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A Comparison of General and Task-Specific Measures of Self-Efficacy in Adult Hearing Aid Users

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A Comparison of General and Task-Specific Measures of Self-Efficacy in Adult Hearing Aid Users

Brittney Dullard, PhD

University of Connecticut, 2014

Self-efficacy is defined as “the belief in one’s capability to organize and execute the courses of action required to manage prospective situations” and plays a major role in goal-setting (Bandura, 1997; 2004). Self-efficacy can be broken down into two types: (1) perceived general self-efficacy and (2) task-specific self-efficacy. General self-efficacy is an individual’s perception of his or her ability to perform across a variety of situations. Task-specific self-efficacy examines an individual’s perception of his or her ability to perform the actions specific to a situation. Self-efficacy is an important component of successful self-management of chronic illness, and has been shown to be important to better health outcomes. Within the field of audiologic rehabilitation, it is empirically unknown whether general or task-specific levels of self-efficacy are related, or if they are good predictors of hearing aid outcomes. Forty individuals were administered a measure of general self-efficacy and hearing aid self-efficacy. These were compared to an objective test of basic hearing aid skills. Overall general and hearing aid self-efficacy were high for all participants. Participants had the lowest perceived self-efficacy for advanced hearing aid skills. Statistical analyses indicated general and task-specific measures of self-efficacy were moderately correlated, and general self-efficacy was a good predictor of self-efficacy for overall hearing aid use and aided listening with hearing aids. Results indicated self-reported vision and pure tone-average were good predictors of hearing aid self-efficacy. Neither general nor task-specific self-efficacy measures were good predictors of the objective test of basic hearing aid skills. There was a large discrepancy between self-efficacy
to manage hearing aids and actual ability to perform these skills, indicating that this group of individuals overestimated confidence in ability to manage hearing aids. Results support a relationship between general and task-specific self-efficacy. However, self-efficacy measures do not predict hearing aid outcomes as measured in this study. Self-efficacy measures should be further investigated to determine whether they are useful predictors of additional outcome measures in more diverse populations.
A Comparison of General and Task-Specific Measures of Self-Efficacy in Adult Hearing Aid Users

by

Brittney Dullard

B.A., University of Connecticut, 2009

A Dissertation
Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy at the University of Connecticut

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APPROVAL PAGE

Doctor of Philosophy Dissertation

A Comparison of General and Task-Specific Measures of Self-Efficacy in Adult Hearing Aid Users

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Chapter 1: Introduction

Chronic Illness

Chronic illness is a general term that includes condition(s) that last a year or more and requires ongoing medical attention and/or limit activities of daily living (Anderson & Horvath, 2004). Examples of specific illnesses that fall within the category of chronic illness include cardiovascular disease, cancer, arthritis, diabetes, and sensory disorders (i.e. vision loss, hearing loss) (CDC, 2014).

Health care professionals are turning their attention to the imposing burden of chronic illness for a number of reasons. First, the rate of the population over 65 years of age is growing rapidly. According to data based on the 2010 Census, this population is expected to increase from its current approximate population of 35 million people to an estimated 71 million people in 2030 (U.S. Census Bureau, 2011; Wagner, 2001). Second, innovative medical procedures and improved pharmaceuticals are increasing the lifespan of individuals. Today, Americans can expect to live longer than any previous generation. In addition, this advanced technology is being used to maintain a level of health that results in increased numbers of individuals surviving with chronic conditions. Diseases that once caused early morbidity can now be treated and maintained, allowing the individual to survive a lifetime with the illness (Anderson, 2010). Lastly, the number of individuals with chronic illness is estimated to grow from 133 million to 157 million Americans by the year 2020 (Anderson, 2010). The confluence of these factors is creating a tremendous burden on the healthcare system (Norris, Glasgow, Engelgau, O’Connor, & McCulloch, 2003). According to the CDC, chronic diseases account for 75% of annual health care costs, and health care professionals are acknowledging the need to transform the current health care system to adequately address chronic illness.
Chronic illness requires individuals to cope with symptoms, disability, lifestyle adjustments, and complex medical regimens, all of which impose physical, psychological, and emotional restrictions (Millen & Walker, 2002; Wagner et al., 2001). Chronic illness affects an individual’s physical health, social interaction, social role status, economic status, and self-esteem (Juth, Smyth, & Santuzzi, 2008; Livneh, 2001). Consequences of chronic illness such as persistent symptoms, continuous medication use, emotional distress, and responsibility to participate in decisions about medical management and care, can contribute to feelings of shock, anxiety, denial, and depression (Holman & Lorig, 2004; Livneh & Antonak, 2005).

Chronic illness may also impose stigma on the individual. Research by Earnshaw, Quinn, and Park (2011) demonstrated that chronic illness fosters anticipated stigma on the part of the individual suffering from the chronic illness from friends, family, and co-workers, regardless of whether friends, family, and co-workers are actually enacting stigma. This anticipated stigma is associated with decreased quality of life, increased stress, lower levels of social support, and decreased levels of patient satisfaction with the care given by their physician (Earnshaw et al., 2011).

Lastly, chronic illness is associated with decreased self-efficacy. Self-efficacy plays a critical role in how goals, tasks, and challenges are approached for new and changing behavior, and thus has been speculated to be important in the management of chronic illness (Bonsaken, Lerdal, & Fagermoen, 2012). Numerous studies have exposed the link between psychosocial and physical characteristics of chronic illness and decreased self-efficacy. In addition, it is an important psychological factor in the adjustment to chronic illness. For example, McCathie, Spence, and Tate (2002) examined the relationship of psychosocial factors and self-efficacy in individuals with chronic obstructive pulmonary disease (COPD). Individuals with COPD who
had lower levels of self-efficacy for COPD symptom management had significantly greater
levels of depression, anxiety, and a reduced quality of life.

In summary, consequences of chronic illness are vast and can include decreased quality
of life, strained relationships with co-workers, family members, and healthcare providers, higher
levels of stress and self-perceived stigma, and decreased self-efficacy.

Framework for Managing Chronic Illness. In general, the longest standing and most
traditional framework for viewing illness is the medical model of health. Priester, Kane, and Totten (2005) suggest, “the conceptual model at the foundation of America’s health care system is the acute care model” (p. 4). In this medical model, the job of the health professional is to
discover the cause of the patient’s symptoms, which often becomes the diagnosis, and prescribe a
remedy to eliminate or minimize the symptoms of the disease (Duchan, 2004). This model may
work well for acute illness, but may not be the best conceptual model for diseases and illnesses
that require long term management, such as chronic illness. According to Duchan (2004), there
are three main arguments against the medical model in the treatment of chronic illness. First,
this model restricts assessment procedures and diagnosis based upon physical causes or
interventions that fix physical issues. It does not take into account psychological, social, or
contextual aspects of the disease and/or person (Norris et al., 2003). Second, the medical model
of health emphasizes finding a cure, which is impossible given the nature and definition of
chronic illness. Third, by making the diagnosis and recommending treatment, the physician is at
the focus of this model. Health professionals are considered experts in the field and may guide
the patient towards a particular course of action despite the patient’s feelings towards the
intervention. However, chronic illness cannot be cured and requires long-term management.
The management of the chronic illness requires the patient to take responsibility for treatment
and care for physical, social, and psychological symptoms of the chronic illness, which strengthens the argument for putting the patient at the center of care rather than the physician. Thus, the medical model may not be the best framework for management of chronic illness.

Tinetti and Fried (2004) argue that putting the disease at the center of medical care may lead to undertreatment, overtreatment, or mistreatment. Physicians may be reluctant to treat symptoms that do not meet accepted diagnostic criteria; however, some symptoms may be a result of the interactions between physical and psychological factors such as chronic dizziness or non-specific pain. By centering the treatment on the disease, some symptoms may not be addressed and thus the patient is undertreated. The reverse scenario involves those individuals with several chronic conditions of which the physician may prescribe several medications, which may have several consequences such as high cost to the patient and risk of adverse side effects. Lastly, mistreatment can happen unintentionally when the physician makes decisions based on the disease rather than patient preferences (Tinetti & Fried, 2004). Thus, an integrated, individually tailored healthcare model in which patient goals and the treatment of both biological and non-biological factors are the focus of medical care should be considered (Tinneti & Fried, 2004).

A more holistic framework for viewing health and disability is the International Classification of Functioning, Disability, and Health (ICF) proposed by the World Health Organization (World Health Organization [WHO], 2002). According to the WHO, health is a “state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1948, p. 100). Compared to the medical model of health, the ICF framework proposes a broader view of health and disease. The ICF defines an individual’s health condition by three independent domains of health: body structures, activities, and participation.
The framework also recognizes contextual factors such as environmental and personal influences that may interact and influence the three domains of health. The ICF is designed to assess the impact the level of dysfunction, activity limitation, and participation restriction, as well as to determine the role these contextual factors play. For a given individual, a disorder or disease is the result of a series of complex relationships among the three health domains in interaction with the two categories of contextual factors (Gagne, 2003). All of these factors should be kept in mind when recommending treatment and rehabilitation interventions. The framework can later be used to assess how interventions reduced activity limitations and participation restrictions. This model is useful for viewing any disease, but lends itself well to chronic illness in particular because it provides a way to assess and reassess the psychosocial impact of the chronic illness and to monitor the way treatments and interventions reduce this impact at various points in time. It does not just focus on the physical symptoms of the disease, and it includes how personal characteristics play a role into successful management of the disease.

Management of Chronic Illness. Opposite to acute diseases, which can often be cured, there is no cure for chronic illnesses and thus the symptoms require long-term management. As outlined by the ICF model there are physical, social, and emotional symptoms to be managed that may impact daily activities and participation in life events (WHO, 2002). Living with a chronic illness requires significant adaptations to reduce the activity limitations and participation restrictions imposed by the disease, as well as positively impact the individual’s quality of life. The management for chronic illness requires long-term changes that require the individual to take responsibility for his or her care (Newman, Steed, & Mulligan, 2004). In fact, Lorig and Holman (2003) suggest adaptations be made within three broad domains including: medical, lifestyle, and emotional. First patients must learn how to manage the chronic disease medically.
The individuals must learn how to take multiple medications, or how to use special devices such as inhalers or hearing aids. Second, the individual must create, maintain, or change behaviors in their life. For example, someone with a hearing impairment may need to learn how to communicate in quieter environments. Lastly, the individuals must learn how to manage the emotions that will be ever present with chronic illness. The patient must take responsibility for making and maintaining these changes and this is often referred to as self-management. Self-management programs are designed to allow the patient to take responsibility for his or her care and to improve overall health outcomes.

The goal of self-management education for patients with chronic illness is to improve clinical outcomes and preserve quality of life. Self-management often includes education and support to help the individual accept and manage the daily actions to keep the illness and its symptoms under control. There are several components of self-management education that must be included in order for rehabilitation and management to be successful (Bodenheimer, Lorig, Holman, & Grumbach, 2002; Gallant, 2003). These include: recognizing and responding to symptoms, understanding and learning how to use medications appropriately, maintaining a healthy lifestyle, and responding to emotional and psychological reactions. For sensory disorders such as vision and hearing impairment, self-management education may include learning how to operate, manage, and care for assistive devices such as glasses and hearing aids. Lastly, the patient’s attitude and knowledge must be considered, as each individual’s past experiences, motives, and reactions to chronic illness are different (Bonsaken et al., 2012). More specifically, rehabilitation programs must be designed to provide patients with the skills and tools necessary to manage the illness and symptoms, and must enhance an individual’s
confidence to use those skills and tools (Bonsaken et al., 2012; Marks, Allegrante, & Lorig, 2005).

Self-management education programs have been empirically shown to improve health outcomes (both physical and psychosocial) and improve self-efficacy (Clark, Abrams, Niaura, Eaton, & Rossi, 1991; Kennedy et al., 2007; Steed, Cooke, & Newman, 2003). Steed et al. (2003) conducted a meta-analysis to examine psychosocial health outcomes following self-management education for patients with diabetes mellitus. The variability in methodology and outcomes measurements between the 36 studies included in the review made it difficult to draw concrete conclusions; however, the authors highlighted trends for self-management programs to reduce depression and improve quality of life. Four of six randomized controlled trials examining the effect of self-management groups and education interventions on symptoms of depression revealed significant improvement in the intervention group. In addition, the authors reported three of five randomized controlled trials demonstrated significant improvements in quality of life (as measured by disease specific quality of life questionnaires) in patients with diabetes (Steed et al., 2003).

Self-Efficacy in Health

Self-efficacy is one component of self-management programs that has been shown to be important in successful management of illness. Self-efficacy offers a research-based theoretical construct with which health educators may be able to develop interventions designed to reduce the activity limitations and participation restrictions created by chronic illness in general (Marks et al., 2005). Patients’ knowledge and beliefs about their illness, motivation to manage it, and confidence (self-efficacy) in their ability to engage in illness-management behaviors interact in unknown ways to influence adherence to health behaviors. Thus, as health professionals move
away from a medical model of treatment for health conditions and towards a client-centered model where the patient’s role in the management of his/her illness is emphasized, self-efficacy becomes an important factor to consider.

A large body of literature demonstrates that self-efficacy beliefs concerning health are important for the successful management of health problems and positive treatment outcomes for a variety of health domains including vision impairment, arthritis, obesity, and diabetes management (Bandura, 1997). For example, in the visual domain several researchers have argued that sudden visual impairment is a devastating sensory loss that requires adjustment. Maladjustment can lead to depression and learned helplessness. If an individual does not feel they have the skills necessary to adjust to the sudden vision loss, they may subject to negative effects. Therefore, self-efficacy must be a part of the intervention plan to encourage individuals to manage their loss (Brody, Roch-Levecq, Kaplan, Moutier, & Brown, 2006; Dodds, 1989; Girdler, Boldy, Dhaliwal, Crowley, & Packer, 2010). In addition, Brown and Barrett (2011) explored the relation between functional or self-reported visual status, life satisfaction, magnitude of depressive symptoms, and social and psychological resources (i.e. self-efficacy). These authors reported the level of self-efficacy had the greatest effect on the relation between functional visual status and quality of life. Level of self-efficacy accounted for 35% of the effect in functional visual impairment and 60% of the effect on life satisfaction. This suggests that self-efficacy levels have an impact on the negative effects of vision impairment. Focht, Rejeski, Ambrosius, Katula, and Messier (2005) researched baseline levels of self-efficacy and changes in level of self-efficacy following obesity management intervention. They found that the greater the increase in self-efficacy levels, the greater the reduction in mobility disability. Similar findings have been found in the arthritis and diabetes management literature Brekke, Hjortdahl,
& Kvien (2003). These authors found that individuals with higher levels of self-efficacy prior to treatment had better ability to manage pain symptoms.

Successful management of chronic illness, like diabetes and arthritis, relies on the individual being able to carry out tasks designed to control symptoms and avoid acute, as well as chronic, complications (Bodenheimer et al., 2002; Rapley & Fruin, 1999). When self-efficacy for health management is high, individuals persevere through treatment set-backs, put forth increased effort, set higher goals, and ultimately succeed at managing their health condition (Bandura, 1997). For example, Lorig et al. (2001) demonstrated that individuals who dropped out of a one-year self-management program had lower baseline self-efficacy than those who completed the one year self-management program. This suggested that individuals with higher levels of self-efficacy might be more likely to persevere through long-term rehabilitation. In addition, improving self-efficacy can result in improved healthcare utilization. A single study randomized control trial designed to assess changes in health status and self-efficacy one and two years following a formalized self-management program (Chronic Disease Self-Management Program [CDSMP]) demonstrated improved health outcomes and self-efficacy Lorig et al. (2001). Those who received the CDSMP demonstrated a reduction in health distress, increases in perceived self-efficacy, fewer visits to physicians and hospitals, and improved self-rated health and energy (less fatigue) at one and two years post-baseline (Lorig et al., 2001). The authors concluded that increased self-efficacy, as a result of the self-management program for chronic disease, decreases healthcare utilization. By providing the tools necessary to manage the illness and building the patient’s confidence to manage the disease, self-management programs put the patient, instead of the disease, at the center of the health program and may improve both physical and psychological health outcomes.
Hearing Loss as a Chronic Illness

Based upon the definition of chronic illness outlined by Anderson and Horvath (2004), hearing loss can be classified as a chronic illness. Hearing loss is one of the most prevalent chronic conditions affecting older adults and is an increasingly important public health concern. A population-based Epidemiology of Hearing Loss Study (EHLS) was designed to evaluate the epidemiology of hearing loss in older adults in Beaver Dam, Wisconsin (Cruickshanks et al., 1998). A total of 3,753 individuals participated in the hearing study. The presence of a hearing loss was defined as a pure tone average of thresholds at 500, 1000, 2000, and 4000 Hz greater than 25 dB HL in the worse ear. Overall, the authors found the prevalence of hearing loss for adults between the ages of 43-89 years of age to be 45.9%, and the prevalence increased with age. More recently, Lin, Thorpe, Gordon-Salant, and Ferrucci (2011) examined data collected from the National Health and Nutritional Examination Survey (NHANES) during 2005-2006 for 717 individuals who completed the study. In this study, presence of a hearing loss was defined as the speech frequency pure tone average at 500, 1000, 2000, and 4000 Hz greater than 25 dB HL in the better ear. The prevalence of hearing loss in adults over the age of 70 was 63.1%, and odds of hearing loss increased as age increased. Lin, Thorpe et al. (2011) acknowledged that comparing prevalence of hearing loss across studies is difficult because of varying definitions of hearing loss and different demographic characteristics. While the NHANES sample is weighted and may be a more representative of the United States population, this study had considerably less participants than the EHLS epidemiologic study. Nonetheless, hearing loss is highly prevalent in older adults and cannot be ignored as a common chronic illness.
Impact of Hearing Loss

Hearing loss impairs the exchange of information and can have a significant impact on daily activities (Dalton et al., 2003). Hearing loss does not impact everyone in the same way; it is an individual experience that has a different course for everyone. Despite the various combinations of factors that may influence the type and degree of impact on the individual, hearing loss has been linked to communication deficits, cognitive concerns, social and emotional deficits such as depression, anxiety, and social isolation, and decreased perceived quality of life (Arlinger, 2003; Ciorba, Bianchini, Pelucchi, & Pastore, 2012; Lin, Ferucchi, et al. 2011; Lin, Metter, et al. 2011; National Council on Aging [NCOA], 1999; Oyler, n.d.).

Communication. Type and degree of hearing loss is determined from audiometric threshold testing. However, it has been well established that the challenges faced by people with hearing impairment cannot be explained by the audiogram alone. There is a lack of correlation between an individual’s degree of hearing loss and the perceived difficulty communicating (Erdman & Demorest, 1998; Taylor, 1993). Mulrow et al. (1990) administered the Quantified Denver Scale of Communication (QDS) to individuals with and without hearing loss to measure perceived communication impairment (Tuley, Mulrow, Aguilar, & Velez, 1990). The QDS is a 25-item questionnaire assessing perceived communication difficulties due to hearing loss. Results demonstrated individuals with untreated hearing impairment have significantly greater perceived communication impact than those with hearing loss utilizing amplification. Individuals who receive hearing aids reported significant improvements in communication as early as six weeks post-fit. A more recent study by Bainbridge and Ramachandran (2014) examined cross-sectional data from the National Health and Nutrition Survey (NHANES) from 2005-2006 and 2009-2010. They collected audiometric data including a three-frequency pure
tone average of 500, 1000, and 2000 Hz, and asked the participants to self-rate hearing with and without a hearing aid on a scale from 1 = Excellent to 5 = Have a lot of trouble, or are deaf. The data suggested that 35% of those with a PTA of 35 dB or better reported moderate trouble in self-rated hearing, and 8% of those who reported excellent hearing had a PTA of 35 dB or worse, indicating that individuals self-perception of hearing handicap does not equally match measured audiometric thresholds.

