. No items were left blank by any of the participants.

The entire HAPI was administered in the standard published format (see Appendix D). The participant was asked to answer each of the 64 questions according to the following instructions, "We are interested in knowing the extent to which your hearing aids help you in your daily life. In this questionnaire you are asked to judge the helpfulness of your hearing aids in a variety of listening situations. You are asked to rate the benefit of your hearing aids in each situation and not the difficulty of the situation itself. To answer each question, check the phrase that best describes how your hearing aids help you in that situation: Very Helpful, Helpful, Very Little Help, No Help, or Hinders Performance." A sample question was as follows: "You are sitting alone at home watching the news on TV." The items were scored on a five-point scale where 1 = "very helpful," 2 = "helpful," 3 = "very little help," 4 = "no help," and 5 = "hinders performance". The lower the respondent's score, the greater the perceived hearing aid benefit. A mean score, ranging from 1-5 is calculated for each subscale, as well as an overall mean score.

Mood assessment. The Positive and Negative Affect Schedule (PANAS, shown in Appendix E) by Watson, Clark, and Tellegen (1988) was administered using the "today" instructions: "This scale consists of a number of words that describe different feelings and emotions. Read each item and circle the answer that best describes the extent to which you are experiencing each of the feelings or emotions today" (Watson, Clark, & Tellegen, 1988). A response of "1" was assigned to "very slightly or not at all," a response of "2" was assigned to "a little," a response of "3" was assigned to

"moderately," a response of "4" was assigned to "quite a bit," and a response of "5" was assigned to "extremely." Ten of the 20 items assessed positive affect, while the remaining 10 items assessed negative affect. The items were summed to derive the two factors of Positive and Negative Affect (Watson, et al., 1988). Each of these scores can range from 10 to 50 with higher numbers indicating stronger positive or negative affect.

Procedures

Initially, participants were informed of the goals of the study and were asked to sign a consent form (Appendix F). All testing was completed during one test session which lasted approximately 1.5 hours. Audiometric testing was completed first to assure that each participant's hearing loss met the requirements for inclusion in this study.

Participants were tested audiometrically in a double-walled sound suite at the University of Maryland Hearing Clinic. Preliminary measures included pure tone air conduction thresholds, measured from 250-8000 Hz, and pure tone bone conduction thresholds, measured from 250-4000 Hz. Word recognition ability was assessed using NU-6 words presented via compact disc recording through a Grason-Stadler-61 audiometer at 85 dB HL. Acoustic immittance measures were conducted using a Grason-Stadler-33 Middle Ear Analyzer and included the measurement of 226 Hz tympanograms, contralateral acoustic reflex thresholds at 500 and 1000 Hz, and ipsilateral acoustic reflex thresholds at 1000 Hz. Acoustic reflex adaptation measures at 500 and 1000 Hz were obtained when possible (if acoustic reflex thresholds were less than or equal to 100 dB HL) to rule out retrocochlear pathology.

An electroacoustic evaluation of each participant's hearing aids was conducted to ensure proper functioning of the instruments according to current standards of the

American National Standards Institute (ANSI, 2003). A listening check and a battery check of each hearing aid were performed to ensure that the hearing aids sounded clear, they were free from distortion or static, and the batteries were working properly. All participants were using hearing aids that were functioning according to manufacturer specifications on the day of testing.

The personality tests, mood assessment, and hearing aid benefit self-assessment questionnaires were administered in a standard paper and pencil format. A paper and pencil administration was chosen over the available computer administration of the APHAB because Cox (1997) reported that many elderly hearing aid candidates are not sufficiently computer literate, and that more reliable results could be obtained with a paper and pencil administration. The MBTI, the Keirsey Four Types Sorter, the PANAS, the APHAB and HAPI were administered according to recommended procedures while the participants were seated in the same room as the examiner. The examiner answered any questions from the participants regarding the procedures for answering each of the questionnaires. Participants were offered breaks between test administrations, as needed. The order of administration of the experimental questionnaires was randomized across participants.

Chapter 5: Results

Initially, mean performance scores for males and females were inspected for the five different questionnaires. Independent samples t-tests and Mann-Whitney U-tests were performed to assess any gender differences that may have been present in the data. Following presentation of these descriptive data for each measure, statistical analyses that examined relationships between the measures will be presented.

Performance on Hearing Aid Benefit Measures

Hearing Aid Performance Inventory. A variety of differences scores were obtained on the HAPI. The mean scores for each subscale of the HAPI, as well as the overall benefit score, separated by gender, are shown in Figure 3. On the HAPI, a lower score reflects a greater amount of self-reported hearing aid benefit. A score of three or lower indicates that the individual is reporting at least some amount of benefit from amplification. Although, ideally, a score of two would show that the person was reporting a good amount of benefit from the use of hearing aids. Internal consistency data for this measure indicated a coefficient alpha = 0.89.

Initial examination of the mean results shows that, in general, the participants reported at least some amount of benefit from their hearing aids. Overall, the participants elected to pursue amplification, decided to continue to use amplification, and were satisfied users of hearing aids. Mann-Whitney U tests were used to determine if statistically significant differences existed between the scores of the male and female participants on each of the different subscales as well as the overall benefit score of the HAPI. The Mann-Whitney U test is a statistical test that is used to compare mean data

when the data are nonparametric. It is the nonparametric analog to the Independent

Samples t-test for parametric data. U tests were conducted to examine the effect of

gender on all four of the individual subscales of the HAPI, as well as on the overall grand

mean score. The results are summarized in Table 3.

The results of these analyses revealed no significant differences ($p > 0.05$)

between males and females on self-reported hearing aid benefit as measured on the HAPI

suggesting that gender does not play a significant role in the amount of self-reported

hearing aid benefit on this measure.
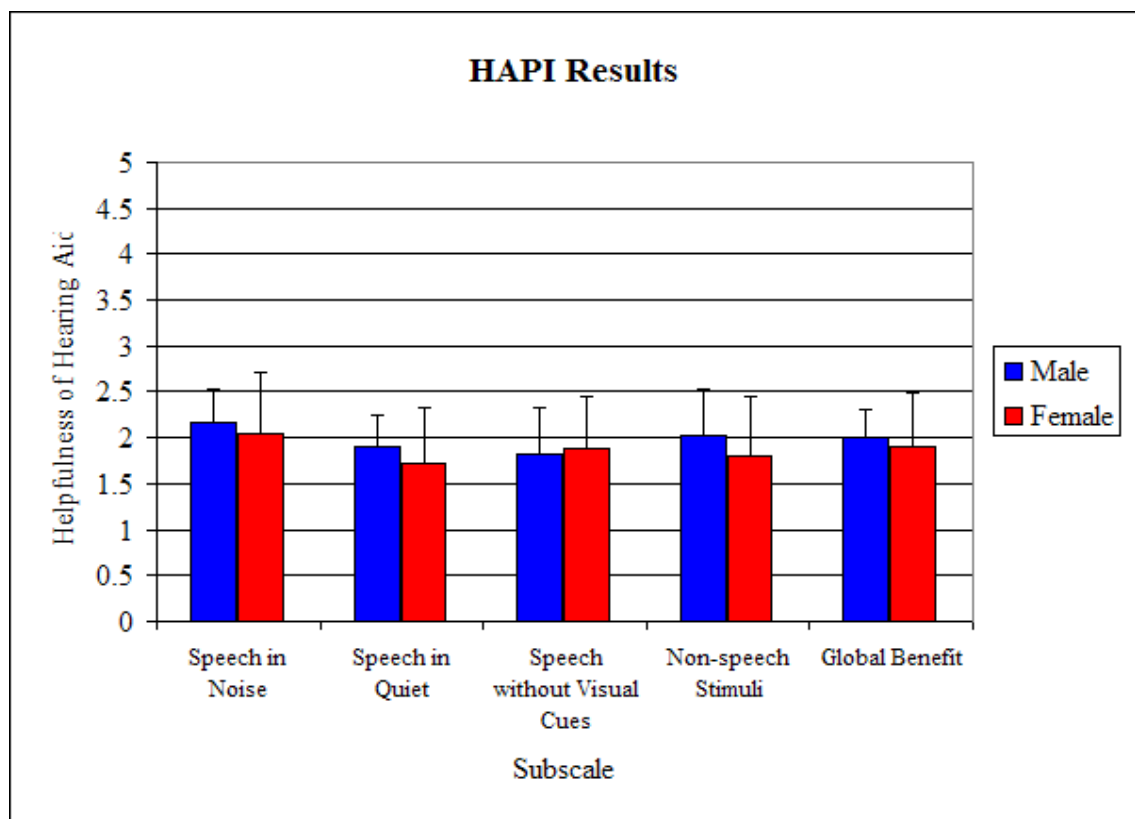
Figure 3. Mean helpfulness of hearing aids (for males and females) for each of the subscales and the global benefit score of the HAPI. Errors bars depict one standard deviation.

Table 3

U-score, p- value, and statistical significance comparing gender and hearing aid benefit as measured on each of the individual subscales of the HAPI

Subscale	*U*-score	*p*-value	Statistical Significance
Speech in Noise	41	0.517	NS
Speech in Quiet	86	0.285	NS
Speech without Visual Cues	48	0.909	NS
Non-speech Stimuli	37	0.341	NS
Global Benefit Score	35	0.270	NS

Abbreviated Profile of Hearing Aid Benefit. Each individual completed the entire APHAB measure. Unaided, aided, and benefit scores were obtained for each of the four subscales (EC, BN, RV, and AV), as well as the overall score. Figure 4 represents the mean data of the males and females for the unaided responses on each of the four subscales. Figure 5 represents the mean data of the males and females for the aided responses on each of the four subscales. Figure 6 represents the mean data of the males and females for the benefit scores (difference between the unaided and the aided scores) on each of the four subscales. Figure 7 represents the overall benefit score (difference between the mean of the unaided and aided scores on the EC, BN, and RV subscales combined) on the APHAB. Cronbach's alphas ranged from 0.77 to 0.86 for the unaided items, from 0.43 to 0.77 for the aided items, and from 0.58 to 0.84 for the benefit scores.
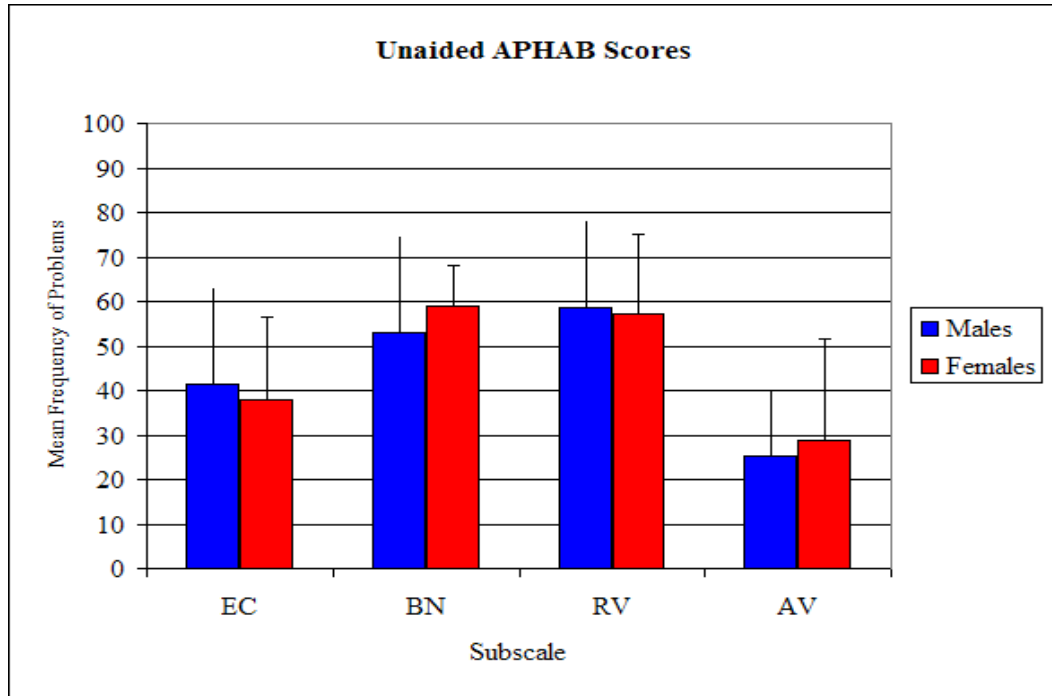
Figure 4. Mean unaided scores by gender for each of the four individual subscales of the APHAB. Error bars represent one standard deviation.
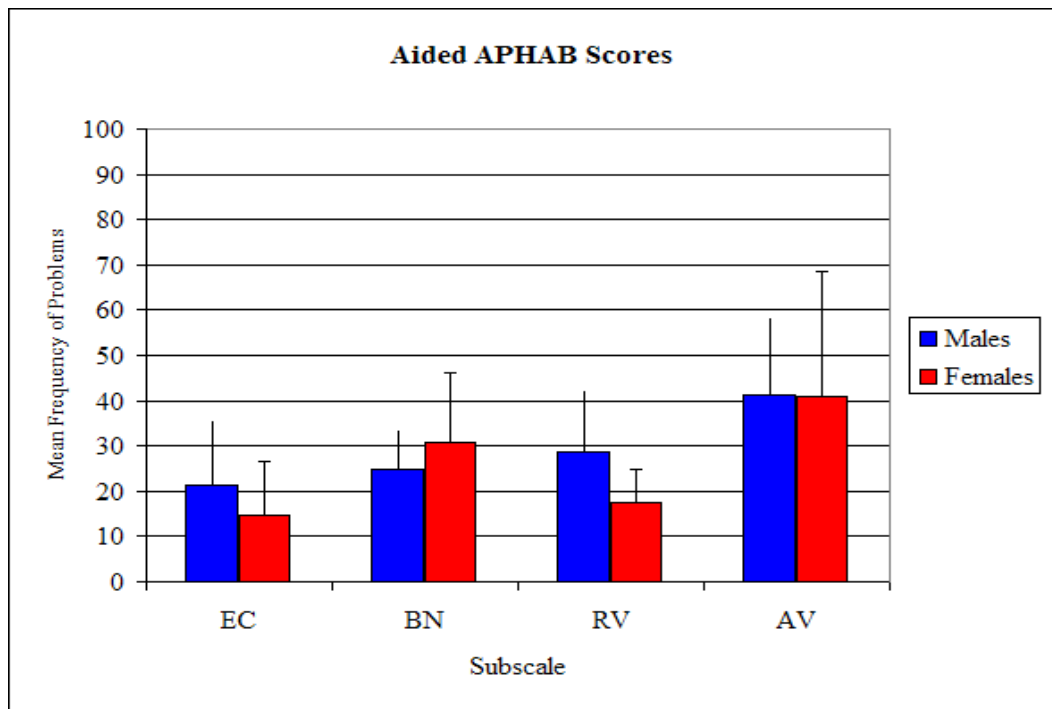
Figure 5. Mean aided scores by gender for each of the four individual subscales of the APHAB. Error bars represent one standard deviation.
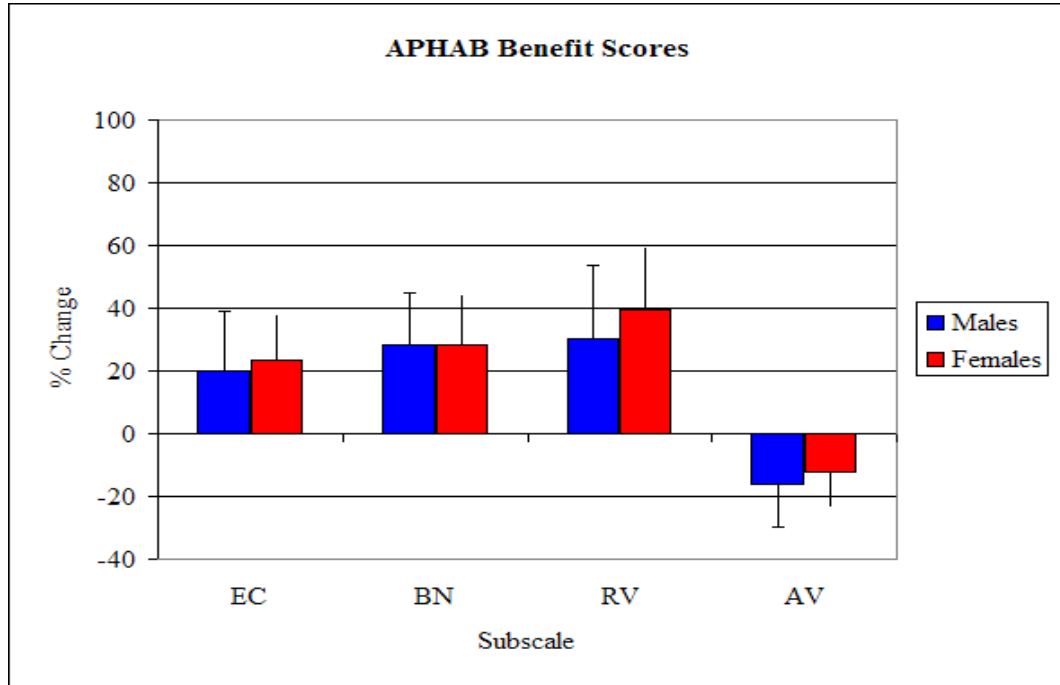
Figure 6. Mean APHAB benefit scores by gender for each of the four individual subscales. Error bars represent one standard deviation.
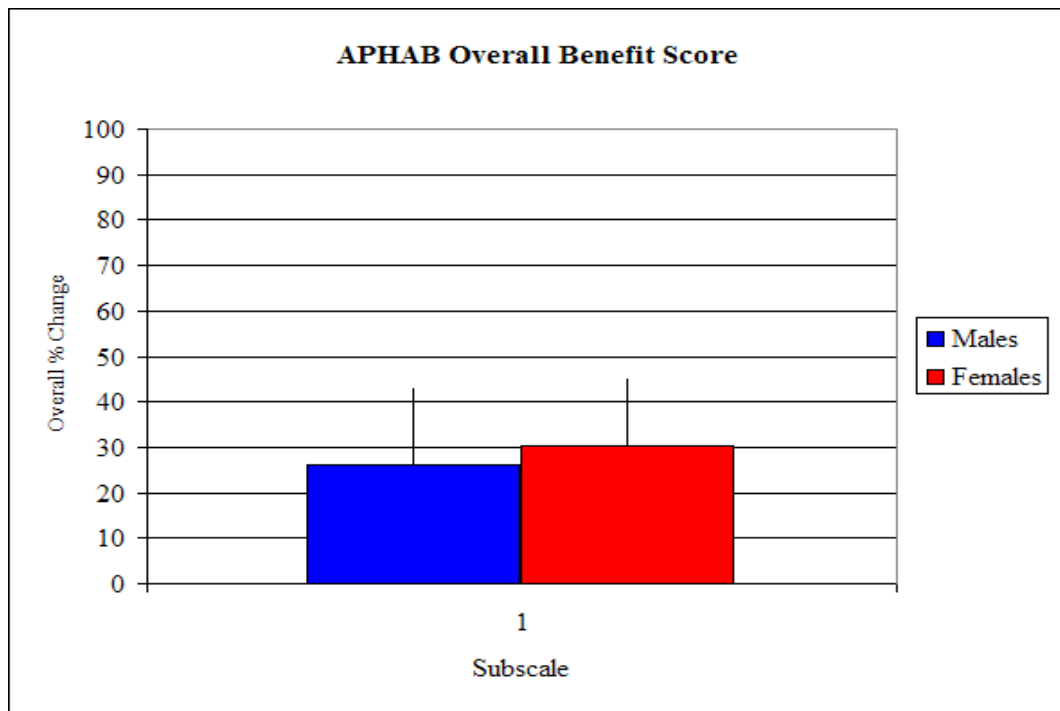
Figure 7. Mean overall benefit (difference between the unaided and aided scores on the EC, BN, and RV subscales) scores on the APHAB by gender. Error bars represent one standard deviation.

