The Role of Trust in Treatment Uptake for Hearing Loss in Older Adults

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Abstract

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Untreated hearing loss in older adults is a growing public health problem. Many of the barriers contributing to the low uptake of hearing healthcare (e.g., stigma, accessibility, affordability) have been cited in the audiology/hearing healthcare literature. Policymakers are working to improve accessibility and affordability of hearing healthcare, but other barriers (i.e., trust) require further examination to effectively reduce this gap in need. While trust is a less-documented barrier, qualitative findings suggest that a lack of trust in hearing healthcare providers contributes to the low uptake of hearing aids and hearing healthcare services. However, there is little evidence to support a measurable relationship between trust and treatment uptake for hearing loss. Therefore, the purpose of the proposed study was to quantitatively explore the role of trust in older adults' decisions to

treat their hearing loss. American adults ages 60 years and older (n= 300, 50.3% Female) completed a 30-45 minute survey which examined their experiences with hearing healthcare, hearing healthcare-seeking behaviors, and trust levels in various aspects of the healthcare and hearing healthcare systems. Many of the survey items that measured trust were unique to this study. All participants had subjective hearing loss; 118 (39.4%) participants had never sought help for hearing problems while 182 (60.7%) participants were hearing aid and/or cochlear implant users. Factor analysis, reliability analysis, and multiple regression analyses were employed to examine the relationship between trust and treatment uptake. Factor analysis and reliability analysis confirmed that the items used to measure trust were internally consistent. Regression analyses revealed that hearing sensitivity (as measured by pure-tone average) and having insurance coverage for hearing aids consistently and significantly predicted treatment uptake. Results also suggest that trust moderates the effect of stigma. However, we found no evidence that trust significantly predicted treatment uptake. Limitations and generalizations of these results are discussed, as well as future directions for research.

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Chapter 1: Introduction

People today are living longer than ever. With this extended life expectancy, there has been an increased focus on healthy aging—the concept of retaining a high quality of life in old age. Some attributes of healthy aging include: the slowing down of body processes, an adaptation to a continuous process of change, a desire to continue to actively participate in life processes, and the ability to function physically, cognitively, and socially. The slowing of body processes, often caused by changes in physical abilities, requires people to adapt in order to maintain their activities of daily living (Bryant, Corbett, & Kutner, 2001).

Hearing loss is one of the many impairments that arises and progresses as we age (Davis, 1989; Gates & Mills, 2005; Working Group on Speech Understanding and Aging, 1988), and untreated hearing loss in older adults has been described as a public health concern (Reavis, Tremblay, & Saunders, 2016). Approximately 1.34 billion people (18.1% of the world's population) have at least a mild degree of hearing loss, and hearing loss is the fourth leading contributor to years lived with disability worldwide (Tucci, Wilson, & O'Donoghue, 2017; Wilson, Tucci, Merson, & O'Donoghue, 2017). Estimated incidence increases with age, with 1 in 3 adults 65 years of age and older having at least a moderate degree of hearing loss, and 1 in 2 of those over 75 years of age (National Institute on Deafness and Communication Disorders [NIDCD], 2017). Unlike other aspects of healthy aging, such as declining cognitive ability and visual acuity, older adults seem less determined to combat and/or treat declining hearing sensitivity. In fact, findings from

Davis, Smith, Ferguson, Stephens, & Gianopoulos (2007) suggest that even if they are aware of their hearing loss, long term hearing aid use is low amongst seniors. This point is supported by the fact that after realizing that they have a hearing loss, adults tend to wait for 7-10 years on average to seek intervention (Davis et al., 2007). Also, only about 19% of people ages 70 years and older with hearing loss reported using a hearing aid in the United States (Lin, Thorpe, Gordon-Salant, & Ferrucci, 2011). These statistics are concerning because living with untreated hearing loss puts older adults at risk of poorer balance, increased incidence of falls and hospitalizations, early mortality, loss of autonomy, impaired driving ability (Davis et al., 2016b), financial decline/loss of employment (Jung & Bhattacharyya, 2012), depression (Acar, Yurekli, Babademez, Karabulut, & Karasen, 2011; Li et al., 2014; Saito et al., 2010), social isolation (Jones, Victor, & Vetter, 1984), cognitive decline (Lin et al., 2013), and overall reduced quality of life (Chia et al., 2007). For these reasons it is important to understand what barriers contribute to this near-decade waiting period and what motivates people to seek hearing healthcare (HHC).

1.1. Causes of Low Hearing Healthcare Uptake in Older Adults

Donahue, Dubno, and Beck (2010) formed a National Institute of Health-sponsored working group to explore ways to establish "Accessible and Affordable Hearing Healthcare for Adults with Mild to Moderate Hearing Loss." A product of this working group was a list of recommendations for future research—including answering the questions "What are the barriers for patients accessing the HHC system?" and "What are

the patient-centered factors that impact access to HHC (Donahue, Dubno, & Beck, 2010). Many studies have explored the facilitators and barriers to seeking HHC. Commonly noted factors include: stigmas of aging, hearing aids, and hearing loss (Erler & Garstecki, 2002; Kochkin, 2007; Southall, Gagné, & Jennings, 2010; Wallhagen, 2010), cost of hearing aids (President's Council of Advisors on Science and Technology [PCAST], 2015; Wilson et al., 2017), adaptation to the gradual progression of hearing loss (van den Brink, Wit, Kempen, & van Heuvelen, 1996), social influences (Southall et al., 2010), physicians' management of hearing loss (Meyer & Hickson, 2012), and perceived seriousness of hearing impairment (Duijvestijn et al., 2003; Saunders, Chisolm, & Wallhagen, 2012). Many of these factors may be considered barriers or facilitators. For example, perceived seriousness can be a barrier if a person does not believe their hearing loss is detrimental to the point that it warrants intervention. Contrarily, perceived seriousness can be a facilitator if a person believes their hearing loss is significant enough to seek intervention. Cost is a barrier in the United States (Kochkin, 2007), partially because HHC services are not typically covered by medical insurance. Findings from a focus group study in older adults suggest that HHC providers' dispensing of hearing aids also contributes to the high prevalence of untreated hearing loss in older adults (Tremblay et al., *in preparation*). More specifically, the providers' intent to sell hearing assistive technologies to patients can cultivate distrust toward providers; some patients feel less comfortable being cared for by someone who profits from selling expensive devices like hearing aids.

1.2. Increasing Treatment Uptake in Older Adults

One of the most logical ways to improve treatment uptake is to remove the current barriers preventing older adults from getting the help that they need. In effort to combat inequity in access to quality HHC, services can be provided outside of the clinic via community-based programs (e.g., Oyendo Bien by Marrone et al., 2017). Community-based HHC services also serve to promote awareness of hearing loss and education about hearing loss and treatment options (Marrone et al., 2017). The Over the Counter Hearing Aid Act (OTCHAA) was signed into law in August 2017 as a method for improving accessibility and affordability of hearing aids and HHC. The OTCHAA proposes that air-conduction hearing aids be sold and purchased over-the-counter, opening hearing aid sales to non-medical professionals (e.g., retail stores, technology store, pharmacies). This legislation thwarts the requirement for a medical waiver or medical exam for purchasing an air-conduction hearing aid and requires new Food and Drug Administration (FDA) regulations regarding the safety and labeling requirements for the over-the-counter hearing aids. The FDA would also update its guidelines regarding personal sound amplifiers (PSAPs). While the OTCHAA directly combats the issues of accessibility and affordability of HHC treatment options, it does not address some of the other contributors to the low uptake of HHC in older adults. This means the effects of social barriers like trust will still remain. Thus, it is important to better understand the impact of trust in the context of reducing unmet HHC needs.

Chapter 2: A Review of Trust and Treatment Uptake

This chapter will describe the existing research as it relates to trust and treatment uptake for older adults with hearing loss. First, theoretical models of help-seeking behavior and trust will be discussed. Next, a review of the literature on the topics of trust and help-seeking behavior will be provided. Finally, the theoretical and empirical background in trust and help-seeking behavior will be presented, synthesized, and summarized. Sources of information were obtained using keywords/phrases such as:

> *trust, trust in healthcare, trust AND health care, theoretical models of trust, trust AND audiology, trust AND hearing, help-seeking behavior AND trust, help-seeking, models of help-seeking, help-seeking AND hearing, help-seeking AND audiology, help-seeking AND healthcare, trust AND utilization, hearing AND treatment uptake, trust AND treatment uptake, trust AND treatment uptake AND hearing OR audiology.*

Databases searched include:

- PubMed (https://www.ncbi.nlm.nih.gov/pubmed)
- University of Washington library website (lib.washington.edu)
- Google scholar (scholar.google.com)
- Academic Search Complete (EBSCOhost; http://eds.a.ebscohost.com)
- Web of Science (http://apps.webofknowledge.com)

Sources were obtained directly from search results and via snowball methods.

2.1. Key Concepts and Terms

Before delving into the empirical literature as it relates to trust and treatment uptake in older adults, it is important to first understand these concepts. It should be noted that treatment uptake is one of many types of help-seeking behaviors. While trust and treatment uptake are the focal points of the current study, the concept of help-seeking behavior will also be explained, as many empirical studies in hearing healthcare (HHC) group treatment uptake with other types of help-seeking behaviors (i.e., deciding

to get a hearing test, seeking information about hearing loss, making hearing-related decisions with a HHC provider).

2.1a. Defining "Older Adults"

The term "older adults" typically refers to people ages 65 years and older (American Psychological Association, 2010). The current study uses data from a larger study, which aimed to not only survey people with hearing loss, but also those with normal hearing who had not yet sought help. Therefore, we included people slightly below the standard age of an "older adult." In the context of the current study, the terms "older adults" and "seniors" refer to people ages 60 years and older.

2.1b. Conceptualizing "Trust"

While "trust" is a widely-used term, there has been much debate regarding its definition. Although many researchers agree on the impact of trust, the definition of trust varies within and outside of the healthcare literature. **Table 2.1** illustrates how prominent trust researchers operationalize "trust" across disciplines. Few publications include a concrete definition of trust. For example, Rolfe et al. (2014) published a Cochrane Review that included 10 studies on interventions to increase patient-physician trust found that only *one* study provided a clear definition of trust (Rolfe, Cash-Gibson, Car, Sheikh, & Mckinstry, 2014).

AUTHOR	DEFINITION	DISCIPLINE
Möllering, 2001	"a state of favorable expectation regarding other people's actions and intentions"	Sociology
Thom & Campbell (1997)	"cooperative behavior that depends on one person's expectation that the other person will voluntarily act to the first person's benefit"	Medicine
Rousseau, Sitkin, Burt, & Camerer (1998)	"psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behaviors of others"	Management
Luhmann (1979)	"a blending of knowledge and ignorance"	Sociology
Goold (2002)	"people's expectations, typically for goodwill, advocacy, and competence"	Medicine
Mechanic & Schlesinger (1996)	"the expectations of the public that those who serve them will perform their responsibilities in a technically proficient way (competence), that they will assume responsibility and not inappropriately defer to others (control), and that they will make their patients' welfare their highest priority (agency)"	Medicine
Meize-Grochowski (1984)	"an attitude bound to time and space in which one relies with confidence on someone or something"	Nursing
Hupcey, Penrod, Morse, & Mitcham (2001)	"a willing dependency on another's actions" to have a need met	Nursing

Table 2.1. Definitions of "trust" in healthcare-related fields.

Hall et al. (2001) provide a definition of trust from a healthcare lens with similarities to definitions from other fields. Hall et al. (2001) define trust as *"the optimistic acceptance of a vulnerable situation in which the trustor believes the trustee will care for the trustor's interest"* (p. 615; Hall, Dugan, Zheng, & Mishra, 2001). Rousseau et al. (1998) also streamline the operationalization of "trust". In a review of trust across disciplines (psychology, economics, and sociology), Rousseau and colleagues identify confident expectations and a willingness to be vulnerable as "critical components" across many definitions of trust; they define trust as "*a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another*" (p. 395; Rousseau et al., 1998). In both articles, the authors emphasize the importance of vulnerability in a trusting relationship; without vulnerability, there would be no need for trust. Rousseau et al. also found consistencies across definitions of trust from different disciplines regarding the conditions that must exist for trust to arise. Risk, defined as the perceived probability of loss as interpreted by a decision maker, creates an opportunity for trust. A higher risk yields a higher potential for trust and distrust in a relationship (Thom, 2000). The other overarching condition of trust mentioned across disciplines is interdependence— "*where the interests of one party cannot be achieved without reliance upon another*" (Rousseau et al., 1998).

The conditions that cause trust to arise (i.e., risk and interdependence) signify the importance of trust in the healthcare realm. Patients are often vulnerable, either financially, spiritually, physically, or emotionally, and must give some power to healthcare providers, systems, and/or insurers (Delmar, 2012; Goold, 2002). The

imbalance of knowledge and power between patients, healthcare providers, and other parties calls for trusting attitudes and/or behaviors to make health-related decisions. It should be noted that trusting *behaviors* are not always reflective of trusting *attitudes.* A patient may engage in trusting behaviors (e.g., adhering to a physician's recommendations) with distrusting attitudes (e.g., pessimism or wariness). Some argue that having a trusting attitude, and not merely engaging in trusting behaviors, is necessary to constitute trust (Hall et al., 2001; Mayer, Davis, & Schoorman, 1995; Uslaner, 2002). A patient might adhere to a provider's recommended treatment if the treatment is highly necessary, even if they do not trust the provider.

At any rate, it is evident that trust is an important aspect of patient-provider interactions (Hupcey et al., 2001; Thom & Campbell, 1997; Thorne & Robinson, 1988). Studies have examined the relationship between trust and a patient's decisions to see a certain provider, to adhere to providers' recommendations, to recommend a provider to others, to utilize healthcare services, and to participate in handover between primary and secondary care (Angst & Deatrick, 1996; LaVeist, Isaac, & Williams, 2009; Musa, Schulz, Harris, Silverman, & Thomas, 2009). Trust has also played a role in patients' satisfaction with health services and how likely they are to revisit a provider (Safran et al., 1998). Patients must rely on healthcare providers to work in their best interest by educating them, keeping private health information confidential, and providing the best care possible. What's more, patients with low levels of trust are less likely to seek or access healthcare services and maintain continuity of care; they are also more likely to avoid healthcare services and facilities entirely (Armstrong et al., 2006).

2.1c. Conceptualizing "Help-Seeking Behavior"

Like trust, help-seeking behavior is also used often, but not always clearly defined. Cornally and McCarthy (2011) completed a content analysis on the topic and defined help-seeking behavior for a health problem as "*a problem focused, planned behavior, involving interpersonal interaction with a selected health-care professional"* (Cornally & McCarthy, 2011; p. 280). Cornally and McCarthy also developed a conceptual model on help-seeking behavior **(Figure 2.1).**

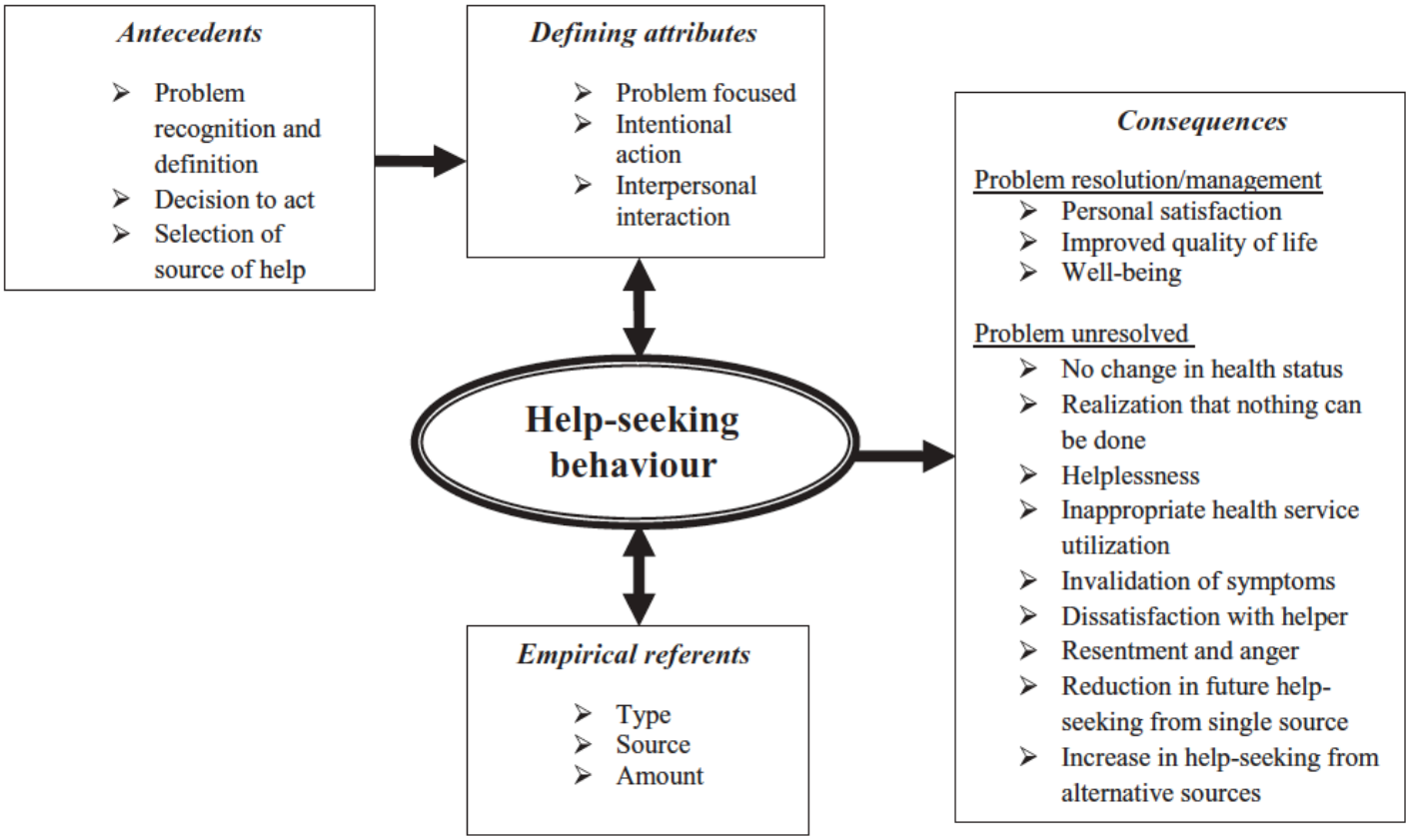

Figure 2.1. Conceptual model of help-seeking behavior (Cornally & McCarthy, 2011).

According to this model, one must recognize a problem, decide to act, and select a source of help prior to seeking help. The act of help-seeking is characterized by: focusing on a specific problem, acting with *intention*, and engaging in some form of interpersonal interaction (i.e., reaching out to a source of help). In the healthcare field, researchers and providers tend to measure help-seeking behavior based on health service use (e.g., seeing a provider in a hospital or clinic) but fail to recognize some sources of informal help (e.g., researching online), the type of help that one seeks, and the amount of help that one is seeking. Thus, Cornally and McCarthy's conceptual model includes type, source and amount of help-seeking behavior as empirical referents. The model also includes possible consequences of help-seeking, including managing and/or resolving the problem or leaving the problem unresolved.

In the context of the current study, treatment uptake is defined as a specific *type* of empirical referent of help-seeking behavior, characterized by the use of hearing aids, cochlear implants, and/or hearing assistive technology (e.g., pocket talkers or personal sound amplifiers) and/or engagement in auditory training or auditory rehabilitation. Treatment uptake is the focal outcome measure of help-seeking behavior. In the current study, people who have treated their hearing loss have engaged in the listed antecedents (recognized their hearing loss, decided to act, selected a source of help, and received hearing technology or auditory rehabilitative services from a HHC professional). One could also assume that their help-seeking process was defined by an intentional action with the goal of lessening their problem (i.e., hearing loss) and involved seeing and/or

speaking with a HHC provider or retailer for their treatment. Thus, in the context of the current study, "treatment uptake" is defined as:

> *the use of hearing aids, cochlear implants, and/or hearing assistive technology (e.g., pocket talkers, PSAPs) AND/OR engagement in auditory training or other form auditory rehabilitation.*

Treatment uptake does not include having a hearing test or participating in non-clinical hearing research.

2.2. Theoretical Models of Trust and Help-Seeking Behavior

When it comes to the unmet hearing healthcare (HHC) needs in older adults, many theoretical models could explain seniors' help-seeking behaviors and the processes that they employ when deciding to treat (or not treat) their hearing loss. An ideal model would incorporate the multidimensionality of help-seeking for chronic diseases; it would include the physiologic, psychological, and social factors that contribute to decision-making. Saunders, Chisholm, and Wallhagen (2012) explored the literature on HHC-seeking among older adults and described three relevant models to better understand their help-seeking and decision making processes—the Health Belief Model (HBM; (Rosenstock, 1966), the Transtheoretical Stages of Change Model (TTM; Prochaska & Velicer, 1997), and the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980; Cobelli, Gill, Cassia, & Ugolini, 2014; Fishbein & Ajzen, 1975). Preminger and colleagues proposed an original model which illustrated the changes in trust at various stages of the help-seeking process (J. E. Preminger, Oxenbøll, Barnett, Jensen, & Laplante-Lévesque, 2015)..

A description of these four models as they relate to help-seeking behaviors, treatment uptake, and trust appear in **Sections 2.2a. – 2.2d.**

2.2a. The Health-Belief Model (HBM)

The Health-Belief Model (HBM) focuses on the subjective state of an individual in relation to their help-seeking behaviors. The HBM is based on the idea that health behaviors are determined by personal beliefs and perceptions about a health condition as well as the strategies that are available to reduce the occurrence of the condition(s) (Hochbaum, 1958). In other words this model depicts the interplay of value and expectancy; people value behavior change when they expect that the behavior change will reduce the likelihood of a threat occurring, notably when said threat would have severe consequences (Saunders, Frederick, Silverman, Nielsen, & Laplante-Lévesque, 2016a, 2016b). The HBM has six key constructs:

1) Perceived susceptibility— a self-assessment of one's chances of acquiring a health condition
2) Perceived severity— judgment as to the severity of a disease
3) Perceived benefits— conclusions as to whether changing one's behavior would be more advantageous than maintaining current behaviors
4) Perceived barriers— opinion as to what would stop an individual from adopting new behaviors
5) Perceived self-efficacy—belief in one's own ability to use and benefit from an intervention
6) Cues to action—events, people, or things that motivate one to take action (e.g., illnesses of loved ones, media reports, advice from trusted sources)

Figure 2.2. illustrates the HBM, including the 6 concepts described above (Stretcher & Rosenstock, 1997).