**Psychosocial.** As the WHO ICF framework suggests, hearing loss can impact activities and participation in daily life. Together, these domains can be viewed as overall quality of life such that if activity and participation is greatly affected by hearing loss this leads to overall decreased quality of life. Individuals often report decreased quality of life when asked to report how hearing impairment impacts activity and participation in their life. The Hearing Handicap Inventory for the Elderly (HHIE) is commonly used and is one example of a hearing-related assessment that incorporates questions designed to assess quality of life, specifically the emotional and social adjustment of elderly people (Ventry & Weinstein, 1982). The HHIE-S is a shortened version designed to screen individuals for hearing impairment based upon their responses to the social and emotional subscales (Ventry & Weinstein, 1983). Chew and Yeak (2010) investigated the impact of age-related hearing loss in adults as measured by the HHIE-S questionnaire. These authors found that degree of hearing loss was significantly negatively correlated with HHIE-S scores, meaning individuals with greater hearing impairment reported more negative scores (higher degree of handicap) on the HHIE-S.

These results were consistent with Dalton et al. (2003). Dalton et al. reported nearly 56% of individuals with moderate-severe hearing loss reported hearing handicap as measured by the HHIE-S 80% reported communication difficulties, and 30% reported impaired activities of daily
living (ADLs). Additionally, moderate to severe hearing impairment, self-reported communication difficulties, and HHIE-S scores were all significantly associated with decreased scores on a generic measure of quality of life (Short Form 36). The authors concluded that hearing impairment results in decreased quality of life and increased handicap (Dalton et al., 2003).

Kramer et al. (2002) conducted a study including 167 participants and found that those with hearing impairment had significantly lower self-efficacy and mastery scores, higher amounts of depressive symptoms and loneliness, and a smaller social network than those who had normal hearing.

Finally, the NCOA conducted a large-scale national survey to document the effect of hearing loss and lack of treatment among older Americans with hearing impairment (NCOA, 1999). The goal of this study was to assess the effects of hearing loss on quality of life. A survey of nearly 2,300 hearing impaired individuals found that those who have untreated hearing loss (i.e. do not wear hearing aids) are more likely to report sadness and depression, worry and anxiety, paranoia, less social activity, and emotional insecurity compared to those who have hearing impairment and wear hearing aids. The results of this study are indicative of potential negative effects on quality of life due to untreated hearing loss.

**Cognition.** Hearing impairment may also impact cognition. Lin, Ferucchi, et al. (2011) investigated the link between hearing loss and dementia. Lin and colleagues looked at the audiometric profiles and cognitive state of 639 individuals who participated in the Baltimore Longitudinal Study of Aging (BLSA) from 1990- 2008. The results indicated hearing loss was independently associated with incident dementia, after controlling for sex, age, race, education, diabetes, smoking, and hypertension. Individuals with hearing loss were also at greater risk for
developing dementia later in life, and the risk increases proportionally to degree of hearing loss. Thus, individuals with mild loss were 1.8 times as likely to develop dementia compared to individuals with normal hearing. Individuals with moderate hearing loss were 3 times as likely, and individuals with severe hearing loss were nearly 5 times as likely to develop dementia compared to normal hearing individuals. This study suggested hearing loss is independently associated with dementia; however, it is unclear whether treating hearing loss can prevent or modify incident dementia.

**Self-Management of Hearing Loss**

Like all other chronic illnesses, there is no treatment for most types of hearing loss. Therefore, rehabilitation must focus on providing education and building confidence so the patient has and can use the necessary tools to successfully manage hearing impairment and communication (Cox, 2003; Gagne, Jennings, & Southall, 2014). Self-management skills may help the individual alter his or her communication environment, understand better in background noise, and utilize hearing aids and hearing assistive technology appropriately. Supporting these skills is dependent upon the interaction between the clinician and the patient. These self-management skills cannot be implemented unless the patient feels confident in his or her ability to utilize these skills (Bonsaken et al., 2012).

**Rehabilitation options.** As discussed above, the impact of hearing loss is broad. Rehabilitation interventions must be designed to reduce the functional, social, and emotional effects of hearing impairment. According to Boothroyd (2007) there are several rehabilitation options that can be recommended alone or in conjunction with each other. These options include (1) sensory devices such as hearing aids, (2) cochlear implants, and/or assistive listening devices, (3) instruction in the use of technology and listening environment, (4) auditory and
visual training to improve speech perception and communication, and (5) counseling. Of these options, sensory devices, specifically hearing aids, are most commonly recommended (Weinstein, 1996).

**Hearing aids.** Given that hearing aids are commonly recommended as a rehabilitation option for individuals with hearing impairment, it is expected that hearing aids provide benefit to hearing aid users. This is a complicated issue to address because there are a variety of domains in which hearing aids may be considered beneficial. For example, auditory access, speech understanding, benefit, satisfaction and use of hearing aids, and quality of life with hearing aid use are all domains to consider. Overall, hearing aids have been shown to improve audibility and provide access to sounds (Humes, et al., 1999).

Second, hearing aids have been shown to improve social and emotional well-being and quality of life. A randomized control trial was conducted with 60 veterans both with and without service-connected hearing loss (Yueh et al., 2001). Those with service-connected hearing loss were randomly assigned to receive one of two types of hearing aids, and those without service-connected hearing loss were randomly assigned to receive nothing or an assistive listening device. Quality of life as measured by the (HHIE) and self-rated communication ability as measured by the Abbreviated Profile of Hearing Aid Benefit and the Denver Scale of Communication Function was examined for all participants to determine the impact hearing aids have on quality of life and self-rated communication ability. The group that received amplification had significantly improved quality of life and self-rated communication ability 1 and 3 months following the hearing aid fitting compared to the control group, which received no amplification and did not demonstrate significant differences in scores. The results of this study support amplification improves quality of life and self-assessment of communication.
Prevalence of Hearing Aid Use. Despite the documented benefits of amplification, the statistics on hearing aid ownership and use are bleak. In 2005, Kochkin estimated that approximately six million adults with hearing loss utilize amplification, and 24 million adults with hearing loss do not utilize hearing aids. These numbers were based on the National Family Opinion (NFO) panel, which consists of households that are balanced to the U.S. Census information. Recently, Lin, Thorpe, et al. (2011) reported that the overall prevalence of hearing aid use is approximately 19.1%, with only 3.4% of hearing aid users having mild hearing loss. This prevalence rate is consistent with other epidemiological studies such as the Epidemiology Hearing Loss Study (Beaver Dam Study; Cruishkanks et al., 1998), as well as rates of hearing aid use in the United Kingdom, where hearing aids are free. Bainbridge and Ramachandran (2014) reported that of their sample of individuals from the NHANES study that were eligible for hearing aids (i.e. those who had a better-ear PTA of 35 dB HL or poorer, or a report of moderate trouble hearing, a lot of trouble hearing, or being deaf; n=601), only 33% reported using hearing aids (defined as the individual reporting wearing a hearing aid at least 5 hours a week in the past 12 months).

Gopinath et al. (2011) examined the prevalence of hearing aid ownership and use among 2,015 individuals previously enrolled in the Blue Mountains Study over the age of 55 between the years of 1997-1999 and 2002-2004. Face-to-face questions to all participants included information about hearing, demographic factors, socioeconomic characteristics, and lifestyle factors. The authors found that 24.3% of individuals with any degree of hearing impairment (defined as thresholds poorer than 25 dB HL, bilaterally) owned hearing aids and only 23.4% of this population used hearing aids, and concluded that hearing aid use was relatively low among this population. These numbers suggest that of those who have hearing aids and could benefit
from their use, only a small number are using them regularly and a large number have abandoned these devices.

Overall, prevalence of hearing aid use is low and ranges between 20-30% for individuals with hearing loss. The prevalence estimates vary based upon measurement and definition of hearing loss as well as methodology. Regardless, there is a significant portion of individuals suffering from hearing loss who are not utilizing amplification despite the documented benefits of rehabilitation and treatment for hearing impairment.

**Hearing Aid Outcomes.** Given the low prevalence of hearing aid use, several researchers have tackled the difficult task of examining factors associated with hearing aid outcomes. Measuring hearing aid outcome can be done in two ways: (1) subjectively and (2) objectively. Subjectively, hearing aid outcomes can be determined by individual reports of hearing aid use, benefit, and satisfaction. Objectively, hearing aid outcomes can be determined by measuring aided speech perception benefit, hearing aid use via datalogging, and objective ability to perform basic hearing aid skills.

In 2010, Knudsen, Obeg, Nielsen, Naylor, and Kramer conducted a systematic review of 39 published studies to investigate the factors associated with help-seeking, uptake, use of, and satisfaction with hearing aids. Overall, they identified 31 variables important to these at various stages of the hearing aid process. Two non-audiological factors were consistently found to be associated with successful outcomes defined as use of hearing aids: positive pre-fitting attitudes towards hearing aids and higher levels of self-reported hearing difficulties. In addition, they examined a handful of factors related to hearing aid use that were investigated in two or fewer studies. Anecdotally they noted self-efficacy to be one factor warranting more research attention.
More recently, three studies have shed light on factors that may be related to use and non-use of hearing aids. McCormack and Fortnum (2013) conducted a retrospective analysis of ten studies published since the year 2000 that reported on any reason for the non-use of hearing aids. The authors aimed to identify all the possible reasons for non-use of hearing aids among individuals with hearing loss who have been fitted with a hearing aid. The most common reasons cited for non-use of hearing aids were related to the care and maintenance of the hearing aid and manual dexterity, as well as lack of knowledge on how to insert/remove them correctly (McCormack & Fortnum, 2013). A qualitative study conducted by Kelly et al. (2013) aimed to explore older adults’ perceptions of and experiences with new hearing aid use and to identify what they believed would enable them to successfully adjust to wearing a hearing aid. The authors surveyed 154 new and long-term hearing aid users on their views regarding the amount of instruction, practical help and support during the process of receiving a hearing aid. Following this survey, semi-formal interviews were conducted for eight focus groups to further examine the issues identified from the survey. Results from the survey revealed 59% (n= 90) of respondents did not feel they received enough practical help and support to use the hearing aid after the hearing aid fitting. Over one-third (36%; n= 52) of respondents reported they did not feel confident using their hearing aids or using the controls on the aid. Interestingly, these results were consistent among new and long-term hearing aid users. Key findings from the eight follow-up focus groups revealed the informational needs and follow-up support for use of hearing aids are not being met. Topics most frequently discussed in the focus groups included requesting more information about how and when to wear the hearing aids, how to perform hearing aid cleaning including how to clean the aid and tubing, dealing with condensation, and caring for or changing batteries, how to troubleshoot devices when they stop working, and what
to do when the there are difficulties inserting the earmold and changing the battery. Overall, the authors concluded the participants did not feel they received enough information both pre- and post-hearing aid fitting on device use and management. Patients who do not have enough information may lack the confidence to perform these skills and this could have potential negative effects on hearing aid outcomes.

A recent study by Hong et al. (2014) surveyed 81 hearing aid users who returned their hearing aids within 3 months of obtaining them. The authors divided reasons for returning hearing aids into two categories: problem relating to hearing aids and problem relating to the patient. Overall, the largest reasons for non-use and/or hearing aid return was ineffectiveness and listening in noise (32% and 33.4%, respectively). The largest reason for problems relating to the patient was difficulty managing the hearing aids (9.8%). The authors concluded that hearing aid return rates may be reduced by proper follow up measures including rehabilitation and education to help solve problems, and allow patients to adapt to hearing aids (Hong et al., 2014).

Lastly, Hickson, Meyer, Lovelock, Lampert, and Khan (2014) investigated factors related to hearing aid success, defined as minimum of one-hour daily hearing aid use and at least moderate benefit in self-identified communication situation. Significant non-audiologic factors related to successful hearing aid users included attitude towards hearing aids, perceived hearing handicap, and self-efficacy for advanced handling of hearing aids. Specifically, individuals who had positive attitudes towards hearing aids and higher levels of self-efficacy were more likely to be successful hearing aid owners. Unsuccessful hearing aid users were asked why they did not use their hearing aids, and 18% reported they had difficulty managing or adjusting to a hearing aid.
Non-Device Related Factors Influencing Use and Non-Use of Hearing Aids. The literature suggests elderly adults commonly experience visual decline and manual dexterity issues, the latter of which is most commonly from arthritis. Ward, Schiller, & Goodman estimate that 50 million adults in the United States (1 in 5) report having doctor-diagnosed arthritis. The self-reported occurrence of vision loss in adults 65 years of age and older is 3.1 million, or 17% (Weber & Wong, 2010). Both of these numbers are expected to rise as the aging population increases. Vision status and manual dexterity are important factors to consider when discussing adult hearing aid users. Over the last several years, hearing aids have undergone drastic changes both technologically and cosmetically (Singh, 2009). While the miniaturization of hearing aid size has aimed to address stigma as one barrier to uptake and use of hearing aids the smaller devices cause more concern for hearing aid handling ability for elderly adults (Knudsen et al., 2010; Singh, 2009). There are many hearing aid related activities that involve a number of motor tasks as well as adequate vision ability (Hickson et al., 2014; Humes, Wilson, & Humes, 2003; Singh, 2009). Examples of these tasks include insertion and removal procedures, pressing buttons, rotating wheels, and flipping toggles to make adjustments to the sound, coupling boots and wires, and cleaning procedures such as changing wax guards, and changing receiver tips and batteries (Singh, 2009). Studies have demonstrated that manual dexterity and vision impairment do in fact impact hearing aid use, performance, and satisfaction (Hickson, Hamilton, and Orange, 1986; Humes et al., 2003; Kumar, Hickey, & Shaw, 2000).

Manual dexterity. Kumar et al., 2000 examined manual dexterity as it relates to self-rated hearing aid performance and satisfaction. Thirty hearing aid users were administered the Purdue Pegboard Test, a measure of fine hand and finger dexterity, as well as a modified version of the Hearing and Assessment Questionnaire, to measure self-rated hearing aid performance and
satisfaction (Brooks, 1989; Desrosiers, Herbert, Bravo, & Dutil, 1995). The results demonstrated a large correlation ($r = .80$) between scores on the Purdue Pegboard test and hearing aid satisfaction, and moderate positive correlation ($r = .60$) between scores on the Purdue Pegboard test and hearing aid performance. The authors concluded manual dexterity is related to self-rated hearing aid performance and satisfaction; however, it was noted that this relationship may be associated with behind-the-ear hearing aids only. It is possible that dexterity also impacts hearing aid return rates. Humes et al., 2003 examined manual dexterity in 76 adult hearing aid candidates split into three groups classified as nonadherents, participants who rejected hearing aids, and participants who accepted hearing aids. Each participant underwent a test battery including the 9-Hole peg test, designed to measure the time it takes for participants to place nine small pegs on a pegboard (Mathiowetz, Allegrante, & Lorig, 1985). While there were no significant differences on a test of manual dexterity between the three groups, the group who accepted hearing aids had higher scores on the 9-Hole peg test than those who rejected hearing aids. Knudsen et al. (2010) completed a comprehensive literature review of several factors related to hearing aid uptake, use, and satisfaction. Of the 17 studies reviewed, three investigated the role of manual dexterity in relationship to uptake and use of, and satisfaction with hearing aids. A study by Hickson et al., 1986 observed that difficulty handling the hearing aids was associated with infrequent hearing aid use, and Wilson and Stephens (2003) reported a positive association between manual dexterity and satisfaction. However, the latter of the two studies measured dexterity as perceived by the audiologist, which may not be a reliable measure (Knudsen et al., 2010). Overall, it appears manual dexterity may be related to hearing aid use of, performance, and satisfaction with hearing aids.
**Vision.** Vision impairment in older adults has been shown to compromise the ability to carry out routine daily activities such as read the newspaper, recognize facial expressions, and perform tasks necessary for day-to-day function. The inability to perform such functions can impair social roles and decrease quality of life (Crews & Campbell, 2004). In an effort to examine the role dual sensory impairment (i.e. both vision and hearing impairment) plays on individuals’ ability to perform daily activities, Crews and Campbell (2004) examined the likelihood of activity limitations and social participation of adults over the age of 70 with hearing loss only, vision loss only, and dual sensory loss. Individuals with both hearing and vision impairment were 4 times as likely to have difficulty taking medication, and 9 times as likely to have difficulty using a telephone compared to individuals without sensory impairments. This study demonstrated how vision impairment impacts a person’s ability to manipulate small objects such as medication, which typically consists of small pills. This can be extrapolated to hearing aid use such that most hearing aids have small components that are difficult to see and handle. While vision has been suggested to play an important role in the management of hearing aids, no studies have empirically documented the exact relationship (Saunders & Echt, 2007).

**Summary of factors.** The literature suggests there are several factors related to the use and non-use of hearing aids. Several reasons for non-use of hearing aids reported were related to the operation, management, and care of the hearing aids. For example, many hearing aid users reported difficulty inserting hearing aids, changing batteries, cleaning hearing aids, and troubleshooting. It can be argued that if an individual does not feel he or she has the knowledge to perform this task, perhaps they do not feel confident in performing this task, and thus they are not using the devices. Lastly, vision loss and manual dexterity issues may play a role in the
management of hearing aids as an individual’s ability and confidence in using the devices is impacted by sensory skills.

**Self-Efficacy**

Self-efficacy is a topic that has been and continues to be a widely studied concept in a variety of fields including psychology, academics, sports, and health. Self-efficacy involves people’s perceptions of how capable they believe they are of successfully performing a behavior. Self-efficacy is one component of Albert Bandura’s social cognitive theory (SCT; Bandura, 1977). SCT is based on the idea that individuals learn by observing others. SCT argues that cognition contributes to actual behavior, in opposition to social psychologists who argue that the environment one grows up in contributes to behavior. Specifically, self-efficacy is the “belief in one’s capability to organize and execute the courses of action required to manage prospective situations” (Bandura, 1997; 2004). Self-efficacy can be distinguished from intentions because intentions involve a willingness to do a behavior, whereas self-efficacy involves belief that one can do a behavior (Bandura, 1997). It is not merely perceived capability to carry out the necessary motor response, but involves perceived capability to perform the behavior in the context of competing demands and impediments. Self-efficacy plays a major role in how goals, tasks, and challenges are approached, thus affecting individual’s choices, amount of effort they will expend on a task, and the length of time they will persist in the face of obstacles. Bandura argues that individuals with high confidence are more likely to perceive difficult tasks as challenges to be overcome rather than threats to be avoided. Individuals who doubt their capabilities will avoid difficult tasks, have low aspirations, and give up quickly.

According to Bandura (1997), there are four major sources of self-efficacy: mastery experiences, social modeling, social persuasion, and psychological responses (Bandura, 1977).
Mastery experiences provide the individual with evidence that they can succeed. Once successful completion of a task has been achieved numerous times, the task is mastered and self-efficacy is likely to increase. The negative impact of occasional failures is likely to decrease. Mastery experience is believed to be the most effective way of creating a strong sense of self-efficacy. Vicarious experience involves observing others similar to the individual achieving success on similar tasks. These models transfer knowledge and strategies for managing difficult tasks. Verbal persuasion is a third way of strengthening self-efficacy. This concept centers on the fact that receiving positive feedback and encouragement promotes the development of skills. The last source of self-efficacy focuses on the individual’s psychological state and addressing anxiety and stress associated with an activity. The goal is to reduce stress reactions and negative emotions (Bandura, 2004).

Self-efficacy can be broken down into two types: general levels of self-efficacy and task specific levels of self-efficacy. General self-efficacy assesses a broad and stable sense of personal competence to deal effectively with a variety of stressful situations and is an individual’s perception of his or her ability to perform across a variety of different situations (Chen, Gully, & Eden, 2001; Judge, Erez, & Bono 1998; Sherbaum, Cohen-Charash, & Kern, 2006). In the health domain, it can be used to assess perceived ability to manage a complex set of adherence behaviors (i.e. diabetes management). Self-efficacy measured in a specific domain examines an individual’s perception of his or her ability to perform the actions specific to a situation.

Bandura (2006) argues that perceived self-efficacy is dependent upon context and situational demands and emphasizes the importance of measuring task-specific self-efficacy levels in order to obtain an accurate picture of one’s confidence in their ability to complete a task.
or skill. Many researchers have taken this to mean self-efficacy must be measured within a situation specific context. However, there are some researchers who argue that more general measures of self-efficacy should be utilized as one’s experiences in life may influence overall self-efficacy beliefs that may influence more specific tasks.