Independent Samples t-tests were used to compare the mean scores for males and females and the mean APHAB scores. Unlike the ordinal data of the HAPI, the scores from the APHAB provide percentages which allow the use of parametric statistical tests to examine the differences between the males and the females. The effect of gender was assessed for the unaided, aided, and benefit scores of each of the four individual subscales of the APHAB (12 separate analyses), as well as the overall benefit score. Results are summarized in Table 4.

A statistically significant difference ($t = 2.152$; $p < 0.05$) was found between the aided RV subscale scores of the men and women participants, with men reporting more difficulty communicating (higher percentage of problems) in reverberant listening situations while wearing hearing aids compared to women. The remaining statistical analyses of the effect of gender on the APHAB scores yielded no significant differences between males and females ($p > 0.05$).

Table 4

T-value, p-value, and statistical significance comparing gender and the unaided, aided and benefit score as measured on each of the individual subscales of the APHAB

Subscale	t-value	p-value	Statistical Significance
Unaided			
Ease of Communication	0.381	0.708	NS
Background Noise	-0.857	0.406	NS
Reverberation	0.158	0.876	NS
Aversiveness	-0.412	0.685	NS
Aided			
Ease of Communication	1.094	0.289	NS
Background Noise	-1.074	0.297	NS
Reverberation	**2.152**	**0.045**	**$p < 0.05$**
Aversiveness	0.022	0.983	NS
Benefit			
Ease of Communication	-0.398	0.695	NS
Background Noise	-0.036	0.972	NS
Reverberation	-0.976	0.342	NS
Aversiveness	-0.646	0.527	NS
Overall Benefit	-0.592	0.561	NS

Performance on Mood Assessment

　　　　All participants in this study reported being in a positive mood on the day of testing. However, even though each participant reported a positive mood, different levels of positive feelings were reported. This means that some individuals reported a more positive mood while other individuals reported a somewhat less positive mood. Figure 8 presents the mean data for the results of the PANAS by gender (scores range from 10-50 each for positive affect and negative affect). Cronbach's alpha was 0.90 for the positive affect scale and 0.67 for the negative affect scale. Results of independent samples t-tests indicated a statistically significant difference ($p < 0.05$) between the male and female participants on the negative affect scores with females overall reporting higher negative affect than males.
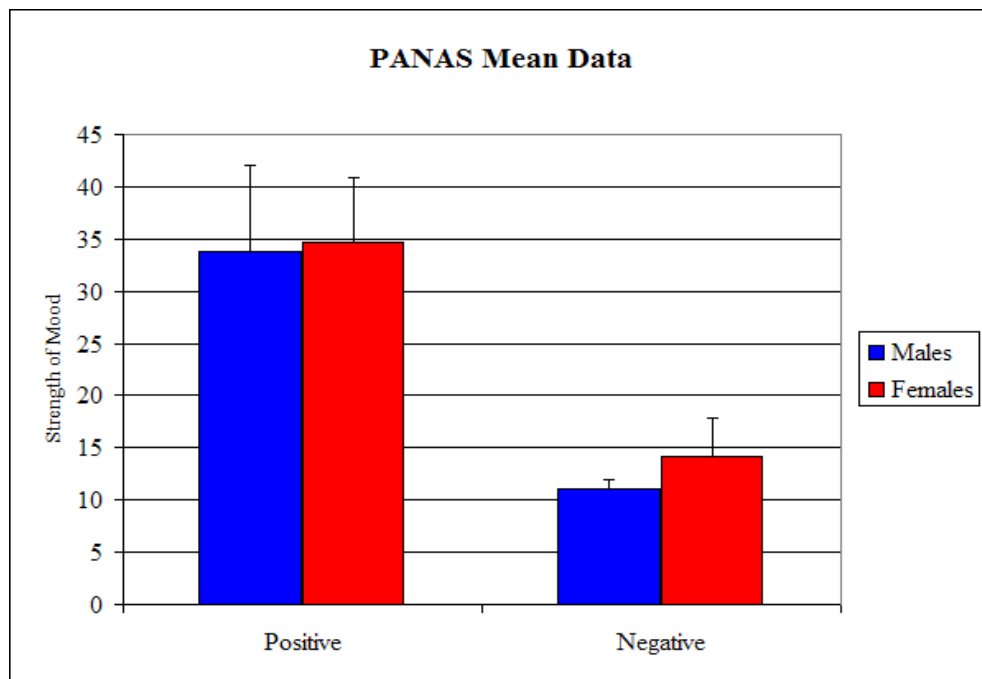
Figure 8. Mean positive and negative affect scores for male and female participants. Error bars depict one standard deviation.

Performance on Personality Measures

      MBTI - Extraversion/Introversion scale. The Extraversion/Introversion scale of the MBTI classifies people into either category based on personality preference. Scores are accumulated for each dimension (E or I). The dimension containing the largest score is the respondent's preferred way of interacting with the outside world. Cronbach's alpha for the E/I subscale was 0.91. The results of the MBTI showed that of the 20 individuals who participated in the study, 12 were classified as extraverted while the remaining eight were classified as introverted. Figures 9 and 10 illustrate the range of scores reported for each of the extraverted and the introverted individuals. The higher the score (either extraverted or introverted), the more extreme the preference for extraversion or introversion in that person.