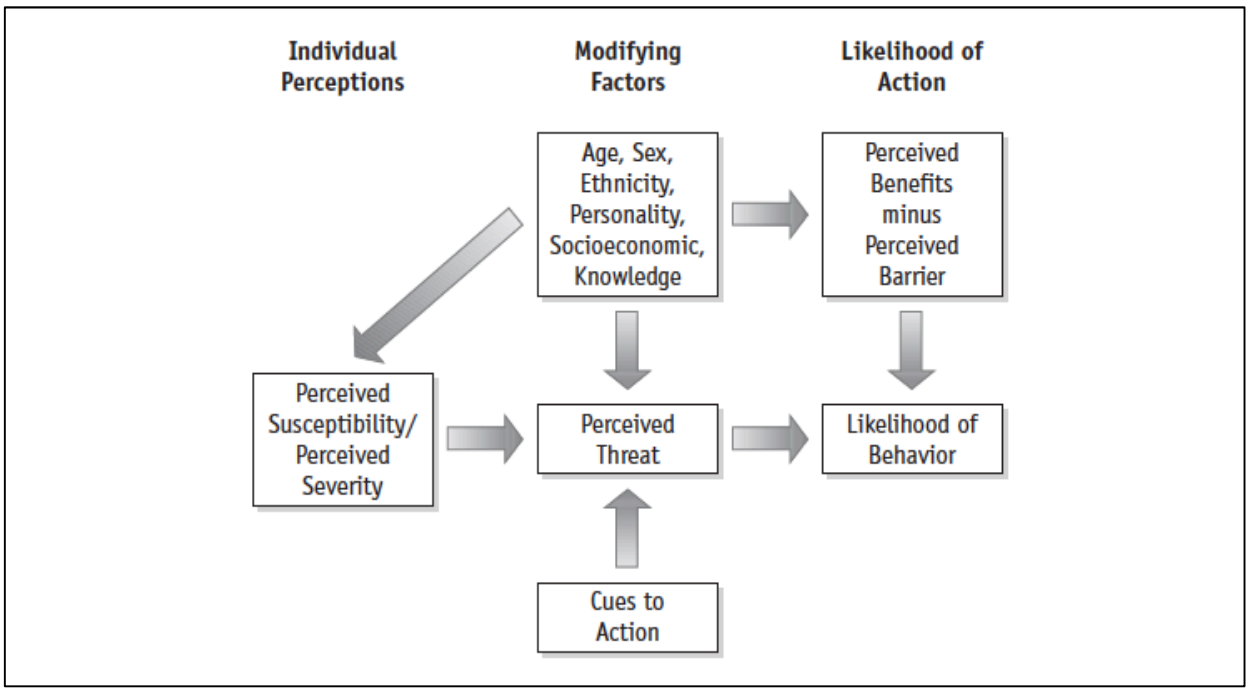

Figure 2.2. Illustration of the Health Belief Model and its six constructs (Rosenstock, 1966; Stretcher & Rosenstock, 1997).

The HBM has been used to examine hearing health behaviors for over two decades (Saunders et al., 2016a, 2016b; Saunders, Frederick, Silverman, & Papesh, 2013; van den Brink et al., 1996). Most recently, Saunders et al. (2016a) examined adults' attitudes and beliefs about their hearing loss and found that degree of hearing loss was associated with constructs of the HBM. More specifically, participants with more hearing loss perceived fewer barriers and more perceived benefits, susceptibility, severity, and cues to action compared to those with less hearing loss. In a follow-up study, Saunders et al. (2016b)

found that older adults' attitudes and beliefs were associated with hearing aid adoption (a form of treatment uptake) and that their attitudes and beliefs *after* a behavior change occurred were better predictors of hearing aid outcomes than their attitudes and beliefs *before* a change in behavior. Comparisons of the health belief questionnaire (which is based on the HBM) administered at baseline and 6 months follow-up revealed no significant change. However exploration of the interaction between change over time, the health belief questionnaire, and hearing aid uptake revealed that participants who took up hearing aids viewed hearing aids and hearing more positively at follow-up than those who did not. These findings are as one might expect, that people who had chosen to seek treatment (hearing aids in this case), viewed hearing aids and hearing with a more positive outlook.

While the HBM provides insights into a person's beliefs and behaviors, it fails to provide the level of detail necessary in determining the role that noted barriers and facilitators play on an individual level. For instance, if we were to group all of the social/psychological barriers and facilitators to seeking treatment for hearing loss (i.e., trust, stigma, pressures from family and friends, communicative barriers) into the "modifying variables" construct, the HBM leaves no space to determine which of these factors is weighing in on the decision-making process. This broad stroke approach is great for conceptualizing the help-seeking/treatment uptake process, but it does not help us to hone in on the role of trust in this process.

2.2b. The Transtheoretical Model of Behavior Change (TTM)

Similar to the HBM, the TTM conceptualizes the process of help-seeking into a series of constructs. The TTM postulates that change is a multi-step process that can, but does not necessarily unfold linearly. The premise of this model is that a person's readiness for change underlies their decision to engage in and maintain help-seeking behaviors, and that a person can progress and regress throughout the help-seeking process.

The TTM is comprised of six constructs, also known as "stages of change":

1) Pre-contemplation—no intention to take action (within 6 months)
2) Contemplation—intends to take action (within 6 months)
3) Preparation—intention to take action (within 1 month) and exhibiting behavior changes toward health-promoting behavior
4) Action—has changed behavior (for less than 6 months)
5) Maintenance—has changed behavior (for over 6 months)
6) Termination—no temptation to revert; high self-efficacy

Prochaska and Velicer (1997) postulate that specific processes underlie each of these constructs. As a person moves from the pre-contemplation to the contemplation phase of behavior change, they might reevaluate their environment, search for information that promotes a positive behavior change (referred to as "consciousness-raising"), and experience some of the drawbacks of not changing their behaviors (i.e. "dramatic relief"). Between the contemplation and action phases, one might reevaluate themselves and realize that a behavior change is a part of their identity; they might also experience self-liberation, or freedom from their old behavior/identity, as they commit to change. Processes underlying the maintenance construct include: substituting healthier behaviors for the unhealthy behavior (i.e. "counterconditioning"), forming helping relationships that support healthy behavior change, using positive reinforcement to

manage their behavior change, and replacing reminders/cues to engage in unhealthy behavior with reminders/cues to engage in healthy behavior (i.e. "stimulus control"). These underlying processes are illustrated in **Figure 2.3.**

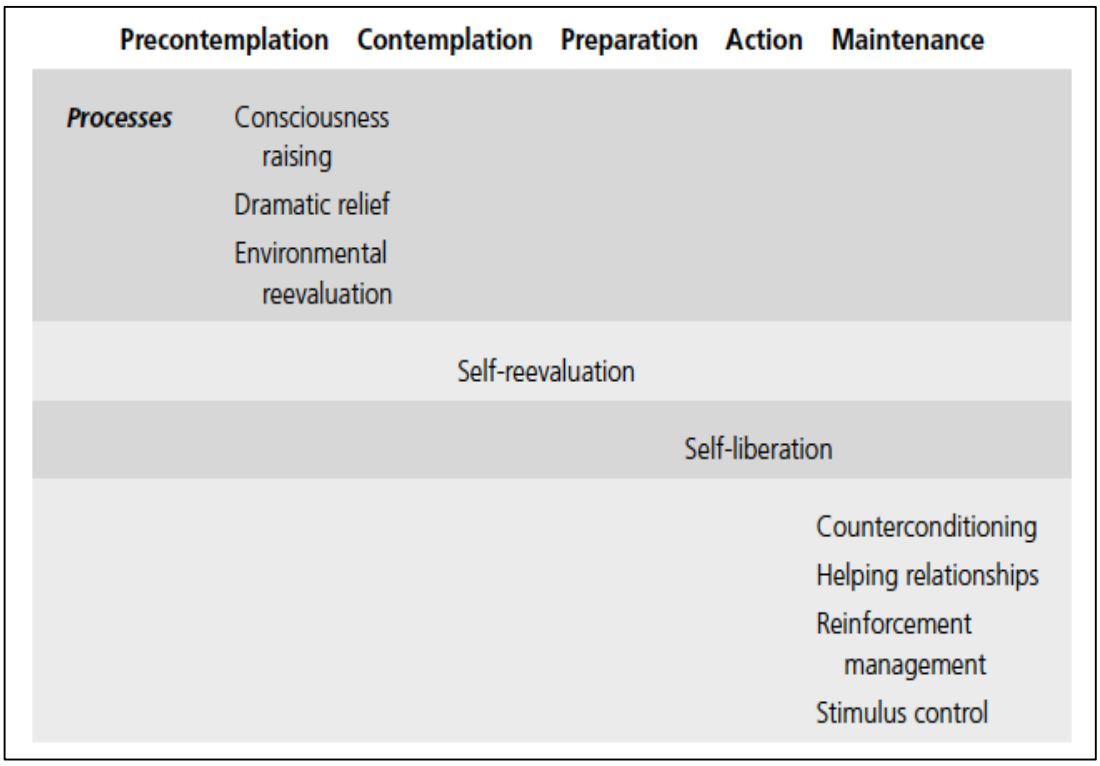

Figure 2.3. Stages and underlying processes of the Transtheoretical Model of Change (Prochaska & Velicer, 1997)

The flexibility of the TTM is advantageous when describing the process of seeking help for hearing because this process is usually non-linear. Laplante-Lévesque, Brännström, Ingo, Andersson, & Lunner (2015) explored stages of change in 224 Swedish adults who had failed online hearing screening tests. They used the University of Rhode Island Change Assessment (URICA) to categorize participants into stages of change and completed a cluster analysis, which revealed that only 44% of the sample was in the decision making process. Twenty-eight percent of the sample had already taken action; 16% were indecisive, and 12% had completely rejected treatment uptake (Laplante-Lévesque, Brännström, Ingo, Andersson, & Lunner, 2015). This type of analysis is not possible using the HBM, since it so heavily relies on perception rather than concrete and observable behaviors. Saunders et al. (2016b) found that attitudes and beliefs about hearing were better predictors of hearing aid outcomes when assessed *after* purchasing hearing aids than when assessed *before* a behavior change occurred. This supports the usefulness of the TTM because it focuses more on observable behaviors, like the act of purchasing a hearing aid, than thoughts and perceptions.

Compared to the HBM, the TTM allows for a more granular analysis of behavior change due to its discrete stages and associated processes. Yet, when it comes to the basis of the current study—examining the role of trust in a person's decision-making process—

the TTM is both lacking and excessive. The TTM provides little insight regarding the specific barriers a person might face and the relationship between these barriers and their decisions regarding treatment uptake. More importantly, many of the TTM's focal concepts are not particularly important to the current study. These concepts and their associated processes are best measured using the URICA or other standardized measure and are not specifically queried in the current study.

2.2c. Preminger et al. (2015) Conceptual Model of Trust in HHC

Preminger et al. (2015) investigated trust in HHC from a service delivery perspective. Rather than focusing on treatment, Preminger et al. examined the role of trust before, during, and after seeing an audiologist. Authors utilized data from a previous study (Laplante-Lévesque et al., 2012) in which they conducted semi-structured interviews with 34 adults from Australia, Denmark, the United Kingdom (UK), and the United States (USA) to examine their views on seeking HHC services and rehabilitation. These participants had varying degrees of hearing loss and experiences with the HHC system. Interview transcripts of 29 participants were thematically analyzed using an interpretive phenomenological analysis (IPA) approach. Five participants (one from Australia, Denmark, and UK, and two from the USA) did not discuss trust and were thus not included in the final analysis.

From their thematic analysis, Preminger et al. organized their findings into four aspects of trust. **Figure 2.4** provides a graphic representation of Preminger et al.' model.

The four aspects of trust derived from Preminger et al.' semi-structured interviews include:

1) Components and sub-components of trust: relational (i.e. interpersonal) competence, technical competence, clinical environment, and commercialized approach
2) Assignment of trust: interpersonal trust (i.e., trust in people) and institutional trust (i.e., trust in systems and institutions)
3) Level of trust: varies from low to high
4) Time course of trust: trust can vary before, during, and after receiving HHC service(s).

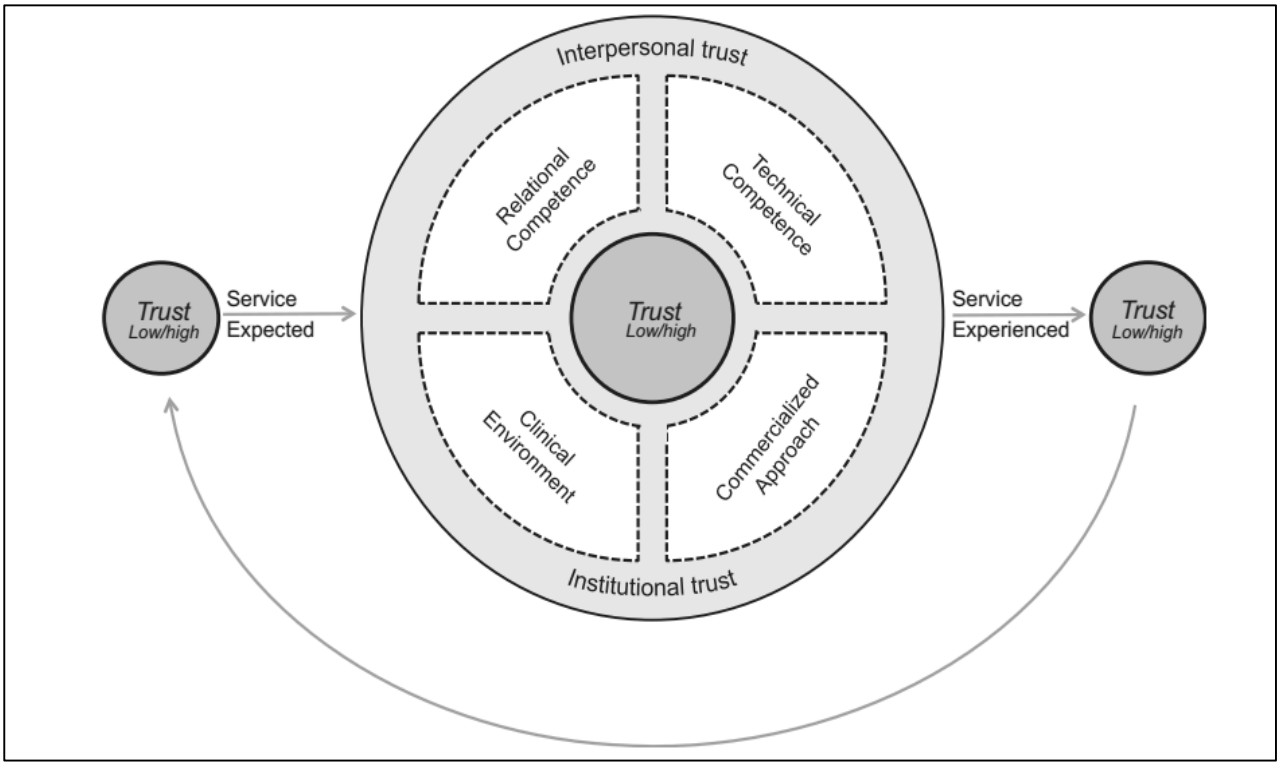

Figure 2.4. Conceptual model of trust in hearing healthcare (Preminger et al., 2015).

Findings from Preminger and colleagues' interviews suggest that people enter the HHC system with a preconceived level of trust that shapes their expectations for service. During the appointment, trust in the HHC provider is altered based the provider's interpersonal and technical competence, while trust in the healthcare system is altered based on the clinical environment and the provider's commercialized approach. In reference to a provider's commercialized approach, participants revealed that they were less trusting of provider who advertised their services, especially if they disseminated free hearing aid ads. Participants were also less likely to trust a provider who focused on sales rather than service and providers who systematically recommended the most expensive hearing aids. The Preminger model proposes that the patient establishes some level of trust in the provider during the appointment. Based on their service experience, patients will leave with a certain level of trust in the HHC system as well as the specific provider. This could influence their level of trust during future appointments.

The Preminger model captures some of the most prominent features of trust (types and dimensions, susceptibility to change over time). However, a critique of this model is that while it parses apart dimensions of trust during the patient's appointment, it does not incorporate any aspects of behavior change. The Preminger model could drive a hypothesis on how certain experiences might shape trust, but one could not theorize any concrete changes in behavior or treatment uptake based solely on this model. What's more, the Preminger model focuses on patient experiences during a formal appointment with a HHC provider. This information does little to help us understand how to get more people into the clinic, as trust might affect decision-making prior to seeing a provider.

Unlike the HBM and TTM, the Preminger model serves as a solid foundation for understanding trust in HHC. However, it lacks the decision-making/treatment uptake aspect that is equally important to the current study.

2.2d. The Theory of Reasoned Action (TRA)

The Theory of Reasoned Action (TRA) is a model of behavioral intention that aims to capture the factors that motivate people to perform particular behaviors; it focuses on how much effort a person must exert in order to perform a behavior and has been proven to closely relate to a person's actual behavior (Ajzen, 1991; Cobelli et al., 2014; Weddle & Bettman, 1974). The TRA proposes that behavioral intention is driven by an individual's attitude and their subjective norm. While an individual's attitude is based on their own thoughts and feelings, the subjective norm is a product of what the individual believes the people who are important to them will think. A model of the original TRA is provided in **Figure 2.5**.

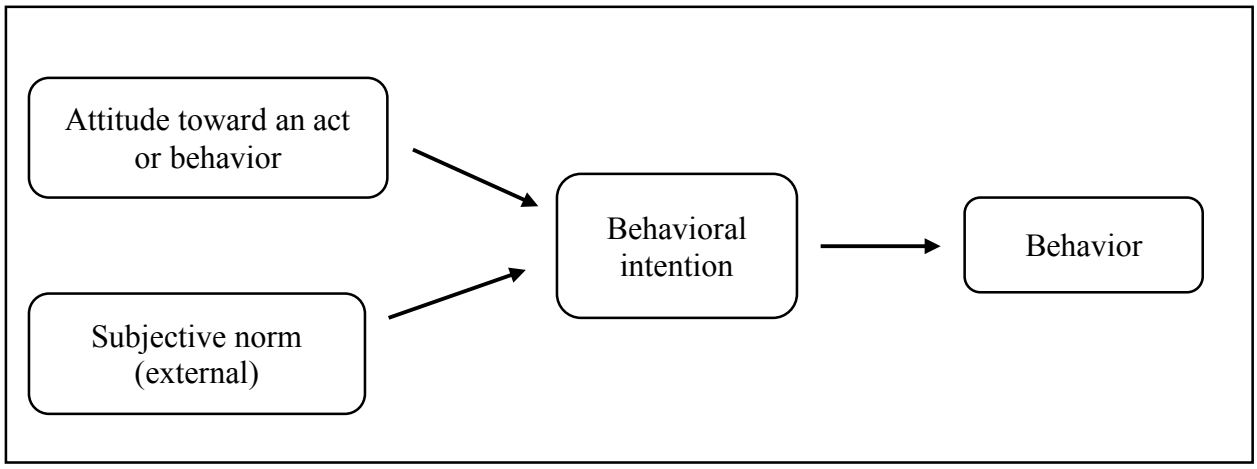

Figure 2.5. Theory of Reasoned Action Model (Fishbien & Azjen, 1975)

Cobelli et al. (2014) aimed to identify factors that influence older adults' intent to adopt hearing aids. They achieved this by developing a modified model of the TRA (Fishbein & Azjen, 1975; Ajzen & Fishbein, 1980; Ajzen, 1991). In Cobelli's adaptation of the TRA, authors theorize that a person's intent to adopt hearing aids is not only affected by what they personally believe (attitude) about hearing aids, but also by stigma (subjective norm) and their trust in the hearing healthcare (HHC) provider. Cobelli et al. administered a survey to candidates for free hearing aids in Italy. A total of 243 adults, ages 60 years and older, rated their attitudes toward the adoption of hearing aids, subjective norms, intention to adopt hearing aids, and trust in the HHC provider on a 5-point Likert scale (1= completely disagree; 5= completely agree). Through linear regression modeling, Cobelli revealed that while trust did not moderate the relationship between participants' attitudes toward hearing aids and their intent to adopt hearing aids, trust did mitigate the relationship between participants' subjective norms and their

intent to adopt hearing aids. Thus, trust was shown to mitigate the relationship between societal stigma and intent to adopt. **Figure 2.6** illustrates Cobelli et al.' (2014) extended TRA model.

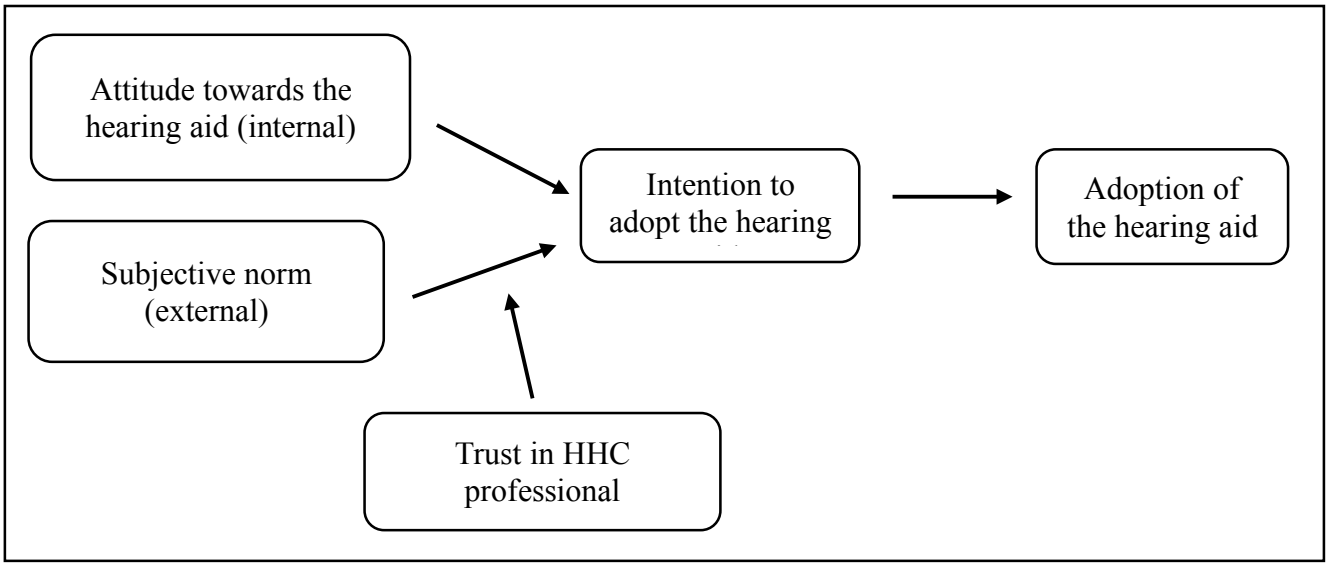

Figure 2.6. Extended Theory of Reasoned Action Model (Cobelli et al., 2014). Authors propose that trust in a hearing healthcare (HHC) professional mitigates the effect of subjective norms (i.e., stigma) on an individual's intention to adopt hearing aids.

The Extended TRA model has many advantages for application to the current study. Most importantly, it specifically incorporates trust into the HHC-seeking process. None of the other models include both of the current study's focal components—trust and treatment uptake. Secondly, the Extended TRA model includes components that the current study queries. Thus, we could actually test this model using the data at hand.

While the HBM and TTM are both thorough and well-supported frameworks for behavior change and help-seeking, they are not the most parsimonious models for describing the distinct relationship between trust and treatment uptake. The HBM, TTM, and Preminger models require the incorporation of information that was not queried in the current study. The HBM and TTM lack the level of detail necessary for viewing trust specifically and the Preminger model does not incorporate the decision-making/treatment uptake, a focal aspect of the current study. Therefore, the current study is based on the extended TRA, which is simple, testable with the available data, and incorporates both trust and treatment uptake.

2.3. Review of Empirical Findings on Trust, Help-Seeking, and Treatment Uptake

Trust is not a prominent area of study in the audiology/HHC literature. In fact, a literature search on trust and hearing healthcare yielded only **five** studies that report on trust in the context of seeking help and/or treatment in adults (Cobelli et al., 2014; Laplante-Lévesque, Hickson, & Worrall, 2010; Poost-Foroosh, Jennings, Shaw, Meston, & Cheesman, 2011; Preminger et al., 2015). An editorial (Taylor, 2015), an interview (Preminger, 2018), and a market review MarkeTrak publication (Kochkin, 2007) have also been published on the topic and will be discussed in the following sections. The peer-reviewed studies provided two models of trust in HHC (described in **Section 2.3;** Cobelli et al., 2014; Preminger et al., 2015), and two qualitative studies on patient-provider interactions (Laplante-Lévesque et al., 2010; Poost-Foroosh et al., 2011).