Rapley and Fruin (1999) lobby for application of the self-efficacy framework to the self-management of a complex chronic illness health-care program. Self-efficacy theory must account for initial and ongoing phases of a multitask self-management regimen. Research outcomes that have one task or behavior change as a focus cannot warrant generalization to the complex regimen situation. Complex regimens involve multiple tasks, each with its own self-efficacy belief and expectation. These authors argue that in the case of more complex care, a more general sense of self-efficacy is important at the start, while task-specific efficacy is of more importance later. Task specific efficacy beliefs may initially be low and increase as the person persists and masters the various new skills and behavior changes. If this were the case, it could be that the high sense of general self-efficacy is acting to mediate the relationship between initial behavior change efforts and the development of task-specific efficacy expectations. When complex rehabilitation programs require the individual to master multiple tasks and skills, it is unreasonable to assume self-efficacy levels for one task will generalize to all other tasks. In addition, the argument can be made that if self-efficacy levels are being measured initially for a task that an individual has never completed, that individual has no reference to make self-efficacy judgments.

Sherer and Maddux (1982) argue that general self-efficacy positively influences task-specific self-efficacy across tasks and situations. There is evidence that general self-efficacy and task-specific self-efficacy are positively correlated (Sherer & Adams, 1983). In essence, when
an individual has high self-efficacy across a variety of tasks and situations, this tends to infiltrate to task specific situations (Chen et al., 2001; Sherer & Adams, 1983). Sherer and Maddux (1982) argue that those individuals with high GSE will succeed at more task-specific domains because the task-specific self-efficacy will be higher. Despite these findings, many researchers continue to focus only on task-specific self-efficacy and tend to ignore general self-efficacy.

It is possible there is an underlying fundamental internal measurement the individual is making to judge their self-efficacy. Sherer & Maddux (1982) argue, “an individual’s experiences with success and failure in a variety of situations should result in a general set of expectations that the individual carries into new situations” (p. 664). Rapley and Fruin (1999) believe efficacy beliefs specific to a particular task or behavior develop over time and therefore for the initial period after diagnosis of a chronic illness, a more global measure of self-efficacy may give the clinician an idea about the individual’s view on life’s challenges in general. The measurement of general self-efficacy may aid the clinician in addressing challenges to the individual’s rehabilitation.

Ultimately, there is a juxtaposition regarding the measurement of self-efficacy. Bandura argues for a more task-specific measurement of self-efficacy while other researchers argue that general self-efficacy may have a more appropriate place in the health rehabilitation field. There is some evidence to suggest that general self-efficacy influences task-specific self-efficacy which may prove useful in the clinical realm.

**Self-Efficacy in Audiology**

The literature supports a link between self-efficacy and successful self-management of chronic illness. Given that hearing loss is classified as a chronic illness, it is worthwhile to investigate the relationship between self-efficacy and the management of hearing aids.
However, just a few researchers have suggested self-efficacy may play a role in the outcomes of patients with hearing impairment, and even fewer have empirically examined self-efficacy related to management of hearing loss (Carson & Pichora-Fuller, 1997; Jennings, 2005; Kricos, 2000, West & Smith, 2007). Support for why self-efficacy is important to investigate is clearly outlined in the three recent studies discussed (Hong et al., 2014; Kelly et al., 2013; McCormack & Fortnum, 2013. These studies demonstrated that individuals frequently expressed uncertainty in performing the new skills they are learning. Indeed, in a clinical setting it is not uncommon for clinicians to hear “I am uncomfortable asking people to repeat themselves”, or “I am unsure what to do for that situation” (Smith & West, 2006). Patients expressing low confidence are at risk of being unsuccessful at the skills or behaviors they are trying to accomplish. Increasing confidence in audiologic rehabilitation skills may result in more successful management of hearing loss in everyday life.

Few researchers are examining the link between self-efficacy and hearing, and most of this research is focused on the development of measures to assess perceived self-efficacy for a variety of hearing related tasks. For example, West and Smith (2007) developed the Measure of Audiologic Rehabilitation Self-Efficacy for Hearing Aids to assess perceive self-efficacy to manage hearing aids. These authors found that new hearing aid users demonstrated lower levels of self-efficacy for advanced hearing aid skills such as using the telecoil and troubleshooting hearing aids compared to experienced hearing aid users. However, the authors note these differences were small and they need further examination to determine clinical significance. Jennings (2005) developed the Self-Efficacy for Situational Communication Management Questionnaire (SESMQ) to measure the effectiveness of a group audiologic rehabilitation program on perceived self-efficacy to communicate in everyday listening environments for
adults with hearing impairment. In addition, Jennings (2005) examined the relationship between perceived self-efficacy and goal-setting in the same participant group. Jennings (2005) found that those with medium levels of perceived self-efficacy in the self-efficacy targeted group audiologic rehabilitation program received the greatest increase in goal-attainment and strategy use for communicating in listening environments. Smith, Pichora-Fuller, Watts, and More (2011) developed the Listening Self-Efficacy Questionnaire (LSEQ), designed to assess perceived self-efficacy for listening. Lastly, Smith and Fagelson (2011) developed the Self-Efficacy for Tinnitus Management Questionnaire to assess an individuals self-efficacy to manage their tinnitus.

There is some evidence to suggest that hearing aid self-efficacy influences the decisions older adults make with respect to their hearing health care and their success with hearing aids. It has been suggested that many older adults with hearing impairment have low levels of confidence in their ability to use hearing aids. Hickson et al. (2014) found that hearing aid self-efficacy was found to be one factor that influenced older adults’ decisions to consult a health professional about hearing impairment, obtain hearing aids, and achieve successful outcomes with hearing aids. Older adults who possessed both a positive attitude towards hearing aids and greater confidence in their ability to manage the more advanced features of a hearing aid were also more likely to report a successful outcome with hearing aids. What is less clear is why levels of self-efficacy vary among adults with hearing impairment. Meyer, Hickson, & Fletcher (2013) investigated the barriers and facilitators to achieving optimal hearing aid self-efficacy using the MARS-HA and found that a different combination of factors influenced the different domains of hearing-aid self-efficacy, and these varied according to whether participants did or did not own hearing aids. For example, non-hearing aid owners reported higher levels of self-efficacy for
adjustment to hearing aids if they had lower levels of anxiety and reported experiencing hearing loss for a longer duration. However, hearing aid owners were likely to report higher levels of self-efficacy for adjustment to hearing aids if they reported greater outcomes with hearing aids (as defined as wearing hearing aid at least one hour per day and reporting moderate benefit from hearing aids in one listening situation).

In summary, there are four questionnaires designed to assess self-efficacy to perform very specific hearing related tasks. The development of these questionnaires is a gateway into further research surrounding self-efficacy and hearing. However, the assessment of self-efficacy in a variety of task-specific domains is not clinically feasible or efficient. As noted previously, the number of individuals with hearing impairment is rapidly increasing, placing a greater demand on hearing healthcare professionals and audiologists to see more patients. While it is acknowledged that self-efficacy may be important to rehabilitation outcomes, administering several self-efficacy questionnaires is not realistic. In addition, general measures of self-efficacy have not been examined within the audiologic rehabilitation literature, and its relationship with task-specific measures of self-efficacy are unknown.

Statement of Problem

Self-efficacy has been identified as an important component of successful self-management, and has been linked to improved health outcomes in a variety of health domains. In audiologic rehabilitation, self-efficacy has been acknowledged as an important factor to investigate in relation to hearing aid management and successful outcomes with hearing aids. However, at this time self-efficacy has received little attention in the audiologic literature. The few studies that have examined self-efficacy and hearing have utilized only task-specific measures of self-efficacy. However, the necessity of general measures of self-efficacy can be
argued as more general measures of self-efficacy draws upon past success and failure in order to formulate a self-efficacy judgment that impacts multiple tasks. In addition, a single general measure of self-efficacy may be more clinically efficient. However, it is unknown whether general or task-specific measures of self-efficacy are related or if they predict hearing aid outcomes. In addition to self-efficacy, self-reported hearing aid experience and use, hearing loss, speech understanding, vision, and manual dexterity are all of interest in their relationship to self-efficacy and hearing aid outcomes. The purpose of this research study was to compare general and task-specific measures of self-efficacy in adult hearing aid users, to determine the relationship between several variables and self-efficacy and hearing aid outcomes, and to determine if self-efficacy can predict successful outcomes on measures of basic hearing aid skills.
Chapter II: Research Questions

1) Is there a relationship between general self-efficacy and hearing aid self-efficacy among participants?
   a. It is hypothesized that general and task-specific measures of self-efficacy will be significantly positively correlated.

2) Is there a relationship between self-efficacy and demographic variables such as age, gender, education level, degree of hearing impairment, hearing aid use, hearing aid experience, self-reported vision impairment, and fine motor control?
   a. It is hypothesized that there will be a significant correlation between general and hearing aid self-efficacy and demographic variables.

3) What predicts hearing aid self-efficacy?
   a. It is hypothesized that general self-efficacy will be a significant predictor of hearing aid self-efficacy.

4) Do general and/or hearing aid self-efficacy predict actual ability of hearing aid management?
   a. It is hypothesized task-specific self-efficacy will be a significant predictor of hearing aid handling skills.
Chapter III: Methodology

This study was a quantitative prospective research design targeted to measure general and task specific levels of self-efficacy in adult hearing aid users and to compare these results to each participant’s ability to perform a variety of hearing aid skills. The University of Connecticut-Storrs Institutional Review Board (IRB) approved all study procedures.

Participants

Forty adult hearing aid users (20 female, 20 male) between the ages of 55 and 89 were recruited from the local and surrounding communities for this study. The average age of participants was 74.23 years with a standard deviation of 7.78 years. A sample size of 40 was chosen to achieve a medium effect size of .30 with 93% power. Participant inclusionary criteria is as follows. All participants had bilateral, symmetrical mild hearing loss at 250 through 1000 Hz sloping to moderately-severe hearing loss at 2000 through 8000 Hz. The three-frequency pure tone average (defined as the average of thresholds at 500, 1000, and 2000 Hz) was 39.60 dB HL and 39.83 dB HL for the right and left ears, respectively. Participants were cleared of obvious cognitive impairment as measured by a score of 23 or greater on the Mini Mental Status Examination ([MMSE]; Folstein, Folstein, & McHugh, 1975; Hickson, 2012), and were free of debilitating hand, finger, and/or arm function as measured by an average of 3 or lower on the Arthritis Impact Measurement Scale-2 (Meehan, Gertman, & Mason, 1980). The MMSE and the AIMS-2 are included in Appendices A and B.

Materials

Several standardized questionnaires and functional measures were used in this research protocol and are described below.

Questionnaires.
**General Self-Efficacy Scale (GSE).** The GSE scale is designed to assess a general sense of perceived self-efficacy (Schwarzer & Jerusalem, 1995). This measure has been adapted for use in 25 countries and is used widely across health fields (Sholz, Dona, Sud, & Schwarzer, 2002). It is suitable to use for patients with chronic pain or those in a rehabilitation program, and is easy to administer and score. There are 10 questions and each response is scored on a four-point scale: 1= not at all true and 4= exactly true. This measure is available in Appendix C. The instrument is scored by summing each of the 10 items to obtain a final composite score between 10 and 40. Lower scores indicate lower general self-efficacy and higher scores indicate higher general self-efficacy. The scale is self-administered and takes approximately five minutes to complete.

**Measure of Audiologic Rehabilitation Self-Efficacy for Hearing Aids (MARS-HA).**

The MARS-HA is a clinical tool for understanding how individuals assess their hearing aid skills, and is a domain- and task- specific measure of hearing aid self-efficacy (West & Smith, 2007). This tool was developed to address lack of hearing aid use, and was designed to measure the confidence that individuals have in their abilities to care for and to use their hearing aids in various listening situations (West & Smith, 2007). The MARS-HA is a self-report instrument consisting of 25 questions designed according to Bandura’s (2006) guidelines for measuring self-efficacy. The questionnaire items are divided into four subscales: basic handling (i.e. hearing aid insertion/removal); aided listening (i.e. telephone use), adjustment (i.e. own voice issues), and advanced handling (i.e. troubleshooting). Each question directly asks individuals to report whether they feel they have the capability to perform actions or obtain particular outcomes in the future. The test is administered in paper-and-pencil format. According to the authors of this test, respondent instructions are as follows: “(1) These questions ask about your ability to do certain
activities with a hearing aid, and they also ask about your ability to hear in certain situations. (2) If you have never been in these situations, then make your best guess about how well you could do. (3) Given what you know right now, indicate how confident you are that you could do the things described here” (West & Smith, 2007). The response scale is a 0-100, 10-unit interval scale, where “0%= cannot do this at all and 100%= I am certain I can do this. A higher score indicates higher perceived self-efficacy. See Appendix D for the specific questions and response scale. Results from West and Smith (2007) show that the MARS-HA has strong validity and reliability and is a useful tool for understanding how individuals assess their hearing aid skills.

**The National Eye Institute Visual Function Questionnaire- 25 (NEI- VFQ-25).** The NEI-VFQ-25 is a measure of self-reported visual function (Mangione et al., 2001). The survey measures the influence of visual disability and visual symptoms on generic and task-oriented health domains related to daily visual functioning. The NEI-VFQ-25 is self-administered and takes approximately 10 minutes to complete. This questionnaire generates several vision-targeted subscales. In the current study, the global vision rating and difficulty with near vision activities were the two subscales of interest. This instrument is provided in Appendix F.

Participants were instructed to read a series of statements, which involve vision or feelings they may have regarding their visual condition. They chose the response that best described their situation. Individuals were instructed to answer the questions as if they were wearing glasses or contact lenses (if any).

The subscale scores are calculated by summing the relevant items and transforming the raw scores into a 0- 100 scale. Each item is then converted to a 0-100 scale so that the lowest and highest possible scores are set at 0 and 100 points, respectively. Higher scores indicate better self-reported visual functioning or well-being. Scores represent the average for all items.
in the sub-scale that the participant answered. A composite score is calculated by averaging the sub-scale scores, excluding the general health rating. Averaging the sub-scale scores rather than the individual items gives equal weight to each sub-scale, whereas averaging the items would give more weight to scales with more items. For some sub-scales, a response option includes “does not perform the activity because of reasons that are unrelated to vision”. In this case, this is coded as a missing value, and is not included in the average score for that particular subscale. Therefore, if the participant is missing one of the items, the person’s score for that subscale will be equal to the average of the remaining non-missing items.

**Functional measures.**

**9-Hole Peg Test.** The 9-Hole Peg Test is a simple, quick test of finger dexterity used often by occupational therapists (Mathiowetz et al., 1948). The test consists of a square board with 9 holes spaced equally apart, and 9 wooden pegs equal in diameter and length. The pegboard is centered in front of the participant, with the pegs placed in the container next to the board on the same side as the hand being tested. The examiner instructs the participant to pick up the pegs one at a time, using the right (or left) hand only and put them into the holes in any order until all the holes are filled. They are then instructed to remove the pegs one at a time and return them to the container. The participant is allowed to stabilize the pegboard with the hand that is not in use. The test is scored by the amount of time it takes for the participant to complete the task. The examiner begins the stopwatch as soon as the first peg is picked up by the participant and stops the stopwatch as soon as the last peg hits the container. The higher the score, the longer it took the participant to complete the task. Three trials were administered for each hand. The first trial was the practice trial and was excluded from the final score. The remaining two trials were averaged together, as suggested by Humes et al. (2003) and
Mathiowetz et al. (1984). This was done to reduce any practice effects. The dominant hand was the only hand tested.

**Performance-Perceptual Test (PPT).** The PPT examines both objective and subjective dimensions of speech understanding with the same test materials (the HINT sentences), same testing format, and gives results in the same unit of measurement (Saunders & Cienkowski, 2002). Two conditions are measured: a ‘Performance’ reception threshold for speech and a ‘Perceptual’ reception threshold for speech. The signal-to-noise ratio (SNR) difference between these two conditions is computed to determine the Performance-Perceptual Discrepancy (PPT-DIS). For the performance condition, participants were asked to repeat back each sentence. The score is the SNR at which the participant understands 50% of the material. The higher the SNR, the more intense the sentence had to be for the participant to understand half of the sentence material. For the perceptual condition, participants were asked to say “yes” if they understood the entire sentence, “maybe” if they understood some of the sentence, and “no” if they did not understand any of the sentence. The result is the SNR at which listeners perceive that they can “just understand 50% of the speech material”. The higher the SNR, the more intense the sentence had to be just understand half of the speech material. For each condition, two lists of ten sentences each (twenty sentences total) from the HINT were presented in the presence of background noise. The sentences presented for each condition were randomized. The steady-state background noise was presented at 65 dBA, and the initial level of the speech was presented 4 dB above the level of the noise. The intensity level of the speech increased or decreased for correct or incorrect responses respectively for the first four sentences. The adaptive step-size was 2 dB for the remaining sixteen sentences. The scores were the SNR thresholds.
**Practical Hearing Aid Skills Test-R (PHAST-R).** The PHAST-R is an objective measure of a hearing aid user’s ability to perform tasks that are representative of critical hearing aid use and care functions (Desjardins & Doherty, 2009; Doherty & Desjardins, 2012). This instrument was originally designed to compare hearing aid user’s self-reported ability and their actual measured ability to perform basic hearing aid skills (Desjardins & Doherty, 2009). It requires hearing aid users to perform eight common hearing aid skills covering the following skills: (a) inserting the battery, (b) removing the hearing aid, (c) opening the battery door (d) changing the hearing aid battery, (e) cleaning the hearing aid, (f) manipulating the volume control, (g) using the telephone, (h) using the hearing aid’s directional microphone or noise program. See Appendix E for each of the eight specific questions. Each of the eight tasks are broken down into necessary actions required to perform the task, and each is scored upon the individual’s ability to perform these specific actions described below. The score is calculated as a percent correct, with 100% indicating the participant was able to perform all required hearing aid tasks. If a question on the PHAST-R was not applicable for a participant, the question was eliminated from scoring and the raw score was calculated based upon how many questions the participant got correct out of seven questions (opposed to eight questions). The individual’s hearing aid settings were verified by the first examiner in NOAH v4 to ensure the correct scoring.

The PHAST-R was administered face-to-face by an examiner. Items including a telephone, batteries, magnetic tool, cleaning brush, cleaning cloth, and wax loop were placed in front of the participant. The examiner asked the participant to complete each of the eight items on the PHAST-R. Each PHAST-R session was video recorded for off-line analysis by a second examiner. For this study, two independent examiners judged the participants’ actions based on a
3-point scale (e.g. 2= performs with no difficulty, 1= performs with some difficulty, 0= cannot perform the task). The first examiner scored the test at the time of administration. The second examiner viewed the video recording of the test and independently scored the PHAST at a later date. The inter-rater reliability between the two examiner’s scores was \( r = .92 \); therefore, an average of the two scores was included in data analysis. The PHAST-R is scored percent correct with a maximum score of 100% indicating the participant completed each hearing aid skill successfully and with no difficulty. If a particular skill was not applicable to the participant’s hearing aid, the question was eliminated and the raw score was calculated out of the remaining applicable questions.

**Procedure**

All subjects were screened prior to their participation in the study to ensure they met the study inclusion criteria. All participants underwent an otoscopic evaluation, a pure tone audiometric assessment, and completed the MMSE and the AIMS-2. Otoscopy was conducted for each participant prior to audiometric testing. Pure tone air- and bone- conduction thresholds as well as the PPT were performed in an Industrial Acoustics Company (IAC) sound chamber. Pure tone air- and bone- conduction thresholds were obtained using the Modified Hughson-Westlake method with a GSI-10 audiometer under TDH-49 headphones for pure tone air conduction thresholds, and with a bone oscillator for pure tone bone conduction thresholds (American National Standards Institute standards, 2004). The PPT was performed in the soundfield at 0° azimuth. Both speech and noise were presented through a speaker from which the participant was seated three feet away. The sentences were routed from a DELL computer through a GSE 16 audiometer. The intensity of the noise stayed constant at 65 dBA and the intensity of the sentences were increased or decreased depending on the participant’s response.
via the intensity dial on the audiometer. Finally, the MMSE and AIMS-2 were administered. Participants were excluded from this study if they did not meet the audiometric criteria, scored lower than 23 points on the MMSE based on the work of Hickson and colleagues (2012), or averaged greater than three on the AIMS-2 (i.e. average of four or five). The minimum, maximum, mean, and standard deviation values for the MMSE and AIMS-2 are displayed in Table 1.