      Extraversion/Introversion results were inspected separately for the male and female participants. Of the 11 men who participated in the study, five were classified as Extraverts and six were classified as Introverts. Of the nine women who participated in the study, seven were classified as Extraverts and two were classified as Introverts. Mean extraversion and introversion preference scores by gender are represented in Figure 11. Scores can range from 0-21 for Extraversion preference and 0-21 for Introversion preference. Independent samples t-tests were performed on the mean data to determine if statistically significant differences were found between the males and females. Results of these tests for both the extraversion and the introversion data indicated that the differences between the males and females were not significant ($t = 1.085$; $p > 0.05$ and $t = -0.259$; $p > 0.05$ for extraversion and introversion, respectively).
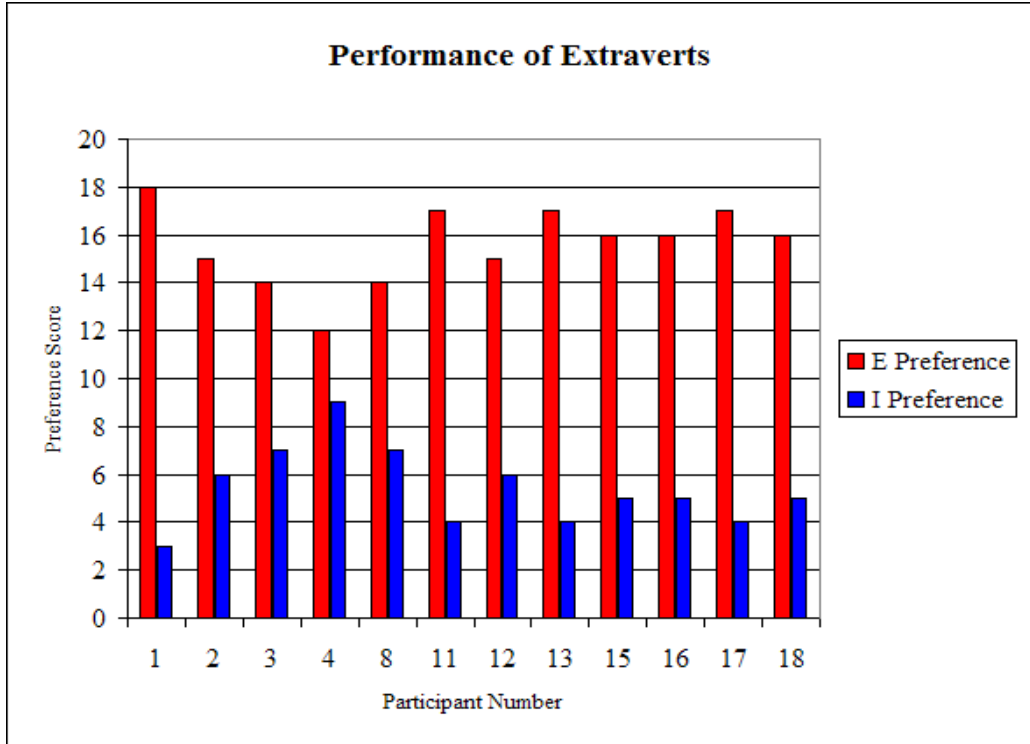
Figure 9. Extraversion and Introversion preference scores for those participants classified as Extraverts. Higher Extraversion preference scores indicate a greater preference.
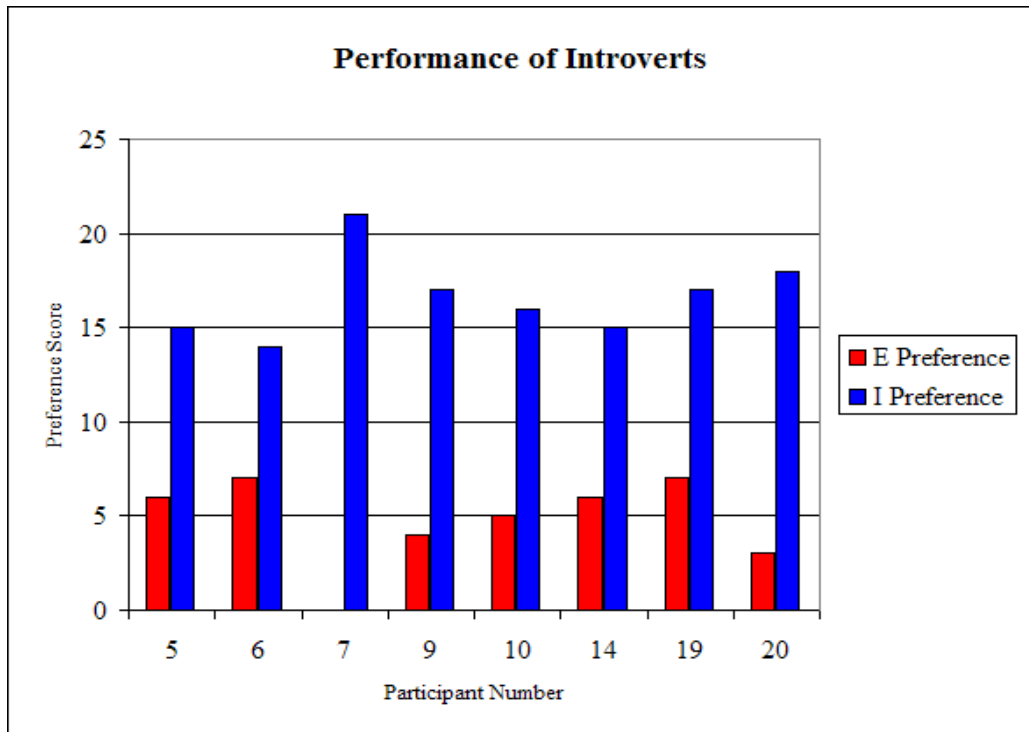
Figure 10. Extraversion and Introversion preference scores for those participants classified as Introverts. Higher Introversion preference scores indicate a greater preference.
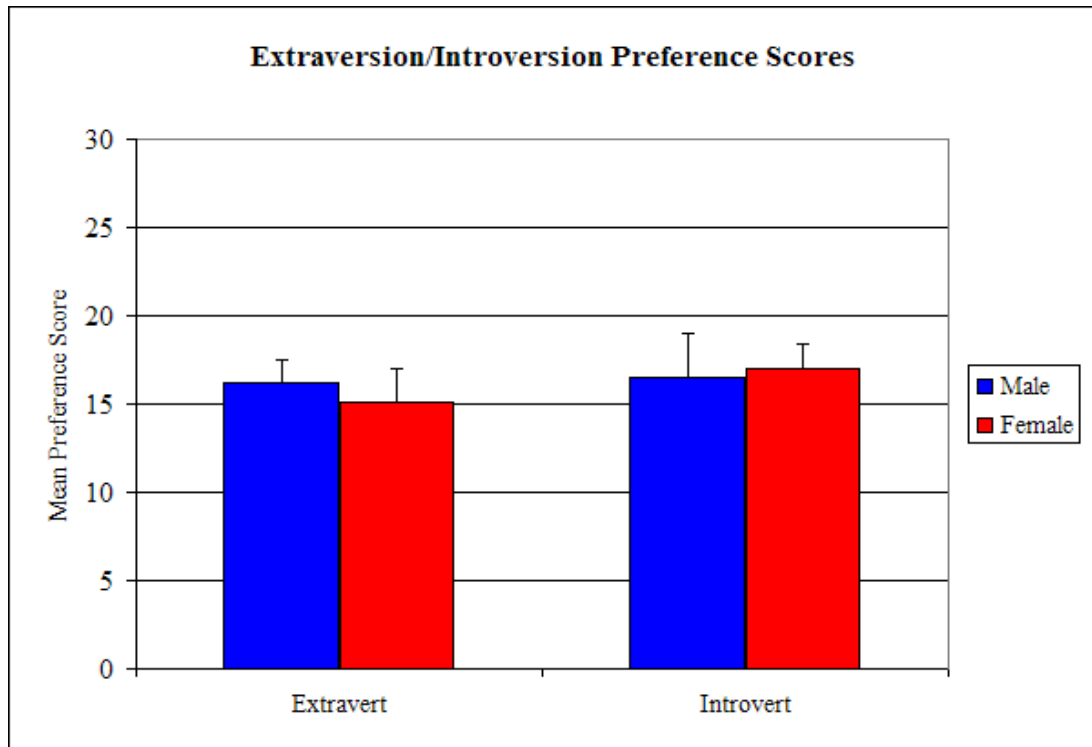
Figure 11. Mean preference scores for Extraverts and Introverts for males and females. Error bars depict one standard deviation.

Keirsey Four Types Sorter. The Keirsey Four Types Sorter was administered to sort the participants into one of four personality types as described by Keirsey (1998). Of the 20 total participants in this study, three were Artisans, nine Idealists, three Guardians, and five Rationals. The distribution of percentages is depicted in Figure 12. Comparison with Keirsey's estimates of type for the general population (shown in Figure 13) shows some major differences in the distributions between current study participants and Keirsey's population estimates. According to Keirsey's estimates, the majority of individuals should fall into either the Artisan or Guardian types (35-40% and 40-45% respectively). However, in the current study sample, the least number of participants actually sorted into these two groups (15% for each). Conversely, Keirsey estimates that approximately 5-10% of the general population should fall into each of the Idealist and

the Rational groups. However, in the current study, the largest proportion of participants

sorted into the Idealist personality type.
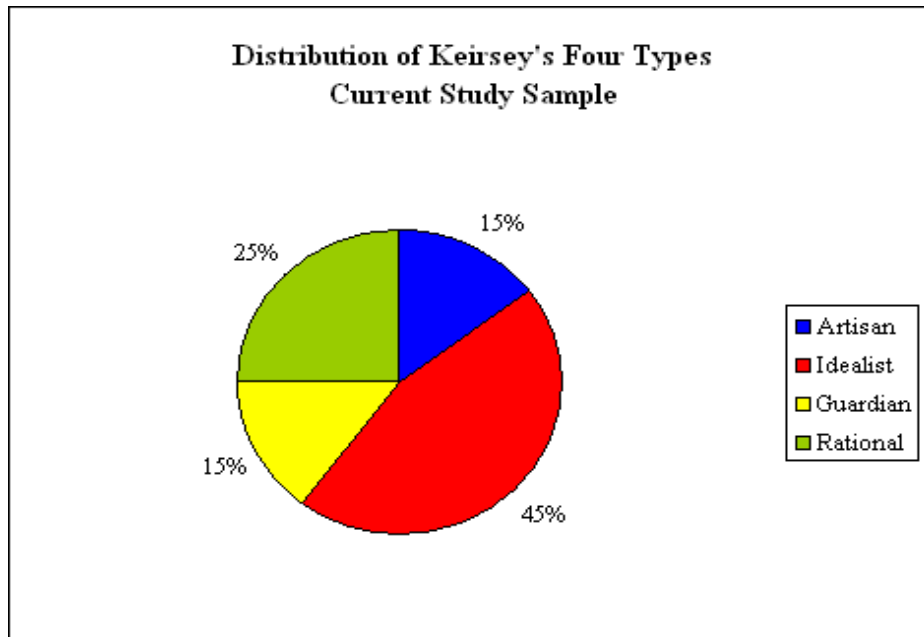
Figure 12. Distribution of Keirsey's four types as they are
represented in the current study sample.
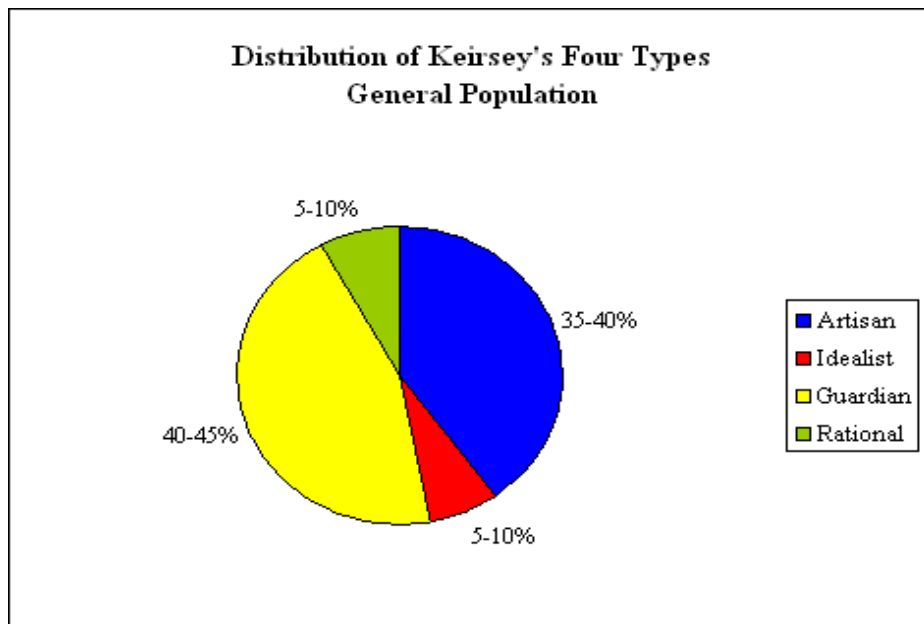
Figure 13. Distribution of Keirsey's four types as they are
represented in the general population (adapted with
modifications from Keirsey, 1998).

In comparison to previous research, Barry (2000) found that 7% of the participants were Artisan, 20% were Idealist, 53% were Guardian, and 20% were Rational. Additionally, Barry and Barry (2002) found that 5% of the sample was Artisan, 5% was Idealist, 55% was Guardian, and 35% was Rational.

Relationships Between Measures

Statistical analyses were conducted to examine more closely the responses of the current study sample on selected subscales of the APHAB and the HAPI that assess similar dimensions of hearing aid benefit. Pearson correlation coefficients were conducted comparing the benefit scores of the 20 participants on the Ease of Communication subscale of the APHAB to the scores of the 20 participants on the Speech in Quiet subscale of the HAPI. Results of this analysis indicated no significant relationship between the two subscales ($p > 0.05$).

Pearson correlation coefficients were also conducted comparing the benefit scores of each of the 20 participants on the Background Noise subscale of the APHAB to the scores from those same participants on the Speech in Noise subscale of the HAPI. The results of this analysis revealed a statistically significant correlation between the two subscales $r(df = 18) > 0.44$, ($p < 0.05$) indicating that individuals reported a similar amount of benefit on the BN subscale of the APHAB as on the Speech in Noise subscale of the HAPI.

The second phase of statistical analysis examined the relationships between measures of personality and mood with the measures of hearing aid benefit, assessed in the five questionnaires. Both the APHAB and the HAPI produced a global benefit score and separate subscale scores. The PANAS produced both a positive and a negative score

which led to an overall positive or negative mood (determined by the higher of the two scores). The Keirsey Four Types Sorter provided scores for each individual on each of the four different personality types (individuals were sorted into one predominant personality type) while the MBTI (EI) provided scores for both extraversion preference and introversion preference for each individual. These data were used for the statistical analyses. The presentation of the statistical analyses is organized to answer each of the five different experimental questions of this study.

Relationship between personality and perceived hearing aid benefit. The relationships between extraversion/introversion and scores on both the HAPI and the APHAB were examined using Spearman Rank Correlation. This is a measure of association that requires two variables to be measured on at least an ordinal scale. In computing the statistic, individual scores were ranked in two ordered series, and the magnitudes of the differences between ranks provided an estimate of the strength of the relation between the two variables. Compared with the Pearson r (for parametric data), the Spearman r_s will reveal a correlation in 100 cases at the same level of significance as the Pearson r would attain in 91 cases (Sheskin, 2004).

Spearman rank correlations were conducted on each of the four subscales as well as on the grand mean score of the HAPI. The results can be found in Table 5.

The correlations between both the extraversion preference scores and the introversion preference scores and each of the individual subscales of the HAPI were weak and not significant with $r_s(df = 18) < 0.48$, $(p > 0.05)$ on all analyses.

Spearman rank correlations were also conducted on the unaided, aided, and benefit scores for each of the individual subscales of the APHAB (a total of 12 separate

analyses), as well as for the overall benefit score. The results are summarized in Table 6

for the extraversion preference scores, and Table 7 for the introversion preference scores.

Table 5

Spearman Rank Correlations Comparing Extraversion and Introversion Preference and Hearing Aid Benefit as Measured on Each Subscale of the HAPI

| | Extraversion Preference Score | | |
Subscale	Spearman *rs*	*p*-value	Statistical Significance
Speech in Noise	0.272	0.246	NS
Speech in Quiet	0.064	0.790	NS
Speech without Visual Cues	0.121	0.610	NS
Non-speech Stimuli	0.240	0.307	NS
Global Benefit Score	0.180	0.449	NS
	Introversion Preference Score		
Speech in Noise	-0.307	0.188	NS
Speech in Quiet	-0.042	0.859	NS
Speech without Visual Cues	-0.140	0.555	NS
Non-speech Stimuli	-0.222	0.346	NS
Global Benefit Score	-0.165	0.488	NS

A significant negative correlation ($p < 0.05$) was found between the extraversion preference score and the Background Noise benefit score (see Figure 14). This suggests that those individuals who are more extroverted report less benefit from their hearing aids in a noisy listening situation. The correlation between the introversion preference score and the Background Noise benefit score was positive and statistically significant ($p < 0.05$) (see Figure 15), suggesting that those individuals who are more strongly introverted report more benefit from their hearing aids when communicating in a background of noise. The remaining correlations were weak and not significant with $r_s(\text{df} = 18) < 0.48$, $p > 0.05$.