One of the qualitative studies (Laplante-Lévesque et al., 2010) employed in-depth interviews with adults aged 50 years and older in order to better understand how they engaged in shared decision-making for rehabilitative audiology. Participants reported that audiologists having financial incentives for hearing aid sales made them less trustworthy, as it produced a conflict of interest. Similar findings were reported in a focus group study of adults ages 60 years and older in the USA, UK, Canada, and Australia (Tremblay et al., *in preparation*). When prompted to describe the barriers and facilitators for seeking help for hearing problems, participants mentioned feeling as if HHC professionals were mainly interested in selling hearing aids or other devices, and that patients would be taken advantage of if they decided to see a HHC professional for their hearing problems. In the UK, Canada, and Australia, where most hearing aids and HHC services are federally funded, participants mentioned high trust in federal HHC providers and their HHC system. However, many reported a lack of trust in private HHC providers. This distinction was not pronounced in the USA focus group. Taken together, these studies provide qualitative evidence that trust affects HHC-seeking behaviors and can operate as a barrier when a perceived conflict of interest arises.

Poost-Foroosh et al. (2011) aimed to identify factors during patient-provider interactions that contributed to patients' decisions to adopt hearing aids. A total of 13 adults between 45-85 years of age (M = 70.84 years) generated statements describing patient-provider interactions and ranked them in order of importance in regards to their hearing aid adoption decisions. Authors employed a hierarchical cluster analysis technique to group participants' rankings into 8 topics in patient-provider interactions

that influenced decisions regarding hearing aid adoption (listed in order of importance): 1) Ensuring client comfort, 2) Understanding and meeting client needs, 3) Client-centered traits and actions, 4) Acknowledging client as an individual, 5) Imposing undue pressure and discomfort, 6) Conveying device information by clinician, 7) Supporting choices and shared decision making, and 8) Factors in client readiness. Trust was ranked of highest importance for ensuring client comfort, which participants reported as the most important contributor to hearing aid adoption. In other words, patients felt most comfortable when they trusted their clinician and this was instrumental in their decision to adopt hearing aids. These findings further support the importance of trust in treatment uptake.

While qualitative studies strongly suggest that trust significantly contributes to decisions to seek HHC services, there is no strong, quantitative evidence in the HHC literature to support this notion. There is, however, a large literature base on help-seeking and treatment uptake in older adults with hearing loss. The following section will describe current empirical evidence on the topic of HHC-seeking behaviors in older adults.

2.3a. Hearing Healthcare-Seeking Behavior in Older Adults

Vestergaard-Knudsen et al. (2010) conducted a review of the literature on the correlates to HHC-seeking behavior and hearing aid uptake, use, and satisfaction. Although 39 articles were reviewed (all published between years 1980 and 2009), trust was not mentioned in Vestergaard-Knudsen's review at all. Factors included in the Vestergaard-Knudsen review that relate to HHC uptake, hearing aid use, and hearing aid

satisfaction before, during, and after being fit with a hearing aid are summarized in **Figure 2.7.**

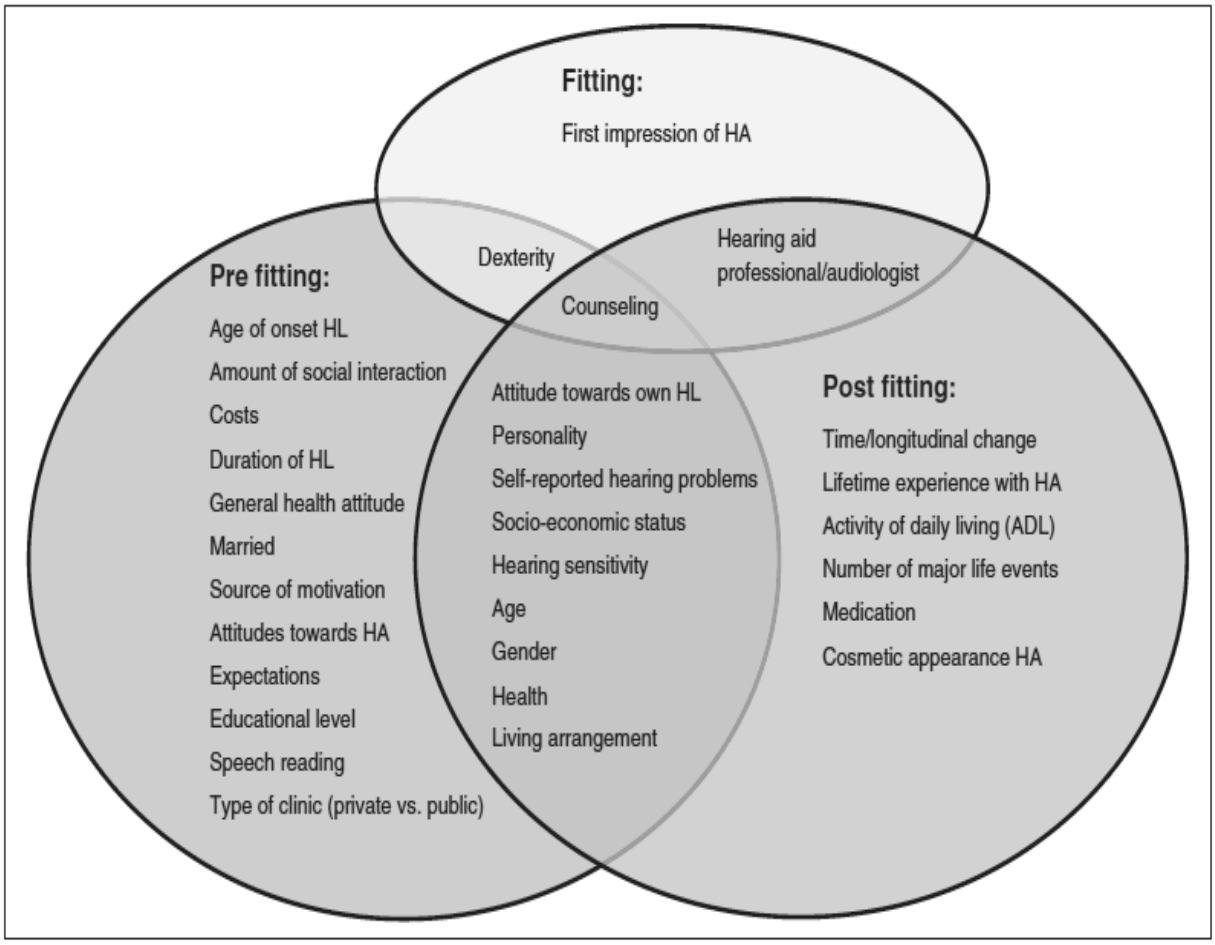

Figure 2.7. Overview of all factors that were included in the studies selected for analysis. Factors are divided over different stages, before, during, and after receiving a hearing aid (Vestergaard-Knudsen et al., 2010).

Others who have investigated factors that contribute to help-seeking behavior in HHC report similar findings (Laplante-Lévesque et al., 2012; Meyer, Hickson, & Fletcher, 2014; Saunders et al., 2012). Laplante-Lévesque et al. (2012) conducted in-depth interviews on older adults in Australia, Denmark, the United Kingdom, and the United States. All participants had hearing loss and a range of experiences with the HHC system— from being satisfied hearing aid users to never having sought help. Although factors such as lacking adequate resources (e.g., time and money) to seek services, cosmetic concerns about wearing a hearing aid, and low self-perceived degree of hearing difficulty were mentioned, trust was not reported in participants' discussions of their help-seeking decisions. It should be noted that Laplante-Lévesque et al. reported findings based on density of the topic; topics that were discussed in-depth by many participants were reported, but those that were discussed to a lesser extent were not included in this analysis. Preminger et al. later used findings from this study to develop a theoretical model of trust in HHC (2015). Thus, trust was mentioned during the interviews, but was possibly not a salient enough topic to be included in the publication.

Meyer et al. (2014) conducted a cross-sectional study to examine audiologic and non-audiologic factors that influence adults' (aged 60+ years) decisions to seek help for hearing problems. Although Meyer et al. report a multitude of non-audiologic factors that influence help-seeking for hearing loss (e.g., attitudes toward hearing aids, employment status, significant life events, hearing handicap, number of health conditions) in over 300 participants, trust was not reported as a factor. This might lead one to believe that trust is

not a factor that contributes to help-seeking in this context. However, Meyer et al. utilized a combination of standardized questionnaires, in-depth case histories, and single-items, none of which queried trust. Therefore, these findings do not support or negate the possibility that trust plays a significant role in HHC-seeking behaviors.

Shortly after the Vestergaard-Knudsen (2010) review, Jenstad & Moon (2011) published a systematic review of barriers and facilitators for hearing aid uptake in a similar population (adults aged 65+ years). Of the 14 articles included in the review, Jenstad & Moon report trust being a significant factor in one, the MarkeTrak VII survey (Kochkin, 2007). Kochkin surveyed adults in the United States to query the obstacles that affected their decisions to not adopt hearing aids. Nearly one in four (24%) of over 4000 adults reported that a lack of trust in healthcare professionals (i.e., hearing aid dispensers, audiologists, and/or physicians) played a role in their decision to not obtain hearing aids. While Kochkin does provide some quantitative data on trust in HHC, these data are descriptive in nature. The MarkeTrak publications report findings from the national surveys but do not employ sophisticated statistical modeling to further examine plausible relationships. The subsequent MarkeTrak Survey VIII (Kochkin, 2012) did not query trust.

2.3b. Trust and help-seeking for other medical problems

It has been shown that a lack of trust in HHC providers can deter a person from obtaining hearing aids (Kochkin, 2007) and affect the ways in which they engage in shared decision-making with their HHC provider (Laplante-Lévesque et al., 2010). Still, few studies in the HHC literature measure trust in the context of help-seeking and

treatment uptake. Could it be that trust is not important in HHC? Thom, Hall, & Pawlson (2004) would disagree. Thom et al. (1999) argue that while there are certainly some limitations to measuring trust, studying trust contributes to healthcare professionals' concepts of medical ethics and enhances the quality of patient-provider relationships. Measuring trust and discovering ways to foster it could help to improve the quality of healthcare, as trust is linked to adherence to provider's recommendations and continuity of care (Thom, Ribisl, Stewart, Luke, & The Stanford Trust Study Physicians, 1999). Therefore an area that is not heavily studied does not necessarily mean that it lacks importance.

In order to learn more about the role of trust in treatment uptake for hearing loss, it is important to understand what is known about help-seeking and trust for other medical concerns. Thus, this section will describe what is known about trust in relation to help-seeking within the healthcare sector.

2.3c. System-related trust and help-seeking

According to published data, trust facilitates patients help-seeking behavior while mistrust inhibits seeking medical care (Jacobs, Rolle, Ferrans, Whitaker, & Warnecke, 2006; Musa et al., 2009). LaVeist et al. (2009) conducted a telephone survey to investigate the relationship between patients' mistrust of healthcare organizations and underutilization of healthcare services. Mistrust was measured using the Medical Mistrust Index (MMI, Laveist et al., 2009) and underutilization was quantified by 5 measures: failure to take medical advice, failure to keep a follow-up appointment, postponing receiving needed care, failure to fill a prescription, and failure to get needed care.

Mistrust was predictive of four markers of underutilization (all except for failure to get needed care). Conceptually, mistrust in the HHC system could contribute to people with a known hearing loss waiting 7-10 years to seek treatment or failing to seek help altogether.

2.3d. Trust, stigma, and help-seeking

Trust in the healthcare providers and systems is particularly important for people with stigmatized illnesses or disorders (e.g., HIV/AIDS, mental illness). Whetten et al. (2006) found that people with HIV/AIDS who exhibited high trust in providers were more likely to attend regular medical appointments, take anti-retroviral medications, and have better mental and physical health. Higher system-related trust was associated with reduced emergency room visits (as emergency room visits are a sign of poor help-seeking behaviors) and better mental and physical health (Whetten et al., 2006). It should be noted that these are results from an observational study so causal conclusions cannot be drawn.

Ostertag, Wright, Broadhead, & Altice (2006) examined survey data from 374 injection drug users. Provider-related trust, as measured by the Trust in Physicians Scale (TiPS; Anderson & Dedrick, 1990), was positively and significantly correlated to healthcare utilization. Adults with psychosis reported a lack of trust in the healthcare system as a barrier for seeking help, particularly at a point of crisis, when they recognized an increased need for help (Cairns, Reid, & Murray, 2015). The notion that system-related trust can serve as a barrier even when the need for help is evident illustrates the importance of understanding the relationship between trust and treatment uptake.

Gaining insight on the role of trust could help to develop a more trustworthy HHC system which could subsequently improve HHC uptake.

2.3e. Trust and help-seeking for chronic illnesses

Since hearing loss is a chronic condition, it is also useful to examine the role of trust in help-seeking behaviors for people with other types chronic illnesses. Haywood et al. (2014) found that in adults with sickle cell disease, those who reported experiencing discrimination in the healthcare system were more likely to report being nonadherent to physician recommendations. Provider-related trust mediated this relationship. Thus, HHC providers should be conscious of their bias toward patients; although hearing aids may be fairly expensive, providers should never assume that certain patients cannot afford them. Patients with colorectal cancer report that trusting their provider is very important in their decision to receive chemotherapy treatment (Jorgensen, Young, & Solomon, 2013). Similar findings were reported for patients with prostate cancer (Orom, Homish, Homish, & Underwood, 2014; O'Rourke, 1999) and breast cancer (Ciambrone, 2006). This information further supports the notion that trust plays a significant role in treatment uptake.

2.4. Summary

Given this review of key concepts, theoretical models, and empirical findings on trust, help-seeking, and treatment uptake, it is important to explain how this information fits into the current study. The research questions and hypotheses of the current study

are rooted and informed by this literature base. For example, even though quantitative findings in cancer research (Ciambrone, 2006; Jorgensen et al., 2013; O'Rourke, 1999; Schildmann et al., 2013) and research on stigmatized illnesses like HIV/AIDS (Whetten et al., 2006) suggest that trust significantly contributes to healthcare utilization and treatment uptake, there is no evidence to show that trust significantly predicts treatment uptake in HHC. Qualitative studies suggest that trust plays a role in decision-making, but no studies delve deeply into the relationship between trust and HHC treatment uptake. The topic of trust has been touched upon in discussion pieces (i.e., Taylor, 2015; Preminger, 2018), but has received very little attention. Therefore, the current study is the first to quantitatively examine the relationship between trust and HHC treatment uptake in older adults.

Prior work by this research team, which included focus groups and interviews, illustrated a relationship between trust and financial incentives. Participants in the Tremblay et al.' (*in preparation*) focus groups described a distinct difference in their trust toward HHC providers who worked for the national healthcare system versus those who worked in the private sector due to the out-of-pocket costs of hearing aids in the private sector. Interviewees in the Laplante-Lévesque et al. (2012) study also felt at risk of exploitation when it came to purchasing hearing aids. Participants mentioned thinking that HHC providers would be more focused on financial compensation than their hearing health. With the Over-The-Counter Hearing Aid Act (OTCHAA) taking hearing aids out of the bounds of audiology clinics and hearing aid dispensaries, people with hearing loss might be at an even higher risk of exploitation. Over-the-counter hearing aid sales might

increase competition. It is also plausible that the openness of hearing aid sales will give people with hearing loss more autonomy and motivate them to engage in shared-decision making with their providers (Laplante-Lévesque et al., 2010). Answers to these questions remain unknown.

To explore the many barriers to HHC uptake and identify facilitators for future HHC systems, the eHearing Survey was developed. The USA version of the eHearing Survey can be found at https://www.ehearingstudy.org/. Because the role of trust emerged in earlier focus group discussions, questions related to the topic of trust were included in the eHearing Survey and the data collected in the USA serve as the data for the current research study.

2.5. Research Questions and Hypotheses

The purpose of the current study was to address three specific questions:

1) **Can unidimensional and internally consistent measures of trust be constructed using a subset of eHearing Survey items?**

   It was hypothesized that: Yes, eHearing Survey items can be used to construct unidimensional and internally consistent measures of trust.

2) **Will trust, as measured by a subset of eHearing Survey items, significantly predict treatment uptake for hearing loss after controlling for demographic and hearing-related factors?**

   It was hypothesized that:

   a) Trust in healthcare providers will significantly predict treatment uptake, after controlling for demographic and hearing-related factors.

b) Trust in non-medical sources of help and information for hearing loss will not significantly predict treatment uptake, after controlling for demographic and hearing-related factors.

3) **Is trust in healthcare providers a stronger predictor of treatment uptake than trust in non-medical sources of help and information for hearing loss (e.g., hearing aid dispensers, retail stores, nonprofit organizations, internet sources)?**

It was hypothesized that: Trust in healthcare providers will be a stronger predictor of treatment uptake than trust in non-medical sources.

This information will help to clarify ways in which trust in different sources might influence treatment uptake. The next chapter will explain the methods of data collection and analysis, and it will be evident that causal conclusions cannot be drawn from the current study. This study, however, could be used to produce inferences regarding possible effects of trust on the OTCHAA and subsequent hearing aid uptake.

Chapter 3: Methods

3.1 Purpose of the Current Study

As previously stated, untreated hearing loss in older adults is a public health concern due to the unmet hearing healthcare (HHC) needs in this population. The Over the Counter Hearing Aid Act (OTCHAA) was written into law in order to reduce this unmet need. The OTCHAA addresses specific barriers like access to HHC services and affordability of hearing aids, some social barriers to treatment uptake are not addressed under this act. The overall issue of the unmet HHC needs of older adults is well documented, but the role that trust plays as either a contributor to or detractor from this unmet need has not been critically examined. Previous research in audiology and HHC has shown that trust contributes to shared decision making between audiology patients and HHC providers (Laplante-Lévesque et al., 2012), that trust is reported as a barrier to purchasing hearing aids (Kochkin, 2007), that trust can reduce the effects of stigma on a patient's intent to purchase hearing aids (Cobelli et al., 2014), and that factors like an audiologist's competence and clinical environment can reduce or increase patients' trust in audiologists (Preminger et al., 2015). However, the unique role of trust in the context of seeking treatment for hearing loss is still poorly understood, as no studies in HHC/audiology have employed quantitative analyses to examine this relationship.

The purpose of the current study is to employ quantitative analysis methods in order to examine the relationship between trust and treatment uptake. This study is unique in that utilized a new measurement tool, a set of items on the eHearing Survey, to measure trust and its relationship to treatment uptake in older adults with hearing loss.

Trust is a latent variable, therefore structural equation modeling and reliability analyses were used to assess the quality of eHearing Survey items in measuring the concept of trust in medical and non-medical sources of HHC services and information. The models of trust that were generated served as focal predictors in logistic regression models with treatment uptake as the outcome. These methods allowed for an examination of the reliability of eHearing Survey items in measuring trust, whether trust significantly predicted treatment uptake, and whether trust in medical sources was a stronger predictor of treatment uptake than trust in non-medical sources.

3.2 Research Design

The current study employed a cross-sectional design. Survey methods were utilized to query participants' experiences with HHC professionals, history of treatment for hearing loss, financial coverage for hearing aids (including private insurance and Medicaid), sociodemographic backgrounds, levels of trust in various sources, and views on stigma as it relates to age and hearing loss. All eHearing Survey items examined in the current study are listed in **Appendix A.** Hearing thresholds were obtained in order determine if a person's trust depended on the degree of a person's hearing loss. Audiometric thresholds were obtained using the Etymotic Home Hearing Test (HHT), an automated software program used to elicit reliable and accurate ear-specific, air-conduction hearing thresholds up to 90 dBHL (Margolis, Killion, Bratt, & Saly, 2016). Mosley, Langely, Davis, McMahon, & Tremblay (2018) verified the reliability and validity

of audiometric thresholds acquired using the HHT compared to audiometric thresholds acquired using conventional audiometry, the gold standard.

3.3. Target Population and Participant Selection

The population of focus for the current study was older adults in the USA with hearing loss. In the current study, a subset of participants who had already completed a larger study (the eHearing Study) was analyzed. The following section will describe the target population and the subsample analyzed in the current study.

3.3a. Sampling procedures

A convenience sample was recruited from the Seattle, WA area using the following resources within the University of Washington (UW): Communication Studies Participant Pool, Retirement Association newsletters and advertisements, Town Hall meetings, and KUOW radio station advertisements. All participant were required to have the means to attend the study session at the UW. Although the eHearing Survey could be completed online from any location, hearing sensitivity had to be measured at the study site for all participants. Financial stipulations led us to focus on recruitment sources within the UW, as they were both affordable and efficient.

Research assistants contacted potential participants from the Communication Studies Participant Pool via phone and email, described the purpose and procedures of the study, asked screening questions, and scheduled participants if interested. If potential participants had heard of our study through word of mouth, KUOW radio ads, town hall meetings, or UW Retirement Association newsletters, they contacted our lab instead of

the research assistants making the initial contact. All participants in the current study met the following inclusion criteria:

- At least 60 years of age
- Able to read and write in English
- Able to attend a two-hour testing session at the UW in Seattle, WA
- Reported having a hearing loss on the eHearing Survey

3.3b. Population characteristics

Participants included in this study were from a convenience sample and were not specifically recruited to match the national population; rather they were selected based on their reports of having sought or not sought treatment for their hearing loss. While this compromises the external validity of our findings, the results are still strong representations of our sample, which more closely resembles that of the age-matched adult population in King County than Washington State or the USA. The sociodemographic features of the sample included in this study in comparison to the King County older adult population are provided in **Table 3.1.**

Table 3.1. Demographic Descriptive Statistics for Study Sample, King County (Seattle), Washington State (WA), and the USA				
Characteristic	Study Sample	King County	WA	USA
Age (in years) [1, 2]				
60-64	16.4%	31.9%	29.3%	28.9%
65-69	30.9%	39.7%	24.9%	40.6%
70-74	25%		18.2%	
75-79	17%	18.6%	11.5%	21.2%
80-84	10.8%		7.6%	
85+		9.8%	8.4%	9.3%
Sex [1, 2, 3]				
Female	50.9%	56%	53.3%	56.9%
†Race/ Ethnicity [1,4,5]				
American Indian/Alaska Native	0.9%	1%	1.1%	0.6%
Asian	2.8%	13%	6.5%	3.8%
Black	1.5%	4%	2.2%	8.8%
Hispanic/ Latino	0.6%	3%	3.7%	7.3%
Native Hawaiian/ Pacific Islander	0%	0.3%	0.3%	0.1%
White	93.5%	77%	88.4%	86%
Two or more	0.3%	2%	1.5%	0.8%
‡Highest Educational Level Completed [1]				
High School/ GED	2.1%	10.5%	22.9%	32.3%
Associate's or Bachelor's	42.8%	42.3%	31.1%	12.2%
Graduate Degree	55%	24.9%	12.3%	6.8%

Note: Figures above are based on estimated proportions of people ages 65 years and older in King County, WA state, and the USA (unless specified otherwise).

†Seattle and sample statistics based on proportions of people ages 60+ years

‡Figures for King County and WA state are based on proportions of adults ages 25+ years

[1]U.S. Census Bureau (2017), 2012-2016 American Community Survey 5-Year Estimates

[2]Washington State Office of Financial Management, Forecasting and Research Division (2017)

[3]U.S. Census Bureau (2011), The Older Population: 2010

[4]Seattle Aging and Disability Services (2018), American Community Survey, 2011-2013 3-year Estimates

[5]U.S. Census Bureau (2012), Population Estimates and 2012 National Projections

3.3c. Sample size

All participants in the eHearing Study (n = 521) responded to the following question: "Which of the following statements best describes how you feel about your hearing ability?" Participants either reported not having any problems with their hearing, having an untreated hearing problem, or having a hearing problem that has been treated. The current study focused exclusively on those who reported having a hearing problem, both those who reported having treated hearing loss and those who reported having untreated hearing loss. A subsample (n = 325) of participants in the eHearing Study was analyzed for the current study. Listwise deletion of missing data was employed. Thus, a total of 279 participants were included in the final analyses.