Data Analysis

A Pearson Product Moment Correlation was conducted to determine if there was a relationship between general self-efficacy, task-specific self-efficacy, and all variables measured. A series of four separate regression analyses were conducted in order to determine what factors predict self-efficacy for hearing aids overall, basic hearing aid handling skills, advanced hearing aid handling skills, and aided listening with hearing aids. The independent variables for each regression analysis were chosen based upon which variables were significantly correlated with the dependent variable. A regression analysis was not completed for self-efficacy for adjustment to hearing aids as no variables were significantly correlated with this measure. Lastly, a regression analysis was conducted to determine if self-efficacy predicts objective ability to manage hearing aids.
**Table 1**

*Mini-Mental Status Examination (MMSE) and the Arthritis Impact Measurement Scale-2 (AIMS-2) Results*

<table>
<thead>
<tr>
<th>Value</th>
<th>MMSE</th>
<th>AIMS-2</th>
</tr>
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<tbody>
<tr>
<td>Minimum</td>
<td>25</td>
<td>1.00</td>
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<tr>
<td>Maximum</td>
<td>30</td>
<td>2.42</td>
</tr>
<tr>
<td>Mean</td>
<td>29</td>
<td>1.38</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1</td>
<td>0.43</td>
</tr>
</tbody>
</table>
Chapter IV: Results

Research Participant Demographics

On average, participants had a mild sensorineural hearing loss from 250 Hz through 1000 Hz sloping to moderately-severe sensorineural hearing loss from 2000 Hz to 8000 Hz, bilaterally. The mean right and left ear hearing thresholds from 250 to 8000 Hz of all participants are displayed in Figure 1. There were significant correlations between age, gender, and thresholds among participants and significant correlations can be viewed in Table 2. A one-way ANOVA revealed males had significantly poorer hearing thresholds than females at 2000 Hz ($F = 5.37$, $p = .023$), 4000 Hz ($F = 43.05$, $p = .000$), and 8000 Hz ($F = 6.78$, $p = .011$). This data is displayed in Figure 2. These trends are consistent with the literature (Argrawal, Platz, & Niparko, 2008; Cruickshanks et al., 1998).

Figure 3 displays education level completed for all participants. Self-reported education level was split into three groups: (1) high school education, (2) undergraduate education, and (3) graduate education. Twenty percent of participants had a high school diploma ($n=8$), 30% had some college education or a bachelor’s degree ($n=12$), and 50% had some graduate schooling, or a masters or doctoral degree ($n=20$). Given that approximately 80% of this sample had some college education or beyond, and 45% alone had a masters or doctoral degree, the sample may be skewed due to enrollment of highly educated participants.

Figure 4 displays hearing aid styles for all participants. Hearing aid styles varied between behind-the-ear (BTE), including traditional BTE with earmold, receiver-in-the-ear (RITE), and open fit, and custom devices including in-the-ear (ITE) and in-the-canal (ITC). The majority of the devices (67.5%) were newer style BTE hearing aids (open fit hearing aids, slim-tube hearing aids, and receiver-in-the-ear hearing aids). Traditional BTE comprised 12.5% of
Figure 1. Mean audiometric thresholds. Error bars represent 1 standard deviation.
Table 2

**Correlations between Age, Gender, and Audiometric Thresholds**

<table>
<thead>
<tr>
<th>Variable</th>
<th>2000</th>
<th>4000</th>
<th>8000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.213</td>
<td>.367*</td>
<td>.459**</td>
</tr>
<tr>
<td>Gender</td>
<td>-.254*</td>
<td>-.596**</td>
<td>-.283*</td>
</tr>
</tbody>
</table>

Note. * indicates significant correlation at the p = .05 level.
** indicates significant correlation at the p = .01 level.
Figure 2. Mean audiometric thresholds collapsed across ear for males and females. Error bars represent 1 standard deviation. Significant differences were found between male and female thresholds at 2000 Hz ($p = .023$) 4000 Hz ($p = .000$), and 8000 Hz ($p = .011$).
Figure 3. Highest education level completed.
Figure 4. Proportion of Hearing Aid Style.
the hearing aids in this study, and the remaining 20% were custom devices. Thirty-eight of the participants wore bilateral hearing aids, one participant wore a right hearing aid only, and one participant wore a left hearing aid only.

Table 3 displays self-reported current and lifetime experience with hearing aids, as well as average hearing aid use on a daily, weekly, and monthly basis. Experience with hearing aids was measured two ways: total lifetime experience with amplification and total experience with current hearing aids. There were no significant differences between total experience with hearing aids and experience with current hearing devices between ears, thus an average was calculated for both reports of hearing aid experience. On average, participants had 4.83 total years of experience with amplification (SD: 5.17 years). With current hearing devices, participants had an average of 1.70 years experience with hearing aids (SD: 1.70 years). Participants wore amplification an average of 9.39 hours per day (SD: 5.23), 5.99 days per week (SD: 1.94), and 25.23 days of the month (SD: 8.91).

Test Measures

9-Hole Peg Test. All participants completed the 9-Hole peg test with the dominant hand. Thirty-seven participants reported right hand dominance and three participants reported left hand dominance. The three individuals who reported left hand dominance were all males. The average time to complete the task was calculated as the average of the second and third timed trials; the higher the score, the longer the time taken to complete the task. Scores to complete the task ranged between 17 and 37.5 seconds. As a group, the mean time to complete the task was 23.29 seconds (SD: 4.41). There was a significant positive correlation between age and score on the 9-Hole Peg Test (r=.363, p=.021). As can be seen from Figure 5, older individuals took longer to complete the 9-Hole peg test.
Table 3

**Hearing Aid Use and Experience Demographics**

<table>
<thead>
<tr>
<th>Value</th>
<th>Current HA Experience with HA (in years)</th>
<th>Lifetime Experience with HA (in years)</th>
<th>Average Hours Worn per Day</th>
<th>Average Days Worn per Week</th>
<th>Average Days Worn per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>0.10</td>
<td>0.10</td>
<td>0.00</td>
<td>0.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>7.00</td>
<td>20.00</td>
<td>18.00</td>
<td>7.00</td>
<td>30.00</td>
</tr>
<tr>
<td>Mean</td>
<td>1.70</td>
<td>4.83</td>
<td>9.39</td>
<td>5.99</td>
<td>25.23</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.76</td>
<td>5.17</td>
<td>5.23</td>
<td>1.94</td>
<td>8.91</td>
</tr>
</tbody>
</table>
Figure 5. Scatterplot displaying the relationship between age of participants and score on the 9-Hole Peg Test.
There was essentially no difference in mean time to complete the task between males ($M$: 23.55) and females ($M$: 23.03 seconds). However, there was greater variability in females’ scores ($SD$: 5.41) compared to males’ scores ($SD$: 3.50). This greater variability in female scores may be explained in part to the greater age range of females (55-86 years) who completed this task compared to the age range of males (65-89 years) who completed the task. An independent samples t-test revealed no significant differences between score on the 9-Hole peg test between males and females ($t= .36$, $p= .718$). This is in contrast to results reported by Mathiowetz et al. (1985), who found that on average, females scored slightly better than males by approximately 1 second. Again, the female age range was larger than the male age range; however, there were only four females were under the age of 65.

**Performance-Perceptual Test (PPT).** All participants completed the PPT in an unaided condition. Figure 6 illustrates the mean signal-to-noise ratio thresholds (SNRT) for the performance and perceptual conditions as well as the discrepancy score between the two conditions (PPT-DIS). It should be noted that lower SNRTs indicate better performance or perception of speech understanding. The SNRTs for the performance and perceptual conditions were 2.13 dB ($SD$: 4.20 dB) and -.37 dB ($SD$: 3.37 dB), respectively. A Paired Samples T-test revealed a significant difference in scores between the performance and perceptual SNRT ($t=8.28$, $p < .001$). A Bonferroni correction factor was utilized to account for multiple comparisons. All but four participants overestimated speech understanding, meaning that their SNRT was lower for the perceptual condition than the performance condition. The mean SNRT for the discrepancy (PPT-DIS) between the two conditions was 2.47 dB ($SD$: 1.94 dB).

Mean PPT-DIS SNRT for males was 3.30 dB ($SD$: 1.72 dB), and 1.62 dB ($SD$: 1.80 dB) for females. There was a significant difference between male and female PPT-DIS scores
Figure 6. Mean Signal-to-Noise-Ratio Thresholds for the Performance-Perceptual Test. Error bars represent +/- 1 standard deviation. Performance SNRTs were significantly higher than perceptual SNRTs ($p = .000$). Lower SNRTs indicates better performance or perception.
(t=3.00, p=.005), with males overestimating speech understanding more than females. This is illustrated in Figure 7. The large variability for both male and females PPT-DIS scores should be noted. Saunders and Forsline (2006) reported average PPT-DIS values similar to those found in this study. Those authors found that 50% of their sample reported about one test step size (2 dB) difference between unaided performance and perceptual signal-to-noise ratios. On an individual level, they noted there was great variability in that some individuals greatly overestimated and some greatly underestimated. Gender differences between scores have not been examined in the literature and thus there is not normative data to compare this to.

The National Eye Institute Visual Function Questionnaire-25 (NEI-VFQ). Two measures of self-rated vision impairment were obtained in this study: a self-rated vision impairment composite score and a self-rated vision impairment score for near activities (one subscale of the questionnaire). The mean NEI-VFQ-25 composite score was 90.35% (SD: 8.91). This is higher than the general vision score of 83% (SD: 15) reported in the literature. The mean NEI-VFQ-25 near vision score was 87.50% with a standard deviation of 12.78. This is slightly lower than the mean near vision score of 92% with a SD of 13 that is reported in the literature (Mangione et al., 2001). However, these authors administered the NEI-VFQ-25 on 859 visually impaired individuals over the age of 21. An independent t-test revealed no significant differences between the composite and near activities subscale score between males and females. There was no significant correlation between self-reported vision and age.

Practical Hearing Aid Skills Test-Revised (PHAST-R). Figure 8 displays a histogram of the PHAST-R scores. Scores on the PHAST-R ranged from 54% to 95%, with a mean of 73.78% (SD: 10.38%). It should be noted that no participant scored a 100% on this test. Results from this study found the mean PHAST-R scores were slightly lower than the mean PHAST-R
Figure 7. Mean Performance-Perceptual Discrepancy Signal-to-Noise Ratio Thresholds for males and females. Error bars represent +/- 1 standard deviation. There was a significant difference in PPT-DIS between males and females ($p = .005$).
Figure 8. Histogram displaying the frequency of the scores on the Practical Hearing Aid Skills Test- Revised. Dotted lines represent cutoff scores for each category as labeled.
score reported by Doherty and Desjardins (2012), who found an average score of 76.80% ($SD$: 12.82%). According to these authors, percentage correct scores are defined as follows: excellent (90%-100%), good (80%-89%), fair (65%-79%), and poor (below 65%). Utilizing this categorization, participants in this study ranged from having an excellent to a poor understanding of how to use their hearing aids, with the majority of participants having a fair understanding (see Figure 9). Breaking this down further, only 7.5% (n=3) of individuals had an ‘excellent’ score, 20% (n=8) had a ‘good’ score, 52.5% (n=21) had a ‘fair’ score, and 20% (n=8) had a poor score.

In order to determine if hearing aid experience impacted PHAST-R scores, participants were split into four groups based upon experience: (1) 0-3 months hearing aid experience, (2) 3-6 months hearing aid experience, (3) 6-9 months hearing aid experience, (4) 9-12 months hearing aid experience, and (5) 12+ months hearing aid experience. A one-way ANOVA indicated no significant difference in mean PHAST-R scores between groups ($F= .67$, $p= .576$). However, this could be due to the variability in scores between each group. Figure 9 illustrates mean scores among different groups of hearing aid experience. There were no significant correlation between scores on the PHAST-R and gender or age.

**General Self-Efficacy (GSE).** Overall, GSE was high for all but one participant, as can be seen from the distribution of scores in Figure 10. Scores ranged from 16 to 40 (score is calculated out of 40) with a mean of 33.28 ($SD$: 5.28). A higher score indicates higher perceived general self-efficacy. There was one outlier, with a score of 16. There are no peer-reviewed published norms for the GSE; however, the developer of the GSE scale has provided demographic and raw data from 17,553 individuals from 22 different countries.
Figure 9. Practical Hearing Aid Skills Test-Revised scores among four groups split by HA experience. Error bars represent +/- 1 standard deviation.
Figure 10. Histogram displaying the frequency of General Self-Efficacy scores among participants. Higher scores indicate higher perceived general-self efficacy.
The sample age ranges from 12 - 94 years but is heavily skewed such that the median age is 19 years.

The average general self-efficacy score from the 22 countries for all ages is 29.46 (SD: 5.33), and 29.90 (SD: 5.98) when only individuals over the age of 55 are included in the analysis. The mean general self-efficacy score for individuals from the United States is 29.47 (SD: 5.13). Age and sex are not reported for the United States data, thus the mean general self-efficacy score for adults 55 years of age and older cannot be compared to the mean general-self-efficacy scores obtained in this study. However, the average general self-efficacy in the current study is higher than the average worldwide and United States general self-efficacy score.

In order to determine if education level impacted GSE score, a one-way analysis of variance (ANOVA) was completed. Results indicated mean GSE scores were not significantly different between high school education, college and/or some graduate education, and a masters/doctorate degree ($F = .68, p = .514$). An independent samples t-test revealed no significant differences in GSE scores between males and females ($t = .33, p = .744$).

**Measure of Audiologic Rehabilitation Self-Efficacy of Hearing Aids (MARS-HA).**

Figure 11 displays the frequency distribution of composite scores on the MARS-HA. Overall hearing aid self-efficacy ranged from 33% to 98% with a mean of 81.82% (SD: 12.33%). A higher score indicates higher perceived hearing aid self-efficacy. Figure 12 illustrates the mean scores for the MARS-HA four subscale scores. The basic hearing aid handling skills subscale had the highest mean self-efficacy with an average of 92.30% (SD: 10.11%), followed by the adjustment subscale ($M: 90.68\%; SD: 13.18\%$).
Figure 11. Histogram displaying the frequency of overall hearing aid self-efficacy on the Measure of Audiologic Rehabilitation Self-Efficacy for Hearing Aids (MARS-HA). Higher scores indicate higher perceived hearing aid self-efficacy.
Figure 12. Mean scores of subscale scores on the Measure of Audiologic Rehabilitation Self-Efficacy for Hearing Aids (MARS-HA). Error bars represent +/- 1 standard deviation.
the aided listening subscale ($M: 80.47\%; SD: 18.32\%$), and lastly the advanced handling subscale ($M: 67.16\%; SD: 21.61\%$).

West & Smith (2007) reported mean and standard deviation values for two groups: new and experienced hearing aid users. These authors defined a new hearing aid user as an individual who has worn hearing aids for six months or less, and experienced hearing aid users as those who have worn hearing aids for more than six months. Participants in the current study were split into two groups defined by the same criteria for hearing aid experience as West and Smith. When comparing the means for these two groups, the means and standard deviations are very similar as reported in the literature. It should be noted that the sample size in this study was significantly smaller than that reported for the normative data. Table 4 displays the means and standard deviations for both new and experienced hearing aid users in both studies. A one-way ANOVA revealed no significant differences in MARS-HA scores between new and experienced groups for the composite hearing aid self-efficacy ($F= .11, p= .744$), basic handling ($F=.38, p=.539$), advanced handling ($F=.75, p=.392$), adjustment to hearing aids ($F=.45, p=.506$), and aided listening ($F= 2.83, p=.10$). West and Smith (2007) found a significant difference in advanced handling of hearing aids between new and experienced hearing aid users. They found about a 7% difference in scores between the two. This study found a similar difference of 6% between the scores on new and experienced hearing aid users, although this difference was not statistically significant. It should be noted that the sample size in the West & Smith (2007) study was 168 compared to a sample size of 40 in the current study.
Table 4

A Comparison of Means and Standard Deviations of Scores on the Measure of Audiologic Rehabilitation Self-Efficacy Between Current Study to Normative Data

<table>
<thead>
<tr>
<th>Scale</th>
<th>Current Study</th>
<th></th>
<th></th>
<th></th>
<th>West and Smith (2007)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New hearing aid users</td>
<td>Mean</td>
<td>SD</td>
<td>Experienced hearing aid users</td>
<td>Mean</td>
<td>SD</td>
<td>New hearing aid users</td>
<td>Mean</td>
</tr>
<tr>
<td>Basic handling</td>
<td>90.71</td>
<td>9.46</td>
<td>92.77</td>
<td>10.32</td>
<td>93.80</td>
<td>10.40</td>
<td>94.30</td>
<td>17.00</td>
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<tr>
<td>Advanced Handling</td>
<td>63.57</td>
<td>17.45</td>
<td>69.58</td>
<td>22.52</td>
<td>63.40</td>
<td>25.80</td>
<td>70.20</td>
<td>21.30</td>
</tr>
<tr>
<td>Adjustment</td>
<td>85.47</td>
<td>24.65</td>
<td>89.68</td>
<td>15.06</td>
<td>84.70</td>
<td>15.40</td>
<td>87.50</td>
<td>14.80</td>
</tr>
<tr>
<td>Aided Listening</td>
<td>86.19</td>
<td>11.52</td>
<td>76.22</td>
<td>20.39</td>
<td>83.40</td>
<td>16.90</td>
<td>76.70</td>
<td>16.90</td>
</tr>
<tr>
<td>Composite</td>
<td>83.71</td>
<td>6.53</td>
<td>81.34</td>
<td>14.64</td>
<td>82.40</td>
<td>13.00</td>
<td>81.90</td>
<td>11.80</td>
</tr>
</tbody>
</table>
Question 1

**General and hearing aid self-efficacy.** Pearson correlation coefficients were calculated between the scores on the GSE and all scores on the MARS-HA, including subscales. The correlation matrix is displayed in Table 5. There was a moderate positive significant correlation between composite GSE and overall HA SE ($r = .59, p < .001$) and aided listening with hearing aids ($r = .55, p < .001$). There was a weak but significant positive correlation between GSE and basic hearing aid handling skills ($r = .35, p = .027$), and advanced handling skills ($r = .39, p = .010$). There was a small but non-significant correlation between GSE and adjustment to hearing aids ($r = .31, p = .053$). Figures 13 and 14 display the scatterplots for GSE and MARS-HA composite and subscale scores. The data support a trend for higher levels of GSE to be associated with higher levels of hearing aid self-efficacy, although the trend depends on the hearing aid skills being measured.

Question 2

**Demographic variables and self-efficacy measures.** Pearson correlation coefficients were calculated between all self-efficacy measures and each of the demographic variables (overall self-rated vision and self-rated near vision, manual dexterity, hearing aid experience with current devices, hearing aid experience over the lifetime, perceptual and performance speech-in-noise thresholds and the discrepancy threshold, hours worn per day, and days worn per week and month, age, and gender). The statistically significant correlations are displayed in Table 6. The 9-Hole Peg Test had a weak negative correlation with advanced handling skills on the MARS-HA, suggesting that participants who had higher confidence in ability to perform advanced
Table 5

**Correlation between General Self-Efficacy (GSE) and Measure of Audiologic Rehabilitation Self-Efficacy for Hearing Aids (MARS-HA) subscale and composite scores**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Basic HA Skills</th>
<th>Advanced HA Skills</th>
<th>Adjustment to HA</th>
<th>Aided Listening</th>
<th>Composite Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSE</td>
<td>.349*</td>
<td>.397*</td>
<td>.308</td>
<td>-.548**</td>
<td>.585**</td>
</tr>
</tbody>
</table>

Note. * indicates significant correlation at the p=.05 level.
** indicates significant correlation at the p=.01 level
Figure 13. Scatterplot of General Self-Efficacy and Measure of Audiologic Rehabilitation Self-Efficacy for Hearing Aids composite scores.
Figure 14. Scatterplots displaying General Self-Efficacy and Self-Efficacy Subscales Scores on the Measure of Audiologic Rehabilitation Self-Efficacy for Hearing Aids.
Table 6

Summary of Significant Correlations between Demographic Variables and Self-Efficacy Scores

<table>
<thead>
<tr>
<th>Measure</th>
<th>Hearing aid self-efficacy</th>
<th>General self-efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basic HA Skills</td>
<td>Advanced HA Skills</td>
</tr>
<tr>
<td>1. 9-Hole Peg Test</td>
<td>0.87</td>
<td>-0.315*</td>
</tr>
<tr>
<td>2. Composite Vision</td>
<td>0.362*</td>
<td>0.112</td>
</tr>
<tr>
<td>3. Near Vision</td>
<td>0.436**</td>
<td>0.065</td>
</tr>
<tr>
<td>4. Hours Worn per Day</td>
<td>0.376*</td>
<td>0.186</td>
</tr>
<tr>
<td>5. Lifetime Hearing Aid</td>
<td>-0.025</td>
<td>0.091</td>
</tr>
<tr>
<td>Experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Three-Frequency</td>
<td>-0.322*</td>
<td>-0.457**</td>
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<tr>
<td>Pure-Tone Average</td>
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<td></td>
</tr>
<tr>
<td>7. Unaided Performance</td>
<td>-0.189</td>
<td>-0.239</td>
</tr>
<tr>
<td>PPT SNRT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Unaided Perceptual</td>
<td>-0.264</td>
<td>-0.368*</td>
</tr>
<tr>
<td>PPT SNRT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. * indicates significant correlation at the $p<.05$ level.
** indicates significant correlation at the $p<.01$ level.
hearing aid handling skills had better scores on the 9-Hole Peg Test. Further examination of the correlations between scores on the 9-Hole Peg Test and specific questions on the advanced handling subscale revealed no consistent pattern. The highest correlation between manual dexterity and advanced handling was identifying the components of the hearing aid and naming battery size ($r = -.17, p = 2.94; r = -.16, p = .309$, respectively). The two questions that may require some physical manipulation were troubleshooting a hearing aid and feedback management, which were the least correlated with scores on the 9-Hole Peg Test 9 ($r = -.06, p = 7.21; r = .05, p = .743$, respectively).