Table 6

Spearman Rank Correlations Comparing Extraversion Preference Score and Hearing Aid Benefit as Measured on Each Subscale of the APHAB

Subscale	Spearman *rs*	*p*-value	Statistical Significance
Unaided			
Ease of Communication	0.007	0.976	NS
Background Noise	-0.361	0.118	NS
Reverberation	-0.171	0.470	NS
Aversiveness	0.154	0.516	NS
Aided			
Ease of Communication	0.141	0.554	NS
Background Noise	0.039	0.872	NS
Reverberation	0.225	0.340	NS
Aversiveness	0.108	0.651	NS
Benefit			
Ease of Communication	-0.098	0.680	NS
Background Noise	**-0.508**	**0.022**	**p < 0.05**
Reverberation	-0.205	0.386	NS
Aversiveness	0.056	0.815	NS
Overall Benefit	-0.216	0.36	NS

Table 7

Spearman Rank Correlations Comparing Introversion Preference Score and Hearing Aid Benefit as Measured on Each Subscale of the APHAB

Subscale	Spearman *rs*	*p*-value	Statistical Significance
Unaided			
Ease of Communication	0.013	0.957	NS
Background Noise	0.402	0.079	NS
Reverberation	0.213	0.367	NS
Aversiveness	-0.178	0.452	NS
Aided			
Ease of Communication	-0.130	0.585	NS
Background Noise	-0.009	0.970	NS
Reverberation	-0.188	0.427	NS
Aversiveness	-0.102	0.669	NS
Benefit			
Ease of Communication	0.129	0.588	NS
Background Noise	**0.527**	**0.017**	**p < 0.05**
Reverberation	0.238	0.311	NS
Aversiveness	-0.091	0.704	NS
Overall Benefit	0.254	0.280	NS
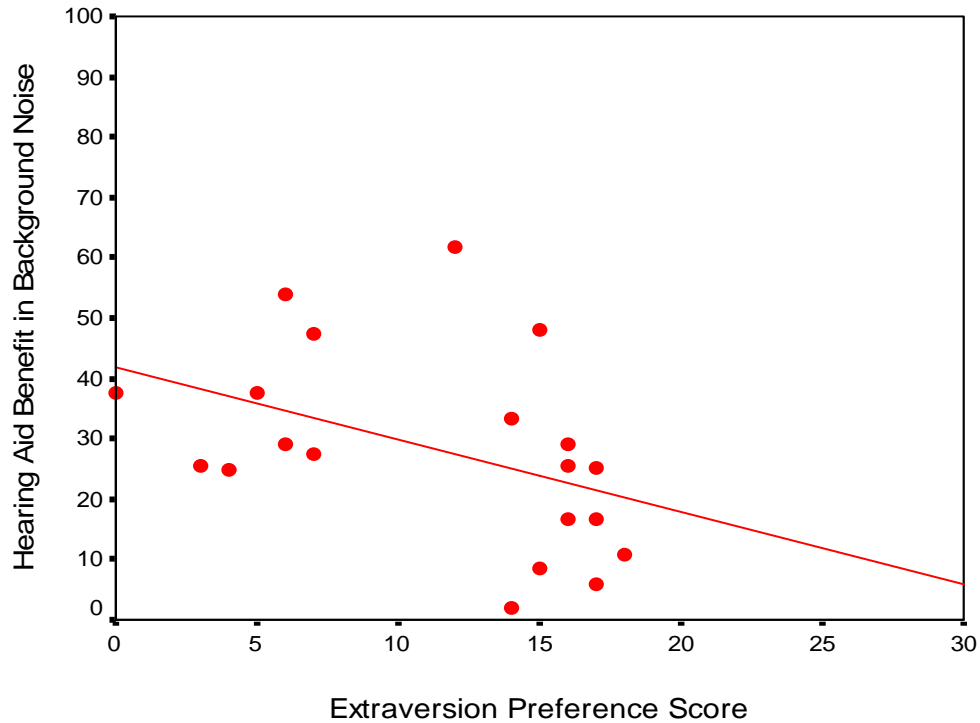
Figure 14. Correlation between the extraversion preference score and
the benefit score on the Background Noise (BN) subscale of the APHAB

Relationship between mood and perceived hearing aid benefit. The relationship

between mood (positive and negative affect) and self-reported hearing aid benefit as

measured on the HAPI and on the APHAB was examined using the Spearman rank

correlation coefficient.   Although all participants reported a positive affect they showed a

range of scores indicating that some individuals were more positive than others. As a

result, positive affect was used as a continuous variable for statistical analysis purposes.

Five separate analyses were conducted for the HAPI results (each of the four

individual subscale scores and the overall global score). A summary of the results can be

found in Table 8. The correlations between positive mood and each of the individual

subscales of the HAPI were weak and not significant with r_s(df = 18) < 0.48, p > 0.05 for

all analyses.

Table 8

Spearman r₍s₎, p- value, and statistical significance comparing mood and hearing aid benefit as measured on each of the individual subscales of the HAPI

Subscale	Spearman *rs*	*p*-value	Statistical Significance
Speech in Noise	0.12	0.613	NS
Speech in Quiet	0.159	0.503	NS
Speech without Visual Cues	-0.09	0.704	NS
Non-speech Stimuli	0.118	0.620	NS
Global Benefit Score	0.177	0.454	NS

Thirteen separate analyses were conducted for the APHAB results (unaided, aided, and overall score). A summary of the results can be found in Table 9. The correlations between positive mood and each of the unaided, aided, and benefit scores of the APHAB were weak and not significant with r_s(df = 18) < 0.48, p > 0.05 for all analyses.

Table 9

Spearman rs, p-value, and statistical significance comparing mood and the unaided, aided and benefit scores as measured on each of the individual subscales of the APHAB.

Subscale	Spearman *rs*	*p*-value	Statistical Significance
		Unaided	
Ease of Communication	-0.106	0.656	NS
Background Noise	-0.345	0.136	NS
Reverberation	-0.208	0.380	NS
Aversiveness	-0.137	0.565	NS
		Aided	
Ease of Communication	-0.072	0.763	NS
Background Noise	-0.128	0.590	NS
Reverberation	-0.387	0.091	NS
Aversiveness	-0.180	0.447	NS
		Benefit	
Ease of Communication	0.043	0.856	NS
Background Noise	-0.213	0.367	NS
Reverberation	0.122	0.609	NS
Aversiveness	0.079	0.741	NS
Overall Benefit	-0.053	0.825	NS

Relationship between Keirsey personality type and self-reported hearing aid benefit. The Spearman Rank Correlation Coefficient was utilized to examine the association between each of the personality scales and scores on the HAPI. The score for each of the 20 participants on each of the four Keirsey personality types (four scores for each person) was compared, in turn, with the data from all four of the subscale scores of the HAPI, as well as the overall benefit score. The results of these analyses are summarized in Table 10.

Table 10

Spearman r_s, comparing scores on each of the Keirsey personality types and self-reported hearing aid benefit as measured on each of the individual subscales of the HAPI. P-values are shown in parentheses.

n = 20	Artisan	Idealist	Guardian	Rational
Speech in Noise	-0.270 (.243)	-0.203 (.390)	**0.600** (.005)**	-0.086 (.718)
Speech in Quiet	0.014 (.953)	-0.105 (.660)	0.364 (.114)	-0.043 (.856)
Speech without Visual Cues	-0.244 (.300)	-0.146 (.538)	0.304 (.193)	0.094 (.693)
Non-speech Stimuli	0.009 (.968)	-0.216 (.360)	0.238 (.312)	0.078 (.743)
Overall Benefit	-0.282 (.229)	-0.071 (.766)	**0.489* (.029)**	-0.126 (.596)

* Correlation is significant at the .05 level (2-tailed)
** Correlation is significant at the .01 level (2-tailed)

The correlations between Keirsey's Artisan, Idealist, and Rational personality types and each of the individual HAPI subscales and overall benefit scores were weak and not significant. The same is true for the Guardian personality type and Speech in Quiet, Speech without Visual Cues, and Non-speech Stimuli subscales of the HAPI. The correlation between the Guardian personality type and the Speech in Noise subscale score of the HAPI was positive and statistically significant ($p < 0.01$). Additionally, the correlation between the Guardian personality type and the overall benefit score of the HAPI was positive and statistically significant ($p < 0.05$). These significant relationships are represented in Figures 15 and 16.
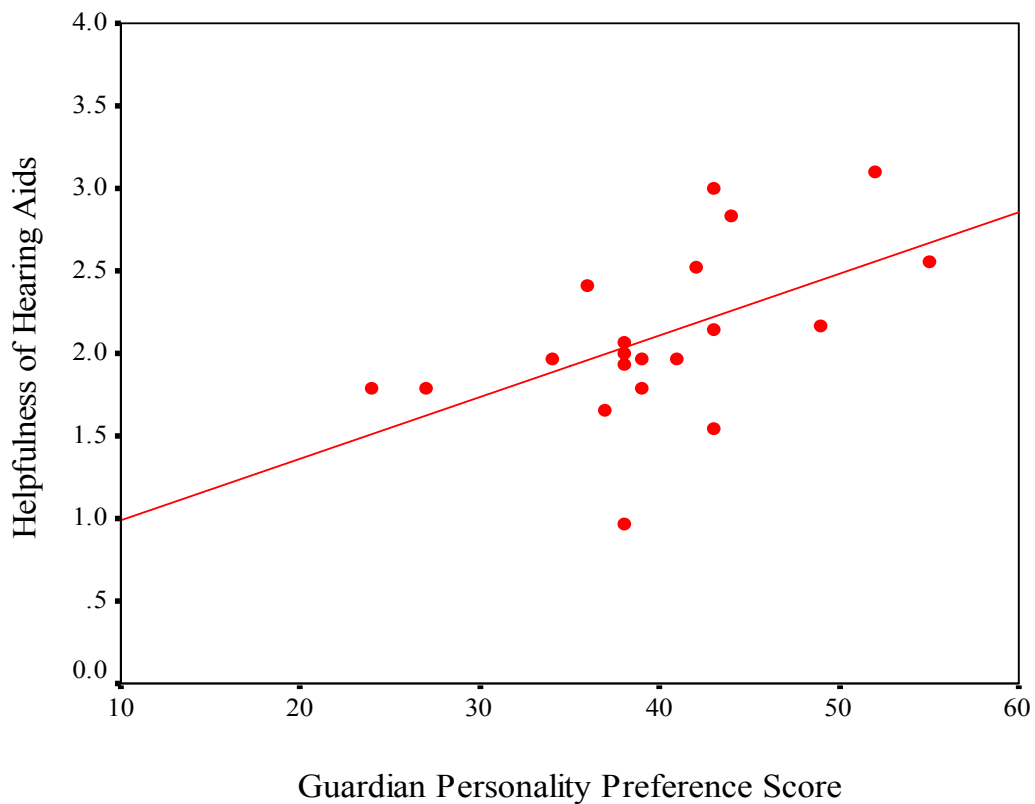
Figure 15. Correlation between the Keirsey Guardian personality preference score and the Speech in Noise subscale score of the HAPI
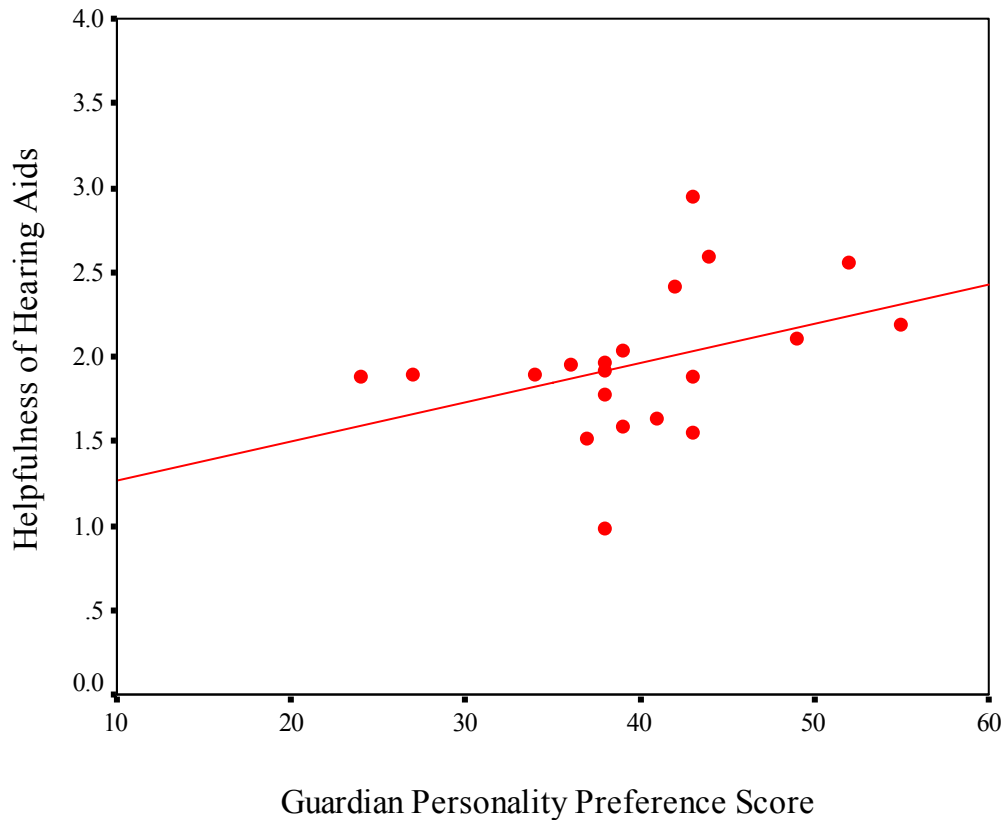
Figure 16. Correlation between the Keirsey Guardian personality preference score and the overall benefit score of the HAPI

For the purposes of statistical analyses comparing the Keirsey Four Types Sorter and the APHAB, it was necessary to make a modification to the scoring of the Keirsey Four Types Sorter on each of the four different personality traits. The traditional scoring for this questionnaire delineates "1" as the designated highest rank (or the respondent's preferred choice), and "4" as the designated lowest rank (or the respondent's least preferred choice). However, the response scale of the APHAB designates "1%" as the lowest score (i.e. poorer benefit from the hearing aids) and "99%" as the highest score (i.e. more benefit from the hearing aids). If left unaltered, this reverse ranking scheme of the two instruments would create negative correlations despite a possible positive

association. To correct for this problem, changes were made to the rankings of the Keirsey Four Types Sorter data prior to statistical analysis. These same issues were not encountered when comparing the Keirsey Four Types Sorter and the HAPI, because the HAPI uses a similar ranking scheme in which a lower score (i.e. a score of "1") signifies more perceived benefit.

Statistical comparisons were made to examine the relationship between the four Keirsey personality types and the performance on each of the subscales of the APHAB. These analyses were repeated for the unaided, aided, and benefit scores, for a total of 12 analyses. The data based upon each of the four Keirsey personality types were compared, in turn, with the data from the Ease of Communication (EC) subscale, the Background Noise (BN) subscale, the Reverberation (RV) subscale, and the Aversiveness to loud sounds (AV) subscale in the unaided, the aided, and the benefit conditions of the APHAB. The results of these analyses are summarized in Tables 11, 12, and 13.

The correlations between Keirsey's Artisan personality type and the unaided, aided, and benefit scores of each of the four individual subscales of the APHAB were not statistically significant. There were statistically significant relationships between the Idealist personality type and the BN benefit score ($p < 0.05$), between the Guardian personality type and the BN benefit score ($p < 0.05$), and between the Rational personality type and the AV benefit score ($p < 0.05$). The relationships between the Idealist personality type and BN benefit score and between the Rational personality type and AV benefit score were negative suggesting an inverse relationship between the variables. These significant relationships are represented in Figures 17, 18, and 19.