3.4 Procedures

3.4a. Protection of participants

All practices and procedures were approved by the UW Human Research Protection Program and Institutional Review Board. The UW Communication Studies Participant Pool provided contact information for people ages 60 years and older. Researchers retrieved these information packets directly from the Communication Studies Participant Pool office and they were kept in double-locked filing cabinets. All calls were made from the Brain and Behavior lab landline phones and emails were sent via HIPPA-compliant UW email servers. All electronic materials (e.g., scheduling list) containing participant names and/or contact information were password protected and only shared amongst lab members. Participants were identified using a unique ID name/number (e.g., US0424C) on both the survey responses and hearing evaluations.

Names were only matched to ID numbers on sign-in sheets, which were stored in double-locked filing cabinets after each session. Informed consent documents were posted on the eHearing Survey website (ehearingstudy.org) and verbally explained prior to each testing session. Per standard clinical protocol, audiology students completed otoscopic prior to each hearing evaluation to ensure that inserting earphones for testing would not cause harm.

3.4b. Data collection

Each testing session was scheduled for two hours; however most sessions lasted between 1-1.5 hours. Participants arrived at the UW Department of Speech and Hearing Sciences and research assistants escorted them into a room or computer lab. Participants signed in with their name, a unique participant ID number, and email address and took a seat at a computer or tablet. Most testing sessions were completed in groups of up to 15 participants. At the beginning of each session, research assistants explained the purpose of the study, the procedures that would take place during the session, and the informed consent document. Researchers encouraged participants to alert them if they had any questions about survey items or needed help navigating the survey or using the computers. Research assistants directed participants to the survey page, which was already loaded onto their computers. In group testing sessions, all participants began the survey at the same time, but completed at their own pace. After completing the survey, research assistants directed participants into a quiet area for hearing testing and explained the procedures of the Home Hearing Test (see Mosley et al. 2018).

3.5. Instrument: eHearing Survey

The eHearing Survey was developed to query the barriers to and facilitators for seeking help for hearing problems in older adults residing in Australia (AU), Canada (CA), the United Kingdom (UK), and the USA. It is an appropriate instrument for the current study because the eHearing Survey investigates topics that directly relate to older adults' experiences. We created the eHearing Survey in 3 phases.

The purpose of the first phase was to query older adults' experiences with hearing loss and the HHC system. We conducted qualitative focus groups across each country in order to inform ourselves of the factors that they had experienced firsthand or with friends/family as barriers to and facilitators for getting help for hearing problems. Interpretative phenomenological analysis (IPA) methods were employed, as they are used for exploring experiences and social cognitions (Smith, Jarman, & Osborn, 1999; Biggerstaff & Thompson, 2008). We used these focus group results to develop survey items that would relate directly to what our target population deemed important. See **Appendix B.** for detailed information regarding the initial focus groups. Two validated items were included in the eHearing Survey to query trust. They include: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?" (World Values Survey/ General Social Survey— See Sapienza et al. (2013) and "Which of the following best reflects your view? A) 'I will not trust a person until there is clear evidence that he or she can be trusted.' B) 'I will trust a person until I

have clear evidence that he or she can't be trusted,'"(Rotter, 1980). All other trust-related items were original and based on focus group transcripts.

The second phase of the study served to beta test our survey items. We conducted another set of focus groups; however participants were professionals in healthcare and health science (e.g., nurses, speech-language pathologists, audiologists, lecturers in rehabilitative sciences, experts in survey metrics) rather than older adults. Professionals looked over sections of the eHearing survey and offered advice on how to improve our wording of items and condense the overall survey.

The third and final phase of creating the eHearing Survey was a pilot study of n = 20 older adults with hearing loss. The testing protocol for Phase III of the survey development was very similar to the protocol employed during data collection for the current study. Participants completed the survey on tablets in a UW classroom and the HHT in a quiet room immediately after. During the survey, participants were encouraged to keep notes of survey items that were unclear to them or did not seem appropriate. At the end of each testing session, notes were collected and discussed among a team of researchers to incorporate into the survey. Participants were compensated $25 for their time and help. A content analysis approach was implemented to incorporate participants' suggestions into the final survey.

3.6. Data Analysis

This section will provide a detailed description of each type of analysis conducted in the current study. In order to answer the research questions, it is important to first

describe the study sample based on their sociodemographic characteristics, hearing sensitivity, treatment uptake status, and trusting behaviors. Therefore, descriptive statistics were provided. Frequencies, means, ranges, and standard deviations were calculated for age group, gender, household income, ethnicity, education level, and hearing sensitivity based on four-frequency pure tone average (PTA; average of hearing thresholds at 0.5, 1, 2, and 4 kHz) in the better-hearing ear. Before exploring the non-standardized measures of trust included in the survey, the distributions of responses to the two binary validated trust items for the entire sample were viewed, followed by treatment group (treatment uptake vs. no treatment uptake). Fisher's exact tests were performed to determine whether or not there were statistically significant group differences.

3.6.a. Research Question 1.

Can unidimensional and internally consistent measures of trust be constructed using a subset of eHearing Survey items?

Factor analysis and reliability analysis methods were used to explore the first research question. Factor analyses were employed to assess the factor structure of original items in the eHearing Survey that queried trust. Factor analysis was designed to determine the number of discrete constructs needed to account for the pattern of correlations between items within a set of measures (Fabrigar, 2012). These constructs are also known as "factors."

An Exploratory Factor Analysis (EFA) is often the first step taken to examine the underlying associations for a set of measures when the researcher has no clear

expectations about the underlying factor structure for a set of measures—as with a new questionnaire. In other words, EFA helps to determine whether individual items work together to reflect a single underlying factor or represent multiple distinct factors. EFA analyses were conducted using SPSS Statistics Version 24 (IBM Corporation©, 1989; 2016). Individual items (i.e., "loadings") with eigenvalues (i.e., "loading values") higher than 0.326 were considered significant due to the sample size (Stevens, 2002). Factors were considered significant based on guidelines listed in **Table 3.2.** (Guadagnoli & Velicer, 1988; Stevens, 2002).

Table 3.2. Guidelines for determining significant factors	
Number of Loadings	**Magnitude of Loadings**
3 or more	$\leq \pm 0.8$, regardless of sample size
4 or more	$\leq \pm 0.6$, regardless of sample size
10 or more	$\leq \pm 0.4$, but only if $N \geq 150$

EFAs were conducted using a maximum likelihood method of extraction, listwise deletion, and a Promax (non-orthogonal) rotation method. The EFAs included eHearing Survey items that queried trust and were answered on a 5-point Likert Scale (k = 55 items). After determining the number of significant factors, a series of Confirmatory Factor Analyses (CFAs) were conducted. CFA evaluated the unidimensionality of each

trust measure developed using a subset of eHearing Survey items. CFA model fit was assessed using three categories of fit indices (Brown, 2006; Harrington, 2008): absolute model fit (i.e., chi-square test; χ^2); a parsimony correction index (i.e., Root Mean Square Error of Approximation; RMSEA); and a comparative fit index (CFI). The following guidelines from Kline (2005) were employed to assess model fit:

- $\chi^2 > 0.05$
- RMSEA ≤ 0.05
- CFI > 0.90

It should be noted that while the chi-square test is the most commonly used measure of absolute model fit, it is biased against larger sample sizes (Harrington, 2009). Studies with $n > 200$ subjects are likely to produce significant chi-square tests at $p < 0.05$. This was taken into account when comparing sets of trust-related items. The change in chi-square was observed across item sets to examine changes in absolute model fit, as all models tested had the same sample size. Initial CFA analyses were conducted using MPlus (Version 7; Muthén & Muthén, 2012). Final CFA analyses were conducted in R.Studio Version 3.4.1 (2015) using the Lavaan package (Rosseel, 2012) due to its convenience and ease of use.

Next, reliability analyses were conducted to quantify the extent to which the trust measures (as determined by item sets with the best CFA model fits) produced consistent results. Reliability analyses calculated Cronbach's alpha (a model of internal consistency), descriptive statistics (e.g., mean, range, etc.) for each variable and each scale, item-to-total correlations, and inter-item correlations and covariances (Muthén & Muthén, 2012). Data were ordinal, Likert scale ratings from 1 (strongly disagree/not at all) to 5 (strongly

agree/very much). Inter-item correlations of 0.4 were considered acceptable; higher correlations indicated stronger associations. A reliability coefficient (i.e., Cronbach's alpha) ≥ 0.70 is generally considered "acceptable" in social science research. All reliability analyses were conducted in SPSS Statistics Version 24 (IBM Corporation©, 1989; 2016). CFAs and reliability analyses were conducted iteratively; initial CFAs models were generated, assessed for reliability, and adapted per results of the reliability analyses.

3.6.b. Research Question 2

Will trust, as measured by a subset of eHearing Survey items, significantly predict treatment uptake for hearing loss after controlling for demographic and hearing-related factors?

Multiple logistic regression analyses were employed to explore question 2. Two multiple logistic regression analyses were conducted to assess the relationship between trust and treatment uptake, with treatment uptake as the response variable (0= non-treatment group, 1= treatment group). The focal predictor of the first model was trust in healthcare providers (Trust_HCP). The focal predictor of the second model was trust in non-medical sources (Trust_NonMed). Both models included the following predictors to account for possible confounding variables in the relationship between trust and treatment uptake: age, gender, income, education, hearing sensitivity (measured by 4-frequency PTA), financial coverage for hearing aids (HA_Cov), and stigma toward aging, hearing loss, and hearing aids. Age and income were entered as categorical variables, with the eldest and lowest income groups serving as reference categories. Education, gender, and financial coverage were entered as binary variables, with those who reported high

school/undergraduate as their highest educational attainment, females, and those who did not receive financial coverage for hearing aids serving as reference groups. Trust, stigma, and hearing sensitivity were continuous, metrical variables and needed no reference group. Measures of trust and stigma were composite scores of survey items, which were answered on a 5-point Likert scale.

A review of 22 peer-reviewed articles on help-seeking for hearing loss in older adults revealed that older individuals were more likely to seek help for their hearing and/or adopt hearing aids, a common form of treatment (Meyer & Hickson, 2012). Age was included as a possible confound despite the fact that adding hearing sensitivity would likely account for the variance attributed to age, as age-related hearing loss is typically progressive (Gates & Mills, 2005). This measure was taken to account for possible cohort effects, as different age groups might exhibit different trusting behaviors (Armstrong et al., 2006). Studies suggest that men are less likely to seek help for hearing loss than women (Meyer, Hickson, & Fletcher, 2014) and that hearing loss is more prevalent in men compared to women (Cruickshanks et al., 1998), so gender was included in the model. People who have a higher income (LaVeist et al., 2009) and are more educated (Huang, van den Brink, & Groot, 2011) have been show to exhibit higher levels of trust, which led to the inclusion of income and education level as predictors. Race could have affected the relationship between trust and treatment uptake; however 94% of the sample was of the same race, so it was not included in the analysis. Severity of hearing loss has a positive relationship with treatment uptake. People with poorer hearing sensitivity are more likely to engage in treatment uptake (Meyer, Hickson, & Fletcher, 2014), so hearing sensitivity

was included. Having financial assistance for the cost of hearing healthcare services (Kochkin, 2007; Tremblay et al., *in preparation*) and stigma (Southall, Gagné, & Jennings, 2010; Wallhagen, 2010) might influence seniors' decisions to get help; thus, coverage for hearing healthcare coverage and stigma were included as predictors to treatment uptake. See Appendix A. for details regarding the survey items used to measure each variable. The final models were as follows:

Model 1:
Logit (treatment uptake) = $b_0 + b_1$*Trust_HCP+ b_2*Age + b_3*Female + b_4*Income + b_5*Education + b_6*PTA + b_7*HA_Cov + b_8*Stigma

Model 2:
Logit (treatment uptake) = $b_0 + b_1$*Trust_NonMed+ b_2*Age + b_3*Female + b_4*Income + b_5*Education + b_6*PTA + b_7*HA_Cov + b_8*Stigma

In the models above, the log-odds (logits) of taking up treatment for hearing loss is equal to the conditional mean (b_0), plus the unique effects of trust, age, gender, income, education, hearing sensitivity (PTA), having financial coverage for hearing aids, and stigma.

3.6.c. Research Question 3

Is trust in healthcare providers a stronger predictor of treatment uptake than trust in non-medical sources of help and information?

An additional logistic regression analysis was conducted to determine whether trust in medical providers would be a stronger predictor of treatment uptake than trust in non-medical sources (Hypothesis 3). This model included both measures of trust and all other predictors from the previous two models:

Model 3:
Logit (treatment uptake) = b_0 + b_1*Trust_HCP+ b_2*Trust_NonMed+ b_3*Age + b_4*Female + b_5*Income + b_6*Education + b_7*PTA + b_8*HA_Cov + b_9*Stigma

In the model above, the log-odds (logits) of taking up treatment for hearing loss is equal to the conditional mean (b_0), plus the unique effects of trust in healthcare providers, trust in non-medical sources, age, gender, income, education, hearing sensitivity (PTA), having financial coverage for hearing aids, and stigma.

Findings from the initial regression models prompted a post-hoc analysis to further investigate the relationship between hearing sensitivity and treatment uptake. This analysis, however did not directly relate to the original research questions or hypotheses.

3.6.c. Expected Findings

Based on the factor analyses and reliability analyses, acceptable CFA models, marked by $\chi^2 > 0.05$, RMSEA ≤ 0.05, and CFI > 0.90 for trust using unique items developed for the eHearing Survey were expected. The trust-related item sets were expected to elicit a high internal reliability (inter-item correlations ≥ 0.4 and Cronbach's alpha ≥ 0.7).

Multiple logistic regression analyses were expected to result in a rejection of the null hypotheses (H_0) for each regression model, which stated that none of the independent variables (i.e., "predictors" or X's) would predict values of the dependent (i.e., "outcome" or Y) variable any better than they would by chance. It was expected that the alternative hypothesis (H_1), which stated that at least one of the independent

variables would significantly predict the dependent variable, would not be rejected. The formulae below summarize these statements, where β_i is a coefficient for a predictor:

$H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = \ldots \beta_i = 0$
H_1 : Not all $\beta_i = 0$

To put this in the context of the research question, it was expected that the trust variables would significantly predict treatment uptake ($p < 0.05$) and that the variables measuring trust in medical providers would have a higher regression coefficient (β_i) and/or odds ratio than the variable that measured trust in non-medical sources.

Chapter 4: Results

4.1. Description of the Study Sample

A convenience sample from the King County area in Seattle, WA was recruited using resources within the University of Washington (UW) community. The sampling procedure was described in **Chapter 3, Section 3.3.** Participants were at least 60 years of age and reported having a known hearing impairment. A subsample of $n = 324$ met inclusion criteria for analysis in the current study. After a listwise deletion of missing cases, a final total of 279 participants were included in the current analysis. Descriptive statistics for the participants in the treatment (tx) and non-treatment (non-tx) groups are described in **Table 4.1.**, including: age, gender, education, income, and average PTA in the better-hearing ear (BEPTA). Average hearing thresholds at octave frequencies from 0.5-8 kHz in each group are plotted in **Figure 4.1.**

Table 4.1. Descriptives of Study Sample by Group

Group	**Age** (%)	**Gender** (%)	**Education** (%)	**Income** (%)	**BEPTA** (SD)
Tx (*n* = 191)	**60-64**: 25 (13.1) **65-69**: 57 (29.8) **70-74**: 45 (23.6) **75-79**: 37 (19.4) **80+:** 27 (14.1)	**F:** 90 (47.1) **M:** 101 (52.9)	**HS:** 3 (2.1) **UG/Tech:** 76 (39.7) **Grad:** 112 (58.2)	**Under $20K:** 11 (5.8) **$20 – 39,999**: 19 (9.9) **$40-59,999:** 22 (11.5) **$60-79,999:** 25 (13.1) **$80-99,999:** 29 (12.2) **Over $100K:** 64 (33.5) **Prefer not to say:** 18(9.4)	44 dBHL (16.78)
Non-Tx (*n* = 133)	**60-64:** 28 (21.1) **65-69**: 43 (32.3) **70-74**: 36 (27.1) **75-79**: 18 (13.5) **80+**: 8 (6.0)	**F:** 75 (56.4) **M:** 58 (43.6)	**HS:** 3 (2.3) **UG/Tech:** 63 (47.4) **Grad:** 67 (50.4)	**Under $20K:** 8 (6.0) **$20 – 39,999**: 15 (11.3) **$40-59,999:** 16 (12.0) **$60-79,999:** 19 (14.3) **$80-99,999:** 23 (17.3) **Over $100K:** 38 (28.6) **Prefer not to say:** 13 (9.8)	24 dBHL (10.62)

Note: Tx- treatment group; Non-Tx- non-treatment group; age groups are in years; HS- high school; UG/Tech- undergraduate program/technical college; Grad- graduate school; BEPTA- hearing sensitivity as measured by the average thresholds at 0.5, 1, 2, and 4 kHz in the better-hearing ear (better-ear PTA)

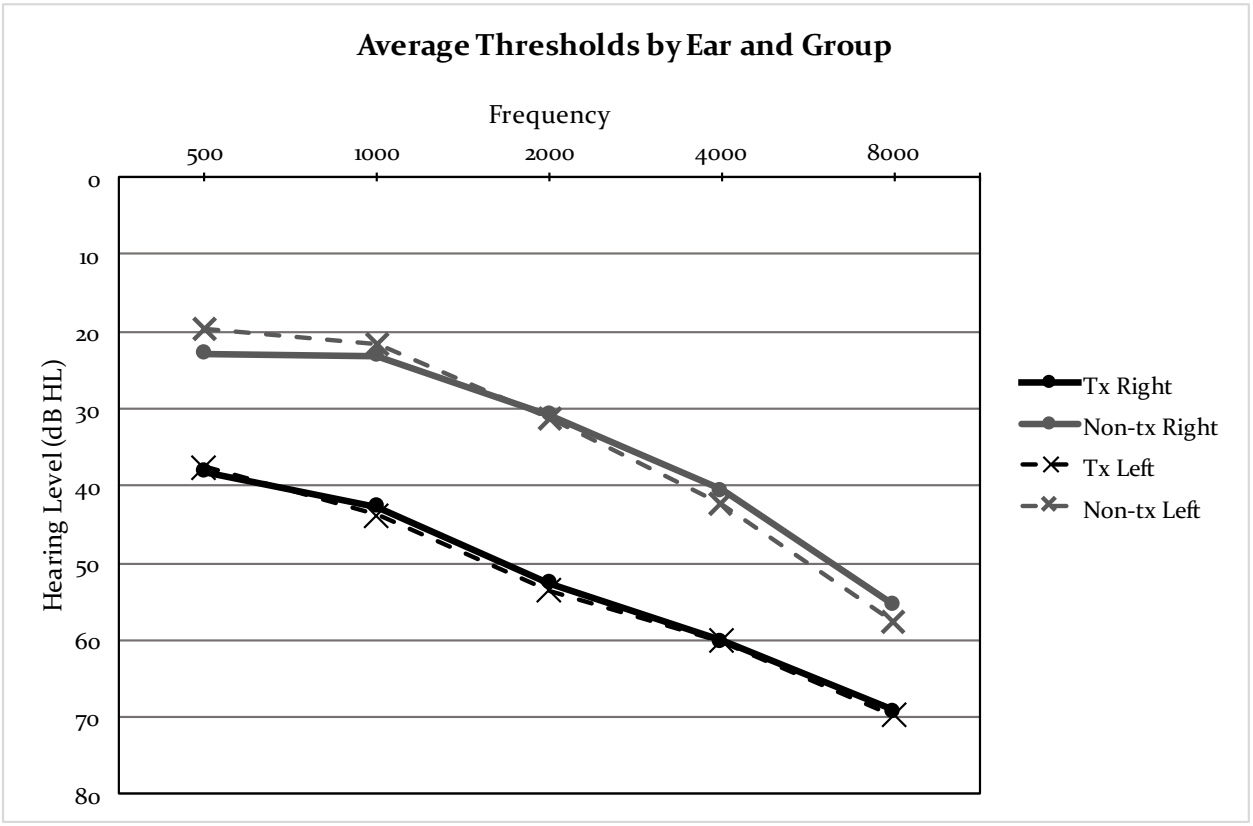

Figure 4.1. Hearing thresholds in the treatment (Tx) and non-treatment (Non-tx) groups for the right and left ears.

As mentioned in **Chapter 3, Section 3.6.**, responses to binary, validated trust questions were examined for the study sample and between groups. Fisher's Exact tests revealed a non-significant difference between the non-treatment and treatment groups on these items: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?" (p = 0.365) and "Which of the following statements best reflects your view?" (p = 0.137). **Figure 4.2.** illustrates participants' responses to these binary trust questions.

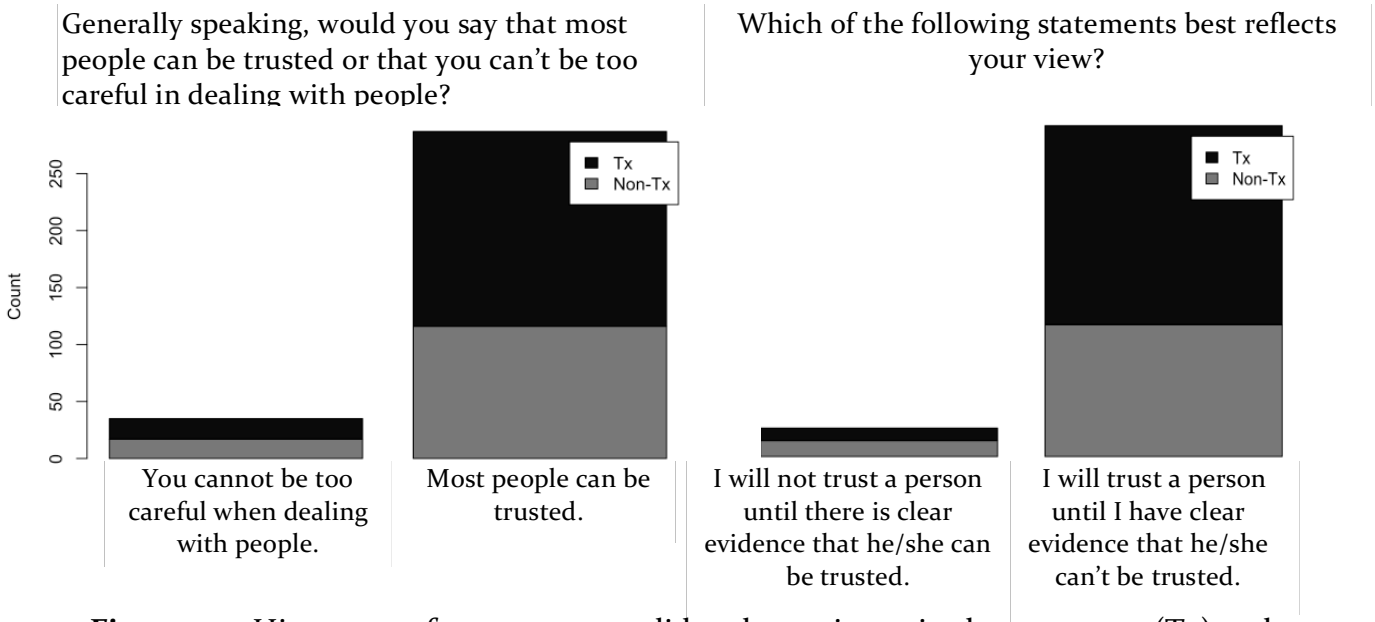

Figure 4.2. Histogram of responses to validated trust items in the treatment (Tx) and non-treatment (Non-Tx) groups.