The three-frequency pure tone average was significantly negatively correlated with the GSE composite score ($r = -.59, p = .003$), and self-efficacy for basic hearing aid handling ($r = -.322, p = .04$), advanced hearing aid handling, ($r = -.49, p = .003$), aided listening ($r = -.54, p = .000$), and overall hearing aid use ($r = -.593, p = .000$). Unaided PPT performance scores was weakly negatively correlated with aided listening self-efficacy ($r = -.317, p = .046$), and strongly correlated with general self-efficacy ($r = -.55, p = .000$). Unaided perceptual PPT SNRT was strongly negatively correlated with general self-efficacy ($r = .56, p = .001$), and weakly correlated with advanced handling ($r = .37, p = .02$), aided listening ($r = -.40, p = .011$), and overall hearing aid self-efficacy ($r = -.42, p = .007$).

Overall self-rated vision impairment was moderately correlated with self-efficacy for aided listening and overall hearing aid self-efficacy, and weakly correlated with basic hearing aid handling skills and general self-efficacy. The NEI-VFQ 25 near vision subscale was moderately correlated with self-efficacy for basic hearing aid handling, aided listening, and overall hearing aid self-efficacy. In addition, there was a weak correlation between hearing aid use and self-efficacy for basic hearing aid handling skills.
Participants who reported wearing amplification more hours per day had higher self-efficacy for basic hearing aid skills. Lastly, there was a moderately negative correlation between lifetime experience with hearing aids and self-efficacy for aided listening with hearing aids. Individuals who reported less lifetime experience with hearing aids had higher self-efficacy for aided listening. The only subscale of the MARS-HA not correlated with any of the demographic variables was adjustment to hearing aids.

**Question 3**

**Hearing aid self-efficacy.** A linear regression analysis was completed to determine the significant predictors of overall hearing aid self-efficacy. GSE, best three-frequency PTA, unaided perceptual SNRT from the PPT, and NEI-VFQ 25 composite score were entered into the model as the independent variables and composite hearing aid self-efficacy was entered as the dependent variable. Two measures of self-rated vision impairment were significantly correlated with hearing aid self-efficacy; however, these two measures were highly correlated themselves and thus violated collinearity in the regression model. The composite score for NEI-VFQ was chosen as it had the highest correlation with overall hearing aid self-efficacy. Together, general self-efficacy, self-rated vision impairment, PTA, and perceptual SNRT explain approximately 45% of the variance in overall hearing aid self-efficacy ($r^2 = .55$). Thus, individuals who had lower (better) PTA, better self-rated vision, and higher general self-efficacy were likely to have higher overall hearing aid self-efficacy (see Table 7).

A second regression analysis was completed with self-efficacy for basic hearing aid handling entered as the dependent variable and GSE, best three-frequency PTA, and self-rated vision impairment for near activities entered as the independent variables.
Table 7

*Predictors of Hearing Aid Self-Efficacy*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model</th>
<th>B</th>
<th>Standard Error</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>39.49</td>
<td>16.42</td>
<td></td>
<td>.050*</td>
</tr>
<tr>
<td>GSE</td>
<td>.809</td>
<td>.342</td>
<td></td>
<td>.024*</td>
</tr>
<tr>
<td>PTA</td>
<td>-.471</td>
<td>.177</td>
<td></td>
<td>.012*</td>
</tr>
<tr>
<td>Performance SNRT</td>
<td>.169</td>
<td>.583</td>
<td></td>
<td>.773</td>
</tr>
<tr>
<td>NEI-VFQ Composite</td>
<td>.378</td>
<td>.69</td>
<td></td>
<td>.032*</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.55</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. * indicates significant correlation at the p=.05 level.
** indicates significant correlation at the p=.01 level.
Together, these three variables explain approximately 26% ($r^2 = .26$) of the variance in hearing aid handling self-efficacy; however, only self-rated vision for near activities is a significant predictor (see Table 8).

The third regression analysis included self-efficacy for advanced hearing aid handling skills as the dependent variable and GSE, PTA, unaided perceptual PPT SNRT, and 9-Hole Peg Test scores entered as the independent variables. Together, these four variables explain approximately 33% of the variance in advanced hearing aid handling skills ($r^2 = .33$). Manual dexterity, and PTA were the only two significant predictors of self-efficacy for advanced hearing aid handling (see Table 9).

The fourth and final regression analysis included self-efficacy for aided listening as the dependent variable and GSE, PTA, performance SNRT, perceptual SNRT, NEI-VFQ composite score, and lifetime hearing aid experience as the independent variables. Together, these six predictors explain 65% ($r^2 = .65$) of the variance in self-efficacy for aided listening. The significant variables in this model were general self-efficacy, PTA, performance SNRT, lifetime hearing aid experience, and, self-rated vision. This model suggests that individuals who have higher general self-efficacy, lower (better) PTA, higher SNRT for speech understanding, less lifetime experience with hearing aids, and less self-reported vision impairment have higher self-efficacy for aided listening (see Table 10). It should be noted that the number of variables entered into the model decreases the power due to the sample size and the results of this regression analysis should be interpreted with caution.
Table 8

*Predictors of Self-Efficacy for Basic Hearing Aid Handling Skills*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model B</th>
<th>Standard Error</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>62.25</td>
<td>16.98</td>
<td>.001**</td>
</tr>
<tr>
<td>GSE</td>
<td>.355</td>
<td>.312</td>
<td>.262</td>
</tr>
<tr>
<td>PTA</td>
<td>-.139</td>
<td>.156</td>
<td>.381</td>
</tr>
<tr>
<td>NEI-VFQ Composite</td>
<td>.268</td>
<td>.188</td>
<td>.028*</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. * indicates significant correlation at the p=.05 level.

** indicates significant correlation at the p=.01 level.
### Table 9

**Predictors of Self-Efficacy for Advanced Hearing Aid Handling Skills**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model $B$</th>
<th>Standard Error</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>116.422</td>
<td>38.40</td>
<td>.005**</td>
</tr>
<tr>
<td>Perceptual SNRT</td>
<td>.012</td>
<td>1.186</td>
<td>.992</td>
</tr>
<tr>
<td>GSE</td>
<td>.513</td>
<td>.669</td>
<td>.468</td>
</tr>
<tr>
<td>PTA</td>
<td>-.831</td>
<td>.366</td>
<td>.030</td>
</tr>
<tr>
<td>Manual Dexterity</td>
<td>-1.422</td>
<td>.695</td>
<td>.048*</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. * indicates significant correlation at the p=.05 level.

** indicates significant correlation at the p=.01 level.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Model B</th>
<th>Standard Error</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>16.045</td>
<td>30.327</td>
<td>.600</td>
</tr>
<tr>
<td>PTA</td>
<td>-.622</td>
<td>.261</td>
<td>.023*</td>
</tr>
<tr>
<td>Performance SNRT</td>
<td>1.839</td>
<td>1.045</td>
<td>.088*</td>
</tr>
<tr>
<td>Perceptual SNRT</td>
<td>-1.743</td>
<td>1.379</td>
<td>.215</td>
</tr>
<tr>
<td>Lifetime HA Experience</td>
<td>-1.159</td>
<td>.390</td>
<td>.006**</td>
</tr>
<tr>
<td>NEI-VFQ Composite</td>
<td>.612</td>
<td>.248</td>
<td>.019*</td>
</tr>
<tr>
<td>GSE</td>
<td>1.030</td>
<td>.472</td>
<td>.036*</td>
</tr>
<tr>
<td>R²</td>
<td></td>
<td>.60</td>
<td></td>
</tr>
</tbody>
</table>

Note. * indicates significant correlation at the p=.05 level.
** indicates significant correlation at the p=.01 level.
Question 4

**Objective measurement of hearing aid skills.** Pearson correlation coefficients were obtained to determine if any demographic variables or self-efficacy measures are significantly correlated with scores on the PHAST-R. There was no correlation between PHAST-R scores and age, gender, audiometric thresholds, hearing aid experience, hearing aid use, performance and perceptual speech understanding or the discrepancy between these two measures, self-rated vision, manual dexterity, general self-efficacy, or hearing aid self-efficacy.

Despite lack of significant correlations between hearing aid management, general self-efficacy, and self-efficacy for hearing aids, a linear regression analysis was completed to determine if general and/or hearing aid self-efficacy predicts hearing aid management. Scores on the GSE, overall hearing aid self-efficacy, self-efficacy for basic hearing aid handling, advanced handling, and aided listening were entered as the independent variables, and PHAST-R score was entered as the dependent variable. Self-efficacy for adjustment to hearing aids was highly correlated with overall hearing aid self-efficacy ($r = .85$), which violated the collinearity assumption, and thus was excluded from the regression analysis. The independent variables explained 20% of the variance in PHAST-R scores ($r^2 = .20$), and none of the predictors reached significance (see Table 11).

Participants were grouped according to the categorization for PHAST-R scores outlined by Desjardins & Doherty (2009) as excellent, good, fair, or poor performers. A one-way ANOVA was conducted to determine if there were differences between general and hearing aid self-efficacy among the four performance categories. There was a main
Table 11

*Predictors of Practical Hearing Aid Skills Test- Revised*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model B</th>
<th>Standard Error</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>59.657</td>
<td>16.231</td>
<td>.001**</td>
</tr>
<tr>
<td>GSE</td>
<td>-.445</td>
<td>.381</td>
<td>.252</td>
</tr>
<tr>
<td>Basic Handling</td>
<td>.212</td>
<td>.359</td>
<td>.559</td>
</tr>
<tr>
<td>Advanced Handling</td>
<td>.103</td>
<td>.189</td>
<td>.591</td>
</tr>
<tr>
<td>Aided Listening</td>
<td>-.206</td>
<td>.327</td>
<td>.534</td>
</tr>
<tr>
<td>Composite</td>
<td>.231</td>
<td>.793</td>
<td>.773</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. * indicates significant correlation at the p=.05 level.

** indicates significant correlation at the p=.01 level.
effect of self-efficacy for advanced handling of hearing aids \((F=2.74, p=.057)\), indicating that self-efficacy for advanced handling differed among the performance categories on the PHAST-R. Tukey post hoc testing revealed a significant difference in self-efficacy for advanced hearing aid skills between the fair and poor groups \((p=.048)\). Individuals who scored in the “poor” category had significantly lower self-efficacy for advanced handling hearing aid skills. Means for self-efficacy for advanced handling among the PHAST-R performance categories are shown in Figure 15.

**Self-Efficacy and Hearing Aid Management Discrepancy.** The basic hearing aid handling skills on the MARS-HA consists of questions regarding basic hearing aid tasks such as battery insertion and removal, distinguishing a right from left hearing aid, hearing aid insertion and removal, operating the controls on the hearing aid, and proper cleaning and maintenance of the hearing aid. All of these questions are included on the PHAST-R objective measure of hearing aid management. In order to examine the relationship between scores on these similar questions, a Pearson correlation coefficient was conducted. There was no significant correlation between scores on the PHAST-R and self-efficacy for basic hearing aid handling. As can be seen from the scatterplot in Figure 16, many individuals had high confidence in their ability to perform basic hearing aid skills; however, their actual observed ability of those skills was highly variable.

In order to quantify the difference between self-efficacy for basic hearing aid handling and actual ability to perform these basic hearing aid skills, a discrepancy score was calculated by subtracting the PHAST-R score from the MARS-HA self-efficacy for basic hearing aid handling score. This score was termed the SE/PHAST-dis. SE/PHAST-dis scores ranged from -19.57 to 45. The mean SE/PHAST-dis score was 18.26 \((SD: 12.49)\). On average, participants were rating
Figure 15. Means plot illustrating differences in scores on the advanced handling subscale by group. Self-efficacy for advanced handling skills was significantly lower for those who scored poorly on the PHAST-R compared to those who scored fair ($p = .048$).
Figure 16. Scatterplot displaying relationship between basic hearing aid handling self-efficacy and objective measure of hearing aid management.
their confidence to perform basic hearing aid skills 20 points higher their actual ability to perform these skills. Figure 17 illustrates a bar graph of individual SE/PHAST-dis scores. Only two participants performed better on hearing aid management than their rated confidence in their ability to perform these skills, and the remaining participants. Two participants had approximately no difference between perceived self-efficacy and actual ability, and the remaining participants had higher perceived self-efficacy compared to their actual ability to perform basic hearing aid skills.

Pearson correlation coefficients were obtained for SE/PHAST-dis and all demographic variables, and self-efficacy measures. Table 12 displays the significant correlations. Older individuals, individual’s with lower PTAs, and individuals with higher general self-efficacy had larger SE/PHAST-dis scores. A linear regression analysis indicated that age, PTA, and general self-efficacy explains 32% in SE/PHAST-dis scores ($r^2=.32$). However, only age and PTA are significant predictors ($p=.007; p=.057$) of SE/PHAST-dis scores.

To determine if SE/PHAST-dis scores varied among education level, a one-way ANOVA was conducted. Results revealed a main effect of education group ($F=4.34, p=.020$). A Tukey post hoc test revealed a significant difference in SE/PHAST-dis scores between a post-doctoral education and undergraduate education, and this pattern can be seen in Figure 18. Individuals with a graduate education tend to have lower SE/PHAST-dis scores; however, there is great variability in SE/PHAST-dis scores among the three education groups.
Figure 17. Bargraph illustrating each participant’s discrepancy score between self-efficacy to perform basic hearing aid skills and actual performance (SE/PHAST-Dis). The dotted line indicates zero discrepancy (i.e. scores on self-efficacy for basic hearing aid skills are equal to scores on PHAST-R).
Table 12

**Correlation between Demographic Variables and the Se/PHAST Discrepancy Score**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Age</th>
<th>PTA&lt;sup&gt;a&lt;/sup&gt;</th>
<th>GSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE/PIIAST Dis</td>
<td>.351*</td>
<td>-.335*</td>
<td>.369*</td>
</tr>
</tbody>
</table>

Note. * indicates significant correlation at the p<.05 level.
** indicates significant correlation at the p=.01 level.

<sup>a</sup>PTA defined as average of thresholds at 500, 1000, and 2000 Hz. There were no differences between the PTA for right and left ears so the right ear PTA is reported here.
Figure 18. Mean PHAST-R/Basic HA SE discrepancy scores for each education group. Error bars represent +/- 1 standard deviation. There is a significant difference in SE/PHAST-dis scores between undergraduate and graduate education ($p = .003$).
Chapter V: Discussion

Question 1--- Are General and Task-Specific Self-Efficacy Measures Related?

Self-efficacy is the “belief in one’s capability to organize and execute the courses of action required to manage prospective situations” (Bandura, 1997). Self-efficacy is one component shown to be important to successful self-management of chronic illness. Studies investigating rehabilitation outcomes for patients with arthritis, diabetes, and vision impairment show high levels of self-efficacy are associated with positive health outcomes (Bodenheimer et al., 2002; Bonsaken et al., 2012; Gallant, 2003; Brown & Barrett, 2011; Lorig et al., 2001). As previously discussed, self-efficacy can be broken down into two types: perceived general self-efficacy, which is an individual’s perception of his or her ability to perform across a variety of situations, and task-specific perceived self-efficacy, which examines an individual’s perception of his or her ability to perform the actions specific to a situation (Judge et al., 1997; Sherbaum et al., 2006; Smith & West, 2006). Task-specific self-efficacy is commonly studied in the health literature, and the only type of self-efficacy investigated in audiology at this time (Jennings, 2005; West & Smith, 2007). However, GSE may influence task-specific self-efficacy and may provide information on a patient’s overall confidence to manage difficult situations prior to beginning a comprehensive rehabilitation plan (Rapley & Fruin, 1999; Sherer et al., 1982). The first question this study aimed to investigate was whether GSE measures are related to and can be used to determine more task specific self-efficacy such as hearing aid management.

The results from this study suggest that general and task-specific self-efficacy are positively related. General self-efficacy and overall hearing aid self-efficacy are
moderately correlated in such a way that those individuals with higher general self-efficacy had higher overall hearing aid self-efficacy. However, the correlation is not as strong between general self-efficacy and self-efficacy for more specific hearing aid tasks. For example, general self-efficacy has a moderate correlation with aided listening self-efficacy, and a small correlation with advanced handling, basic hearing aid handling, and adjustment to hearing aid self-efficacy.

The aforementioned relationship may be explained by classifying self-efficacy into three categories: global self-efficacy, domain self-efficacy, and task-specific self-efficacy (Woodman & Cashman, 1993). Claggett and Goodhue (2011) theorize a breakdown of self-efficacy based upon their research with self-efficacy related to computers. Claggett and Goodhue (2011) postulate that self-efficacy can be thought of as a continuum ranging from the most general self-efficacy (an individual’s overall sense of self-efficacy for any task), to midrange self-efficacy for a particular but broad domain (such as performing tasks related to computers), to a specific self-efficacy (such as writing formula’s in a spreadsheet program). The results from the current study support a similar three-pronged classification system. For example, general self-efficacy was very high for all individuals, despite low self-efficacy levels for specific hearing aid tasks and low objective performance of hearing aid skills. Thus, it can be argued that the perception of general self-efficacy is made based upon a lifetime of experiences. The second category, domain self-efficacy, refers to the overall hearing aid self-efficacy score (defined by the composite self-efficacy score from the MARS-HA). This score was moderately correlated with general self-efficacy, indicating that the individuals’ judgment of hearing aid skills are being made on somewhat of the same metric as general self-
efficacy judgments. Lastly, the third category of self-efficacy is the very specific tasks that comprise the domain. Each of the four subscales of the MARS-HA asked very specific questions regarding hearing aids. Domain self-efficacy was strongly related to task-specific self-efficacy and thus is a good predictor of their perceived ability to perform hearing aid skills. However, general self-efficacy was weakly correlated with three of the four subscales, indicating that one’s general perception of ability to overcome challenges cannot predict their self-efficacy judgments of very specific tasks related to hearing aids.

The results from this study do not support the sole use of one type of self-efficacy measure. In other words, general self-efficacy measures cannot replace task-specific self-efficacy measures according to the results from this study. If general self-efficacy were completely generalizable to very task-specific situations, individuals who had high GSE should have high hearing aid self-efficacy across all four subscales (i.e. for all hearing aid related tasks). However, this was not the case as general self-efficacy was only moderately correlated with the aided listening tasks, but had just a small correlation with the basic and advanced hearing aid skills, and adjustment to hearing aids. Rather, the results suggest that a balance between general and task-specific self-efficacy measures may be appropriate.