When interpreting the scatterplots it is important to keep several things in mind. The benefit scores for the BN subscale shows the amount of improvement the person reports from the hearing aids. Therefore, a higher score is a positive result. However, the benefit score of the AV subscale is actually reporting the amount of increase of the unpleasantness of sounds when they are amplified. This means that a more negative score translates to a greater unpleasantness of sounds, and a more positive score to a lesser degree of unpleasantness of sounds.

Table 11
Correlations Between Keirsey Personality Types and Unaided Performance on the APHAB. P-values are shown in parentheses.

n = 20	Artisan	Idealist	Guardian	Rational
Ease of Communication	-0.209 (.377)	-0.134 (.574)	0.117 (.624)	0.317 (.174)
Background Noise	-0.192 (.417)	-0.244 (.301)	0.219 (.353)	0.327 (.159)
Reverberation	-0.360 (.119)	-0.013 (.957)	0.097 (.685)	0.383 (.096)
Aversiveness	-0.075 (.752)	0.128 (.591)	-0.241 (.305)	0.043 (.856)

Table 12

Correlations Between Keirsey Personality Types and Aided Performance on the APHAB.
P-values are shown in parentheses.

n = 20	Artisan	Idealist	Guardian	Rational
Ease of Communication	-0.318 (.171)	0.196 (.408)	-0.142 (.551)	0.230 (.329)
Background Noise	-0.255 (.277)	0.340 (.142)	-0.114 (.632)	-0.023 (.922)
Reverberation	0.023 (.923)	0.029 (.904)	-0.387 (.092)	0.254 (.280)
Aversiveness	-0.035 (.885)	-0.028 (.906)	-0.292 (.211)	0.284 (.226)

Table 13

Correlations Between Keirsey Personality Types and Reported Hearing Aid Benefit
Scores on the APHAB. P-values are shown in parentheses.

n = 20	Artisan	Idealist	Guardian	Rational
Ease of Communication	-0.173 (.465)	-0.241 (.306)	0.411 (.072)	0.164 (.489)
Background Noise	-0.196 (.407)	**-0.465* (.039)**	**0.463* (.040)**	0.384 (.094)
Reverberation	-0.295 (.207)	0.002 (.992)	0.206 (.383)	0.175 (.459)
Aversiveness	0.183 (.439)	0.278 (.235)	-0.035 (.883)	**-0.480* (.032)**

* Correlation is significant at the .05 level (2-tailed)
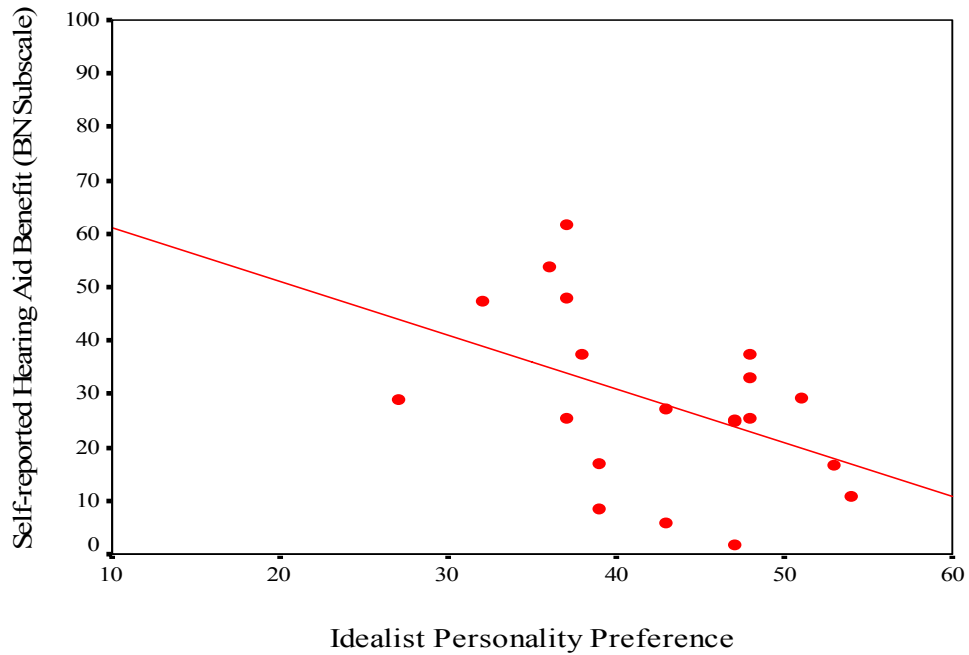
Figure 17. Correlation between the Keirsey Idealist personality preference score and the benefit score of the Background Noise (BN) subscale of the APHAB.
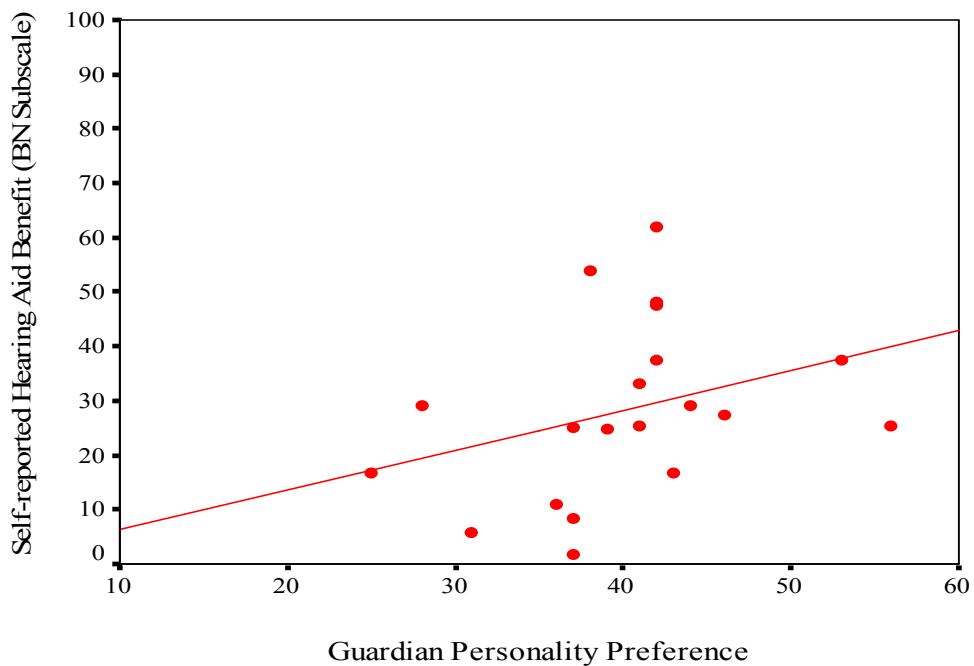
Figure 18. Correlation between the Keirsey Guardian personality preference score and the benefit score of the Background Noise (BN) subscale of the APHAB.
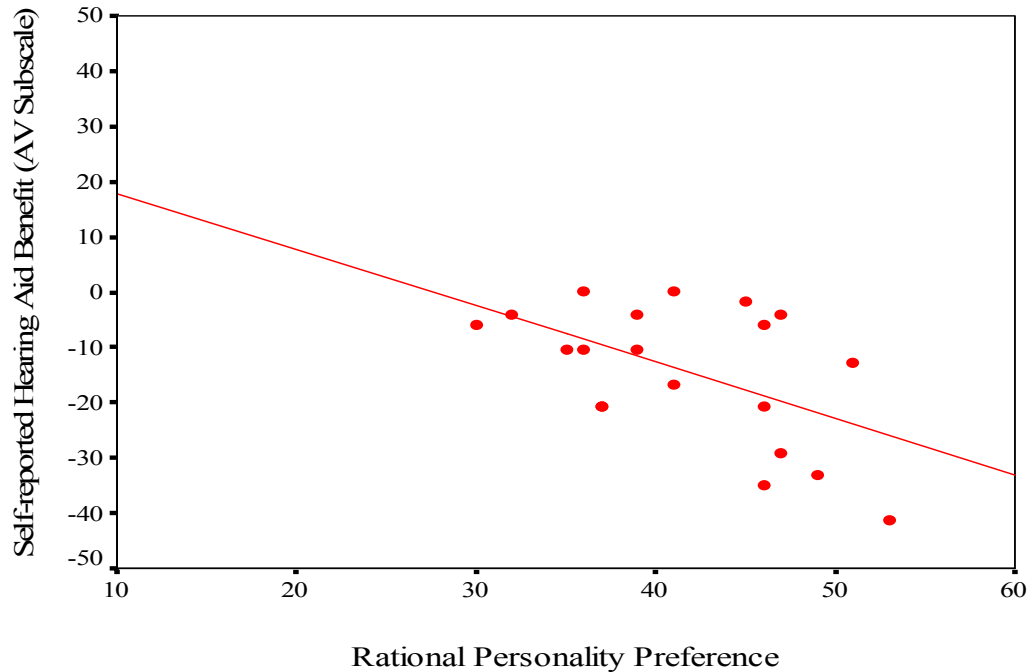
Figure 19. Correlation between Keirsey Rational personality preference scores and the benefit score of the Aversiveness (AV) subscale of the APHAB.

Predictors of Hearing Aid Benefit

Stepwise Multiple Linear Regression analyses were performed to determine which factors potentially influenced the amount of self-reported hearing aid benefit on each of the two hearing aid benefit measures. A stepwise procedure was used because it provides criteria based on both forward selection and backward elimination procedures for acceptance of variables into the equation at each step.

Separate analyses were made for each of the four different subscales as well as for the overall global score from the HAPI. The criterion (dependent) variable in each of these analyses was the amount of hearing aid benefit. Initially, a number of possible predictor variables were used in the regression analyses, including 1) hearing threshold at 250 Hz; 2) hearing threshold at 500 Hz; 3) hearing threshold at 1000 Hz; 4) hearing

threshold at 2000 Hz; 5) hearing threshold at 4000 Hz; 6) hearing threshold at 8000 Hz;

7) gender; 8) positive affect score; 9) negative affect score; 10) Keirsey personality type;

11) extraversion/introversion score; 12) aided speech recognition score; 13) pure tone

average at 500, 1000, and 2000 Hz; 14) high frequency pure tone average at 1000, 2000,

and 4000 Hz; and 15) age. The resulting correlation matrix showed that many of the

predictor variables were highly correlated with one another, particularly those pertaining

to hearing thresholds. Thus, because of the multicollinearity of several of the possible

predictor variables, the independent variables were reduced to a smaller set that were not

highly inter-correlated. The final set of predictor (independent) variables were 1) gender;

2) positive affect score; 3) negative affect score; 4) Keirsey personality type; 5)

extraversion/introversion score; 6) aided speech recognition score; 7) high frequency pure

tone average (average of the thresholds at 1000, 2000, and 4000 Hz in the better ear); and

8) age.

These results of the stepwise multiple regression indicated that PTA (amount of

high frequency hearing loss) was significantly related to the Speech in Quiet subscale of

the HAPI. The amount of hearing impairment accounted for 27% of the variance in the

hearing aid benefit score on the Speech in Quiet subscale. This relationship suggests that

individuals with a greater degree of hearing loss reported more benefit from their hearing

aids in a quiet listening environment. None of the variables emerged as significant

predictors for the other subscales of the HAPI.

Separate multiple regression analyses were performed for aided, unaided, and

benefit data for each of the APHAB subscales. The results of the analyses performed on

the APHAB subscales are summarized in Table 14.

For the Ease of Communication (EC) subscale, PTA accounted for 45% of the variance in the unaided condition. Thus, in relatively easy listening situations, hearing impairment was the only variable that was consistently related to communication difficulty without using hearing aids. Individuals with greater degrees of hearing loss reported more difficultly communicating without the use of their hearing aids. Additional variables entered into the equation did not account for significantly more variance. Hearing impairment (PTA) also accounted for 23% of the variance in the aided score of the EC subscale where individuals with a greater degree of hearing impairment reported greater difficulty communicating in easy listening situations while wearing their hearing aids. No variables were significantly related to the benefit scores on the EC subscale.

The results of the stepwise multiple regression analysis for the Background Noise (BN) subscale shows that negative affect scores accounted for 32% of the variance in the aided scores of the BN subscale. Additional variables entered into the equation did not account for significantly more variance. These findings indicate that those individuals with a higher negative affect score (a larger number) reported more difficulty communicating in a noisy environment when using their hearing aids.

The results for the Reverberation subscale (RV) show that communication difficulty in reverberant situations was significantly related to hearing impairment in the unaided listening condition, where PTA accounted for 35% of the variance in scores. This suggests that individuals with a greater degree of hearing loss report more difficulty when trying to communicate in a reverberant listening environment when not using their hearing aids.

Table 14

Results of Stepwise Multiple Regression Analyses for Each Subscale of the APHAB with Significant Variables and Direction of Relationship Identified

Condition	Variable	r^2	p-value	+/-
Ease of Communication Subscale				
Unaided	PTA	0.450	0.001	+
Aided	PTA	0.227	0.034	+
Benefit	-----	-----	-----	-----
Background Noise Subscale				
Unaided	-----	-----	-----	-----
Aided	Negative Affect	0.322	0.009	+
Benefit	-----	-----	-----	-----
Reverberation Subscale				
Unaided	PTA	0.353	0.006	+
Aided	Positive Affect	0.258	0.022	-
	Gender	0.434	0.034	-
	EI	0.707	0.001	-
Benefit	-----	-----	-----	-----
Aversiveness Subscale				
Unaided	Negative Affect	0.223	0.036	+
Aided	Negative Affect	0.204	0.046	+
Benefit	4TS	0.426	0.002	-

Note. PTA = pure tone average in the better ear; EI = extraversion/introversion preference; 4TS = Keirsey personality type

For the aided condition of the RV subscale, positive mood score was entered on the first step and accounted for 26% of the variance in the aided RV score. This indicates that individuals who reported a more positive mood at the time of testing reported a lesser degree of difficulty communicating in reverberant listening situations while using amplification. Gender was entered in the second step and increased the proportion of the variance accounted for in the aided RV scores to 43%. The extraversion/introversion score was entered in the third step and increased the proportion of the variance accounted for to 71%.

The results from the Aversiveness subscale (AV) show that negative affect score accounted for 22% of the variance on the unaided condition of the AV subscale indicating that those individuals who reported a more negative mood on the day of testing reported more negative reactions toward aversive environmental sounds when listening without hearing aids. Negative affect score also accounted for 20% of the variance in the aided condition of the AV subscale. Keirsey personality type (4TS) accounted for 43% of the variance in the benefit score on the AV subscale.