4.2. Focal Analyses

Results of the exploratory factor analysis (EFA), confirmatory factor analysis (CFA), reliability analysis, and multiple logistic regression analysis described in Chapter 3, Section 3.6 are described in sections 4.2a. – 4.2c.

4.2a. Can unidimensional and internally consistent measures of trust be constructed using a subset of eHearing Survey items?

EFA results suggested a two-factor model—Trust in Medical Providers and Trust in Non-Medical Sources of Help and Information. Two separate 1-factor CFAs were conducted to ensure that each subset of items identified in the final EFA was unidimensional. The final CFA model for trust in medical providers produced a good model fit (χ^2 (10) = 28.10, p = 0.002; CFI = 0.964; RMSEA = 0.08, p = 0.079), using k = 7 survey items. The final CFA model for trust in non-medical professionals also produced a good model fit (χ^2 (5) = 7.48, p = 0.187; CFI = 0.997; RMSEA = 0.04, p = 0.542), using k = 6 survey items. Zero-order correlations of the survey items included in the final CFA models are reported in **Table 4.2a.** for the model assessing trust in medical professionals and **Table 4.2b.** for the model assessing trust in non-medical sources. All correlations were statistically significant at $p < 0.01$ unless otherwise stated.

Table 4.2a. Zero-order Correlations for Items Measuring Trust in Medical Professionals						
Item	**1.**	**2.**	**3.**	**4.**	**5.**	**6.**
1. How much do you trust information about HHC options from **hospitals?**	1	--	--	--	--	--
2. In general how much do you tend to trust **medical doctors?**	0.45	1	--	--	--	--
3. In general how much do you tend to trust **nurses?**	0.38	0.55	1	--	--	--
4. In general how much do you tend to trust **audiologists?**	0.12	0.33	0.26	1	--	--
5. In general how much do you tend to trust **speech-language pathologists?**	0.12	0.32	0.54	0.33	1	--
6. I trust a hearing specialist if **their hearing facility is in a university facility.**	0.25	0.34	0.48	0.15	0.41	1
7. When it comes to getting hearing aids or other devices, I would trust the provider if they **took the time to listen to my concerns.**	0.23	0.24	0.28	0.18	0.25	0.25

*$p < 0.05$

Table 4.2b. Zero-order Correlations for Items Measuring Trust in Non-medical Sources					
Item	**1.**	**2.**	**3.**	**4.**	**5.**
1. How much do you trust information about HHC options from **hearing aid dispensers/salespeople?**	1	--	--	--	--
2. How much do you trust information about HHC options from **retail stores (e.g., Costco, Sears)?**	0.44	1	--	--	--
3. How much do you trust information about HHC options provided to you by **unsolicited emails?**	0.27	0.19	1	--	--
4. How much do you trust information about HHC options provided to you by **unsolicited letters or pamphlets in the mail?**	0.28	0.20	0.84	1	--
5. I trust a hearing specialist if **their hearing facility is in a retail store (e.g., Costco, Sears).**	0.37	0.70	0.14	0.16*	1
6. I trust a hearing specialist if **they operate out of a technology store (e.g., Apple Store, Best Buy)**	0.30	0.38	0.25	0.27	0.49

Reliability analysis for the set of survey items that measured trust in medical professionals indicated that the measure was consistent, Cronbach's α = 0.78; all items appeared to be worthy of retention, resulting in a decrease in the alpha if an item was deleted. Similarly, a reliability analysis indicated that the final CFA model assessing trust in non-medical sources was also adequately consistent, Cronbach's α = 0.75; again, all items appeared to be worthy of retention, resulting in a decrease in the alpha if deleted. Corrected item-to-total correlations, Cronbach's α if item was to be removed, and summary statistics are listed in **Table 4.3.**

Table 4.3. Summary of Reliability Analysis Results			
Trust in Medical Professionals (Cronbach's α = 0.78)			
Item	**Mean (SD)**	**Corrected item-to-total correlation**	**Cronbach's α if item deleted**
1. How much do you trust information about HHC options from **hospitals?**	3.37 (0.78)	0.50	0.76
2. In general how much do you tend to trust **medical doctors?**	4.55 (0.69)	0.64	0.73
3. In general how much do you tend to trust **nurses?**	4.24 (0.79)	0.58	0.74
4. In general how much do you tend to trust **audiologists?**	3.46 (0.71)	0.52	0.76
5. In general how much do you tend to trust **speech-language pathologists?**	4.27 (0.93)	0.49	0.77
6. I trust a hearing specialist if **their hearing facility is in a university facility.**	4.11 (0.85)	0.45	0.77
7. When it comes to getting hearing aids or other devices, I would trust the provider if they **took the time to listen to my concerns.**	3.35 (0.72)	0.42	0.77
Trust in Non-medical Sources (Cronbach's α = 0.75)			
Item	**Mean (SD)**	**Corrected item-to-total correlation**	**Cronbach's α if item deleted**
1. How much do you trust information about HHC options from **hearing aid dispensers/salespeople?**	2.21 (0.97)	0.50	0.71
2. How much do you trust information about HHC options from **retail stores (e.g., Costco, Sears)?**	2.64 (1.14)	0.62	0.67
3. How much do you trust information about HHC options provided to you by **unsolicited emails?**	1.25 (0.50)	0.40	0.74
4. How much do you trust information about HHC options provided to you by **unsolicited letters or pamphlets in the mail?**	1.18 (0.99)	0.38	0.74
5. I trust a hearing specialist if **their hearing facility is in a retail store (e.g., Costco, Sears).**	2.63 (0.99)	0.62	0.67
6. I trust a hearing specialist if **they operate out of a technology store (e.g., Apple Store, Best Buy)**	1.66 (0.76)	0.50	0.71

Results from the EFA, CFA, and reliability analysis supported hypothesis 1, which stated: eHearing Survey items can be used to construct unidimensional and internally consistent measures of trust.

4.2b. Will trust, as measured by a subset of eHearing Survey items, significantly predict treatment uptake for hearing loss after controlling for demographic and hearing-related factors?

Multiple logistic regression analyses with simultaneous predictor entry were conducted to determine whether or not the trust measures described in the previous section (**4.2a.**) would uniquely and significantly predict treatment uptake in the study sample (n = 279). Zero-order correlations and descriptive statistics of variables in the final models are listed in **Table 4.4.** Model 1 included the measure of trust in medical providers, and model 2 included the measure of trust in non-medical sources. As shown in **Table 4.5**., Model 1 reliably distinguished participants who had received treatment for hearing loss from those who did not, χ^2 (16) = 149, p < 0.001, Nagelgerke Pseudo-R^2 = 0.56 (correct classification hit rate of 80%); this model was found to have a significantly better fit than the null model with no predictors.

Table 4.4. Correlation Table for Multiple Logistic Regression Models

Measure	*M*	*(SD)*	1.	2.	3.	4.	5.	6.	7.	8.	9.
Outcomes											
1. Treatment Uptake	0.59	(0.49)	--								
Predictors											
2. Trust_HCP	27.36	(3.62)	-.05	--							
3. Trust_NonHCP	11.57	(3.35)	.09	.23 ***	--						
4. Gender	0.51	(0.50)	-.09	-.01	-.02	--					
5. Age	3.75	(1.23)	.16 **	-.09	-.11	-.02	--				
6. Education	0.55	(0.03)	.08 *	.11	-.17 **	-.09	.08	--			
7. Income	4.58	(1.75)	.03	.17 **	.10	-.10	.04	.16 **	--		
8. PTA	36.20	(17.65)	.58 ***	-.19 **	.06	-.13 *	.39 ***	.05	-.01	--	
9. Stigma	9.50	(2.74)	.10 *	.01	-.05	<.01	-.17 **	.04	-.09	-.05 ***	--
10. HA_Cov	0.20	(0.45)	.26 ***	.01	.06	-.11	-.01	.05	.07	.21	-.01

Note. *N*=279. Trust_HCP= Trust in healthcare providers; Trust_NonHCP= Trust in non-medical sources; PTA = Pure tone average in

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4.5.

Summary of Multiple Logistic Regression Model 1. Includes treatment uptake as the dependent variable and trust in healthcare providers as the focal predictor. Demographic variables and hearing-related variables included as potential confounders.

	$\chi^2(16)$	*p*	*Pseudo* R^2	*Sens*	*Spec*	*HR*	*b*	*(SE)*	*Wald*	*p*	*OR*
Treatment Uptake	149.04	<0.001	0.56	83.70	75.20	80.30					
Intercept							-0.34	(1.00)	0.12	0.730	0.71
Trust_HCP							0.15	(0.18)	0.76	0.382	1.17
Female							0.23	(0.35)	0.43	0.513	1.26
Age (80+; Reference)							--	--	1.37	0.850	--
Age (60-64)							0.27	(0.90)	0.09	0.769	1.30
Age (65-69)							0.29	(0.83)	0.12	0.726	1.34
Age (70-74)							-0.08	(0.83)	0.01	0.921	0.92
Age (75-79)							-0.20	(0.83)	0.06	0.810	0.82
Education							0.45	(0.34)	1.73	0.189	1.57
Income (Under $20K; Reference)							--	--	11.44	0.076	--
Income ($20 - 39,999)							-0.66	(0.83)	0.62	0.431	0.52
Income ($40 - 59,999)							0.85	(0.81)	1.11	0.292	2.34
Income ($60 - 79,999)							0.20	(0.82)	0.06	0.805	1.23
Income ($80 - 99,999)							-0.32	(0.78)	0.17	0.684	0.73
Income (More than $100K)							1.07	(0.74)	2.11	0.146	2.92
Income (Prefer not to say)							0.31	(0.85)	0.14	0.713	1.37
PTA							2.37	(0.33)	52.00	<0.001	10.67
Stigma							0.32	(0.19)	2.93	0.087	1.37
HA_Cov							1.29	(0.41)	9.90	0.002	3.62

Note. *N*=279. Trust_HCP= Trust in Medical professionals; PTA= Pure tone average in better-hearing ear; HA_Cov = coverage for hearing aids

Results indicated that PTA and having financial coverage for hearing aids significantly predicted treatment uptake. Holding all else constant, participants with an average PTA had a 41% predicted probability for treatment uptake whereas those with relatively lower PTA (-1 SD; better hearing sensitivity) had a 7% predicted probability for HHC use and those with a higher PTA (+1 SD) had a 87% predicted probability for HHC use. In other words, participants with a high PTA were 4.58 logits higher than those with a low PTA on treatment uptake status, holding all other predictors constant. This relationship is illustrated in **Figure 4.3.** Participants who had some private or federal insurance coverage for hearing aids had a 70% predicted probability for treatment uptake compared to participants with no hearing aid coverage. Those with some coverage for hearing aids were 1.29 logits higher than those without coverage on treatment uptake status. Trust in medical providers, however, was not significantly predictive of treatment uptake (b = 0.04, p = 0.382).

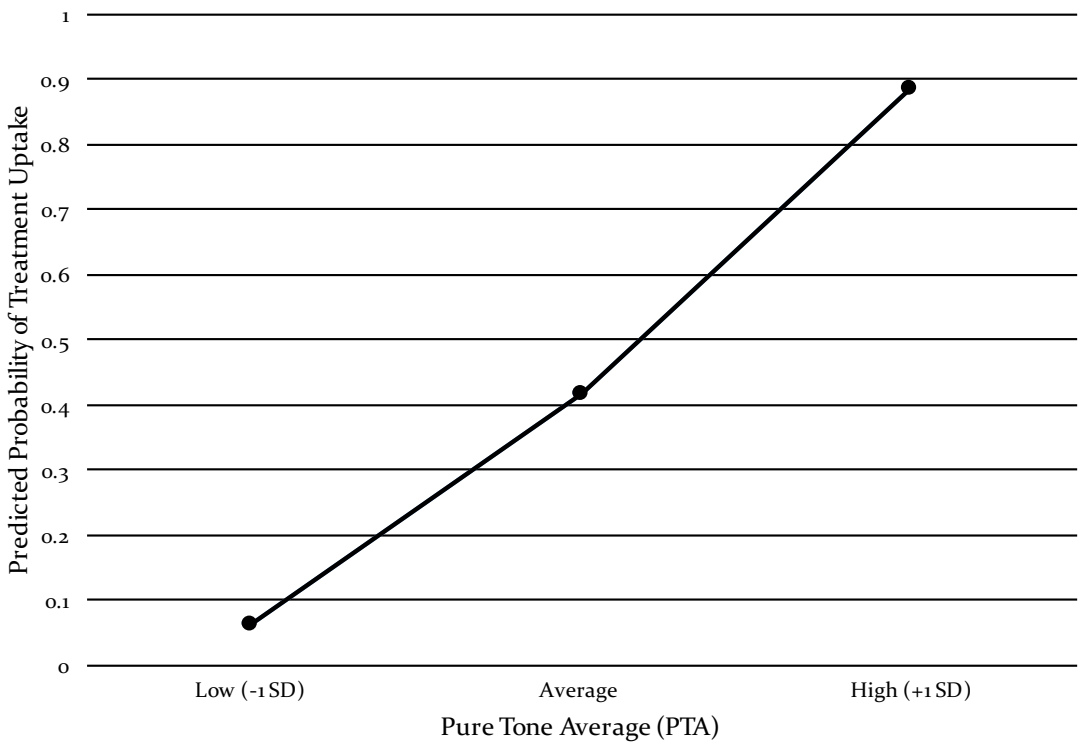

Figure 4.3. Predicted probability of treatment uptake based on PTA in Model 1.

Table 4.6.

Summary of Multiple Logistic Regression Model 2. Includes treatment uptake as the dependent variable and trust in non-medical sources as the focal predictor. Demographic variables and hearing-related variables included as potential confounders.

	$\chi^2(16)$	*p*	*Pseudo* R^2	*Sens*	*Spec*	*HR*	*b*	*(SE)*	*Wald*	*p*	*OR*
Treatment Uptake	156.74	<0.001	0.56	87.20	74.80	82.10					
Intercept							-0.37	(0.92)	0.16	0.686	0.69
Trust_NonHCP							0.22	(0.18)	1.57	0.211	1.24
Female							0.30	(0.35)	0.73	0.393	1.35
Age (80+; Reference)							--	--	1.77	0.779	--
Age (60-64)							0.62	(0.80)	0.60	0.438	1.86
Age (65-69)							0.63	(0.72)	0.76	0.384	1.88
Age (70-74)							0.18	(0.71)	0.07	0.799	1.20
Age (75-79)							0.16	(0.71)	0.05	0.822	1.17
Education							0.56	(0.34)	2.67	0.102	1.75
Income (Under $20K; Reference)							--	--	11.90	0.064	--
Income ($20 - 39,999)							-1.30	(0.87)	2.26	0.133	0.27
Income ($40 - 59,999)							0.50	(0.81)	0.39	0.532	1.65
Income ($60 - 79,999)							-0.37	(0.82)	0.20	0.652	0.69
Income ($80 - 99,999)							-0.66	(0.78)	0.72	0.398	0.52
Income (More than $100K)							0.63	(0.74)	0.73	0.394	1.88
Income (Prefer not to say)							0.01	(0.85)	<0.01	0.995	1.01
PTA							2.29	(0.31)	55.38	<0.001	9.85
Stigma							0.39	(0.18)	4.71	0.030	1.48
HA_Cov							1.23	(0.40)	9.33	0.002	3.41

Note. *N*=279. Trust_NonHCP = Trust in Non-medical sources; PTA = Pure tone average in better-hearing ear; HA_Cov = coverage for hearing aids

Similar results were observed for Model 2, which included trust in non-medical sources as the focal predictor (**Table 4.6**). Model 2 reliably distinguished participants in the treatment group from those in the non-treatment group, χ^2 (16) = 156.74, $p < 0.001$, Nagelgerke Pseudo-R^2 = 0.56 (correct classification hit rate of 82%), and also had a significantly better fit than the null model.

As observed in the first model, Model 2 indicated that PTA and having financial coverage for hearing aids significantly predicted treatment uptake. However, stigma was also a significant predictor in this model. Holding all else constant, participants with an average PTA had a 41% predicted probability for treatment uptake, while those with relatively lower PTA (-1 SD; better hearing sensitivity) had a 7% predicted probability for HHC use and those with a higher PTA (+1 SD) had a 87% predicted probability for HHC use. Again, participants with a high PTA were 4.58 logits higher than those with a low PTA on treatment uptake status, holding all other predictors constant. Participants who had coverage for hearing aids had a 70% predicted probability for treatment uptake compared to participants without hearing aid coverage. Those with hearing aid coverage were 1.23 logits higher than those with no hearing aid coverage on treatment uptake status. Participants with lower stigma scores (indicating less reported stigma toward aging, hearing loss, and hearing aids) had a 32% predicted probability for HHC use and those with the highest stigma scores (+1 SD) had a predicted probability of 50% for HHC use. Participants with high stigma scores were 0.78 logits higher than those with low stigma scores on treatment uptake status. This relationship is illustrated in **Figure 4.4.**

Trust in non-medical sources, however, was not significantly predictive of treatment uptake (b = 0.07, p = 0.211).

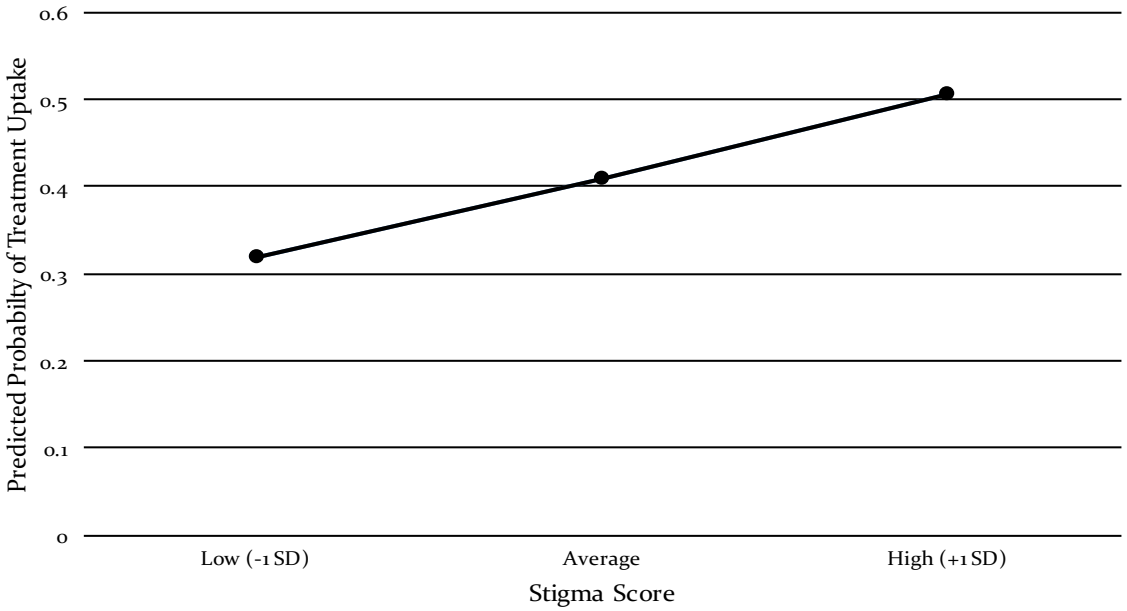

Figure 4.4. Predicted probability of treatment uptake based on stigma scores in Model 2.

Findings from multiple logistic regression analyses did not support hypothesis 2a, which stated: Trust in healthcare providers will significantly predict treatment uptake, after controlling for demographic and hearing-related factors. Findings did support hypothesis 2b, which stated: Trust in non-medical sources of help and information for hearing loss will not significantly treatment uptake, after controlling for demographic and hearing-related factors. Neither trust in medical providers nor trust in non-medical sources significantly predicted treatment uptake.

4.2c. Is trust in healthcare providers a stronger predictor of treatment uptake than trust in non-medical sources of help and information (e.g., hearing aid dispensers, retail stores, internet sources)?

An additional multiple logistic regression analysis with simultaneous predictor entry was conducted to determine whether or not trust in healthcare providers would predict treatment uptake more strongly than trust in non-medical sources (Model 3). Model 3 included both the measure of trust in medical providers and the measure of trust in non-medical sources. As shown in **Table 4.7**., Model 3 reliably distinguished participants who had received treatment for hearing loss from those who did not, χ^2 (17) = 150, $p < 0.001$, Nagelgerke Pseudo-$R^2 = 0.57$ (correct classification hit rate of 81%); this model was found to have a significantly better fit than the null model with no predictors.

Consistent with previous models, Model 3 indicated that neither of the trust measures significantly predicted treatment uptake. Also consistent with previous findings, hearing sensitivity (as measured by PTA) and having coverage for hearing aids significantly predicted treatment uptake. Holding all else constant, participants with an

average PTA had a 41% predicted probability for treatment uptake, while those with relatively lower PTA (-1 SD; better hearing sensitivity) had a 6% predicted probability for HHC use and those with a higher PTA (+1 SD) had a 89% predicted probability for HHC use. Again, participants with a high PTA were 2.42 logits higher than those with a low PTA on treatment uptake status, holding all other predictors constant. Participants who had coverage for hearing aids had a 71% predicted probability for treatment uptake compared to participants without hearing aid coverage. Those with hearing aid coverage were 1.24 logits higher than those with no hearing aid coverage in treatment uptake status. Stigma was not a significant predictor in Model 3.

Findings from the multiple logistic regression analyses described above did not support hypothesis 3, which stated: Trust in healthcare providers will be a stronger predictor of treatment uptake than trust in non-medical sources. Since neither trust in medical providers nor trust in non-medical sources significantly predicted treatment uptake, it cannot be postulated that one is a stronger predictor than the other.

Table 4.7.

Summary of Multiple Logistic Regression Model 3. Includes treatment uptake as the dependent variable and trust in healthcare providers and trust in non-medical sources as focal predictors. Demographic variables and hearing-related variables included as potential confounders.