Two limitations should be noted when discussing the relationship between general and task-specific measures of self-efficacy. The nature of the sample and the methodology of the study prevent this question from being fully answered. First, all participants had very high general and task-specific self-efficacy, reducing variability in the sample, and preventing solid interpretation of the statistical analysis. Second, all
participants had some experience with hearing aids. It is unknown if task-specific self-efficacy judgments are made based upon previous life experience (i.e. general self-efficacy), or if they are made based upon participant’s experience with hearing aids.

**Question 2—Are there Relationships Between Self-Efficacy and Demographic Variables?**

The relationships between self-efficacy and all the demographic variables was examined and several expected and unexpected relationships were discovered among the demographic variables. Among self-efficacy measures, three-frequency pure tone average, speech understanding, vision, self-reported hours worn per day, and lifetime experience with hearing aids were significantly correlated with general and hearing-aid self-efficacy.

**Age, gender, and audiometric thresholds.** There was a significant correlation between age, gender, and audiometric thresholds at 2,000 and 4,000 Hz. There was a moderate correlation between age and thresholds at 4,000 and 8,000 Hz in both the right and left ears such that thresholds at these two frequencies were likely to be poorer as the age of the participant increased. This is consistent with data reported by Cruickshanks et al. (1998) based on measured thresholds of 3,753 adults who participated in the Beaver Dam Study. The average hearing thresholds of men are typically poorer than those of women in the higher frequencies, and this effect remained true after controlling for occupation, history of noise exposure, and education (or income), thus reflecting true sex differences rather than differences related to other variables. These authors reported the sloping pattern of hearing loss is more pronounced above 1,000 Hz and was more pronounced for men than women. In the Beaver Dam Study, the differences between
male and female thresholds were similar at each frequency to the current study.

Cruickshanks et al (1998) found a 21 dB difference between male and female thresholds at 4,000 Hz in the right ear, and a 7 dB and 21 dB difference between male and female thresholds a 2,000 and 4,000 Hz in the left ear, respectively. Similarly in the current study, there was a 16.25 dB difference at 4,000 Hz in the left ear, and a 7 dB and 16.25 dB difference at 2,000 Hz and 4,000 Hz in the left ear, respectively.

Results from Agrawal et al. (2008) also support these trends. These authors reported prevalence of hearing loss across various demographics (age, gender, race, etc.) using data collected from the National Health and Nutrition Examination Survey (NHANES) during the years 1999-2004. They reported that men are more likely to have hearing loss compared to women at all frequencies and this likelihood increases at higher frequencies (3,000, 4,000, and 6,000 Hz). In addition, adults 60 years of age and older are more likely to experience hearing loss than younger adults.

**Age and manual dexterity.** There was a relationship between age and manual dexterity. As expected, older individuals took longer to perform the 9-Hole Peg test, indicating poorer manual dexterity. This is consistent with the literature (Grice et al., 2003).

**Hearing aid use, experience, and self-efficacy.** There was a relationship between hearing aid use and experience with self-efficacy for basic hearing aid skills and aided listening. Individuals with longer self-reported hearing aid use had higher self-efficacy for basic hearing aid handling skills. In contrast, individuals with longer self-reported lifetime hearing aid experience had lower self-efficacy for aided listening. This negative relationship is supported by the results from West and Smith (2007), who
reported that individuals with more experience had decreases self-efficacy for aided listening.

Self-efficacy theory postulates that task-specific self-efficacy should increase as individuals encounter positive experiences with and master these skills. Successes can heighten perceived self-efficacy, and repeated failures can lower it. According to self-efficacy theory, the relationship between self-efficacy and aided listening could be due to the fact that individuals with more hearing aid experience have had negative experiences with hearing aids in specific listening situations, thus lowering their self-efficacy. West and Smith (2007) hypothesized that experienced hearing aid users have more realistic expectations regarding speech understanding in difficult environments such as in background noise or at a distance and thus report more accurate confidence in their ability.

Analysis of specific questions on the aided listening subscale indicate as a group, individuals had low self-efficacy for understanding speech one-on-one in noise, understanding speech in small group in noise, understanding a public service announcement, and understanding conversation in a car. Understanding speech in noise is a common complaint of hearing impaired listeners, and is often what hearing aid users are least satisfied with in terms of amplification. According to Kochkin (2010), nearly 40% of hearing aid users reported dissatisfaction with the hearing aids in noisy situations. Thus, failure at aided listening may lower self-efficacy for this particular hearing aid related task. Experience with hearing aids leads hearing aid users to the realization that the hearing aid will not help speech understanding in noise and may lowers self-efficacy for this task.
Despite low self-efficacy for advanced hearing aid skills, self-reported hearing aid use remained high. Bandura (1997) argues that more difficult tasks will have a greater effect on self-efficacy, such that the harder the task is perceived to be, the lower the perceived self-efficacy for that task. Smith and West, 2006 argue that individuals with low self-efficacy may not promote long-term use with hearing aids. The average self-reported hearing aid wear time was nine hours per day and the average self-reported days worn per month was 25, indicating that most individuals are reporting consistent wear time. It should be noted, hearing aid use was not confirmed objectively via datalogging or other methods.

Two theories explaining why hearing aid use is high despite low self-efficacy for advanced hearing aid skills are proposed. Consistent hearing aid use despite low self-efficacy for more advanced hearing aid skills could be explained in part by high general self-efficacy levels as well as high overall hearing aid self-efficacy. Individuals with high self-efficacy are more likely to attempt new behaviors, and to persist in them (Bandura, 1997).

It can also be argued that individuals do not feel they need, or want, advanced features on the hearing aid. In turn, they do not feel confident in their ability to perform advanced skills; however, this does not influence hearing aid use because they do not necessarily care about performing advanced hearing aid skills. Looking at the broader literature, there is some evidence to suggest that adults may in fact prefer to have technology with “basic” function. In an age where smartphones have become a staple in the cellphone world, the technology is sophisticated and advanced. However, some research suggests that while adults do have positive attitudes towards technology, they
want more practical applications and simpler features of cell phones (Rogers & Fisk, 2010). For example, a study by Mitzner et al. (2010) conducted focus groups among adults over the age of 65 found that individuals reported the ease of use of technology and usefulness of technology are the strongest variables associated with positive attitudes towards technology. Participants disliked technology if it was too complicated to use or had too many features. Interestingly, these authors note that low self-efficacy and high anxiety are two barriers towards technology use. Overall, low self-efficacy for advanced hearing aid skills does not seem to be impacting consistent hearing aid use; however, the reasons behind why self-efficacy is low for these skills warrants further attention.

**Speech Understanding.** Two measures of speech understanding were utilized in this study, (1) measures speech understanding in noise and, (2) perceived speech understanding in noise. These two measures were negatively correlated with overall hearing aid self-efficacy, self-efficacy for aided listening and advanced hearing aid skills, and general self-efficacy. In general, individuals with higher self-efficacy had better speech understanding or speech perception scores. However, speech understanding did not emerge as a significant predictor in any of the regression analyses, clouding the specific role speech understanding plays in general and task-specific self-efficacy.

**Socioeconomic status.** One variable that was expected to be related to self-efficacy measures but was not was education level. Most of the individuals who participated in this study reported high general self-efficacy and one theory behind why participants had very high general self-efficacy scores is due to the homogenous, highly educated sample. For example, 80% of the sample had a graduate school level of education. Thus, it is reasonable to consider that education level may influence general
self-efficacy. There is some support of socioeconomic status influencing self-efficacy in the broader health literature. It should be noted that very few studies measure education level singularly. Often, education level is incorporated into a broader measure of socioeconomic status, which typically consisted of a three factor scores of family income, education level, and occupational status. In the current study, only education level was measured.

Brekke, Hjortdahl, Thelle, & Kvien (1999) investigated differences in individuals arthritis symptoms including blood test results, number of joint replacements, and disease severity, subjective health outcomes, and self-efficacy to manage arthritis. These factors were examined between two communities with vastly different economic statuses. The authors found no differences in physical symptoms of arthritis between the lower and higher SES communities, but did find a significant difference in self-efficacy to manage the symptoms and pain associated with arthritis between the two communities. Specifically, self-reported health outcomes including quality of life, and self-efficacy were statistically lower for the lower SES community compared to the higher SES community.

Scherer and Maddux (1982) collected demographic information including employment, education, and military education. The authors postulate that individuals who have success in these important areas of life should have higher self-efficacy perceptions than individuals who do not have success in occupation and education. Participants completed the Self-Efficacy Scale and a demographic questionnaire designed to measure success in vocational, educational, and military areas. Success was defined as current employment status, educational level completed, and highest military rank.
achieved. All demographic variables were significantly correlated with general self-efficacy; however, the correlations were weak to moderate correlations. Employment had the highest correlation with general self-efficacy followed by education level.

There appears to be a trend for individuals with higher SES to have higher self-efficacy. The individuals in this study had very high self-efficacy levels, and it was postulated that the high education level of 80% of the participants contributed to the high self-efficacy levels. However, the results did not support differences in self-efficacy levels among varying education levels. This could be for three reasons. First, there was very little variability in the self-efficacy scores (likely due to recruitment from a homogenous community). Second, the sample size may not have been large enough for sufficient power to achieve a small effect size. Lastly, a comprehensive definition of socioeconomic status was not utilized in the same way as other studies and therefore may not be a true indicator of SES in the current study.

**Question 3—What are the Significant Predictors of Hearing Aid Self-Efficacy?**

**General self-efficacy.** General self-efficacy was a significant predictor of overall hearing aid self-efficacy and aided listening self-efficacy. Based on the results, general self-efficacy is a predictor of overall hearing aid self-efficacy (which could be described as domain-specific self-efficacy measure), but is not a good predictor of more task-specific hearing aid skills, except for aided listening. It is unclear why GSE would be a predictor of aided listening and not other specific hearing aid related tasks.

**Vision.** Self-rated vision impairment consistently emerged as a significant predictor of hearing aid self-efficacy. Specifically, vision was a significant predictor for composite hearing aid self-efficacy, self-efficacy for basic hearing aid handling skills,
and self-efficacy for aided listening. Overall, participants who had better self-rated vision had higher confidence in their ability to manage hearing aids. Looking at specific hearing aid tasks revealed higher self-rated vision was moderately associated with confidence to perform basic hearing aid skills and to listen in adverse listening environments with their hearing aids. This finding is somewhat in agreement with recently published results by Meyer et al., (2013), who identified self-rated visual disability as a barrier to hearing aid self-efficacy as measured by the MARS-HA. Specifically, these authors found self-reported visual disability to be a significant predictor of basic hearing aid handling skills in non-hearing aid owners, and in advanced handling of hearing aids in hearing aid owners. While the relationship between self-rated vision impairment and specific subscales are different in the current study compared to Meyer et al. (2013) it is worth noting that vision is associated with a variety of self-efficacy measures for various tasks with hearing aids. Methodological differences between the current study and Meyer et al. (2013) may contribute to the difference in findings. Meyer et al. (2013) utilized a subset of questions from the NEI-VFQ and split users into two groups “no self-rated visual disability” or “self-rated visual disability”, whereas in the current study a composite score was utilized on a continuous scale. Lastly, the sample size was much larger in the former study (n=307) and participants were split between non-hearing aid and hearing aid owners.

In a recent study by Hickson et al. (2014), several factors related to successful hearing aid use were investigated. Self-reported vision was identified as a significant factor related to hearing aid use when analyzed on its own; however, when entered into a regression model with 18 other variables, it did not emerge as a significant factor. The
exact measurement of visual disability was not clearly defined other than the authors measured “the impact of aided visual difficulties”.

Investigating vision as a factor related to hearing aid self-efficacy and hearing aid use is important for two reasons. First, it is known that paying attention to the speaker’s face and mouth can provide important articulatory cues that complement and give meaning to speech (Erber, 1975). Specifically, vision was related to self-efficacy for aided listening. Questions on the aided listening subscale ask about self-efficacy to listen to conversations in quiet, small group settings, in noise, and in motor vehicles. Most of these environments are difficult for individuals with hearing impairment because there are factors impeding speech understanding. Good visual ability is crucial to having access to these visual cues to have increased self-efficacy of and outcomes related to speech understanding.

It addition vision was related to self-efficacy to perform basic hearing aid skills. Erber (2003) provides a list of tasks requiring both visual and manual abilities in order to successfully manipulate hearing aids. Individuals may have difficulty seeing the battery polarity because of glare from reflective surfaces, recognizing when cerumen has accumulated in an ear mold, seeing the right/left color markers on hearing aids, and seeing the volume control/programming buttons and switches. These are just a few examples of why adequate vision is required for hearing aid use.

The results from this study support vision as an important factor to consider in audiologic rehabilitation, both in the context of managing hearing aids and utilizing facial cues to provide optimal speech understanding. Vision as it relates to hearing aid outcomes is a trend that has been noted up throughout the literature, but has not been
systematically or empirically studied to determine exactly how vision impacts hearing aid outcomes (Hickson et al., 2014; Meyer et al., 2013). Evidence-based practice should dictate exactly what and how clinicians are incorporating rehabilitation strategies for patients (Hickson & Wong, 2012). Currently, there are no clear evidence based practice guidelines for when and how to measure vision. Before this can be established, empirical research must be conducted to determine exactly how vision impacts hearing aid use and audiologic rehabilitation from a broader perspective.

**Manual dexterity.** Manual dexterity was weakly correlated with, and was a significant predictor of, self-efficacy for advanced hearing aid skills. Participants with lower self-efficacy for advanced hearing aid handling skills had higher scores (performed more poorly) on the 9-Hole Peg Test. A direct relationship between manual dexterity and hearing aid self-efficacy has not been demonstrated in the literature. Thus, it is impossible to compare results across studies. However, manual dexterity has been directly related to hearing aid use (Hickson et al., 1986; Humes, 2003; Singh, 2009). The relationship between hearing aids and manual dexterity is not surprising, as hearing aids require the manipulation of small parts in order to be utilized correctly and successfully. Erber (2003) listed specific examples of hearing aid skills that may be influenced by poor manual dexterity including: visualizing the volume/program wheels or switches, inserting and removing a hearing aid, finding a battery on the floor or other surface, grasping small hearing aid tools to properly clean hearing aids, and using remote controls or other assistive devices.

The argument and research supporting manual dexterity related to hearing aid outcomes is in contrast to more recent research published by Hickson et al. (2014) who
investigated factors related to successful hearing aid users by comparing several variables between successful and unsuccessful users. As success can be defined in a variety of ways, these authors chose to define success as greater than 1 hour per day of hearing aid use and at least moderate benefit from hearing aids as measured by the International outcome inventory- hearing aids (IOI-HA). Manual dexterity was one factor examined; however, the authors found no difference in manual dexterity scores between unsuccessful and successful hearing aid users.

A relationship between basic hearing aid handling skills and manual dexterity was expected considering questions on this subscale inquire about hearing aid insertion and removal, changing small batteries, and cleaning the hearing aids, all of which require some manipulation of the hearing aids. Surprisingly, a relationship was not found between manual dexterity and basic handling skills; rather, it was found between manual dexterity and advanced hearing aid skills. This was unexpected as three of the five questions on this particular subscale do not require manipulation of the hearing aid including: identifying of parts of a hearing aid, naming the make and model of the hearing aid, and naming the correct battery size. Further examination of the final two questions asking about troubleshooting and stopping a hearing aid from squealing was conducted to determine if these two questions were driving the correlation between advanced handling self-efficacy and manual dexterity. Troubleshooting and feedback management may require some manipulation of the hearing aid as the hearing aid user may need to remove the hearing aid, clean wax or debris, change microphone or wax guard, etc. The troubleshooting and feedback management questions on the advanced hearing aid skills subscale were the least correlated with manual dexterity. The questions
with the highest correlations to manual dexterity were identifying the components of hearing aids and naming the battery size, which do not require manipulation. However, even these correlations were weak, at best. This makes the relationship between self-efficacy for advanced skills and manual dexterity difficult to interpret.

**Pure-tone average.** Pure-tone average emerged as a significant predictor of overall hearing aid self-efficacy, and self-efficacy for advanced hearing aid skills and aided listening. The relationship between pure-tone average and self-efficacy is unclear. It has not been documented in the literature and deserves further investigation.

**Question 4--- Is Self-Efficacy a Good Predictor of Hearing Aid Management?**

Results from this study did not support general or hearing aid self-efficacy measures as good predictors of actual ability to manage hearing aids as measured by the PHAST-R. There were no significant correlations between the PHAST-R and any of the self-efficacy measures, age, gender, PTA, performance or perceptual SNRTs, hearing aid use or experience, vision, or manual dexterity. General and hearing aid self-efficacy measures were not significant predictors of objective hearing aid management, and self-efficacy measures only explained a small portion of outcome scores. The results of this study do not support self-efficacy measures as good predictors of hearing aid outcome as measured in this study. However, that is not to say self-efficacy measure do not have clinical importance in relationship to other types of hearing aid outcomes. There are several types of hearing aid outcomes that might be of interest to the clinician including hearing aid use (via datalogging), aided speech perception scores, and self-reported satisfaction and benefit from hearing aids. Future research should be conducted to determine if self-efficacy measures are related to additional hearing aid outcomes.
**Discrepancy between confidence and ability for hearing aid management.**

Questions on the self-efficacy for basic hearing aid skills subscale were similar to the questions on the PHAST-R. In order to further examine these two scores, the SE/PHAST-dis was calculated to determine the difference in confidence to perform basic hearing aid skills and the individual’s measured ability. Overall, most participants felt very confident in their ability to perform basic hearing aid skills; all but four participants overestimated their ability to perform these basic hearing aid skills. Individuals with lower (better) PTA, higher general self-efficacy, and were older in age had larger discrepancy scores. However, just general self-efficacy and age were significant predictors of discrepancy score. An older adult who has high general self-efficacy may feel very confident in ability to manage hearing aids, but may not actually be able to perform these skills. Predicting and/or measuring this discrepancy may be important for counseling purposes. West & Smith (2007) state that if there is a mismatch between confidence and actual ability, hearing aid users could experience added frustration or be at risk for hearing-aid rejection when continued problems occur. While there are no studies in the audiology literature that directly compare hearing aid self-efficacy to hearing aid management, there are a few studies that indirectly compare confidence to ability.

Desjardins & Doherty (2009) administered the original Practical Hearing Aid Skills Test (PHAST) to 50 hearing aid users and in addition gave each participant a lab questionnaire. The lab questionnaire included three questions that related directly to three of the skills on the PHAST. Participants were asked if they felt they know how to use their current hearing aids for three specific skills. Overall, participants were highly
confident in their ability to complete specific skills related to hearing aids. The results indicated 96% of participants reported they felt they knew how to use their hearing aids well, 88% reported they knew how to clean their hearing aids well. Yet, 48% of the participants demonstrated excellent or good performance on the PHAST, and only 38% of participants scored excellent or good on the cleaning skill task. There was clearly a mismatch between users’ perceived ability to manipulate their hearing aids and their actual ability to perform the tasks.

In the follow-up study where the PHAST was revised to the PHAST-R, Doherty & Desjardins (2012) asked questions regarding perception of how well individuals were able to use hearing aids and compared the responses to performance scores on the PHAST-R. Eight individuals either strongly agreed or agreed with the statement “I feel I know how to use my hearing aids well”; however, only three individuals received an excellent rating on all eight PHAST-R tasks. It should be noted that the sample size in the follow-up study was small (n= 15), and the data for the perception portion was not the focus of the study; thus, the authors did not report in-depth details of this portion of the study. Despite this, the mismatch between hearing aid users’ perception of their ability to use hearing aids and their actual ability on the PHAST-R is consistent with the mismatch reported in this study.

Pothier and Bredenkamp (2006) investigated the relationship between hearing aid users perception of their ability to insert their hearing aid and an objective assessment of their ability measured by an audiologist. Eighty-five patients who were fit with a hearing aid at a VA hospital completed a follow-up appointment six weeks following the hearing aid fitting. At the follow-up appointment, each patient was asked “how confident are you
at putting your hearing aid in your ear and taking it out?” The patient was instructed to make a mark along a visual analog scale ranging from 0 mm to 100 mm, where “0” indicated no confidence in ability and “100” indicated complete confidence in ability.