Chapter 6: Discussion, Conclusions, Further Recommendations

The main hypotheses explored in this study were that certain personality characteristics would contribute significantly to the amount of benefit that hearing aid users report from their hearing aids. It was also hypothesized that other non-audiological variables, such as mood and gender, would make an additional contribution to this self-reported hearing aid benefit.

Effect of Gender on Self-reported Hearing Aid Benefit

Women were expected to report more hearing aid benefit than men on both the HAPI and the APHAB. This hypothesis was based on literature (e.g. Garstecki & Erler, 1998) indicating that women have greater locus of control (the individual's belief in his or her ability to have control over what happens to him or her) compared to men.

Gender comparisons were made for each of the individual subscales on both the HAPI and the APHAB. The results of statistical analyses showed that no significant differences were found between the male and female participants on any of the subscales of the HAPI. However, a significant effect of gender was found on the aided condition of the Reverberation (RV) subscale of the APHAB where men reported more difficulty communicating in reverberant listening situations while wearing their hearing aids compared to women. No other significant differences were found between the men and the women. Overall, the participants in this study were satisfied users of hearing aids. More significant gender differences may have been found if the study sample had included less satisfied users of hearing aids.

One possible explanation for a significant gender difference on the aided condition of the RV subscale is that, overall, the males who participated in this study exhibited a greater degree of high frequency hearing loss compared to the women. This was evidenced by statistical analyses which found that men had significantly higher thresholds at 4000 Hz in the left ear. Studies have shown that individuals with significant high frequency hearing loss experience considerable difficulty in reverberant environments (Gelfand & Silman, 1979; Nabelek & Mason, 1981). Although the men in this study were more likely to have their hearing aids set with greater high frequency emphasis, this may not have been sufficient to overcome the degradation in communication that results from reverberation combined with a more impaired auditory system.

Previous research has also examined gender differences on measures of self-reported hearing handicap. Two studies have reported that women assign greater importance to communication in social situations, use nonverbal communication strategies more frequently, and perceive more difficulty with personal adjustment to hearing loss than men (Erdman & Demorest, 1998; Garstecki & Erler, 1999). These findings led to the hypothesis that women would report more hearing aid benefit than men. However, overall, there were no significant differences in the amount of hearing aid benefit reported by men and women in the present investigation.

Nevertheless, previous findings may not directly correlate to the results of the current study. Previous studies specifically assessed hearing handicap and not necessarily hearing aid benefit (as in the current study). The individuals who participated in the Garstecki and Erler (1999) study were older, on average, than those individuals

who participated in the current study. They also had poorer hearing thresholds, on average, in the lower to mid frequencies on the audiogram. Information on age and hearing thresholds is important to consider because it has been shown that both advanced age and degree of hearing loss can influence the amount of communication difficulty a hearing aid user experiences (Gatehouse, 1991, 1994).

Relationship between Extraversion/Introversion and Perceived Hearing Aid Benefit

It was hypothesized that extraverted individuals would report a greater amount of hearing aid benefit as measured on both hearing aid benefit questionnaires. The results of the statistical analyses indicate that those individuals who are more extraverted do not report more hearing aid benefit than those individuals who are more introverted. In fact, on the benefit score of the Background Noise subscale of the APHAB, it was discovered that individuals who are more extraverted actually report less hearing aid benefit and those who are more introverted report more hearing aid benefit. This is contrary to the results of Cox et al. (1999) who found that individuals who were more extraverted also reported greater hearing aid benefit on the Background Noise subscale of the APHAB.

One possible explanation for why individuals who were more extraverted reported less hearing aid benefit in the presence of background noise is that perhaps people who are extraverted and those who are introverted perceive communication situations differently. It is possible that extraverted individuals seek out a greater number of communication situations where background noise is present while those who are more introverted tend to seek out communication situations with smaller groups and not as much background noise. It is also possible that extraverts view communication situations

as being more important, thus, perceive less benefit in background noise due to the difficult nature of communicating in those types of situations.

There could be several reasons why the findings of the current study did not generate similar results to those of Cox et al. (1999). Data for the APHAB responses suggest that the participants in the current study reported less difficulty communicating in both the unaided and aided listening conditions on the Ease of Communication (EC), Background Noise (BN), and Reverberation (RV) subscales and a less negative reaction to the aversiveness of amplified sounds on the Aversiveness (AV) subscale of the APHAB when compared to the participants in the Cox et al. (1999) study. Some of the factors that could contribute to these differences in reported scores include age of the participants, length of hearing aid use, recruitment site (i.e. counseling style of the person fitting the hearing aids), degree of hearing loss, and technology of hearing aids.

The individuals who participated in the Cox et al. (1999) study were between the ages of 60-89 years and had worn hearing aids for a minimum of less than one year to a maximum of greater than 10 years. Those individuals who participated in the current study were also older adult hearing aid users but this group consisted of a slightly younger age range of 55-85 years old. It is possible that this younger age group reported less difficulty communicating in the various listening situations. Additionally, participants in the current study wore hearing aids for a period of three months to five years. This is a much more restricted range of hearing aid use, and perhaps indicates that self-reported hearing aid benefit is different between newer versus more experienced users of hearing aids.

The participants in the Cox et al. (1999) study were recruited from various clinical locations through newspaper advertisements. Those people who participated in the current study were all current patients at the University of Maryland College Park Hearing Clinic. They were all fit with their hearing aids at the same facility, and by one of several audiologists, compared to the group of participants from the Cox et al. (1999) study who had all been fit with hearing aids and received hearing aid follow-up services at different locations. It is possible that the recruitment site impacted the results, because perhaps individuals who seek out hearing healthcare services from a University clinic have different personality characteristics than those who seek out services elsewhere.

In addition to examining if there was a difference between extraversion and introversion preference scores and self-reported hearing aid benefit as measured on the APHAB, it was also hypothesized that more extraverted people would report greater hearing aid benefit on the HAPI compared to more introverted people. The results indicated no significant differences between the extraverted individuals and the introverted individuals on any of the subscales of the HAPI.

In summary, the present results show that more extraverted individuals report less hearing aid benefit on the BN subscale of the APHAB than more introverted individuals. These findings were not observed on the HAPI. This initial investigation, therefore, suggests that different results are obtained for the APHAB and the HAPI regarding the relationship between extraversion/introversion personality dimension and self-reported hearing aid benefit. Both measures include a subscale addressing hearing aid benefit in the presence of background noise, and the results of correlation analyses examining these two questionnaires found a significant relationship between the BN benefit scores of the

APHAB and the Speech in Noise scores of the HAPI. Nevertheless, a significant

relationship between extraversion/introversion and hearing aid benefit was found on the

APHAB, but not on the HAPI. These results could suggest two possibilities. First, some

other aspect of personality may contribute to the scores on the HAPI, but not on the

APHAB. Second, the APHAB and the HAPI ask different types of questions, or seek

different information regarding hearing aid benefit in noise.

Relationship between Mood and Perceived Hearing Aid Benefit

It was hypothesized that individuals with a positive affect would report greater

benefit from their hearing aids than those with a negative affect as measured on both of

the hearing aid benefit questionnaires. The results of the statistical analyses suggest that

mood does not play a significant role in the amount of self-reported hearing aid benefit

on either the HAPI or the APHAB.

This is the first study of its kind to try to examine the relationship between affect

(as measured with the PANAS) and self-reported hearing aid benefit. Previous research

has focused on the issue of anxiety and self-reported hearing handicap and disability

(Garstecki & Erler, 1998; Gatehouse, 1990; 1994; Saunders & Cienkowski, 1996).

Because negative mood can be related directly to anxiety, some comparisons can be made

between this previous research and the current study. Previous studies indicated that

individuals who report more anxiety also report more difficulty communicating in

various listening conditions (Garstecki & Erler, 1998; Gatehouse, 1990; 1994; Saunders

& Cienkowski, 1996). The corollary of this finding is that individuals who have a higher

negative mood may report less benefit from their hearing aids. Additionally, Cox et al.

(1999) found that individuals with greater anxiety reported more problems

communicating as measured on the aided condition of the Ease of Communication subscale of the APHAB. These findings are not consistent with those of the current study, perhaps because all of the individuals in the current study reported a predominantly positive mood on the day of testing.

Relationship between Keirsey Personality Type and Self-reported Hearing Aid Benefit

It was hypothesized that individuals would report different amounts of hearing aid benefit based on their personality type. Individuals who were more strongly oriented toward the Artisan personality type were expected to report more benefit from hearing aids compared to those who were more strongly oriented toward the Guardian personality type, because Artisans enjoy acquiring new techniques and working with equipment, while Guardians appear to be more conservative and less adventurous. Additionally, it was hypothesized that those individuals who were more oriented toward the Idealist or Rational personality types would report less hearing aid benefit than those oriented more toward the other personality types.

The principal findings of this study indicated that strong orientation toward certain Keirsey personality types does influence the amount of self-reported hearing aid benefit. On the Speech in Noise subscale of the HAPI, the Guardian personality type was positively related to the amount of self-reported hearing aid benefit. Those individuals who were more strongly of the Guardian personality type (a lower score on this dimension equates to a stronger orientation for this type) reported more hearing aid benefit (a lower score on the Speech in Noise subscale of the HAPI). Additionally, the Guardian personality type showed a positive correlation with the overall benefit score on

the HAPI. Those individuals who were more strongly oriented toward the Guardian personality type reported a greater amount of benefit from their hearing aids.

This is the first study of its kind to examine the correlation between Keirsey personality types and self-reported hearing aid benefit as measured on the HAPI. The results of this study indicate that individuals who are more strongly of the Guardian personality type may respond differently to the use of hearing aids compared to those who are more strongly oriented toward one of the other Keirsey personality types. Perhaps this is due to the tendency for Guardians to maintain stability and the value they place in belonging to a group or community. This stability and sense of community may translate into a stronger desire to be the protector, or a person who is functioning without any problems. This is an important finding as it relates to counseling hearing aid users and preparing them for everyday communication situations so that they may be prepared to have appropriate communication and listening expectations with the hearing aids.

Significant correlations were also observed between the Keirsey personality types and certain subscales of the APHAB. On the Background Noise subscale of the APHAB, the Idealist personality type was negatively related to the amount of self-reported hearing aid benefit. Those individuals who were more strongly Idealist reported less benefit from their hearing aids when listening in background noise. This finding is consistent with previous research (Barry, 2000; Barry & Barry, 2002) which has shown that the Idealist personality type is negatively correlated to both the benefit score on the Ease of Communication subscale of the APHAB, as well as on the overall benefit score of the APHAB. This is also consistent with the original hypothesis of this study.

The Guardian personality type was positively correlated to the amount of reported hearing aid benefit on the Background Noise subscale of the APHAB. Those individuals who were more strongly oriented toward the Guardian personality type reported more hearing aid benefit when listening in background noise. This finding is clearly consistent with the results obtained on the HAPI. Overall, a consistent finding of this study is that those individuals who are more strongly oriented toward the Guardian personality type tend to report more hearing aid benefit than those oriented more toward the other personality types when responding to difficult listening situations that include communicating in noise.

Finally, a negative correlation was found between the Rational personality type and the benefit score of the Aversiveness subscale of the APHAB. This indicates that those individuals who were more strongly oriented toward the Rational personality type reported less aversiveness to loud sounds when wearing their hearing aids. Individuals who are more oriented toward the Rational personality type enjoy working with machines and strive to control the resources in their environment. The findings suggest that the Rationals may enjoy using their hearing aids, are generally pleased with their functioning, and perhaps may have good control over their use. As a result, the Rationals tend to report less aversiveness to loud sounds while wearing the hearing aids because they are pleased overall, and they are in control.

In addition to the correlations between the Idealist personality type and hearing aid benefit, Barry and Barry (2002) also found a negative correlation between the Artisan personality type and the overall benefit score of the APHAB. The current study found no correlations between the Artisan personality type and any of the subscale scores of the

APHAB . One reason for this difference could be that very few participants in the current study were classified as Artisans. Perhaps if a larger number of individuals who were predominantly Artisan participated in the study, a different result would have been found.

There are several possible explanations for the different results of the previous studies and the current one. Both of the previous studies (Barry, 2000; Barry & Barry, 2002) reported results for all male participants who were recruited from a Veterans Administration hospital. It would be reasonable to expect that individuals who have served in the military may present different personality characteristics than those found in the general population. The inclusion of all male participants raises the issue that the degree of hearing loss would likely be worse for men compared to women. This is important because degree of hearing loss is related to the amount of reported communication difficulty (Gatehouse 1991; 1994). Finally, the etiology of hearing loss might be different between the two groups. It is much more likely that the hearing loss in the VA population is due, at least in part, to noise exposure.

Predictors of Hearing Aid Benefit

In an effort to determine the relative importance of audiological and non-audiological variables on measures of self-reported hearing aid benefit, a set of multiple regression analyses was conducted. The predictor variables included: 1) gender; 2) positive affect score; 3) negative affect score; 4) Keirsey personality type; 5) extraversion/introversion score; 6) aided speech recognition score; 7) high frequency pure tone average (average of the thresholds at 1000, 2000, and 4000 Hz in the better ear); and

8) age. The results revealed a number of variables that accounted for different amounts of variance on the self-reported hearing aid benefit scores.

It was hypothesized that extraversion/introversion would be the strongest predictor of self-reported hearing aid benefit on both outcome measures. The results of the stepwise multiple regression analyses did not find extraversion/introversion to be a predictor of hearing aid benefit. Instead, several other factors were identified as significant predictors.

For the HAPI, degree of hearing impairment (PTA) was negatively correlated with the Speech in Quiet subscale and accounted for 27% of the variance in the hearing aid benefit score. This relationship suggests that individuals with greater hearing loss reported more benefit from their hearing aids in a quiet listening environment compared to those with better hearing in the high frequencies.

Stepwise multiple regression analyses conducted for the APHAB scores yielded several more predictor variables. Degree of hearing loss (PTA) was positively correlated to both the unaided and aided scores of the Ease of Communications subscale. This suggests that as hearing loss increases, frequency of problems in relatively easy listening situations also increases, both without and with the hearing aids. These results are consistent with those of Cox et al. (1999) who also found that degree of hearing loss was positively correlated to the unaided score on the Ease of Communication subscale of the APHAB.

The results of the stepwise multiple regression analyses showed that negative affect was positively correlated to the aided scores on the Background Noise subscale of the APHAB. Those individuals who reported a higher negative affect on the day of

testing also reported more difficulty communicating in the presence of background noise while wearing their hearing aids. These results are different from those of Cox et al. (1999) who found that the frequency of problems with hearing aids (aided score) was related to degree of hearing loss, slope of the hearing loss, and extraversion/introversion preference on the Background Noise subscale.