	$\chi^2(16)$	*p*	*Pseudo* R^2	*Sens*	*Spec*	*HR*	*b*	*(SE)*	*Wald*	*p*	*OR*
Treatment Uptake	150.29	<0.001	0.57	85.20	75.00	81.00					
Intercept							-0.37	(1.01)	0.13	0.719	0.69
Trust_HCP							0.10	(0.19)	0.31	0.578	1.11
Trust_NonHCP							0.12	(0.19)	0.41	0.521	1.13
Female							0.28	(0.37)	0.57	0.450	1.32
Age (80+; Reference)							--	--	1.21	0.876	--
Age (60-64)							0.27	(0.92)	0.09	0.770	1.31
Age (65-69)							0.24	(0.84)	0.08	0.776	1.27
Age (70-74)							-0.14	(0.84)	0.03	0.868	0.87
Age (75-79)							-0.19	(0.84)	0.05	0.819	0.83
Education							0.49	(0.35)	1.92	0.166	1.63
Income (Under $20K; Reference)							--	--	11.56	0.073	--
Income ($20 - 39,999)							-0.88	(0.86)	1.05	0.306	0.41
Income ($40 - 59,999)							0.79	(0.83)	0.92	0.337	2.21
Income ($60 - 79,999)							0.21	(0.83)	0.07	0.797	1.24
Income ($80 - 99,999)							-0.29	(0.79)	0.14	0.711	0.75
Income (More than $100K)							1.09	(0.76)	2.06	0.151	2.97
Income (Prefer not to say)							0.36	(0.87)	0.17	0.677	1.44
PTA							2.42	(0.34)	49.87	<0.001	11.25
Stigma							0.37	(0.19)	3.75	0.053	1.45
HA_Cov							1.24	(0.42)	8.86	0.003	3.46

Note. *N*=274. Trust_HCP= Trust in healthcare providers; Trust_NonHCP = Trust in Non-medical sources; PTA = Pure tone average in better-hearing ear; HA_Cov = coverage for hearing aids

4.3. Post-Hoc Analyses

Findings from the multiple logistic regression analysis described in **Section 4.2b.** prompted further investigation regarding the relationship between treatment uptake and hearing sensitivity. Hearing sensitivity, as measured by 4-frequency PTA, significantly predicted treatment uptake in both regression models; participants with higher PTAs were more likely to seek treatment for their hearing loss than those with lower PTAs (i.e., "better" hearing). Post-hoc analyses were conducted to determine whether degree of hearing loss—as identified by the American Speech-Language-Hearing Association (ASHA) Standards (Clark, 1981)—would significantly predict treatment uptake. Degrees of hearing loss were defined as:

Normal:	*-10 – 25 dBHL*
Mild:	*26 – 40 dBHL*
Moderate:	*41 – 55 dBHL*
Moderately-Severe:	*56 – 70 dBHL*
Severe:	*71 – 89 dBHL*
Profound:	*90 – 120 dBHL*

It was hypothesized that degree of hearing loss would significantly predict treatment uptake. The expected finding was that participants with PTAs that fell within the normal range would exhibit a lower likelihood of receiving treatment than participants with PTAs that fall in the mild, moderate, or severe categories, as determined by a lower odds ratio and/or regression coefficient (*b*). It should be noted that having a PTA in the normal range is not equivalent to having clinically normal hearing sensitivity. Age-related hearing loss is characteristically sloping, with better hearing sensitivity in the low frequencies than the high frequencies. Recall that PTA is an average of low (0.5 kHz),

middle (1 and 2 kHz), and high (4 kHz) frequencies; participants may have hearing loss at specific frequencies that are either masked by or not accounted for in the PTA.

In the post-hoc regression models (denoted as Model 4 [focal predictors are degree of hearing loss per PTA and trust in medical providers] and Model 5 [focal predictors are degree of hearing loss per PTA and trust in non-medical sources]), trust, gender, stigma, education, age, and hearing aid coverage were entered exactly as they were in the focal regression models (described in **Section 4.2b** and Chapter 3, **Section 3.6.**). Instead of using the PTA variable as a measure of hearing sensitivity, degree of hearing loss was entered categorically, with PTAs falling in the "Normal" range (n = 81) as the reference and a total of 3 predictors for each of the other degrees of hearing loss: Mild (n = 95) , Moderate (n = 68), and >Moderate (n = 35).[1] The categorical income variable was removed in order to preserve the power of the analysis. Income was not significantly correlated with hearing sensitivity or treatment uptake, nor did income significantly predict treatment uptake in the previous models; yet it required a total of 5 predictors for analysis. All other aspects of the post-hoc analysis were consistent with methods employed for Model 1 and Model 2.

As shown in **Table 4.8**., Model 4 reliably distinguished participants who had received treatment for hearing loss from those who did not, χ^2 (12) = 136.23, p < 0.001, Nagelgerke Pseudo-R^2 = 0.52 (correct classification hit rate of 76%); this model was found to have a significantly better fit than the null model with no predictors. As expected,

[1] ">Moderate" is not a standard degree of hearing loss per ASHA standards. In the study sample, a very small percentage of participants had PTAs that fell within the "Severe" range, so "Moderately-Severe" and "Severe" were collapsed into one ">Moderate" category.

results indicated that having financial coverage for hearing aids significantly predicted treatment uptake. Participants who had coverage for hearing aids had a 49% predicted probability for treatment uptake compared to participants without hearing aid coverage. In other words, participants with hearing aid coverage were 1.24 logits higher than those without coverage on treatment uptake status. More surprisingly, results indicated that having a PTA in the mild (b = 1.37, p < 0.001), moderate (b = 3.84, p < 0.001), or greater than moderate (b = 4.96, p < 0.001) range, compared to having a PTA of 25 dBHL or lower, significantly predicted treatment uptake. Compared to participants with normal PTAs, participants with PTAs in the mild, moderate, and greater than moderate range had predicted probabilities for treatment uptake of 52%, 93%, and 98%, respectively, when all other predictors were held constant. This relationship is illustrated in **Figure 4.5.** Again, trust in medical providers was not significantly predictive of treatment uptake (b = 0.12, p = 0.487).

Table 4.8.

Summary of Multiple Logistic Regression Model 4. Includes treatment uptake as the dependent variable, and degree of hearing loss and trust in healthcare providers as focal predictors. Demographic variables and other hearing-related variables included as potential confounders.

	χ^2 (12)	*p*	*Pseudo* R^2	*Sens*	*Spec*	*HR*	*b*	*(SE)*	*Wald*	*p*	*OR*
Treatment Uptake	136.23	<0.001	0.52	77.40	72.80	75.50					
Intercept							-1.28	(0.86)	2.21	0.138	0.28
Trust_HCP							0.12	(0.17)	0.48	0.487	1.12
Female							0.05	(0.33)	0.02	0.887	1.05
Education							0.35	(0.32)	1.15	0.283	1.42
Age (80+; Reference)							--	--	1.28	0.865	--
Age (60-64)							-0.47	(0.85)	0.30	0.582	0.63
Age (65-69)							-0.42	(0.79)	0.28	0.597	0.66
Age (70-74)							0.68	(0.79)	0.73	0.391	0.51
Age (75-79)							-0.75	(0.82)	0.84	0.360	0.47
Normal PTA (Reference)							--	--	50.63	<0.001	--
Mild PTA							1.37	(0.38)	12.88	<0.001	3.92
Moderate PTA							3.84	(0.61)	39.95	<0.001	46.73
>Moderate PTA							4.96	(1.11)	20.18	<0.001	143.07
Stigma							0.33	(0.17)	3.58	0.058	1.39
HA_Cov							1.24	(0.38)	10.47	0.001	3.44

Note. *N*=279. Trust_HCP = Trust in Medical sources; HA_Cov = coverage for hearing aids; PTA= pure tone average

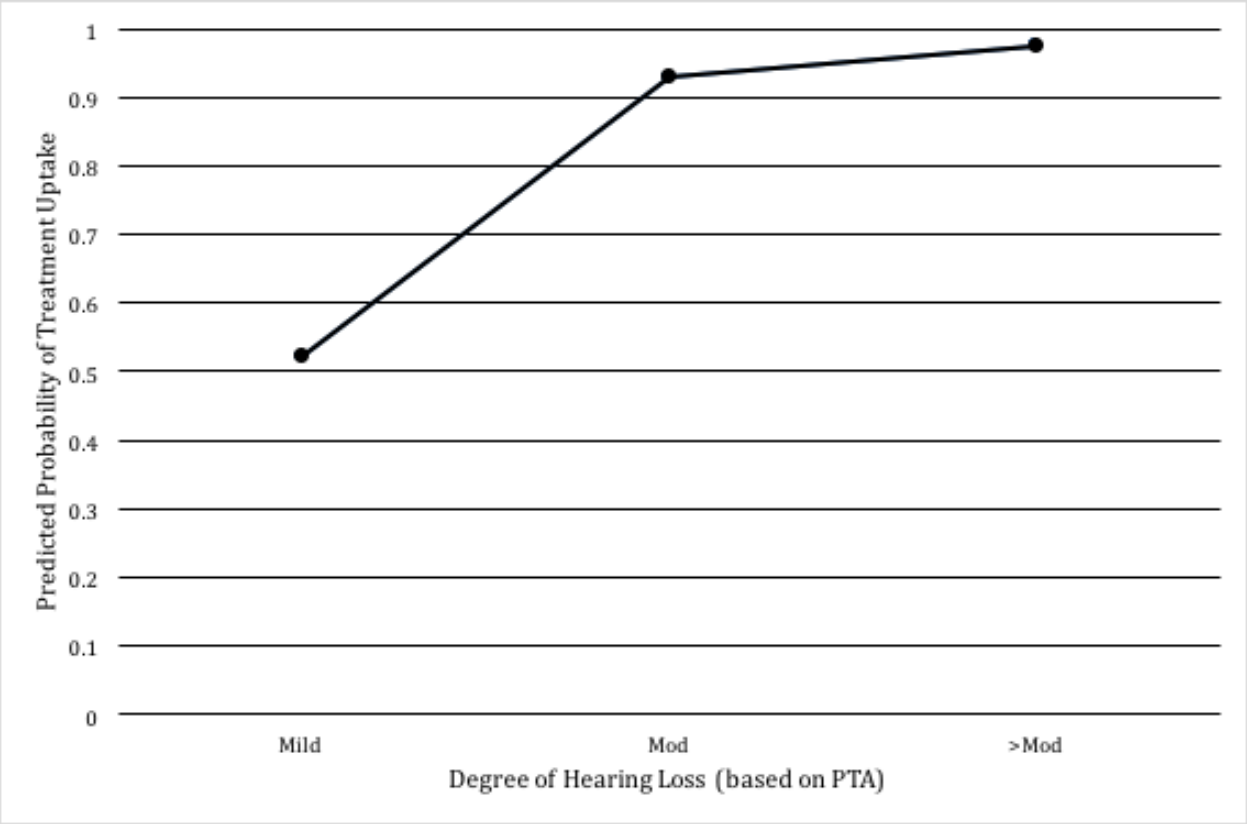

Figure 4.5. Predicted probability of treatment uptake by degree of hearing loss (compared to participants with normal pure tone averages (PTA < 26 dBHL) in Model 4.

Similar results were observed for Model 5, which included trust in non-medical sources (**Table 4.9**). Model 5 reliably distinguished participants in the treatment group from those in the non-treatment group, χ^2 (12) = 144.35, p < 0.001, Nagelgerke Pseudo-R^2 = 0.55 (correct classification hit rate of 78%), and was found to have a significantly better fit than the null model.

As with the previous models, Model 5 indicated that having financial coverage for hearing aids and hearing sensitivity significantly predicted treatment uptake. Participants who had coverage for hearing aids had a 37% predicted probability for treatment uptake compared to participants without hearing aid coverage. Results indicated that having a PTA in the mild (b = 1.37, p < 0.001), moderate (b = 3.80, p < 0.001), or greater than moderate (b = 5.06, p < 0.001) range, compared to having a PTA < 26 dBHL, significantly predicted treatment uptake. Compared to participants with normal PTAs, participants with PTAs in the mild, moderate, and greater than moderate range had predicted probabilities for treatment uptake of 42%, 89%, and 97%, respectively if all other predictors are held constant. As with Model 2, stigma was statistically significant in this model (b = 0.40, p = 0.018). Participants with relatively high stigma scores (+1 SD) had a 22% predicted probability for treatment uptake, compared to 16% and 11% for participants with average and low (-1 SD) stigma scores, respectively. In other words, those with high stigma scores were 0.40 logits higher than those with low stigma scores on treatment uptake status, holding all else constant. This relationship is illustrated in **Figure 4.6.** Again, trust in non-medical sources, however, was not significantly predictive of treatment uptake (b = 0.24, p = 0.141).

Table 4.9.

Summary of Multiple Logistic Regression Model 5. Includes treatment uptake as the dependent variable and degree of hearing loss and trust in non-medical sources as focal predictors. Demographic variables and other hearing-related variables included as potential confounders.

	χ^2 (12)	*p*	*Pseudo* R^2	*Sens*	*Spec*	*HR*	*b*	*(SE)*	*Wald*	*p*	*OR*
Treatment Uptake	144.35	<0.001	0.55	79.30	76.70	78.20					
Intercept							-1.69	(0.78)	4.72	0.030	0.19
Trust_Non-HCP							0.24	(0.17)	2.17	0.141	1.28
Female							0.02	(0.32)	0.01	0.944	1.02
Education							0.47	(0.32)	2.11	0.146	1.60
Age (80+; Reference)							--	--	0.79	0.940	--
Age (60-64)							-0.01	(0.77)	<0.001	0.990	0.99
Age (65-69)							-0.06	(0.70)	0.01	0.937	0.95
Age (70-74)							-0.29	(0.70)	0.17	0.679	0.75
Age (75-79)							-0.37	(0.17)	0.27	0.603	0.69
Normal PTA (Reference)							--	--	54.77	<0.001	--
Mild PTA							1.37	(0.38)	13.24	<0.001	3.92
Moderate PTA							3.80	(0.57)	44.06	<0.001	44.51
>Moderate PTA							5.06	(1.10)	21.32	<0.001	157.01
Stigma							0.40	(0.17)	5.64	0.018	1.50
HA_Cov							1.14	(0.38)	9.05	0.003	3.11

Note. *N*=279. Trust_NonHCP = Trust in Non-medical sources; HA_Cov = coverage for hearing aids; PTA= pure tone average

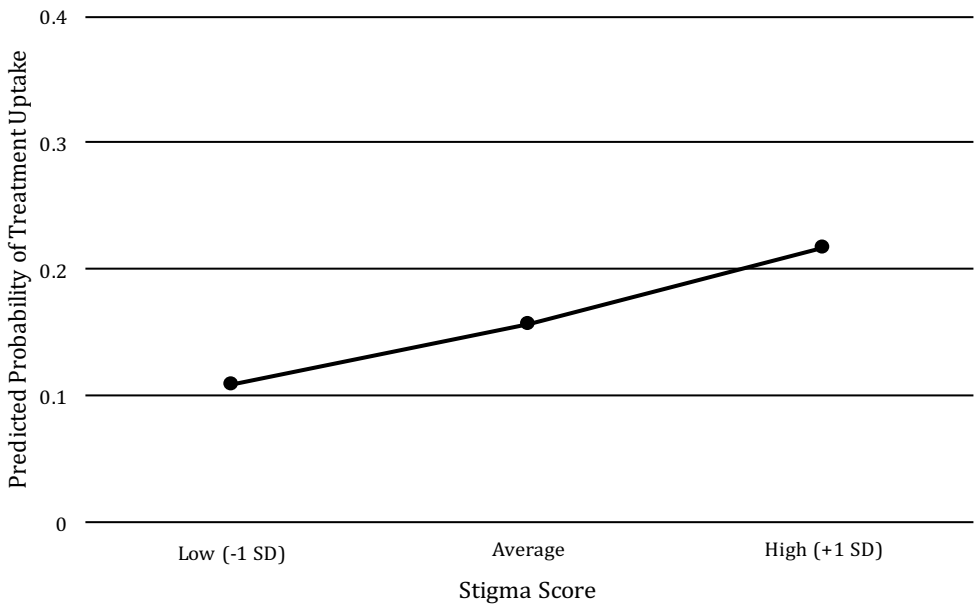

Figure 4.6. Predicted probability of treatment uptake based on stigma scores in Model 5.

Chapter 5: Discussion and Conclusions

The purpose of the current study was to better understand the relationship between trust and treatment uptake in older adults with hearing loss. Here it is reported that a subset of eHearing Survey items could be used to generate unidimensional and internally consistent measures of trust in medical providers and trust in non-medical sources of hearing-related information and help. However, trust was not a statistically significant predictor of treatment uptake in this study sample. Hearing sensitivity and having financial coverage for hearing aids did significantly predict treatment uptake in all models. Participants with higher PTAs (and thus greater degrees of hearing loss) were more likely to obtain treatment for hearing loss than those with lower PTAs. Stigma toward aging, hearing aids, and hearing loss significantly predicted treatment uptake in Model 2 and Model 5, which included trust in non-medical sources as a predictor, rather than trust in medical providers. The following sections discuss implications of these findings.

5.1. Trust and Treatment Uptake

Each measure of trust employed in the current study was unidimensional and internally consistent, as indicated by results from CFAs and reliability analyses. These quantitative analyses provide support that the items included in each score hang together to measure the same underlying construct. It should be noted, however, that the researcher labels the constructs identified in factor analyses. In the current study, the CFA models were said to measure trust in medical providers, since 5/7 items directly

related to hospitals, physicians, audiologists, etc., and trust in non-medical sources, as 4/6 items directly related to retail stores, hearing aid dispensers, etc. Not *all* items included in these models directly queried trust in medical providers or trust in non-medical sources. Thus, it is possible that the survey items captured the concepts of trust and mistrust with underlying correlations to trust in medical providers and non-medical sources, respectively. If this is the case, then findings from the current study support the notion that trust and mistrust form distinct constructs (e.g., Armstrong et al., 2006; Corbie-Smith & Chandra, 2006) and validate researchers' tendency to use different tools for measuring trust versus mistrust in healthcare (i.e., Trust in Physicians Scale [TiPS; Anderson & Dedrick, 1990]; Medical Mistrust Index [MMI; (LaVeist, Isaac, & Williams, 2009]).

As previously discussed (e.g., **Chapter 2, Section 2.3b),** trust has been shown to significantly predict treatment uptake in healthcare. There was no evidence from the current study to indicate that trust is a salient enough factor to predict treatment uptake for hearing loss in older adults. Not only did multiple logistic regression analysis reveal a non-significant relationship between trust and treatment uptake, zero-order correlations (which do not incorporate control variables) also indicated that the trust scores generated from the eHearing Survey items were not significantly correlated with treatment uptake. A possible explanation for the null findings in regards to trust and treatment uptake is that our measure of trust was not sensitive enough to detect group differences. Considering the fact that we did not assess all psychometric properties of the trust measures (e.g., test-retest reliability, external validity) across different samples and

researchers or compare to existing questionnaires, it is possible that we did not produce the most sensitive measure (Müller, Zill, Dirmaier, Härter, & Scholl, 2014). It is plausible that the trust measures from the eHearing Survey could serve as preliminary items for generating standardized and validated questionnaire to measure trust in various sources of treatment and information in adults with hearing loss, a process employed in creating the TIPS, MMI, and many other measures of trust in healthcare (Ozawa & Sripad, 2013).

Another possible explanation for trust not being a significant predictor is the high-trust study sample. As illustrated in **Figure 4.2**, standardized trust questions indicated no difference between the treatment and non-treatment groups. What's more, the vast majority of participants in both groups selected responses that indicated high levels of trust in people (e.g., "I will trust a person until I have clear evidence that he/she cannot be trusted), rather than selecting responses that depicted low trust (i.e., "I will not trust a person until there is clear evidence that he/she can be trusted"). The lack of variance in trusting attitudes between groups could have been due to the homogeneity of the study sample, which was highly educated, reported relatively high household incomes, and lacked representation from racial/ethnic minority groups. Studies employing nationally representative samples (e.g., Hesse, Nelson, Kreps, et al., 2005) have revealed that people with lower education levels exhibited reduced trust in physicians compared to college graduates. Racial/ethnic minority groups report more mistrust of the healthcare system, including healthcare providers, hospitals, health insurance companies, and medical research (Armstrong et al., 2006; Schwei, Kadunc, Nguyen, & Jacobs, 2014; Stepanikova, Mollborn, Cook, Thom, & Kramer, 2006). LaVeist and colleagues (2009) argue that

mistrust could contribute to disparities in healthcare utilization and adherence. In minority groups, mistrust is predictive of patients postponing needed care and failure to take medical advice, to keep follow-up, appointments, and to fill prescriptions (LaVeist et al., 2009). Thus, it is possible that recruiting a more heterogeneous sample of participants would produce different results.

Finally, it could be that trust simply does not predict treatment uptake for hearing loss in older adults. The current study is not the first to find that trust did not predict the use of a healthcare service. In testing the Extended Theory of Reasoned Action, Cobelli et al. (2014) employed linear regression analyses to investigate the relationship between trust and intent to adopt hearing aids. Consistent with the current study, Cobelli et al. found that having trust the healthcare professional did not significantly predict intent to adopt hearing aids.

5.2. Hearing Loss and Treatment Uptake in Older Adults

As expected, hearing sensitivity was the strongest predictor of treatment uptake in all models. Participants with higher PTAs were more likely to treat their hearing loss than those with lower PTAs. Meyer, Hickson, Lovelock, Lampert, & Khan (2014) investigated the influence of audiological and non-audiological factors on HHC seeking in older adults. Their findings identified hearing sensitivity (as measured by PTA) as a significant contributor to HHC uptake. Many others studies revealed similar results (Erler & Garstecki, 2002; Meyer & Hickson, 2012; van den Brink et al., 1996; Vestergaard Knudsen, Öberg, Nielsen, Naylor, & Kramer, 2010).

More interestingly, even participants with PTAs in the mild range had a 52% predicted probability of treatment uptake and were 3.9 times more likely to seek treatment than their peers with PTAs in the normal range. The World Health Organization (WHO) defines "disabling" hearing loss as hearing loss greater than 40 dB (moderate degree) in the better hearing ear for adults (WHO, 2013). While many participants in the current study did not have a hearing loss that would be considered "disabling", the effects of their hearing deficits were significant enough to seek treatment. Ferguson et al. (2017) conducted a Cochrane review on hearing aid use and perceptions in over 800 older adults with mild to moderate hearing loss. Findings revealed that hearing aids had a large effect in improving communication with other people and ability to participate in everyday activities; hearing aids also had a small beneficial effect in improving health-related quality of life. The current study provides further evidence that adults with milder degrees of hearing loss receive treatment for hearing impairment. Together, evidence from Ferguson et al. (2017) and the current study indicate that treatment for hearing loss should not be exclusive to people with "disabling" hearing loss. Still, many healthcare professionals write mild hearing loss off as a normal aspect of aging and do not strongly encourage treatment. In the UK, Davis, Smith, Ferguson, Stephens, & Gianopoulos (2007) found that only 41% of adults between 55-74 years of age with moderate or greater degrees of hearing loss were referred to audiologists after seeing their primary care provider with reported hearing difficulties. It is likely that the referral rate is even lower for those with mild hearing loss, as people with mild hearing loss might not think that their hearing difficulties warrant intervention (Kochkin, 2007). Thus,

healthcare providers may underestimate the effects of mild hearing loss on older adults' quality of life and miss the opportunity to ameliorate the negative effects of hearing loss by offering treatment options.

It should be noted that regression analyses in the current study did not incorporate subjective measures of hearing loss, as all participants reported having a perceived hearing loss. Meyer et al. (2014) also found that non-audiological factors, like perceived need (also reported by Duijvestijn et al., 2003), hearing-related quality of life, perceived benefit of hearing aid use, personality traits (e.g., coping style), and attitudes toward hearing aids, also significantly contributed to HHC seeking. The current study did not include all of the variables noted above, which could have mediated the relationship between PTA and treatment uptake.

5.3. Stigma, Trust, and Treatment Uptake in Older Adults

Regression analyses indicated that stigma was a statistically significant predictor in models that incorporated trust in non-medical sources, but not the models that included trust in healthcare providers. This finding directly supports the Extended Theory of Reasoned Action (Ajzen, 1980, 1991; Cobelli et al., 2014; Fishbein, 1975), which proposes that trust moderates the effects of subjective norms (e.g., stigma). Cobelli et al. found a negative relationship between subjective norm and intent to adopt hearing aids for participants who reported low trust in the healthcare professional; however, when trust in the healthcare professional was high, the effect of social norms was not statistically significant.

In contrast to Cobelli and colleagues' findings, results from the current study suggested that stigma had a positive influence on treatment uptake. The positive relationship between stigma and treatment uptake indicated that participants with higher stigma scores were more likely to have received treatment than those with lower stigma scores. In a qualitative study on the role of stigma in HHC-seeking behaviors for adults with hearing loss, Southall, Gagné, & Jennings (2010) found that stigma could prompt help-seeking for hearing loss. The authors proposed that adults reached a juncture in which negative influences—both the stress directly caused by hearing loss, like difficulty communicating, and stress of negative societal attitudes—prompted them to actively seek help with managing their hearing loss. The combined evidence suggests that trust in healthcare providers moderates the relationship between stigma and HHC-seeking behaviors regardless of whether that relationship is positive or negative.