The audiologist then instructed the patient to insert the hearing aid into his ear, switch it on, switch it off, and remove it again. The audiologist rated the patient’s ability along the same visual analog scale, where “0” indicated no ability and “100” indicated perfect ability. The agreement between the confidence and ability score on the VAS was examined. Results indicated a moderate correlation ($r = .49$) for the scores between the users’ perception of how well they could insert the hearing aid and their actual ability to insert their hearing aid. However, the authors report the correlation was stronger for individuals who were very confident with the insertion of their device than those who were less confident, although the specific numbers are not clearly reported in this study.

The range of scores of actual ability to insert hearing aids was much wider for individuals who were not very confident in their ability to insert hearing aids. Thus, many individuals had a mismatch between ability and confidence.

In this study, the participants had the lowest self-efficacy for naming the make and model of the hearing aid, feedback management, and operating controls on the hearing aid on the advanced hearing aid handling subscale. It should be noted that it is unknown whether these skills were covered during hearing aid orientation sessions. A study by Reese and Hnath-Chisolm (2005) found nearly 70% of individuals did not know when feedback should and should not be expected, and 86% did not know how to perform feedback management. Approximately 40% of participants did not know about the multiple memory function of their hearing aids. Goggins and Day (2009) reported
that the main issues that needed to be addressed during hearing aid follow-up sessions were telephone use with the hearing aid, and appropriate hearing-aid program use. Results from the PHAST-R revealed that the majority of individuals only had fair performance on tasks such as using the telephone with hearing aids, and manipulating volume control and programming buttons. While the mismatch between perception and ability requires further research, it raises an important issue in terms of follow-up care and counseling practices for clinicians. Whether this mismatch is clinically important remains to be seen.
Chapter VI: Conclusion

Overall, individuals in this study felt mostly confident in their ability to overcome difficult life situations and in their ability to perform basic skills with, adjust to, and listen with hearing aids. They felt least confident in their ability to perform advanced hearing aid skills. Rather than categorizing self-efficacy into two distinct categories, it is theorized that self-efficacy should be thought of on a continuum. Perhaps general and task-specific self-efficacy may fall on either end of the spectrum, with domain self-efficacy falling in between. In this study, general self-efficacy had the strongest relationship with overall hearing aid self-efficacy (domain self-efficacy), and least relationship with self-efficacy for performing advanced hearing aid handling skills (task-specific self-efficacy).

Several relationships among the demographic variables and self-efficacy were highlighted in this study. Relationships between hours worn per day, lifetime experience with hearing aids, manual dexterity, pure-tone average, self-rated vision, and speech understanding were noted. As expected, males had poorer thresholds than females in the higher frequencies. Older individuals had poorer thresholds and manual dexterity compared to younger individuals. Individuals with higher self-efficacy had better speech understanding and longer reported hearing aid use. Individuals with lower self-efficacy had longer self-reported lifetime experience with hearing aids.

General self-efficacy was predictive of overall hearing aid self-efficacy, advanced hearing aid skills, and aided listening with hearing aids. This may be an important measure to incorporate in the clinical domain as it may give insight into how an individual will perceive his or her confidence for more specific hearing aid skills.
Second, self-rated vision impairment had a significant impact on individual’s self-efficacy for overall hearing aid skills, basic hearing aid skills, advanced hearing aid skills, and aided listening with hearing aids. The impact of vision on self-efficacy is of clinical importance. While vision as a factor related to self-efficacy for hearing aid management and successful outcomes for those with hearing loss has been documented loosely in the literature, it has not been explored in depth in the literature. This topic should be further explored to provide evidenced-based practice for clinicians to identify how to best measure vision as well as the specific role vision plays in hearing aid self-efficacy and hearing aid outcomes. Lastly, pure-tone average was a predictor of hearing aid self-efficacy. The relationship between pure-tone average and hearing aid efficacy is unclear and should be explored further.

While general and task-specific self-efficacy measures were related to each other, they were not predictive of hearing aid outcomes. Self-efficacy measures are not useful in determining a hearing aid users’ ability to perform basic hearing aid skills. However, the relationship between self-efficacy and other types of hearing aid outcomes are unknown. Interestingly, there was a mismatch between one’s self-efficacy to perform basic hearing aid skills and actual ability to perform basic hearing aid skills. The majority of participants overestimated their confidence to perform these basic hearing aid skills. This discrepancy raises the question of whether the mismatch between self-efficacy and ability is of clinical importance. Further research is required before definitive interpretations can be made.

Results support a relationship between general and task-specific self-efficacy. However, self-efficacy measures do not predict hearing aid outcomes as measured in this
study. Self-efficacy measures should be further investigated to determine whether they are useful predictors of additional outcome measures in more diverse populations.
Limitations

While the results support a relationship between general and hearing aid self-efficacy, all participants in this study had some experience with hearing aids. In order to determine if the relationship between general and task-specific self-efficacy is true, these measures should be administered to a group of non-hearing aid users. Second, the results of the current study do not support self-efficacy measures as a predictor of objective hearing aid measurement. However, it is possible self-efficacy measures may be useful in predicting hearing aid outcomes as defined by perceived satisfaction and benefit with hearing aids, objective hearing aid use, and/or aided speech perception benefit with hearing aids. Thus, the relationship between self-efficacy and hearing aid outcomes should be further explored by measuring a variety of hearing aid outcomes.

A third limitation of this study is the homogeneity of the sample and sample size. All participants were recruited from the surrounding community, and the majority of the population was highly educated and reported high general and task-specific levels of self-efficacy. The lack of variability in the sample prevented clear interpretation of the results. Future research should explore self-efficacy levels among various demographic and socioeconomic populations and among new, experienced, and non-hearing aid users. Further research may elucidate the clinical importance of self-efficacy measures.
## Mini-Mental State Exam

### I. ORIENTATION
(Ask the following questions; correct = q)

<table>
<thead>
<tr>
<th>Question</th>
<th>Record Each Answer</th>
<th>(Maximum Score = 10) Score: ____________</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is today’s date?</td>
<td>Date (eg, May 21)</td>
<td>1 q</td>
</tr>
<tr>
<td>What is today’s year?</td>
<td>Year</td>
<td>1 q</td>
</tr>
<tr>
<td>What is the month?</td>
<td>Month</td>
<td>1 q</td>
</tr>
<tr>
<td>What day is today?</td>
<td>Day (eg, Monday)</td>
<td>1 q</td>
</tr>
<tr>
<td>Can you also tell me what season it is?</td>
<td>Season</td>
<td>1 q</td>
</tr>
<tr>
<td>Can you also tell me the name of this hospital/clinic?</td>
<td>Hospital/ Clinic</td>
<td>1 q</td>
</tr>
<tr>
<td>What floor are we on?</td>
<td>Floor</td>
<td>1 q</td>
</tr>
<tr>
<td>What city are we in?</td>
<td>City</td>
<td>1 q</td>
</tr>
<tr>
<td>What country are we in?</td>
<td>Country</td>
<td>1 q</td>
</tr>
<tr>
<td>What state are we in?</td>
<td>State</td>
<td>1 q</td>
</tr>
</tbody>
</table>

### II. IMMEDIATE RECALL
(correct= q) (Maximum Score = 3) Score: ____________

- Ball 1 q
- Flag 1 q
- Tree 1 q

Ask the subject if you may test his/her memory. Say “ball”, “flag”, “tree” clearly and slowly, about one second for each. Then ask the subject to repeat them. Check the box at right for each correct response. The first repetition determines the score. If he/she does not repeat all three correctly, keep saying them up to six tries until he/she can repeat them.

### III. ATTENTION AND CALCULATION

#### A. Counting Backwards Test
(Record each response, correct = q) (Maximum Score = 5)

<table>
<thead>
<tr>
<th>Response</th>
<th>Record Each Answer</th>
<th>(Maximum Score = 5) Score: ____________</th>
</tr>
</thead>
<tbody>
<tr>
<td>93</td>
<td>1 q</td>
<td></td>
</tr>
<tr>
<td>86</td>
<td>1 q</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>1 q</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>1 q</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>1 q</td>
<td></td>
</tr>
</tbody>
</table>
subtractions. For examples, 93, 87, 80, 72, 66 is a score of 4; 93, 86, 78, 70, 62 is 2; 92, 87, 78, 65 is 0.

<table>
<thead>
<tr>
<th>B. Spelling Backwards Test</th>
<th>D</th>
<th>1 q</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>1 q</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>1 q</td>
</tr>
</tbody>
</table>

Ask the subject to spell the word “WORLD” backwards. Record each response. Use the instructions to determine which are correct responses, and check one box at right for each correct response.

<table>
<thead>
<tr>
<th>C. Final Score</th>
<th>O</th>
<th>1 q</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>W</td>
<td>1 q</td>
</tr>
</tbody>
</table>

Compare the scores of the Counting Backwards and Spelling Backwards tests. Write the greater of the two scores in the box labeled FINAL SCORE at right, and use it in deriving the TOTAL SCORE.

<table>
<thead>
<tr>
<th>IV. RECALL (correct = q)</th>
<th>Ball</th>
<th>1 q</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flag</td>
<td>1 q</td>
</tr>
<tr>
<td></td>
<td>Tree</td>
<td>1 q</td>
</tr>
</tbody>
</table>

Ask the subject to recall the three words you previously asking him/her to remember. Check the Box at right for each correct response.

<table>
<thead>
<tr>
<th>V. Language (correct = q)</th>
<th>Watch</th>
<th>1 q</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pencil</td>
<td>1 q</td>
</tr>
</tbody>
</table>

Show the subject a wrist watch and ask him/her what it is. Repeat for a pencil

<table>
<thead>
<tr>
<th>Repetition</th>
<th>1 q</th>
</tr>
</thead>
</table>

Ask the subject to repeat “No, ifs, ands, or buts.”

<table>
<thead>
<tr>
<th>Three-Stage Command</th>
<th>Takes paper in hand</th>
<th>1 q</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Folds paper in half</td>
<td>1 q</td>
</tr>
<tr>
<td></td>
<td>Puts paper on floor</td>
<td>1 q</td>
</tr>
</tbody>
</table>

Establish the subject’s dominant hand. Give the subject a sheet of blank paper and say, “Take the paper in your right/left hand, fold it in half and put it on the floor.”

<table>
<thead>
<tr>
<th>Reading</th>
<th>Closes eyes</th>
<th>1 q</th>
</tr>
</thead>
</table>

Hold up a card that reads, “Close your eyes.” So the
subject can see it clearly. Ask him/her to read it and do what it says. Check the box right only if he/she actually closes his/her eyes.

**Writing**

Give the subject a sheet of black paper and ask him/her to write a sentence. It is to be written spontaneously. If the sentence contains a subject and a verb and is sensible, check the box at the right. Correct grammar and punctuation are not necessary.

<table>
<thead>
<tr>
<th>Writes sentence</th>
<th>1 q</th>
</tr>
</thead>
</table>

**Copying**

Show the subject the drawing of the intersecting pentagons. Ask him/her to draw the pentagons (about one inch each side) on the paper provided. If ten angles are present and two intersect, check the box at right. Ignore tremor and rotation.

<table>
<thead>
<tr>
<th>Copies pentagrams</th>
<th>1 q</th>
</tr>
</thead>
</table>

**DERIVING THE TOTAL SCORE**

TOTAL SCORE ________
Appendix B

Arthritis Impact Measurement Questionnaire

**Instructions:** Please answer the following questions about your arm and hand function within the past month. There are no right or wrong answers to the questions and each can be answered with a simple check. Please answer every question.

Please check (X) the most appropriate answer for each question.

<table>
<thead>
<tr>
<th>DURING THE PAST MONTH…</th>
<th>All Days (1)</th>
<th>Most Days (2)</th>
<th>Some Days (3)</th>
<th>Few Days (4)</th>
<th>No Days (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Could you easily write with a pen or pencil?</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>2. Could you easily button a shirt or blouse?</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>3. Could you easily turn a key in a lock?</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>4. Could you easily tie a knot or a bow?</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>5. Could you easily open a new jar of food?</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>6. Could you easily wipe your mouth with a napkin?</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>7. Could you easily put on a pullover sweater?</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>8. Could you easily comb or brush your hair?</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>9. Could you easily scratch your low back with your hand?</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>10. Could you easily reach shelves that were above your head?</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>
During the past month, how much of your issues with finger, hand, and/or arm function was due to arthritis?

<table>
<thead>
<tr>
<th>Not a problem for me</th>
<th>Due Entirely to other causes</th>
<th>Due largely to other causes</th>
<th>Due partly to arthritis and to other causes</th>
<th>Due largely to my arthritis</th>
<th>Due entirely to my arthritis</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0)</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
</tbody>
</table>

11. During the past month, how satisfied are you with your finger, hand, and/or arm function?

<table>
<thead>
<tr>
<th>Very Satisfied</th>
<th>Somewhat Satisfied</th>
<th>Neither Satisfied nor Dissatisfied</th>
<th>Somewhat Satisfied</th>
<th>Very Dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
</tbody>
</table>
Appendix C

General Self-Efficacy Scale (GSE)

1. I can always manage to solve difficult problems if I try hard enough.

<table>
<thead>
<tr>
<th>Not at all True</th>
<th>Hardly True</th>
<th>Moderately True</th>
<th>Exactly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

2. If someone opposes me, I can find the means and ways to get what I want.

<table>
<thead>
<tr>
<th>Not at all True</th>
<th>Hardly True</th>
<th>Moderately True</th>
<th>Exactly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

3. It is easy for me to stick to my aims and accomplish my goals.

<table>
<thead>
<tr>
<th>Not at all True</th>
<th>Hardly True</th>
<th>Moderately True</th>
<th>Exactly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

4. I am confident that I could deal efficiently with unexpected events.

<table>
<thead>
<tr>
<th>Not at all True</th>
<th>Hardly True</th>
<th>Moderately True</th>
<th>Exactly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

5. Thanks to my resourcefulness, I know how to handle unforeseen situations.

<table>
<thead>
<tr>
<th>Not at all True</th>
<th>Hardly True</th>
<th>Moderately True</th>
<th>Exactly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
6. I can solve most problems if I invest the necessary effort.

<table>
<thead>
<tr>
<th>Not at all True</th>
<th>Hardly True</th>
<th>Moderately True</th>
<th>Exactly True</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

7. I can remain calm when facing difficulties because I can rely on my coping abilities.

<table>
<thead>
<tr>
<th>Not at all True</th>
<th>Hardly True</th>
<th>Moderately True</th>
<th>Exactly True</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

8. When I am confronted with a problem, I can usually find several solutions.

<table>
<thead>
<tr>
<th>Not at all True</th>
<th>Hardly True</th>
<th>Moderately True</th>
<th>Exactly True</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

9. If I am in trouble, I can usually think of a solution.

<table>
<thead>
<tr>
<th>Not at all True</th>
<th>Hardly True</th>
<th>Moderately True</th>
<th>Exactly True</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

10. I can usually handle whatever comes my way.

<table>
<thead>
<tr>
<th>Not at all True</th>
<th>Hardly True</th>
<th>Moderately True</th>
<th>Exactly True</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Appendix D

Measure of Audiologic Rehabilitation Self-Efficacy for Hearing Aids (MARS-HA)

Instructions: Provide the patient with the questionnaire and writing instrument. It is important to review the instructions with the patient and ensure that the patient is answering the question in regards to the confidence that he/she has right now relating to the given task or behavior. If the patient is unfamiliar with hearing aids, then please instruct the patient to respond to the questions if he/she were being asked about general abilities similar to those described in the questions.

Scoring: The MARS-HA subscale and total scale scores are calculated by taking the average of the item responses. An average less than or equal to 80% (i.e. where the patient is reporting low or moderate self-efficacy) indicates the need for counseling/rehabilitation in this area.

Factor 1 – Basic Handling:
Questions #1-5, 7, 10

Factor 2- Advanced Handling:
Questions #6,8,9,11,12

Factor 3- Aided Listening
Questions #16-24

Factor 4 – Aided Listening:
Questions # 16 – 24
Measure of Audiologic Rehabilitation Self-Efficacy for Hearing Aids (MARS-HA)

Directions:

These questions ask about your ability to do certain activities with a hearing aid, and they also ask about your ability to hear in certain situations. If you have never been in these situations, then make your best guess about how well you would do. If you have never used a hearing aid, then respond by thinking about your general ability to do things like the activities described here. For example, how good are you at naming the make and model of other things you own? Or how good are you at changing the batteries for other things you own? If you have seen a hearing aid, then you may or may not know how to use one. Maybe you received some instruction on hearing aids and maybe not. Given what you know right now, indicate how confident you are that you could do the things described here.

If you believe that you cannot do the task described, then circle 0% for "Cannot do at all" on the rating scale.

If you are absolutely certain that you can do the task, then circle 100% for "Certain can do" on the rating scale.

If you are feeling somewhat unsure, then pick a number in between 0 and 100 on the rating scale that indicates how confident you are that you can do the described activity. Higher numbers indicate greater certainty.

<table>
<thead>
<tr>
<th>0%</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot do this at all</td>
<td>Moderately certain can do</td>
<td>I am certain I can do this</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Go to next page
PRACTICE STATEMENTS:

The following two statements are intended to give you practice using the rating scale described on the previous page. Please circle the percentage that best describes your confidence, right now, regarding each practice statement.

P-1: I can lift a 10-pound object with ease.

<table>
<thead>
<tr>
<th>How certain are you that you can do this? (circle a percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% 10 20 30 40 50 60 70 80 90 100%</td>
</tr>
<tr>
<td>Cannot do certain   Moderately I am certain</td>
</tr>
</tbody>
</table>

P-2: I can easily tell the difference between a 19-pound object and a 20-pound object.

<table>
<thead>
<tr>
<th>How certain are you that you can do this? (circle a percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% 10 20 30 40 50 60 70 80 90 100%</td>
</tr>
<tr>
<td>Cannot do certain   Moderately I am certain</td>
</tr>
</tbody>
</table>

This is the end of the practice statements. Please turn the page and circle the percentage that best describes your confidence, as of now, regarding your hearing aid manipulation skills and listening skills.
1. I can insert a battery into a hearing aid with ease.

How certain are you that you can do this? (circle a percentage)

0% 10 20 30 40 50 60 70 80 90 100%
Cannot do this at all Moderately certain can do I am certain I can do this

2. I can remove a battery from a hearing aid with ease.

How certain are you that you can do this? (circle a percentage)

0% 10 20 30 40 50 60 70 80 90 100%
Cannot do certain Moderately I am certain I can do this

3. I can tell a right hearing aid from a left hearing aid.

How certain are you that you can do this? (circle a percentage)

0% 10 20 30 40 50 60 70 80 90 100%
Cannot do certain Moderately I am certain I can do this

4. I can insert hearing aids into my ears accurately.

How certain are you that you can do this? (circle a percentage)

0% 10 20 30 40 50 60 70 80 90 100%
Cannot do certain Moderately I am certain I can do this

Go to next page
5. I can remove hearing aids from my ears with ease.

<table>
<thead>
<tr>
<th>How certain are you that you can do this? (circle a percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% 10 20 30 40 50 60 70 80 90 100%</td>
</tr>
<tr>
<td>Cannot do certain</td>
</tr>
</tbody>
</table>

6. I can identify the different components of a particular hearing aid (i.e. microphone, battery door, vent, sound outlet, etc.)

<table>
<thead>
<tr>
<th>How certain are you that you can do this? (circle a percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% 10 20 30 40 50 60 70 80 90 100%</td>
</tr>
<tr>
<td>Cannot do certain</td>
</tr>
</tbody>
</table>

7. I can operate all the controls on a particular hearing aid (knobs, switches, and/or remote control) appropriately.

<table>
<thead>
<tr>
<th>How certain are you that you can do this? (circle a percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% 10 20 30 40 50 60 70 80 90 100%</td>
</tr>
<tr>
<td>Cannot do certain</td>
</tr>
</tbody>
</table>

8. I can stop a hearing aid from squealing.

<table>
<thead>
<tr>
<th>How certain are you that you can do this? (circle a percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% 10 20 30 40 50 60 70 80 90 100%</td>
</tr>
<tr>
<td>Cannot do certain</td>
</tr>
</tbody>
</table>
9. I can troubleshoot a hearing aid when it stops working.