The largest number of predictor variables were identified in the analyses for the Reverberation subscale of the APHAB. Degree of hearing loss (PTA) was positively correlated with the unaided score on the RV subscale, indicating that those individuals with a greater degree of hearing loss reported more difficulty communicating in a reverberant environment. Additionally, three predictor variables were found for the aided condition of the RV subscale: positive mood score, gender, and extraversion/introversion score. Together, these variables accounted for 71% of the variance in scores. These results are similar to those of Cox et al. (1999) who found that degree of hearing impairment was positively correlated to the unaided score on the RV subscale and that extraversion/introversion score was related to the aided score. The differences are that the Cox et al. (1999) study did not find gender to be a predictor of aided scores on the RV subscale. Perhaps the reason is that the Cox et al. (1999) study had an unequal gender distribution (75% of the participants were male) while the gender distribution of the current study was nearly equal.

The results of the stepwise multiple regression analyses for the Aversiveness subscale of the APHAB showed that Keirsey personality type accounted for 43% of the variance on the benefit score of the AV subscale. This finding is consistent with the correlation between the Rational personality type and the AV benefit score which was

also identified in this study. These results are quite different from those reported by Cox et al. (1999) who found that gender accounted for 9% of the variance on the benefit score of the AV subscale.

One observation of these analyses is that there is no relationship between aided speech recognition scores and self-reported hearing aid benefit. This is consistent with several studies (Cord, Leek, & Walden, 2000; Rowland, Dirks, Dubno, & Bell, 1985; Weinstein & Ventry, 1983) that have reported that there is virtually no correlation between aided speech recognition measures (both in noise and in quiet) and the amount of benefit individuals reportedly receive from their hearing aids.

Gender emerged as a predictor of aided scores on the RV subscale of the APHAB, accounting for 18% of the variance in scores. This is consistent with the results of the statistical analyses examining differences in performance based on gender, where a significant difference between males and females was found. Because the magnitude of self-reported hearing aid benefit is related to the aided score, the current findings suggest that men may report more difficulty compared to women when listening with their hearing aids in a highly reverberant situation.

It is interesting to note that only pure tone average emerged as a predictor of hearing aid benefit on the HAPI, while a large number of variables emerged on the APHAB. There could be several reasons for this pattern of results. Even though the HAPI and the APHAB are both measures of hearing aid benefit, they may, in fact, measure entirely different communication situations. The HAPI and the APHAB are similar in that they both contain subscales addressing speech in relatively easy or quiet situations and speech in the presence of background noise. Statistical analyses further

examining these similarities suggest that the current sample of individuals report similar amounts of hearing aid benefit in the presence of background noise as measured on both the APHAB and the HAPI. However, they report different amounts of hearing aid benefit in relatively easy or quiet listening situations when measured on the APHAB and the HAPI. Where the measures differ, however, is that the APHAB does not present the respondent with situations that pertain to listening to speech without the use of visual cues or listening to non-speech stimuli (i.e. music, doorbell ringing, telephone ringing). Thus, the differences between the responses on the two measures may be related to differences in the subscale structure of the two instruments. Because no other studies have specifically assessed predictor variables for the HAPI, it is not yet known what other, non-auditory factors exist that would help predict self-reported hearing aid benefit on this measure.

Limitations of the Current Study

Several limitations of the current study can be identified. First, the use of personality type measures remains controversial among the psychological community. This is an important factor to consider when deciding to implement one of these questionnaires into a clinical practice. The personality measures can be useful for helping an individual to understand more about him or herself, but the lack of rigorous psychometric data to support their usefulness is a definite limitation.

Second, it is important to remember that the results of this study were obtained from participants who represent satisfied hearing aid users. These individuals may be unique as compared to the general older adult population in that they are people who decided to pursue hearing aids, and ultimately decided to keep and wear their hearing

aids. Therefore, these participants were happy with their hearing instruments and their performance. The results of this study, therefore, may not generalize to other groups of older adults who are less satisfied with their hearing aids. Different results might have been obtained if unsatisfied hearing aid users were included in the study.

The size of the sample was also a limitation to this study. The small sample size did not allow for representative distribution of Keirsey personality types. If a larger sample size were used, more individuals would likely fall into each of the Keirsey types. Additionally, a larger sample size would increase the likelihood of including individuals reporting a predominantly negative mood (contrary to the current study sample).

Finally, this study suggests that a personality measure that sorts individuals into types may be more useful in the audiology setting. However, the findings reported here are preliminary in nature, and would require independent verifications, as well as cost-benefit analyses to determine if this type of measure is actually useful in the hearing aid delivery process.

Directions for Future Research

The results of this study have provided evidence that self-reported hearing aid benefit is influenced by certain non-audiological factors. However, the fact remains that a large percentage of the variance in scores has not been accounted for. It is important to explore these non-auditory factors more closely in order to expand our knowledge of how personality can influence self-reported hearing aid benefit.

Further research should include a larger sample size of individuals who are matched for both gender and hearing sensitivity. The gender effects that were found in this study could be the result of differences in hearing impairment, and not necessarily

differences between men and women. It would also be helpful to include a larger sample that represents a broader distribution of the different Keirsey personality types in order to identify more clearly the relationship between these personality types and hearing aid benefit.

Further research that more specifically examines mood should be conducted. Since mood emerged as an important predictor on the Background Noise, Reverberation, and Aversiveness subscales of the APHAB, it would be important to more closely examine this issue. Future research should focus on identifying people with both positive and negative affect in equal numbers. Since the PANAS is not the only self-report questionnaire available to assess mood, it would also be useful to conduct a study utilizing a different measure of mood, such as the Global Mood Scale (Denollet, 1993) to determine if similar results as those from this study are found.

Clinical audiologists use many different self-report questionnaires to assess perceived hearing aid benefit. Future studies should be conducted which more closely examine personality and self-reported hearing aid benefit using different self-reported hearing aid benefit questionnaires. Other possibilities include the Glasgow Hearing Aid Benefit Profile (Gatehouse, 1999), or the Hearing Handicap Inventory for the Elderly (Ventry & Weinstein, 1982). The HAPI and the APHAB are not the only subjective questionnaires that are used to assess hearing aid benefit in a clinical population. Further research with different measures would provide useful information to determine if consistent results are found that match this study and other previous research.

Additional investigations could include other measures of personality to determine if similar results to previous research are found. A study utilizing the entire

MBTI (rather than restricted to the extraversion/introversion dimension) would be helpful. It is possible that by using the entire MBTI, other predictor variables for the HAPI might be found. Careful exploration of these different personality characteristics might also help to gain a better understanding of other factors that could account for the large amount of variance in scores that was not explained in the present study.

Clinical Implications

This is the first study that has examined different aspects of personality and the relation to the HAPI as a measure of self-reported hearing aid benefit. Previous studies have focused primarily on the APHAB as the outcome measure. The results of this study provide evidence that personality factors can be related to self-reported hearing aid benefit on more than one questionnaire related to this issue. The implication of this finding is that when an audiologist uses a subjective measure of hearing aid benefit (the APHAB, the HAPI, or any other self-report questionnaire), the data reflect, at least to some extent, personality and non-audiological characteristics of the individuals who are answering them.

More significant correlations were found between personality characteristics and benefit reported on the APHAB. If a clinician were to administer the HAPI to a patient, the result may not be the same as if they were to administer the APHAB. This is an important finding. Until further research is conducted that more closely examines these issues, clinicians should proceed with caution when administering any measure of self-reported hearing aid benefit. This is especially important when administering self-assessment questionnaires as an exclusive means of evaluating the success of a particular hearing aid fitting. It might not be appropriate to choose a certain level of benefit on the

HAPI or the APHAB in order for the hearing aid fitting to be judged successful without first controlling for potential variables that might influence the results (e.g. mood, degree of high frequency hearing loss, gender, and Keirsey personality type).

The finding that certain Keirsey personality types are related to hearing aid benefit on the APHAB provides useful information that can be applied clinically. This information suggests that, although it may not be time or cost effective to administer the MBTI to patients in a clinical setting, audiologists may wish to administer the Keirsey Four Types Sorter. The Keirsey Four Types Sorter is a short questionnaire of only 16 questions which takes approximately five minutes to complete. The information that is gathered from this questionnaire may help to refine the rehabilitation plan, which is the ultimate goal of the clinical audiologist.

In summary, this study examined the relationship between non-audiological factors and self-reported hearing aid benefit on two measures. There appear to be several personality attributes and other non-audiological factors that are correlated with responses to HAPI and APHAB items. The most important finding is that certain Keirsey personality types appear to influence the amount of self-reported hearing aid benefit. People who are more strongly oriented toward the Guardian personality type report more hearing aid benefit on the Speech in Noise subscale of the HAPI, and on the BN subscale of the APHAB. Additionally, people who are more strongly oriented toward the Guardian personality type report more overall hearing aid benefit on the HAPI. People who are more strongly oriented toward the Idealist personality type report less benefit from their hearing aids when listening in background noise. Those people who are more strongly oriented toward the Rational personality type report less

aversiveness to loud sounds when wearing their hearing aids. Additionally, results indicate that extraversion/introversion preference is related to self-reported hearing aid benefit in a limited way, with individuals who are more extraverted reporting more difficulty communicating in background noise. Extraversion/introversion also accounts for some of the variance in difficulty communicating in reverberant listening situations while wearing hearing aids. Mood was a predictor of reported difficulty communicating both with and without hearing aids. Persons who felt more negative reported more difficulty communicating with their hearing aids in background noise and also felt that, without their hearing aids, aversive sounds were more bothersome. Persons who felt more positive reported less frequency of problems communicating in a reverberant listening environment when not wearing their hearing aids. Gender was a predictor of difficulty communicating in reverberant listening situations while wearing hearing aids, where men reported more difficulty than women.

The outcomes of this research also support previous investigations indicating that the extent of hearing loss (pure tone average) is related to self-reported hearing aid benefit. This is seen in the relationship between pure tone average and the Speech in Noise subscale of the HAPI, the unaided condition of the EC and RV subscales of the APHAB, and the aided condition of the EC subscale of the APHAB.

Appendices

Appendix A

Recruitment Letter

Name
Address
City, State, Zip

Dear_____,

     My name is Allyson Segar and I am an Audiology doctoral student in the Department of Hearing and Speech Sciences at the University of Maryland, College Park. I am conducting a study for my doctoral research, under the direction of Dr. Sandra Gordon-Salant, Ph.D., entitled, "Personality Type and Self-Perception of Hearing Aid Benefit." I believe that you would be a good candidate for participation in this study.

     The focus of the study is to determine to what extent certain personality characteristics and mood (feelings and emotions) play a role in how much hearing aid benefit a person reports receiving. Participation in this study would require you to attend one session, approximately two and a half hours in length at the University of Maryland Hearing Clinic. During this session you would receive a full hearing evaluation and check of your hearing aids free of charge. You would additionally be asked to fill out several questionnaires in a paper and pencil format that are related to personality characteristics, hearing aid benefit, and mood. During the two and half hour session you will be allowed to take breaks as needed, and may withdraw at any time. Examples of the questions you would be asked are as follows:

1. Do you usually get along better with
    A. imaginative people, or
    B. realistic people

2. When I am in a crowded grocery store, talking with the cashier, I can follow the conversation
    A. Always
    B. Almost Always
    C. Generally
    D. Half-the-time
    E. Occasionally
    F. Seldom
    G. Never

3. Today I am feeling interested
   A. Very slightly or not at all
   B. A little
   C. Moderately
   D. Quite a bit
   E. Extremely

I invite you to participate in this exciting research. The contribution of your time would help us to gain a greater insight into how aspects of personality and mood affect hearing aid benefit. This research will hopefully help provide audiologists with more information to facilitate successful hearing aid fittings and aid in the overall hearing rehabilitation process.

I will be contacting you within the next several weeks by telephone or you can contact me at 301-498-3980 or asegar@hesp.umd.edu with additional questions or to schedule an appointment. If at the time of the telephone call you do not wish to participate in this study you will not be contacted again.

Sincerely,

Allyson A. Segar
Audiology Graduate Student

Sandra Gordon-Salant, Ph.D.
Professor

Appendix B

The Keirsey Four Types Sorter

For each item, rank-order the four choices. Mark the responses most like you as #1; less like you, #2; still less like you, #3; & least like you, #4. Put your numbers next to the corresponding letters.

1. **I'd rather study**
___ a. arts & crafts
___ b. literature & humanities
___ c. business & finance
___ d. science & engineering

2. **I feel best about myself when**
___ a. I'm graceful in action
___ b. I'm *en rapport* with someone
___ c. I'm rock-solid dependable
___ d. I exercise my ingenuity

3. **In mood I'm more often**
___ a. excited & stimulated
___ b. enthusiastic & inspired
___ c. cautious & prudent
___ d. calm & detached

4. **I keep coming back to**
___ a. perfecting my craft
___ b. helping others affirm themselves
___ c. helping others do right
___ d. figuring out how things work

5. **Coming right down to it I tend to be**
___ a. practice & opportunistic
___ b. compassionate & altruistic
___ c. dutiful & diligent
___ d. efficient & pragmatic

6. **I respect myself more for**
___ a. being bold & adventurous
___ b. being kind-hearted & of good will
___ c. doing good deeds
___ d. being autonomous & independent

7. **I'm more inclined to trust**
___ a. impulses & whims
___ b. intuitions & intimidations
___ c. customs & traditions
___ d. pure reason & formal logic

8. **I'm sometimes eager to**
___ a. make an impression & have impact
___ b. lose myself in romantic dreams
___ c. be a valued & legitimate member
___ d. make a scientific breakthrough

9. **I'm in a life-long search for more**
___ a. thrills & adventure
___ b. self-understanding
___ c. safety & security
___ d. efficient methods of operation

10. **In facing the future**
___ a. I bet something lucky will turn up
___ b. I believe in people's innate goodness
___ c. you just can't be too careful
___ d. it's best to keep a wary eye

11. **If it were possible I'd like to become**
___ a. an artistic virtuoso
___ b. a wise prophet
___ c. a chief executive
___ d. a technological genius

12. **I'd do best in a job working with**
___ a. tools & equipment
___ b. human resources development
___ c. material & services
___ d. systems & structures

13. **As a guide to action I look primarily at**
___ a. immediate advantages
___ b. future possibilities
___ c. past experience
___ d. necessary & sufficient conditions

14. **I'm most self-confident when I'm**
___ a. adaptable & flexible
___ b. genuine & authentic
___ c. honorable & respectable
___ d. strong-willed & resolute

15. **I appreciate it when others**
___ a. surprise me with generosity
___ b. recognize my true self
___ c. express their gratitude
___ d. ask me for my rationale

16. **When thinking about misfortune**
___ a. I usually laugh it off
___ b. I often wonder why
___ c. I try to make the best of it
___ d. I view it from a wide perspective

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
a																		A
b																		I
c																		G
d																		R

Scoring Directions: First, in the numbered columns above, record the rankings (1 to 4) for each of the 16 items. **Second**, add the numbers across each of the four rows (**a, b, c, d**) and place the sums in the boxes at the far right. **Third**, circle the letter (**A, I, G., or R**) beside the *LOWEST* sum. **Fourth**, A stands for Artisan (SP), I for Idealist (NF), G for Guardian (SJ), R for Rational (NT).