5.4. Implications for Public Health and Public Policy

Findings suggest that having financial assistance for the cost of hearing aids via private or federal health insurance positively predicted treatment uptake in all models. Participants with insurance coverage for hearing aids were more likely to have sought treatment than those without. This is consistent with findings from Meyer et al. (2014), who found that participants who received a federal penchant (which included hearing aids at little to no out-of-pocket cost) were more likely to seek HHC services than those who did not. Laplante-Lévesque et al. (2012) reported similar results for older adults in Australia, Denmark, the UK, and the US. The evidence suggests that a reduction in out-

of-pocket costs contributes to a higher likelihood of seeking help for hearing loss and thus supports the push to reduce the cost of hearing aids (the most common form of treatment for hearing loss) through changes in healthcare policy (Barnett et al., 2016).

Reavis et al., (2016) suggest that in order to successfully implement large-scale interventions, it is key to acknowledge the ways in which social and physical determinants shape the burden hearing loss in terms of severity and rehabilitation. Social factors, specifically trust and stigma, were not negatively related to treatment uptake in the present study. In this respect, the Over-the-Counter Hearing Aid Act (OTCHAA) could be a step in the right direction. It is possible trust and stigma will not detract from decisions to obtain hearing aids if the out-of-pocket costs are reduced and a person has a hearing loss. What's more, the OTCHAA serves as a "disruptive change" to the provision of hearing services that is necessary for halting the growth in the burden of hearing loss in older adults (Tucci, Wilson, & O'Donoghue, 2017). The current study supports the notion that improving access to HHC services and affordability of treatment options like hearing aids can help to reduce the unmet HHC needs of older adults in the USA.

5.5. Limitations of Current Study

A strength of the current study is that it employed a within-subjects design. All participants completed the same measures for trust, treatment uptake, hearing sensitivity, and all other factors included in the final analysis. This approach grants the advantage of directly comparing responses across groups without having to incorporate individual-level controls, as would be required with a between-subjects design, and

capitalizes on the sample size. Another advantage of the current study is that the survey questions were generated from the content acquired from focus groups comprised of the target populations, adults ages 60 years and older. Older adults also reviewed/commented on each survey question through a secondary round of focus groups to ensure each question was comprehensible.

While within-subjects designs have their strengths, there are also weaknesses in this type of design. On average, the eHearing survey took about 30-45 minutes to complete. Due to the length of the survey, our participants were at risk for attrition and fatigue effects. While only participants with complete datasets were included in the final analysis, it is possible that they were less attentive toward the end of the survey (when trust and stigma were queried) than they were at the beginning (when providing sociodemographic information). Another weakness of the current study is that the eHearing survey is web-based and was administered on a computer or tablet. Some participants were less comfortable with technology than others. Assistants were on site to aid anyone who could not operate the tablets/computers used to collect the data. Cross-sectional, rather than longitudinal, designs also pose two risks: 1) recall bias, as some questions required participants to think back to when they had first seen a HHC professional or noticed their hearing difficulties; and 2) cohort effects, as participants who are similar in age might have shared life experiences that shaped their views on trust.

An overall weakness of the current study is that we employed a convenience sampling technique. All participants were recruited from resources within the University of Washington (UW). The study sample was not representative of the target population

on a national or state-wide level. Thus, the external validity of findings from the current study was limited. Finally, due to the observational nature of this study design, causality cannot be inferred. However, survey methods can be used to reliably estimate a desired quantity (with a desired precision), quantitatively describe characteristics of a group of interest, and compare responses from different groups.

5.6. Conclusions and Future Directions

The current study examined the relationship between trust and treatment uptake in older adults with hearing loss. While trust was not found to significantly predict treatment uptake, measured hearing sensitivity and having insurance coverage for the cost of hearing aids consistently predicted treatment uptake. Stigma was also a positive predictor in models that incorporated trust in non-medical sources (as compared to models that incorporated trust in healthcare providers). Findings support the Extended TRA (Cobelli et al., 2014) in that trust in healthcare providers mitigated the effects of social norms/stigma. Future studies should further explore the relationship between trust and stigma and their respective and synergistic effects on HHC-seeking. Studies on trust and HHC-seeking behaviors should employ a standardized and/or validated measure of trust and recruit a diverse sample in order to maximize the chances of detecting small effects of trust.

Appendix A. Survey Items Examined in Current Study

eHearing Survey Items Examined in Current Study	
Demographic Information	
Question Stem	**Response Options**
What is your gender?	• Female • Male
What is your age in years?	• Under 60 • 60 - 64 • 65 - 69 • 70 - 74 • 75 - 79 • 80 - 84 • 85+
What is the highest grade or year of school you completed?	• Never attended school or only kindergarten • Grades 1 through 8 (Elementary) • Grades 9 through 11 (Some high school) • Grade 12 or GED (High school graduate) • College 1 year to 3 years (Some college or technical school) • College 4 years or more (College graduate)
What is your annual household income before tax, etc.?	• Under $20,000 • $20,000 - $39,999 • $40,000 - $59,999 • $60,000 - $79,999 • $80,000 - $99,999

	• More than $100,000 • Prefer not to say
Would you describe yourself as…?	• American Indian/Alaska Native • Asian • White • Native Hawaiian/Pacific Islander • Black or African American • Other
Do you consider yourself to be Hispanic, Latino, or of Spanish origin?	• Yes • No • I don't know
Hearing- and-HHC-Related Information	
Question Stem	**Response Options**
Does your health plan cover the cost of hearing aids?	• Yes • No • Partially • I don’t know
Are you deaf or do you have a significant hearing difficulty?	• Yes • No
Which of the following statements best describes how you feel about your hearing ability?	• I do not know if I have a hearing problem • I do not have any problems with my hearing and nobody has complained about my hearing • I do not have any problems with my hearing but sometimes other people tell me I have a hearing problem • I do have a hearing problem but I haven't sought any kind of help for it • I do have a hearing problem and I wear hearing aids or use other technology to help me hear
What is the title of the professional who tested your hearing?	• I have never had a hearing test

	• Physician (e.g., primary care provider, family physician, general practitioner, ear/nose/throat doctor) • Audiologist • Audiometric technician • Hearing instrument specialist (e.g., hearing aid dispenser) • Nurse • Speech-language pathologist • Researcher • Self-test (e.g., on your computer or at a kiosk) • Don't know
Were you offered or have you attended any of the options below to help with your hearing? (All Yes/No)	• Group classes / support groups for you • Support groups for your spouse / partner / family • A person (coach/counselor) to help you manage your hearing difficulties • Computer-based counseling or coaching
If offered, did you go? (All Yes/No)	• Group classes / support groups for you • Support groups for your spouse / partner / family • A person (coach/counselor) to help you manage your hearing difficulties • Computer-based counseling or coaching
Trust-Related Items	
Question Stem	**Response Options**
Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?	• You cannot be too careful when dealing with people • Most people can be trusted
Which of the following statements best reflects your view?	• "I will not trust a person until there is clear evidence that he or she can be trusted." • "I will trust a person until I have clear evidence that he or she can't be trusted."

All questions below were answered on a 5-point Likert Scale with the following options: 1- Strongly disagree, 2- Disagree, 3- Neutral, 4- Agree, 5- Strongly agree **OR** 1- Not at all, 2- A little, 3- Somewhat, 4- Quite a bit, 5- Very much, (N/A) I don't know what this is	
Question Stem	**Individual Items**
How much do you agree or disagree with the following statements?	• I know what information to trust about hearing problems. • I know which professionals to trust to help me with a hearing problem.
How much do you trust information about hearing healthcare options from the following sources?	• Government health authorities • Medical doctor or healthcare provider (e.g., family physician) • Hospitals • Health insurance companies • Non-profit organizations/ charities for seniors (e.g., AARP) • Non-profit organizations/ charities for hearing problems (e.g., • Hearing Loss Association of America) • Hearing aid manufacturers • Audiologists • Hearing aid dispenser/ sales person • Scientists, researchers, or university professors • Retail store (Costco, Sears) • Family and friends • Other people with hearing problems • Wikipedia
How much do you trust information about hearing healthcare options provided to you by the following means?	• Pamphlet or other materials from doctor / healthcare • provider's office • Magazine/Newspaper advertisements • Internet websites • Unsolicited emails • Unsolicited letter or pamphlet in the mail

	• TV programs or commercials • Magazine/newspaper articles
In general, how much do you tend to trust the following healthcare providers?	• Medical doctors (e.g., family doctor; ear, nose, and throat specialist) • Nurses • Pharmacists • Dentists • Naturopaths • Audiologists • Audiometric technicians • Hearing instrument specialists • Speech therapists/Speech-language pathologists • Optometrists • Podiatrists • Chiropractors • Massage therapists • Acupuncturist • Occupational therapists • Physical therapists/ Physiotherapists
I trust a hearing specialist if…	• Their hearing facility is at a "for-profit" hearing center / business • Their hearing facility is at an office at a hospital or medical • facility • Their hearing facility is at an office in a professional office • building • Their hearing facility is in a retail store (e.g., Costco, Sears) • Their hearing facility is at a pharmacy (e.g., Rite Aid) • Their hearing facility is in a university facility • They are accessed online using a computer or tablet (e.g., iPad) • They came to my house or living facility • It is someone who wears a white lab coat • They operate out of a technology store (e.g., Apple Store, Best Buy)

When it comes to getting hearing aids or other devices, I would trust the provider if they:	• Offered me several choices of hearing aids/devices and were NOT biased • towards any particular device • Took the time to listen to my concerns • Were assertive about selling hearing aids or other devices • Offered me choices of other places I might go to purchase hearing aids or • other devices • Suggested approaches for dealing with hearing problems OTHER THAN • hearing aids or other devices (e.g., changing my environment, listening tips, • classes) • Charged me money for a hearing aid or other device
Stigma-Related Items (Also answered on a 5-point Likert Scale)	
Question Stem	**Individual Items**
How much do you agree with each statement about how to deal with hearing problems?	There should be more public awareness campaigns to help reduce the stigma of hearing problems.
How much do you agree or disagree with the following statements? There is a stigma against people…	• with hearing problems who have trouble following conversations • who wear hearing aids • who are old • who wear glasses • who use a cane (stick/walker) to walk • who use a wheelchair

eHearing Survey Items Examined in Current Study	
Demographic Information	
Question Stem	**Response Options**
What is your gender?	• Female • Male
What is your age in years?	• Under 60 • 60 - 64 • 65 - 69 • 70 - 74 • 75 - 79 • 80 - 84 • 85+
What is the highest grade or year of school you completed?	• Never attended school or only kindergarten • Grades 1 through 8 (Elementary) • Grades 9 through 11 (Some high school) • Grade 12 or GED (High school graduate) • College 1 year to 3 years (Some college or technical school) • College 4 years or more (College graduate)
What is your annual household income before tax, etc.?	• Under $20,000 • $20,000 - $39,999 • $40,000 - $59,999 • $60,000 - $79,999 • $80,000 - $99,999 • More than $100,000 • Prefer not to say
Would you describe yourself as…?	• American Indian/Alaska Native

	• Asian • White • Native Hawaiian/Pacific Islander • Black or African American • Other
Do you consider yourself to be Hispanic, Latino, or of Spanish origin?	• Yes • No • I don't know
Hearing- and-HHC-Related Information	
Question Stem	**Response Options**
Does your health plan cover the cost of hearing aids?	• Yes • No • Partially • I don’t know
Are you deaf or do you have a significant hearing difficulty?	• Yes • No
Which of the following statements best describes how you feel about your hearing ability?	• I do not know if I have a hearing problem • I do not have any problems with my hearing and nobody has complained about my hearing • I do not have any problems with my hearing but sometimes other people tell me I have a hearing problem • I do have a hearing problem but I haven't sought any kind of help for it • I do have a hearing problem and I wear hearing aids or use other technology to help me hear
What is the title of the professional who tested your hearing?	• I have never had a hearing test • Physician (e.g., primary care provider, family physician, general practitioner, ear/nose/throat doctor) • Audiologist • Audiometric technician

	• Hearing instrument specialist (e.g., hearing aid dispenser) • Nurse • Speech-language pathologist • Researcher • Self-test (e.g., on your computer or at a kiosk) • Don't know
Were you offered or have you attended any of the options below to help with your hearing? (All Yes/No)	• Group classes / support groups for you • Support groups for your spouse / partner / family • A person (coach/counselor) to help you manage your hearing difficulties • Computer-based counseling or coaching
If offered, did you go? (All Yes/No)	• Group classes / support groups for you • Support groups for your spouse / partner / family • A person (coach/counselor) to help you manage your hearing difficulties • Computer-based counseling or coaching
Trust-Related Items	
Question Stem	**Response Options**
Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?	• You cannot be too careful when dealing with people • Most people can be trusted
Which of the following statements best reflects your view?	• "I will not trust a person until there is clear evidence that he or she can be trusted." • "I will trust a person until I have clear evidence that he or she can't be trusted."
All questions below were answered on a 5-point Likert Scale with the following options: 1- Strongly disagree, 2- Disagree, 3- Neutral, 4- Agree, 5- Strongly agree **OR** 1- Not at all, 2- A little, 3- Somewhat, 4- Quite a bit, 5- Very much, (N/A) I don't know what this is	

Question Stem	Individual Items
How much do you agree or disagree with the following statements?	• I know what information to trust about hearing problems. • I know which professionals to trust to help me with a hearing problem.
How much do you trust information about hearing healthcare options from the following sources?	• Government health authorities • Medical doctor or healthcare provider (e.g., family physician) • Hospitals • Health insurance companies • Non-profit organizations/ charities for seniors (e.g., AARP) • Non-profit organizations/ charities for hearing problems (e.g., • Hearing Loss Association of America) • Hearing aid manufacturers • Audiologists • Hearing aid dispenser/ sales person • Scientists, researchers, or university professors • Retail store (Costco, Sears) • Family and friends • Other people with hearing problems • Wikipedia
How much do you trust information about hearing healthcare options provided to you by the following means?	• Pamphlet or other materials from doctor / healthcare • provider's office • Magazine/Newspaper advertisements • Internet websites • Unsolicited emails • Unsolicited letter or pamphlet in the mail • TV programs or commercials • Magazine/newspaper articles
In general, how much do you tend to trust the following healthcare providers?	• Medical doctors (e.g., family doctor; ear, nose, and throat specialist) • Nurses

	• Pharmacists • Dentists • Naturopaths • Audiologists • Audiometric technicians • Hearing instrument specialists • Speech therapists/Speech-language pathologists • Optometrists • Podiatrists • Chiropractors • Massage therapists • Acupuncturist • Occupational therapists • Physical therapists/ Physiotherapists
I trust a hearing specialist if…	• Their hearing facility is at a "for-profit" hearing center / business • Their hearing facility is at an office at a hospital or medical • facility • Their hearing facility is at an office in a professional office • building • Their hearing facility is in a retail store (e.g., Costco, Sears) • Their hearing facility is at a pharmacy (e.g., Rite Aid) • Their hearing facility is in a university facility • They are accessed online using a computer or tablet (e.g., iPad) • They came to my house or living facility • It is someone who wears a white lab coat • They operate out of a technology store (e.g., Apple Store, Best Buy)
When it comes to getting hearing aids or other devices, I would trust the provider if they:	• Offered me several choices of hearing aids/devices and were NOT biased • towards any particular device • Took the time to listen to my concerns • Were assertive about selling hearing aids or other devices

	• Offered me choices of other places I might go to purchase hearing aids or • other devices • Suggested approaches for dealing with hearing problems OTHER THAN • hearing aids or other devices (e.g., changing my environment, listening tips, • classes) • Charged me money for a hearing aid or other device
Stigma-Related Items **(Also answered on a 5-point Likert Scale)**	
Question Stem	**Individual Items**
How much do you agree with each statement about how to deal with hearing problems?	There should be more public awareness campaigns to help reduce the stigma of hearing problems.
How much do you agree or disagree with the following statements? There is a stigma against people…	• with hearing problems who have trouble following conversations • who wear hearing aids • who are old • who wear glasses • who use a cane (stick/walker) to walk • who use a wheelchair

Appendix B.

eHearing Study Phase I: Focus Groups

The first step in the development of the eHearing Survey was to conduct focus groups in inform lead researchers on the current experiences of the target population. A total of four focus groups were conducted, one in each of the following countries: Australia (AUS), Canada (CAN), United Kingdom (UK), United States (US). Participants were recruited through TNS-Global, a third-party company which employs a team of professionals in survey metrics based in London, England. TNS used the same recruitment methodology across all four countries. TNS recruited 12 adults from each country and conducted interviews with 12 in AUS, UK, and the US and 11 adults from CAN for a total of 47 participants. Inclusion criteria included being 60 years of age or older and able to attend a 2-hour focus group at the local study sites; half of the participants had to have or know someone with hearing loss. Recruitment was stratified so that each focus group contained an equal number of males and females as well as four people in each of the following hearing categories:

1) self-report of no hearing problems (NH)

2) self-report of hearing problems but no hearing aid use (HI-HA)

3) self-reported hearing problems and using hearing aids (HI+HA)

Recruitment was also stratified by age to include participants in four age groups: 60-64 years, 65-69 years, 70-74 years, 75+ years.

Each focus group was conducted in-person and facilitated by a trained interviewer employed by TNS using a script developed with the research team. A different interviewer

led the focus groups at each of the four locations; however, the same basic script was used for each focus group .The lead researchers were present at the focus groups as observers. Hearing accessibility needs were accommodated for participants with hearing loss according to their needs, including the provision of communication real-time access translation (CART), FM systems or Pocket-talkers. Participants were remunerated for their participation, and informed consent was provided in accordance with methods approved by the University of Washington.

At the beginning of each focus group, one of the researchers made brief introductory comments about the purpose of the project with a PowerPoint presentation. Participants were asked to each introduce themselves and provide a brief background about their experiences with hearing loss, either their own experiences or those of someone they knew. The focal concepts discussed during focus groups are presented in **Figure AB.1.** The discussion was opened by the TNS interviewer using scripted questions eliciting descriptions of the types of experiences people wished to share about hearing healthcare. Questions were also asked to probe for opinions about facilitators and benefits of seeking hearing healthcare. Finally, participants were asked to envision what hearing healthcare could ideally be like twenty years in the future. After a short break, the ideas about future hearing healthcare were discussed in three sub-groups. The three sub-groups were formed according to the participants' self-reported hearing status categories (NH, HI-HA, HI+HA) and each sub-group discussion was facilitated by a researcher. The entire group reconvened to share ideas and for concluding remarks and debriefing.

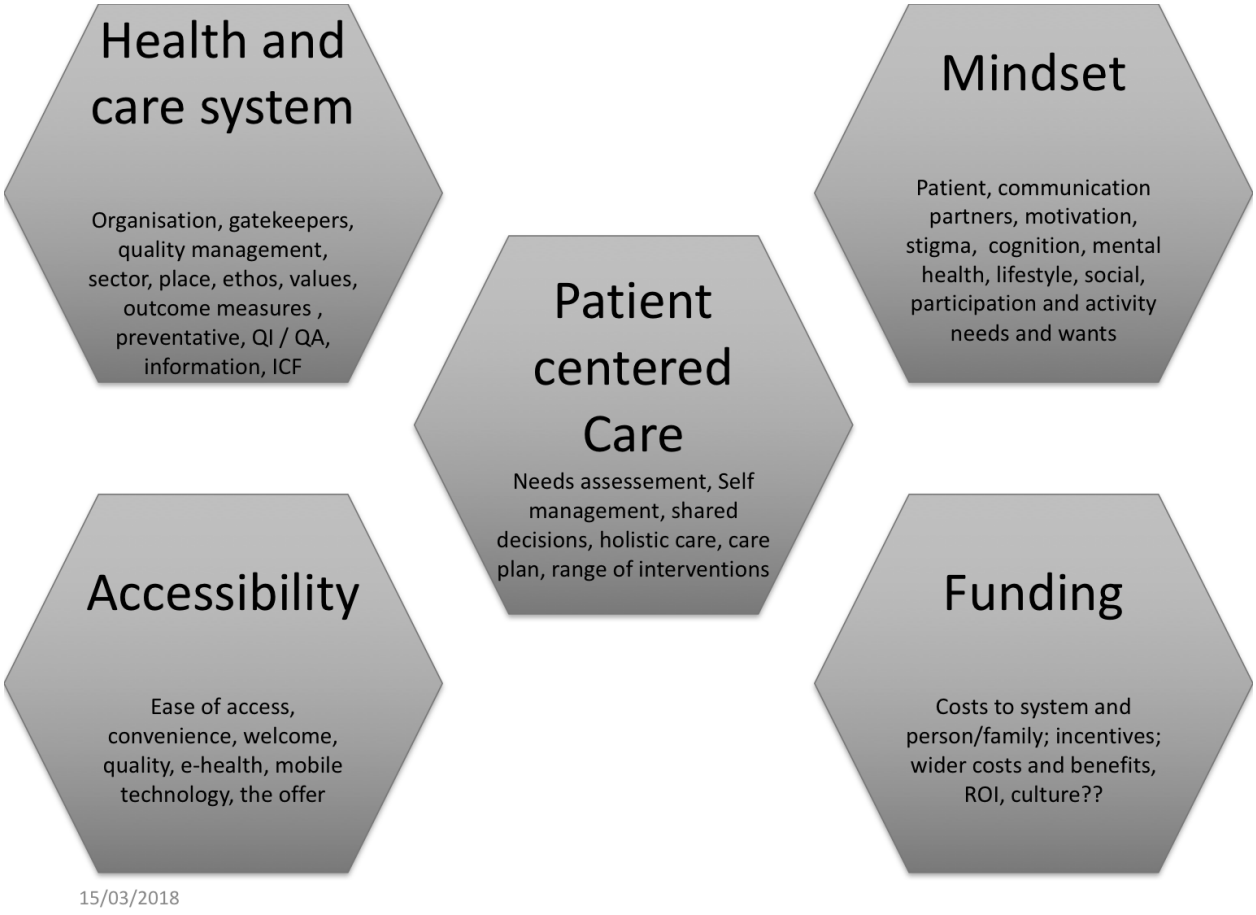

Figure AB.1. Key concepts discussed during Phase I focus groups.

TNS transcribed focus group discussions and these transcripts were reviewed for survey development. This process began with an iterative process of creating a code dictionary and identifying recurring themes across groups. These themes served as the basis of the eHearing Survey items. The research team collaborated on creating items that queried specific topics and concerns mentioned in the focus groups. The eHearing Survey also included questions to elicit sociodemographic information; these were pulled from national surveys like the Census and the National Health and Nutrition Examination Survey (NHANES).

References

Acar, B., Yurekli, M. F., Babademez, M. A., Karabulut, H., & Karasen, R. M. (2011). Effects of hearing aids on cognitive functions and depressive signs in elderly people. *Archives of Gerontology & Geriatrics*, *52*(3), 250–252.

Ajzen, I. (1980). *Understanding attitudes and predicting social behavior* (Pbk. ed.). Englewood Cliffs, N.J.: Englewood Cliffs, N.J. : Prentice-Hall.

Ajzen, I. (1991). The theory of planned behavior. *Theories of Cognitive Self-Regulation*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

American Psychological Association. (2010). *Publication manual of the American Psychological Association* (Sixth edition.). Washington, DC: Washington, DC : American Psychological Association.