How certain are you that you can do this? (circle a percentage)

0%  10  20  30  40  50  60  70  80  90  100%
Cannot do  Moderately  I am
certain

10. I can clean and care for a hearing aid regularly.

How certain are you that you can do this? (circle a percentage)

0%  10  20  30  40  50  60  70  80  90  100%
Cannot do  Moderately  I am
certain

11. I can name the make and model of a particular hearing aid.

How certain are you that you can do this? (circle a percentage)

0%  10  20  30  40  50  60  70  80  90  100%
Cannot do  Moderately  I am
certain

12. I can name the battery size needed for a specific hearing aid.

How certain are you that you can do this? (circle a percentage)

0%  10  20  30  40  50  60  70  80  90  100%
Cannot do  Moderately  I am
certain
13. I could get used to the sound quality of hearing aids.

How certain are you that you can do this? (circle a percentage)

<table>
<thead>
<tr>
<th>0%</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot do certain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Moderately</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I am</td>
</tr>
</tbody>
</table>

14. I could get used to how a hearing aid feels in my ear.

How certain are you that you can do this? (circle a percentage)

<table>
<thead>
<tr>
<th>0%</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot do certain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Moderately</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I am</td>
</tr>
</tbody>
</table>

15. I could get used to the sound of my own voice if I wore hearing aids.

How certain are you that you can do this? (circle a percentage)

<table>
<thead>
<tr>
<th>0%</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot do certain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Moderately</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I am</td>
</tr>
</tbody>
</table>

16. I could understand a one-on-one conversation in a quiet place if I wore hearing aids.

How certain are you that you can do this? (circle a percentage)

<table>
<thead>
<tr>
<th>0%</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot do certain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Moderately</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I am</td>
</tr>
</tbody>
</table>

Go to next page
17. I could understand conversation in a small group in a quiet place if I wore hearing aids.

| How certain are you that you can do this? (circle a percentage) |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 0% 10 20 30 40 50 60 70 80 90 100% |
| Cannot do certain | Moderately | I am                  |

18. I could understand conversation on a regular telephone if I wore hearing aids.

| How certain are you that you can do this? (circle a percentage) |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 0% 10 20 30 40 50 60 70 80 90 100% |
| Cannot do certain | Moderately | I am                  |

19. I could understand television if I wore hearing aids.

| How certain are you that you can do this? (circle a percentage) |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 0% 10 20 30 40 50 60 70 80 90 100% |
| Cannot do certain | Moderately | I am                  |

20. I could understand the speaker/lecturer at a meeting or presentation if I wore hearing aids.

| How certain are you that you can do this? (circle a percentage) |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 0% 10 20 30 40 50 60 70 80 90 100% |
| Cannot do certain | Moderately | I am                  |

Go to next page
21. I could understand a one-on-one conversation in a noisy place if I wore hearing aids.

How certain are you that you can do this? (circle a percentage)

<table>
<thead>
<tr>
<th>0%</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot do</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>I am</td>
</tr>
</tbody>
</table>

22. I could understand a conversation in a small group while in a noisy place if I wore hearing aids.

How certain are you that you can do this? (circle a percentage)

<table>
<thead>
<tr>
<th>0%</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot do</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>I am</td>
</tr>
</tbody>
</table>

23. I could understand a public service announcement over the loudspeaker in a public building if I wore hearing aids.

How certain are you that you can do this? (circle a percentage)

<table>
<thead>
<tr>
<th>0%</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot do</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>I am</td>
</tr>
</tbody>
</table>

24. I could understand conversation in a car if I wore hearing aids.

How certain are you that you can do this? (circle a percentage)

<table>
<thead>
<tr>
<th>0%</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot do</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>I am</td>
</tr>
</tbody>
</table>
Appendix E

The Practical Hearing Aid Skills Test- Revised

Each task is scored on a 3-point Likert scale in which 2 = performs task with no difficulty, 1= performs task with some difficulty, and 0= cannot perform task.

1. Remove your hearing aid(s).
   a. Grasp aid/dexterity
   b. Remove aid from ear

2. Open the battery door.
   a. Locate the door
   b. Open the door

3. Change your hearing aid battery.
   a. Remove old battery
   b. Choose correct battery size
   c. Remove battery tab
   d. Insert new battery

4. Show me how you clean your aid.
   a. Sound bore
   b. Microphone
   c. Vent
   d. Open fit mold

5. Put your hearing aid(s) back in your ear(s).
   a. Grasp aid/dexterity
   b. Placement in ear

6. Turn up the volume of your hearing aid(s).

7. Show me how you use the telephone with your hearing aid(s) (hand phone to client).
   a. Correct use of program/t-coil switch
   b. Placement of phone in relation to hearing aid.

8. Show me how you use your hearing aid in a noisy situation.
Appendix F

The National Eye Institute 25-Item Visual Function Questionnaire (VFQ-25)

National Eye Institute
Visual Functioning Questionnaire – 25

version 2000

(SELF-ADMINISTERED FORMAT)

January 2000

RAND hereby grants permission to use the “National Eye Institute Visual Functioning Questionnaire 25 (VFQ-25) July 1996, in accordance with the following conditions which shall be assumed by all to have been agreed to as a consequence of accepting and using this document:

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2. The user of this NEI –July 1996 accepts full responsibility, and agrees to hold RAND harmless, for the accuracy of any translations of the NEI VFQ-25 Version – July 1996 into another language and for any errors, omissions, misinterpretations, or consequences thereof.

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4. The user of the NEI VFQ-25 – July 1996 will provide a credit line when printing and distributing this document or in publications of the results or analyses based on this instrument acknowledging that it was developed at RAND under the sponsorship of the National Eye Institute.

5. No further written permission is needed for the use of this NEI VFQ-25 – July 1996.

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The following is a survey with statements about problems which involve your vision or feelings that you have about your vision condition. After each question please choose the response that best describes your situation.

Please answer all the questions as if you were wearing your glasses or contact lenses (if any).

Please take as much time as you need to answer each question. All your answers are confidential. In order for this survey to improve our knowledge about vision problems and how they affect your quality of life, your answers must be as accurate as possible. Remember, if you wear glasses or contact lenses; please answer all of the following as though you were wearing them.

INSTRUCTIONS:

1. In general, we would like to have people try to complete these forms on their own. If you find that you need assistance, please feel free to ask the project staff and they will assist you.

2. Please answer every question (unless you are asked to skip questions because they don’t apply to you).

3. Answer the questions by circling the appropriate number.

4. If you are unsure of how to answer a question, please give the best answer you can and make a comment in the left margin.

5. Please complete the questionnaire before leaving the center and give it to a member of the project staff. Do not take it home.

6. If you have any questions, please feel free to ask a member of the project staff, and they will be glad to help you.

Statement of Confidentiality:

All information that would permit identification of any person who completed this questionnaire will be regarded as strictly confidential. Such information will be used only for the purposes of this study and will not be disclosed or released for any other purposes without prior consent, except as required by law.

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PART I – GENERAL HEALTH AND VISION

1. In general, would you say your overall health is:

   (Circle One)

   READ CATEGORIES:

   Excellent.......................... 1
   Very Good......................... 2
   Good.................................. 3
   Fair.................................. 4
   Poor.................................. 5

2. At the present time, would you say your eyesight using both eyes (with glasses or contact lenses, if you wear them) is excellent, good, fair, poor, or very poor or are you completely blind?

   (Circle One)

   READ CATEGORIES:

   Excellent.......................... 1
   Good.................................. 2
   Fair.................................. 3
   Poor.................................. 4
   Very Poor............................ 5
   Completely Blind.................... 6
3. How much of the time do you worry about your eyesight?

READ CATEGORIES:

(Circle One)

None of the time................. 1
A little of the time.............. 2
Some of the time................ 3
Most of the time............... 4
All of the time? .............. 5

4. How much pain or discomfort have you had in and around your eyes (for example, burning, itching, or aching)? Would you say it is:

READ CATEGORIES:

(Circle One)

None................................. 1
Mild................................. 2
Moderate............................ 3
Severe, or......................... 4
Very severe....................... 5

PART 2- DIFFICULTY WITH ACTIVITIES

The next questions are about how much difficulty, if any, you have doing certain activities wearing your glasses or contact lenses if you use them for that activity.

5. How much difficulty do you have reading ordinary print in newspapers?
   Would you say you have:
   (READ CATEGORIES AS NEEDED)

(Circle One)

No difficulty at all................................. 1
A little difficulty................................. 2
Moderate difficulty............................. 3
Extreme difficulty.............................. 4
Stopped doing this because of your eyesight... 5
Stopped doing this for other reasons or not interested in doing this.......................... 6

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6. How much difficulty do you have doing work or hobbies that require you to see well up close, such as cooking, sewing, fixing things around the house, or using hand tools? Would you say:
(READ CATEGORIES AS NEEDED)

(Circle One)

No difficulty at all........................................ 1
A little difficulty.......................................... 2
Moderate difficulty...................................... 3
Extreme difficulty....................................... 4
Stopped doing this because of your eyesight........ 5
Stopped doing this for other reasons or not interested in doing this................................. 6

7. Because of your eyesight, how much difficulty do you have finding something on a crowded shelf?
(READ CATEGORIES AS NEEDED)

(Circle One)

No difficulty at all........................................ 1
A little difficulty.......................................... 2
Moderate difficulty...................................... 3
Extreme difficulty....................................... 4
Stopped doing this because of your eyesight........ 5
Stopped doing this for other reasons or not interested in doing this................................. 6

8. How much difficulty do you have reading street signs or the names of stores?
(READ CATEGORIES AS NEEDED)

(Circle One)

No difficulty at all........................................ 1
A little difficulty.......................................... 2
Moderate difficulty...................................... 3
Extreme difficulty....................................... 4
Stopped doing this because of your eyesight........ 5
Stopped doing this for other reasons or not interested in doing this................................. 6
9. Because of your eyesight, how much difficulty do you have going down steps, stairs, or curbs in dim light or at night?
(READ CATEGORIES AS NEEDED)

(Circle One)

No difficulty at all............................................. 1
A little difficulty............................................... 2
Moderate difficulty.......................................... 3
Extreme difficulty........................................... 4
Stopped doing this because of your eyesight.......... 5
Stopped doing this for other reasons or not
interested in doing this................................. 6

10. Because of your eyesight, how much difficulty do you have noticing objects off to the side while you are walking along?
(READ CATEGORIES AS NEEDED)

(Circle One)

No difficulty at all............................................. 1
A little difficulty............................................... 2
Moderate difficulty.......................................... 3
Extreme difficulty........................................... 4
Stopped doing this because of your eyesight.......... 5
Stopped doing this for other reasons or not
interested in doing this................................. 6

11. Because of your eyesight, how much difficulty do you have seeing how people react to things you say?
(READ CATEGORIES AS NEEDED)

(Circle One)

No difficulty at all............................................. 1
A little difficulty............................................... 2
Moderate difficulty.......................................... 3
Extreme difficulty........................................... 4
Stopped doing this because of your eyesight.......... 5
Stopped doing this for other reasons or not
interested in doing this................................. 6
12. Because of your eyesight, how much difficulty do you have picking out and matching your own clothes?
(READ CATEGORIES AS NEEDED)

(Circle One)
No difficulty at all............................... 1
A little difficulty................................. 2
Moderate difficulty............................... 3
Extreme difficulty............................... 4
Stopped doing this because of your eyesight....... 5
Stopped doing this for other reasons or not interested in doing this............................... 6

13. Because of your eyesight, how much difficulty do you have visiting with people in their homes, at parties, or in restaurants?
(READ CATEGORIES AS NEEDED)

(Circle One)
No difficulty at all............................... 1
A little difficulty................................. 2
Moderate difficulty............................... 3
Extreme difficulty............................... 4
Stopped doing this because of your eyesight....... 5
Stopped doing this for other reasons or not interested in doing this............................... 6

14. Because of your eyesight, how much difficulty do you have going out to see movies, plays, or sports events?
(READ CATEGORIES AS NEEDED)

(Circle One)
No difficulty at all............................... 1
A little difficulty................................. 2
Moderate difficulty............................... 3
Extreme difficulty............................... 4
Stopped doing this because of your eyesight....... 5
Stopped doing this for other reasons or not interested in doing this............................... 6
15. Now, I’d like to ask about driving a car. Are you currently driving, at least once in a while?

Yes...................... 1  Skip to Q 15c

No...................... 2

15a. IF NO, ASK: Have you never driven a car or have you given up driving?

Never drove.................. 1  Skip to Part 3, Q 17

Gave up...................... 2

15b. IF GAVE UP DRIVING: Was that mainly because of your eyesight, mainly for some other reason, or because of both your eyesight and other reasons?

Mainly eyesight.................. 1  Skip to Part 3, Q 17

Mainly other reasons.............. 2  Skip to Part 3, Q 17

Both eyesight and other reasons.... 3  Skip to Part 3, Q 17

15c. IF CURRENTLY DRIVING: How much difficulty do you have driving during the daytime in familiar places? Would you say you have:

No difficulty at all.......................... 1
A little difficulty............................ 2
Moderate difficulty.......................... 3
Extreme difficulty........................... 4

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16. How much difficulty do you have driving at night? Would you say you have:
(READ CATEGORIES AS NEEDED)

(Circle One)
No difficulty at all................................. 1
A little difficulty................................. 2
Moderate difficulty............................. 3
Extreme difficulty.............................. 4
Have you stopped doing this because
of your eyesight.................................. 5
Have you stopped doing this for other reasons
or not interested in doing this................... 6

16a. Because of your eyesight, how much difficulty do you have driving in
difficult conditions, such as in bad weather, during rush hour, on the
freeway, or in city traffic? Would you say you have:
(READ CATEGORIES AS NEEDED)

(Circle One)
No difficulty at all................................. 1
A little difficulty................................. 2
Moderate difficulty............................. 3
Extreme difficulty.............................. 4
Have you stopped doing this because
of your eyesight.................................. 5
Have you stopped doing this for other reasons
or not interested in doing this................... 6

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Part 3: RESPONSES TO VISION PROBLEMS

The next questions are about how things you do may be affected by your vision. For each one, I’d like you to tell me if this is true for you all, most, some, a little, or none of the time.

READ CATEGORIES: All of the time Most of the time Some of the time A little of the time None of the time

17. Do you accomplish less than you would like because of your vision?

18. Are you limited in how long you can work or do other activities because of your vision?

19. How much does pain or discomfort in or around your eyes, for example, burning, itching, or arching, keep you from doing what you would like to be doing? Would you say?

(Circle One on Each Line)

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For each of the following statements, please tell me if it is definitely true, mostly true, mostly false, or definitely false for you or you are not sure.

(Circle One on Each Line)

<table>
<thead>
<tr>
<th></th>
<th>Definitely True</th>
<th>Mostly True</th>
<th>Not Sure</th>
<th>Mostly False</th>
<th>Definitely False</th>
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<td>20. I stay home most of the time because of my eyesight</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>21. I feel frustrated a lot of the time because of my eyesight</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22. I have much less control over what I do, because of my eyesight</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23. Because of my eyesight, I have to rely too much on what other people tell me</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>24. I need a lot of help from other because of my eyesight</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>25. I worry about doing thing that will embarrass myself or others, because of my eyesight</td>
<td>1</td>
<td>2</td>
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That's the end of the interview. Thank you very much for your time and your help.
Appendix of Optional Additional Questions

SUBSCALE: GENERAL HEALTH

A1. How would you rate your overall health, on a scale where zero is as bad as death and 10 is best possible health?

(Circle One)

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<td></td>
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SUBSCALE: GENERAL VISION

A2. How would you rate your eyesight now (with glasses or contact lens on, if you wear them), on a scale of 0-10, where zero means the worst possible eyesight, as bad or worse than being blind, and 10 means the best possible eyesight?

(Circle One)

<table>
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<td></td>
<td></td>
<td>Best</td>
</tr>
</tbody>
</table>

SUBSCALE: NEAR VISION

A3. Wearing glasses, how much difficulty do you have reading the small print in a telephone book, on a medicine bottle, or on legal forms? Would you say:

(READ CATEGORIES AS NEEDED)

(Circle One)

- No difficulty at all.................................................. 1
- A little difficulty................................................... 2
- Moderate difficulty................................................. 3
- Extreme difficulty.................................................. 4
- Stopped doing this because of your eyesight.............. 5
- Stopped doing this for other reasons or not interested in doing this............................. 6

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A4. Because of your eyesight, how much difficulty do you have figuring out whether bills you receive are accurate?

(READ CATEGORIES AS NEEDED)

(Circle One)

No difficulty at all................................. 1
A little difficulty..................................... 2
Moderate difficulty................................. 3
Extreme difficulty................................... 4
Stopped doing this because of your eyesight................... 5
Stopped doing this for other reasons or not interested in doing this................................. 6

A5. Because of your eyesight, how much difficulty do you have doing things like shaving, styling your hair, or putting on makeup?

(READ CATEGORIES AS NEEDED)

(Circle One)

No difficulty at all................................. 1
A little difficulty..................................... 2
Moderate difficulty................................. 3
Extreme difficulty................................... 4
Stopped doing this because of your eyesight................... 5
Stopped doing this for other reasons or not interested in doing this................................. 6

SUBSCALE: DISTANCE VISION

A6. Because of your eyesight, how much difficulty do you have recognizing people who know you across a room?

(READ CATEGORIES AS NEEDED)

(Circle One)

No difficulty at all................................. 1
A little difficulty..................................... 2
Moderate difficulty................................. 3
Extreme difficulty................................... 4
Stopped doing this because of your eyesight................... 5
Stopped doing this for other reasons or not interested in doing this................................. 6

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A7. Because of your eyesight, how much difficulty do you have taking part in active sports or other outdoor activities that you enjoy (like golf, bowling, jogging, or walking)?

(READ CATEGORIES AS NEEDED)

(Circle One)

No difficulty at all……………………………………..  1
A little difficulty……………………………………….  2
Moderate difficulty……………………………………  3
Extreme difficulty…………………………………..……  4
Stopped doing this because of your eyesight………… 5
Stopped doing this for other reasons or not interested in doing this……………………………….  6

A8. Because of your eyesight, how much difficulty do you have seeing and enjoying programs on TV?

(READ CATEGORIES AS NEEDED)

(Circle One)

No difficulty at all……………………………………..  1
A little difficulty……………………………………….  2
Moderate difficulty……………………………………  3
Extreme difficulty…………………………………..……  4
Stopped doing this because of your eyesight………… 5
Stopped doing this for other reasons or not interested in doing this……………………………….  6

SUBSCALE: SOCIAL FUNCTION

A9. Because of your eyesight, how much difficulty do you have entertaining friends and family in your home?

(READ CATEGORIES AS NEEDED)

(Circle One)

No difficulty at all……………………………………..  1
A little difficulty……………………………………….  2
Moderate difficulty……………………………………  3
Extreme difficulty…………………………………..……  4
Stopped doing this because of your eyesight………… 5
Stopped doing this for other reasons or not interested in doing this……………………………….  6
SUBSCALE: DRIVING

A10. [This items, “driving in difficult conditions”, has been included as item 16a as part of the base set of 25 vision-targeted items.]

A11. The next questions are about things you may do because of your vision. For each item, I’d like you to tell me if this is true for you all, most, some, a little, or none of the time.

<table>
<thead>
<tr>
<th>READ CATEGORIES:</th>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
</table>

a. Do you have more help from others because of your vision? ………………. 1 2 3 4 5

b. Are you limited in the kinds of things you can do because of your vision? ………… 1 2 3 4 5

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SUBSCALES: WELL-BEING/DISTRESS (#A12) and DEPENDENCY (#A13)

The next questions are about how you deal with your vision. For each statement, please tell me if it is definitely true, mostly true, mostly false, or definitely false for you or you don’t know.

<table>
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<tr>
<th>Definitely True</th>
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<th>Not Sure</th>
<th>Mostly False</th>
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<td>A12. I am often irritable because of my eyesight ........ 1</td>
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<td>4</td>
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<td>A13. I don’t go out of my home alone, because of my eyesight ............ 1</td>
<td>2</td>
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## Appendix G

**Examiner Cover Sheet**

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<th>How many hours a day do you wear the hearing aid?</th>
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<th>How many days a week do you wear the hearing aid?</th>
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References


Hickson, L. (2012). How can the uptake and outcomes of hearing rehabilitation be improve. Keynote address: Academy of Rehabilitative Audiology: Providence, RI.