Subject #_____

Appendix C

Abbreviated Profile of Hearing Aid Benefit

INSTRUCTIONS: Please circle the answer that comes closest to your everyday experience. Notice that each choice includes a percentage. You can use this to help you decide on your answer. For example, if a statement is true about 75% of the time, circle "C" for that item. If you have not experienced the situation we describe, try to think of a similar situation that you have been in and respond for that situation. If you have no idea, leave that item blank.

A	Always (99%)
B	Almost Always (87%)
C	Generally (75%)
D	Half-the-time (50%)
E	Occasionally (25%)
F	Seldom (12%)
G	Never (1%)

Without my Hearing Aid   With my Hearing Aid

1. When I am in a crowded grocery store, talking with the cashier,

   I can follow the conversation………………………………A B C D E F G   A B C D E F G

2. I miss a lot of information when I'm listening to a lecture………...A B C D E F G   A B C D E F G

3. Unexpected sounds, like a smoke detector or alarm bell are

   uncomfortable…………………………………………………A B C D E F G   A B C D E F G

4. I have difficulty hearing a conversation when I'm with one of my

   family at home……………………………………………….A B C D E F G   A B C D E F G

5. I have trouble understanding dialogue in a movie or at the
   theater…………………………………………………………...A B C D E F G   A B C D E F G

6. When I am listening to the news on the car radio, and family

   members are talking, I have trouble hearing the news…….A B C D E F G   A B C D E F G

7. When I am at the dinner table with several people, and am trying

   to have a conversation with one person, understanding speech

   is difficult…………………………………………………….A B C D E F G   A B C D E F G

8. Traffic noises are too loud………………………………………….A B C D E F G   A B C D E F G

9. When I am talking with someone across a large empty room,

     I understand the words…………………………………..A B C D E F G   A B C D E F G

10. When I am in a small office, interviewing or answering

     questions, I have difficulty following the conversation...A B C D E F G   A B C D E F G

11. When I am in a theater watching a movie or play, and the

People around me are whispering and rustling paper wrappers,

I can still make out the dialogue…………………………………….. A B C D E F G   A B C D E F G

12. When I am having a quiet conversation with a friend, I have

     difficulty understanding…………………………………A B C D E F G   A B C D E F G

13. The sounds of running water, such as a toilet or shower, are

     uncomfortably loud………………………………………...A B C D E F G   A B C D E F G

14. When a speaker is addressing a small group, and everyone is

     listening quietly, I have to strain to understand…………A B C D E F G   A B C D E F G

15. When I'm in a quiet conversation with my doctor in an

     examination room, it is hard to follow the conversation…A B C D E F G   A B C D E F G

16. I can understand conversations even when several people are

     talking………………………………………………………A B C D E F G   A B C D E F G

17. The sounds of construction work are uncomfortably loud……...A B C D E F G   A B C D E F G

18. It's hard for me to understand what is being said at lectures or

     church services………………………………………………A B C D E F G   A B C D E F G

19. I can communicate with others when we are in a crowd………..A B C D E F G   A B C D E F G

20. The sound of a fire engine siren close by is so loud that I need to

     cover my ears………………………………………………...A B C D E F G   A B C D E F G

21. I can follow the words of a sermon when listening to a religious

     service………………………………………………………...A B C D E F G   A B C D E F G

22. The sound of screeching tires is uncomfortably loud…………….A B C D E F G   A B C D E F G

	Without my Hearing Aid	With my Hearing Aid

23. I have to ask people to repeat themselves in one-on-one

     conversation in a quiet room……………………………A B C D E F G   A B C D E F G

24. I have trouble understanding others when an air conditioner or

     fan is on…………………………………………………A B C D E F G   A B C D E F G

Appendix D

The Hearing Aid Performance Inventory

INSTRUCTIONS
We are interested in knowing the extent to which your hearing aids help you in your daily life. In this questionnaire you are asked to judge the helpfulness of your hearing aids in a variety of listening situations. You are asked to rate the benefit of your hearing aids in each situation and not the difficulty of the situation itself.

To answer each question, check the phrase that best describes how your hearing aids help you in that situation.

- Very Helpful
- Helpful
- Very Little Help
- No Help
- Hinders Performance

There are items that appear similar but differ in at least one important detail. Therefore, read each item carefully before checking the appropriate phrase. We know that all people do not talk alike. Some mumble, others talk too fast, and others talk without moving their lips very much. Please answer the questions according to the way most people talk.

If you have never experienced the situation but can predict your hearing aid performance, respond to the item. A "Does Not Apply" response box is also provided. However, use the response "Does Not Apply" only if you do not know how helpful your hearing aid would be in the given situation.

Items

1. You are sitting alone at home watching the news on TV.

☐ ☐ ☐ ☐ ☐ ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

2. You are involved in an intimate conversation with your spouse.

☐ ☐ ☐ ☐ ☐ ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

3. You are watching TV and there are distracting noises such as others talking.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

4. You are at home engaged in some activity and the telephone rings in another room.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

5. You are at home in conversation with a member of your family who is in another room.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

6. You are at a crowded outdoor auction bidding on an item.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

7. You are listening to a speaker who is talking to a large group and you are seated toward the rear of the room. His back is partially turned as he makes notes on a blackboard.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

8. You are starting to cross a busy street and a car horn sounds a warning.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

9. **You are riding on a crowded bus. You are in conversation with a friend seated next to you and you do not want others to overhear your conversation.**

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

10. **You are walking in the downtown section of a large city. There are the usual city noises and you are in conversation with a friend.**

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

11. **You are in a large office with the usual noise in the background (e.g., typewriters, air conditioners, fans, etc.). A co-worker is telling you the latest gossip from close range in a soft voice.**

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

12. **You are riding in the back seat of a taxi. The window is down and the radio is on. The driver strikes up a conversation in a relatively soft voice.**

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

13. **You are driving your car and listening to a news broadcast on the radio. You are alone and the windows are closed.**

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

14. You are in a crowded grocery store checkout line and talking with the cashier.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

15. You are alone in a small office with the door closed. People are talking quietly outside the door and you want to overhear the conversation.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

16. You are at a crowded office picnic talking with a friend.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

17. You are at home watching television and the doorbell rings.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

18. You are with your family at a noisy amusement park and you are discussing which attraction to go to next.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

19. You are taking an evening stroll with a friend through a quiet neighborhood park, there are the usual environmental sounds around (e.g., children playing, dogs barking).

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

20. You are at home alone listening to your stereo system (instrumental music).

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

21. You are listening to an orchestra in a large concert hall.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

22. You are in whispered conversation with your spouse at an intimate restaurant.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

23. You are in the kitchen in conversation with your spouse during the preparation of an evening meal.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

24. You are at home in face to face conversation with a member of your family.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

25. You are shopping at a large busy department store and talking with a salesclerk.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

26. You are at church listening to the sermon and sitting in the front pew.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

27. You are listening to a speaker who is talking to a large group and you are seated toward the rear of the room. There is an occasional noise in the room (e.g., whispering, rattling papers, etc.).

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

28. You are having a conversation in your home with a salesman and there is background noise (e.g., TV, people talking) in the room.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

29. You are attending a business meeting where people are seated around a conference table. The boss is talking; everybody is listening quietly.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

30. You are at church listening to the sermon and sitting in the back pew.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

31. You are talking with a friend outdoors on a windy day.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

32. You are driving your car with the windows up and carrying on a

   conversation with your spouse in the front seat.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders*   *Does Not Apply*
                                                                          Performance

33. You are in a small office interviewing for a job.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders*   *Does Not Apply*
                                                                          Performance

34. You are ordering food for the family at McDonald's.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders*   *Does Not Apply*
                                                                          Performance

35. You are at home reading the paper. Two family members are in another

   room talking quietly and you want to listen in on their conversation.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders*   *Does Not Apply*
                                                                          Performance

36. You are in a courtroom listening to the various speakers (witness, judge,

   lawyer).

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders*   *Does Not Apply*
                                                                          Performance

37. You are talking with a teller at the drive-in window bank.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders*   *Does Not Apply*
                                                                          Performance

38. You are in a noisy business office talking with a stranger on the telephone.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

39. You are in conversation with someone across a large room (such as an auditorium).

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

40. You are in conversation with a neighbor across the fence.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

41. You are in a crowded reception room waiting for your name to be called.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

42. You are in your backyard gardening. Your neighbor is using a noisy power lawnmower and yells something to you.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

43. You are listening in a small quiet room to someone who speaks softly.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

44. You are on an airplane and the stewardess is requiring a meal selection.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

45. You are riding in a crowded bus and are in conversation with a stranger seated next to you.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

46. You are alone driving your automobile and the cars around you are pulling to the side of the road. You begin to listen for what you anticipate is an emergency vehicle (firetruck, rescue squad, etc.).

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

47. Someone is trying to tell you something in a small quiet room while you have your back turned.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

48. You are driving with your family and are listening to a news broadcast on the car radio. Your window is down and family members are talking.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

49. You are driving your car with the windows down and are carrying on a conversation with other riding with you.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

50. You are at an exciting sports activity (baseball, football games, etc.) and talk occasionally with those around you.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

51. You are in a large business office talking with a clerk. There is the usual office noise (e.g., typing, talking, etc.).

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

52. You are in a quiet conversation with your family doctor in an examination room.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

53. You are talking to a large group and someone from the back of the audience asks a question in a relatively soft voice. Audience is quiet as they listen to the question.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

54. You are walking through a large crowded airport and are in conversation with a friend.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

55. You are at a large noisy party and are engaged in conversation with one other person.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

56. You are alone in the woods listening to the sounds of nature (e.g., birds, insects, small animals, etc.).

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

57. You are at the dinner table with your whole family and are in conversation with your spouse.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

58. You are attending a business meeting where people are seated around a conference table. The discussion is heated as everyone attempts to make a point. The speakers are frequently interrupted.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

59. You are one of only a few customers inside your bank and are talking with a teller.

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

60. You are at a theater watching a movie. There are occasional noises around you (e.g., whispering, wrappers rustling, etc.).

☐	☐	☐	☐	☐	☐
Very Helpful	*Helpful*	*Very Little Help*	*No Help*	*Hinders Performance*	*Does Not Apply*

61. You are alone at home talking with a friend on the telephone.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

62. You are downtown in a large city requesting directions from a pedestrian.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

63. You are riding in a car with friends. The windows of the car are rolled down. You are in the back seat carrying on a conversation with them.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

64. You are driving your car with the windows up and radio off and are carrying on a conversation with your spouse who is in the front seat.

☐   ☐   ☐   ☐   ☐   ☐

Very Helpful   *Helpful*   *Very Little Help*   *No Help*   *Hinders Performance*   *Does Not Apply*

Positive and Negative Affect Schedule

Subject #:_____

The scale consists of a number of words that describe different feelings and emotions. Read each item and circle the answer that best describes the extent to which you are experiencing each of the feelings or emotions today.

1. interested	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
2. distressed	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
3. excited	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
4. upset	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
5. strong	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
6. guilty	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
7. scared	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
8. hostile	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
9. enthusiastic	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
10. proud	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
11. irritable	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
12. alert	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*

13. ashamed	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
14. inspired	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
15. determined	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
16. attentive	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
17. jittery	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
18. nervous	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
19. active	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*
20. afraid	*very slightly or not at all*	*a little*	*moderately*	*quite a bit*	*extremely*

Appendix F

Consent Form

Project Title	*Personality Type and Self-Perception of Hearing Aid Benefit*
Statement of Age of Subject	*The participant is over 18 years of age, in good physical health, and wishes to participate in a program of research being conducted by Allyson Segar, under the direction of Dr. Sandra Gordon-Salant in the Department of Hearing and Speech Sciences at the University of Maryland, College Park.*
Purpose	*The purpose of this research is to determine how personality and mood are related to a person's self-perception of hearing aid benefit.*

Procedures	*The procedures involve one session, two and a half hours in length, during which time the individual will be asked to participate in a hearing evaluation where he or she will be asked to respond to various sounds and words by either pushing a button, or by providing verbal responses. Each participant's hearing aids will be tested using computerized equipment to ensure proper functioning of the instruments. The participant will also be asked to fill out various questionnaires in a paper and pencil format that are related to personality, mood, and hearing aid benefit. Below are sample questions from each type of questionnaire:*
	
	1. Do you usually get along better with
	  A. imaginative people, or
	  B. realistic people
	
	2. When I am in a crowded grocery store, talking with the cashier, I can follow the conversation
	  A. Always
	  B. Almost Always
	  C. Generally
	  D. Half-the-time
	  E. Occasionally
	  F. Seldom
	  G. Never

	3. Today I am feeling interested
	   A. Very slightly or not at all
	   B. A little
	   C. Moderately
	   D. Quite a bit
	   E. *Extremely*

Confidentiality	*All information collected in this study is confidential to the extent permitted by law. The participant understands that the data provided will be grouped with data others provide for reporting and presentation and that no names will be used.*
Risks	*There is a minimal risk to participating in this study. Stimuli used for hearing measurements will be presented at levels and durations used in standard hearing testing and will not damage hearing. The Standard Precautions for spread of infection, set-forth by the Centers for Disease Control, will be followed.*
Benefits, Freedom to Withdraw, & Ability to Ask Questions	*The experiment is not designed to help the participant personally, but to help the investigator learn more about how different aspects of personality are related to the subjective benefit a person receives from hearing aids. The only benefit the participant will receive is a free audiological evaluation and check of hearing aids. He or she will be free to ask questions or withdraw from participation at any time without penalty.*
Contact Information of Investigators	*Dr. Sandra Gordon-Salant* *Allyson A. Segar* *University of Maryland* *14427 Bonnett Ln.* *0119E LeFrak Hall* *Laurel, MD 20707* *College Park, MD 20742* *301-498-3980* *301-405-4225* *asegar@hesp.umd.edu*
Contact Information of Institutional Review Board	If you have questions about your rights as a research participant or wish to report a research-related injury, please contact: **Institutional Review Board Office, University of Maryland, College Park, MD 20742; (email) irb@deans.umd.edu; (telephone) 301-405-4212**
Name of Participant	
Signature of Participant	
Date	

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