Anderson, L. A., & Dedrick, R. F. (1990). Development of the Trust in Physician Scale: A Measure to Assess Interpersonal Trust in Patient-Physician Relationships. *Psychological Reports*, *67*(3 suppl), 1091–1100. https://doi.org/10.2466/pro.1990.67.3f.1091

Angst, D. B., & Deatrick, J. A. (1996). Involvement in Health Care Decisions: Parents and Children with Chronic Illness. *Journal of Family Nursing*, *2*(2), 174–194. https://doi.org/10.1177/107484079600200205

Armstrong, K., Rose, A., Peters, N., Long, J. A., McMurphy, S., & Shea, J. A. (2006). Distrust of the Health Care System and Self-Reported Health in the United States. *Journal of General Internal Medicine*, *21*(4), 292–297. https://doi.org/10.1111/j.1525-1497.2006.00396.x

Barnett, M., Hixon, B., Neville, O., Irungu, C., Ayugi, J., Thompson, R., … Bush, M. L. (2016). Factors involved in access and utilization of adult hearing healthcare: A systematic review. *The Laryngoscope*, *127*(5), 1187–1194. https://doi.org/10.1002/lary.26234

Bryant, L. L., Corbett, K. K., & Kutner, J. S. (2001). In their own words: a model of healthy aging. *Social Science & Medicine*, *53*(7), 927–941. https://doi.org/10.1016/S0277-9536(00)00392-0

Cairns, V. A., Reid, G. S., & Murray, C. (2015). Family members' experience of seeking help for first-episode psychosis on behalf of a loved one: a meta-synthesis of qualitative research. *Early Intervention in Psychiatry*, *9*(3), 185–199. https://doi.org/10.1111/eip.12157

Chia, E.-M., Wang, J. J., Rochtchina, E., Cumming, R. R., Newall, P., & Mitchell, P. (2007). Hearing impairment and health-related quality of life: The blue mountains hearing study. *Ear and Hearing*, *28*(2), 187–195. https://doi.org/10.1097/AUD.0b013e31803126b6

Ciambrone, D. (2006). Treatment Decision-Making Among Older Women with Breast Cancer. *Journal of Women & Aging*, *18*(4), 31–47. https://doi.org/10.1300/J074v18n04_04

Clark, J. G. (1981). Uses and abuses of hearing loss classification. *ASHA*, *23*(7), 493. https://doi.org/10.1080/0097840X.1980.9936093

Cobelli, N., Gill, L., Cassia, F., & Ugolini, M. (2014). Factors that influence intent to adopt a hearing aid among older people in Italy. *Health & Social Care in the Community*, *22*(6), 612–622. https://doi.org/10.1111/hsc.12127

Corbie-Smith, G., & Chandra, L. F. (2006). Distrust and poor self-reported health. *Journal of General Internal Medicine*, *21*(4), 395–397. https://doi.org/10.1111/j.1525-1497.2006.00407.x

Cornally, N., & McCarthy, G. (2011). Help-seeking behaviour: A concept analysis. *International Journal of Nursing Practice*, *17*(3), 280–288. https://doi.org/10.1111/j.1440-172X.2011.01936.x

Cruickshanks, K. J., Wiley, T. L., Tweed, T. S., Klein, B. E. K., Klein, R., Mares-Perlman, J. A., & Nondahl, D. M. (1998). Prevalence of hearing loss in older adults in Beaver Dam, Wisconsin. *American Journal of Epidemiology*, *148*(9), 879. https://doi.org/10.1093/oxfordjournals.aje.a009713

Davis, A. C. (1989). The Prevalence of Hearing Impairment and Reported Hearing Disability among Adults in Great Britain. *International Journal of Epidemiology*, *18*(4), 911–917. https://doi.org/10.1093/ije/18.4.911

Davis, A., McMahon, C. M., Pichora-Fuller, K. M., Russ, S., Lin, F., Olusanya, B. O., … Tremblay, K. L. (2016). Aging and Hearing Health: The Life-course Approach. *The Gerontologist*, *56*(Suppl_2), S256–S267. https://doi.org/10.1093/geront/gnw033

Davis, A., Smith, P., Ferguson, M., Stephens, D., & Gianopoulos, I. (2007). Acceptability, benefit and costs of early screening for hearing disability: a study of potential

screening tests and models. *Health Technol Assess*, *11*(42), 294. https://doi.org/10.3310/hta11420

Delmar, C. (2012). The excesses of care: a matter of understanding the asymmetry of power. *Nursing Philosophy*, *13*(4), 236–243. https://doi.org/10.1111/j.1466-769X.2012.00537.x

Donahue, A., Dubno, J. R., & Beck, L. (2010). Accessible and Affordable Hearing Health Care for Adults with Mild to Moderate Hearing Loss. *Ear and Hearing*, *31*(1), 2–6. https://doi.org/10.1097/AUD.0b013e3181cbc783

Duijvestijn, J. A., Anteunis, L. J. C., Hoek, C. J., Van Den Brink, R. H. S., Chenault, M. N., & Manni, J. J. (2003). Help-seeking Behaviour of Hearing-impaired Persons Aged ≥ 55 Years; Effect of Complaints, Significant Others and Hearing Aid Image. *Acta Oto-Laryngologica*, *123*(7), 846–850. https://doi.org/10.1080/0001648031000719

Erler, S. F., & Garstecki, D. C. (2002). Hearing Loss- and Hearing Aid-Related StigmaPerceptions of Women with Age-Normal Hearing. *American Journal of Audiology*, *11*(2), 83–91. https://doi.org/10.1044/1059-0889(2002/020)

Fabrigar, L. R. (2012). *Exploratory factor analysis*. Oxford ; New York: Oxford ; New York : Oxford University Press.

Ferguson, M. A., Kitterick, P. T., Chong, L. Y., Edmondson-Jones, M., Barker, F., & Hoare, D. J. (2017). Hearing aids for mild to moderate hearing loss in adults. https://doi.org/10.1002/14651858.CD012023.pub2

Fishbein, M. (1975). *Belief, attitude, intention, and behavior : an introduction to theory and research*. Reading, Mass.: Reading, Mass. : Addison-Wesley Pub. Co.

Gates, G. A., & Mills, J. H. (2005). Presbycusis. *The Lancet*, *366*(9491), 1111–1120. https://doi.org/10.1016/S0140-6736(05)67423-5

Goold, S. D. (2002). Trust, Distrust and Trustworthiness: Lessons from the Field. *Journal of General Internal Medicine*, *17*(1), 79–81. https://doi.org/10.1046/j.1525-1497.2002.11132.x

Guadagnoli, E., & Velicer, W. F. (1988). Relation of sample size to the stability of component patterns. *Psychological Bulletin*, *103*(2), 265–275. https://doi.org/10.1037/0033-2909.103.2.265

Hall, M. A., Dugan, E., Zheng, B., & Mishra, A. K. (2001). Trust in Physicians and Medical Institutions: What Is It, Can It Be Measured, and Does It Matter? *The Milbank Quarterly*, *79*(4), 613–639. https://doi.org/10.1111/1468-0009.00223

Haywood, C., Lanzkron, S., Bediako, S., Strouse, J. J., Haythornthwaite, J., Carroll, C. P., … for the IMPORT Investigators. (2014). Perceived Discrimination, Patient Trust, and Adherence to Medical Recommendations Among Persons with Sickle Cell Disease. *Journal of General Internal Medicine*, *29*(12), 1657–1662. https://doi.org/10.1007/s11606-014-2986-7

Hesse BW, Nelson DE, Kreps GL, & et al. (2005). Trust and sources of health information: The impact of the internet and its implications for health care providers: findings from the first health information national trends survey. *Archives of Internal Medicine*, *165*(22), 2618–2624. https://doi.org/10.1001/archinte.165.22.2618

Hochbaum, G. (1958). *Public participation in medical screening programs: a socio-psychological study*.

Huang, J., van den Brink, H. M., & Groot, W. (2011). College Education and Social Trust: An Evidence-Based Study on the Causal Mechanisms. *Social Indicators Research*, *104*(2), 287–310. https://doi.org/10.1007/s11205-010-9744-y

Hupcey, J. E., Penrod, J., Morse, J. M., & Mitcham, C. (2001). An exploration and advancement of the concept of trust. *Journal of Advanced Nursing*, *36*(2), 282–293. https://doi.org/10.1046/j.1365-2648.2001.01970.x

Jacobs, E. A., Rolle, I., Ferrans, C. E., Whitaker, E. E., & Warnecke, R. B. (2006). Understanding African Americans' Views of the Trustworthiness of Physicians. *Journal of General Internal Medicine*, *21*(6), 642–647. https://doi.org/10.1111/j.1525-1497.2006.00485.x

Jenstad, L., & Moon, J. (2011). Systematic Review of Barriers and Facilitators to Hearing Aid Uptake in Older Adults. *Audiology Research*, *1*(1), e25. https://doi.org/10.4081/audiores.2011.e25

Jones, D. A., Victor, C. R., & Vetter, N. J. (1984). Hearing difficulty and its psychological implications for the elderly. *Journal of Epidemiology and Community Health*, *38*(1), 75–78.

Jorgensen, M. L., Young, J. M., & Solomon, M. J. (2013). Adjuvant chemotherapy for colorectal cancer: age differences in factors influencing patients' treatment decisions. *Patient Preference and Adherence*, *7*, 827–834. https://doi.org/10.2147/PPA.S50970

Jung, D., & Bhattacharyya, N. (2012). Association of Hearing Loss With Decreased Employment and Income Among Adults in the United States. *Annals of Otology, Rhinology & Laryngology*, *121*(12), 771–775.

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: New York : Guilford Press.

Kochkin, S. (2007). MarkeTrak VII: obstacles to adult non-user adoption of hearing aids. *The Hearing Journal*, *60*(4), 24. https://doi.org/10.1097/01.HJ.0000285745.08599.7f

Laplante-Lévesque, A., Brännström, K. J., Ingo, E., Andersson, G., & Lunner, T. (2015). Stages of change in adults who have failed an online hearing screening. *Ear and Hearing*, *36*(1), 92. https://doi.org/10.1097/AUD.0000000000000085

Laplante-Lévesque, A., Hickson, L., & Worrall, L. (2010). *A Qualitative Study of Shared Decision Making in Rehabilitative Audiology* (Vol. 43).

Laplante-Lévesque, A., Knudsen, L. V., Preminger, J. E., Jones, L., Nielsen, C., Öberg, M., … Kramer, S. E. (2012). Hearing help-seeking and rehabilitation: Perspectives of adults with hearing impairment. *International Journal of Audiology*, *51*(2), 93–102. https://doi.org/10.3109/14992027.2011.606284

LaVeist, T. A., Isaac, L. A., & Williams, K. P. (2009). Mistrust of Health Care Organizations Is Associated with Underutilization of Health Services. *Health Services Research*, *44*(6), 2093–2105. https://doi.org/10.1111/j.1475-6773.2009.01017.x

Li, C.-M., Zhang, X., Hoffman, H. J., Cotch, M. F., Themann, C. L., & Wilson, M. R. (2014). Hearing impairment associated with depression in us adults, national health and

nutrition examination survey 2005-2010. *JAMA Otolaryngology–Head & Neck Surgery*, *140*(4), 293–302. https://doi.org/10.1001/jamaoto.2014.42

Lin, F. R., Thorpe, R., Gordon-Salant, S., & Ferrucci, L. (2011). Hearing Loss Prevalence and Risk Factors Among Older Adults in the United States. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, *66A*(5), 582–590. https://doi.org/10.1093/gerona/glr002

Lin, F. R., Yaffe, K., Xia, J., Xue, Q.-L., Harris, T. B., Purchase-Helzner, E., … for the Health ABC Study. (2013). Hearing Loss and Cognitive Decline Among Older Adults. *JAMA Internal Medicine*, *173*(4), 10.1001/jamainternmed.2013.1868. https://doi.org/10.1001/jamainternmed.2013.1868

Luhmann, N. (1979). *Trust and power*. Chichester [England] ; New York: Chichester England ; New York : John Wiley & Sons.

Margolis, R. H., Killion, M. C., Bratt, G. W., & Saly, G. L. (2016). Validation of the Home Hearing Test. *Journal of the American Academy of Audiology*, *27*(5), 416–420.

Marrone, N., Ingram, M., Somoza, M., Jacob, D. S., Sanchez, A., Adamovich, S., & Harris, F. P. (2017). Interventional Audiology to Address Hearing Health Care Disparities: Oyendo Bien Pilot Study. *Seminars in Hearing*, *38*(2), 198–211. https://doi.org/10.1055/s-0037-1601575

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An Integrative Model of Organizational Trust. *The Academy of Management Review*, *20*(3), 709–734. https://doi.org/10.2307/258792

Mechanic, D., & Schlesinger, M. (1996). The Impact of Managed Care on Patients' Trust in Medical Care and Their Physicians. *JAMA*, *275*(21), 1693–1697. https://doi.org/10.1001/jama.1996.03530450083048

Meize-Grochowski, R. (1984). An analysis of the concept of trust. *Journal of Advanced Nursing*, *9*(6), 563–572. https://doi.org/10.1111/j.1365-2648.1984.tb00412.x

Meyer, C., & Hickson, L. (2012). What factors influence help-seeking for hearing impairment and hearing aid adoption in older adults? *International Journal of Audiology*, *51*(2), 66–74. https://doi.org/10.3109/14992027.2011.611178

Meyer, C., Hickson, L., & Fletcher, A. (2014). Identifying the barriers and facilitators to optimal hearing aid self-efficacy. *International Journal of Audiology*, *53*(sup1), S28–S37. https://doi.org/10.3109/14992027.2013.832420

Meyer, C., Hickson, L., Lovelock, K., Lampert, M., & Khan, A. (2014). An investigation of factors that influence help-seeking for hearing impairment in older adults. *International Journal of Audiology*, *53*(sup1), S3–S17. https://doi.org/10.3109/14992027.2013.839888

Möllering, G. (2001). The Nature of Trust: From Georg Simmel to a Theory of Expectation, Interpretation and Suspension. *Sociology*, *35*(2), 403–420. https://doi.org/10.1177/S0038038501000190

Müller, E., Zill, J. M., Dirmaier, J., Härter, M., & Scholl, I. (2014). Assessment of Trust in Physician: A Systematic Review of Measures. *PLOS ONE*, *9*(9), e106844. https://doi.org/10.1371/journal.pone.0106844

Musa, D., Schulz, R., Harris, R., Silverman, M., & Thomas, S. B. (2009). Trust in the health care system and the use of preventive health services by older Black and White adults.(RESEARCH AND PRACTICE)(Author abstract)(Report). *The American Journal of Public Health*, *99*(7), 1293. https://doi.org/10.2105/AJPH.2007.123927

Orom, H., Homish, D. L., Homish, G. G., & Underwood, W. (2014). Quality of physician-patient relationships is associated with the influence of physician treatment recommendations among patients with prostate cancer who chose active surveillance. *Urologic Oncology: Seminars and Original Investigations*, *32*(4), 396–402. https://doi.org/10.1016/j.urolonc.2013.09.018

O'Rourke, M. E. (1999). Narrowing the Options: The Process of Deciding on Prostate Cancer Treatment: Nursing Perspectives. *Cancer Investigation*, *17*(5), 349–359. https://doi.org/10.3109/07357909909032877

Ostertag, S., Wright, B. R. E., Broadhead, R. S., & Altice, F. L. (2006). Trust and other Characteristics Associated with Health Care Utilization by Injection Drug Users. *Journal of Drug Issues*, *36*(4), 953–974. https://doi.org/10.1177/002204260603600409

Ozawa, S., & Sripad, P. (2013). How do you measure trust in the health system? A systematic review of the literature. *Social Science & Medicine*, *91*, 10–14. https://doi.org/10.1016/j.socscimed.2013.05.005

Poost-Foroosh, L., Jennings, M. B., Shaw, L., Meston, C. N., & Cheesman, M. F. (2011). Factors in Client–Clinician Interaction That Influence Hearing Aid Adoption. *Trends in Amplification*, *15*(3), 127–139. https://doi.org/10.1177/1084713811430217

Preminger, J. (2018). Building Trust and Improving Outcomes With Family-Centered Hearing Care. *ASHA Leader*, *23*(1), 28–29.

Preminger, J. E., Oxenbøll, M., Barnett, M. B., Jensen, L. D., & Laplante-Lévesque, A. (2015). Perceptions of adults with hearing impairment regarding the promotion of trust in hearing healthcare service delivery. *International Journal of Audiology*, *54*(1), 20–28.

Prochaska, J. O., & Velicer, W. F. (1997). The Transtheoretical Model of Health Behavior Change. *American Journal of Health Promotion*, *12*(1), 38–48. https://doi.org/10.4278/0890-1171-12.1.38

Reavis, K. M., Tremblay, K. L., & Saunders, G. (2016). How Can Public Health Approaches and Perspectives Advance Hearing Health Care? *Ear and Hearing*, *37*(4), 376–380. https://doi.org/10.1097/AUD.0000000000000321

Rolfe, A., Cash-Gibson, L., Car, J., Sheikh, A., & Mckinstry, B. (2014). Interventions for improving patients' trust in doctors and groups of doctors. *Cochrane Database Syst Rev.*, *2014*(3). https://doi.org/10.1002/14651858.CD004134.pub3

Rosenstock, I. (1966). WHY PEOPLE USE HEALTH SERVICES. *Milbank Memorial Fund Quarterly/Health and Society*, *44*(3), JUL – 124.

Rotter, J. B. (1980). Interpersonal trust, trustworthiness, and gullibility. *American Psychologist*, *35*(1), 1–7. https://doi.org/10.1037/0003-066X.35.1.1

Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management Review*, *23*(3), 393–404. https://doi.org/10.5465/AMR.1998.926617

Safran, D., Kosinski, M., Tarlov, A., Rogers, W., Taira, D., Lieberman, N., & Ware, J. (1998). The primary care assessment surrey - Tests of data quality and measurement performance. *Med. Care*, *36*(5), 728–739. https://doi.org/10.1097/00005650-199805000-00012

Saito, H., Nishiwaki, Y., Michikawa, T., Kikuchi, Y., Mizutari, K., Takebayashi, T., & Ogawa, K. (2010). Hearing Handicap Predicts the Development of Depressive Symptoms After 3 Years in Older Community-Dwelling Japanese. *Journal of the American Geriatrics Society*, *58*(1), 93–97. https://doi.org/10.1111/j.1532-5415.2009.02615.x

Saunders, G. H., Chisolm, T. H., & Wallhagen, M. I. (2012). Older Adults and Hearing Help-Seeking Behaviors. *American Journal of Audiology*, *21*(2), 331–337. https://doi.org/10.1044/1059-0889(2012/12-0028)

Saunders, G. H., Frederick, M. T., Silverman, S. C., Nielsen, C., & Laplante-Lévesque, A. (2016a). Description of Adults Seeking Hearing Help for the First Time According to Two Health Behavior Change Approaches: Transtheoretical Model (Stages of Change) and Health Belief Model. *Ear and Hearing*, *37*(3). Retrieved from https://journals.lww.com/ear-hearing/Fulltext/2016/05000/Description_of_Adults_Seeking_Hearing_Help_for_the.9.aspx

Saunders, G. H., Frederick, M. T., Silverman, S. C., Nielsen, C., & Laplante-Lévesque, A. (2016b). Health behavior theories as predictors of hearing-aid uptake and

outcomes. *International Journal of Audiology*, *55*(sup3), S59–S68. https://doi.org/10.3109/14992027.2016.1144240

Saunders, G. H., Frederick, M. T., Silverman, S., & Papesh, M. (2013). Application of the health belief model: Development of the hearing beliefs questionnaire (HBQ) and its associations with hearing health behaviors. *International Journal of Audiology*, *52*(8), 558–567. https://doi.org/10.3109/14992027.2013.791030

Schildmann, J., Ritter, P., Salloch, S., Uhl, W., & Vollmann, J. (2013). "One also needs a bit of trust in the doctor … ": a qualitative interview study with pancreatic cancer patients about their perceptions and views on information and treatment decision-making. *Annals of Oncology*, *24*(9), 2444–2449. https://doi.org/10.1093/annonc/mdt193

Schwei, R. J., Kadunc, K., Nguyen, A., & Jacobs, E. A. (2014). Impact of sociodemographic factors and pervious interactions with the health care system on institutional trust in three racial/ethnic groups. *Patient Education and Counseling*, *96*(3), 333–338. https://doi.org/10.1016/j.pec.2014.06.003

Southall, K., Gagné, J.-P., & Jennings, M. B. (2010). Stigma: A negative and a positive influence on help-seeking for adults with acquired hearing loss. *International Journal of Audiology*, *49*(11), 804–814. https://doi.org/10.3109/14992027.2010.498447

Stepanikova, I., Mollborn, S., Cook, K. S., Thom, D. H., & Kramer, R. M. (2006). Patients' Race, Ethnicity, Language, and Trust in a Physician. *Journal of Health and Social Behavior*, *47*(4), 390–405. https://doi.org/10.1177/002214650604700406

Stevens, J. (James P. (2002). *Applied multivariate statistics for the social sciences* (4th ed.). Mahwah, N.J.: Mahwah, N.J. : Lawrence Erlbaum Associates.

Thom, D. (2000). Training physicians to increase patient trust. *Journal of Evaluation in Clinical Practice*, *6*(3), 245–253. https://doi.org/10.1046/j.1365-2753.2000.00249.x

Thom, D. H., & Campbell, B. (1997). Patient-physician trust: an exploratory study. *Journal of Family Practice*, *44*(2), 169.

Thom, D. H., Hall, M. A., & Pawlson, L. G. (2004). Measuring Patients' Trust In Physicians When Assessing Quality Of Care. *Health Affairs*, *23*(4), 124–132. https://doi.org/10.1377/hlthaff.23.4.124

Thom, D. H., Ribisl, K. M., Stewart, A. L., Luke, D. A., & The Stanford Trust Study Physicians. (1999). Further Validation and Reliability Testing of the Trust in Physician Scale. *Medical Care*, *37*(5), 510–517.

Thorne, S., & Robinson, C. (1988). Reciprocal trust in health care relationships. *Journal of Advanced Nursing*, *13*(Nov 88), 782–789.

Tucci, D. L., Wilson, B. S., & O'Donoghue, G. M. (2017). The Growing—and Now Alarming—Burden of Hearing Loss Worldwide. *Otology & Neurotology*, *38*(10). Retrieved from https://journals.lww.com/otology-neurotology/Fulltext/2017/12000/The_Growing_and_Now_Alarming_Burden_of_Hearing.2.aspx

Uslaner, E. M. (2002). *The moral foundations of trust*. Cambridge University Press.

van den Brink, R. H. S., Wit, H. P., Kempen, G. I. J. M., & van Heuvelen, M. J. G. (1996). Attitude and help-seeking for hearing impairment. *British Journal of Audiology*, *30*(5), 313–324. https://doi.org/10.3109/03005369609076779

Vestergaard Knudsen, L., Öberg, M., Nielsen, C., Naylor, G., & Kramer, S. E. (2010). Factors Influencing Help Seeking, Hearing Aid Uptake, Hearing Aid Use and Satisfaction With Hearing Aids: A Review of the Literature. *Trends in Amplification*, *14*(3), 127–154. https://doi.org/10.1177/1084713810385712

Wallhagen, M. I. (2010). The Stigma of Hearing Loss. *The Gerontologist*, *50*(1), 66–75. https://doi.org/10.1093/geront/gnp107

Whetten, K., Leserman, J., Whetten, R., Ostermann, J., Thielman, N., Swartz, M., & Stangl, D. (2006). Exploring Lack of Trust in Care Providers and the Government as a Barrier to Health Service Use. *American Journal of Public Health*, *96*(4), 716–721. https://doi.org/10.2105/AJPH.2005.063255

Wilson, B. S., Tucci, D. L., Merson, M. H., & O'Donoghue, G. M. (2017). Global hearing health care: new findings and perspectives. *The Lancet*, *390*(10111), 2503–2515. https://doi.org/10.1016/S0140-6736(17)31073-5

Working Group on Speech Understanding and Aging. (1988). Speech understanding and aging. *The Journal of the Acoustical Society of America*, *83*(3), 859–895. https://doi.org/10.1121/1.395965