

2015

The Relationship Between Social Intelligence and Hearing Loss

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Walden University

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Deborah Finken

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Walden University

2015

Abstract

The Relationship Between Social Intelligence and Hearing Loss

by

Deborah Finken

MS, Walden University, 2009

BA, University of Colorado at Denver, 2006

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Health Psychology

Walden University

May 2015

Abstract

This study was an exploration of adults with long-term hearing loss (LTHL) and how it may relate to social intelligence (SI) proficiency. The outcome of this study was intended to illuminate a gap in the literature, namely, the manner in which those with long-term LTHL were able to understand social situations and communicate with others when auditory comprehension was limited. A quantitative nonexperimental method was used that provided the Tromso Social Intelligence Scale (TSIS) to a group of 66 adults with LTHL who were diagnosed with hearing loss as children, as well as a group of 70 adults with no discernable hearing loss (NDHL). The TSIS was used to determine if those with LTHL would have scored higher on the total scale score and the subscales of social information processing and social awareness, than would those with NDHL. The results of the study were determined by an independent t test. There was no significant difference in the total scale and subscale scores between LTHL and NDHL for this relatively small samples study. These findings could aid the hearing loss community at large through a focus on SI skills to improve confidence and communication for those with LTHL. One social change benefit of this study demonstrates that SI for people with LTHL is comparable to people with NDHL. Such a finding suggests that while people with LTHL did not rate higher in SI, they also are not impaired in social situations because of their hearing loss.

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Dedication

Mark, my dear husband, has been a wonderful support for me. He has always encouraged me to achieve what matters to me, and has been willing to be there for our children so that I could reach my goal in getting a Ph.D. Thank you Mark, for being my best friend and greatest support.

Katya and Alanagh, my two amazing children, have always known that education is important to me. My girls are my inspiration, and it means so much to me to be a good role model for them. I am grateful for every day that I get to be with them.

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To Walden University, I appreciate the opportunity to learn and grow and I believe I am a far better person than when I first started, all because of my higher level of education.

Table of Contents

List of Tables	iv
Chapter 1: Introduction to the Study.....	1
Introduction.....	1
Background of Study	5
Statement of Problem.....	7
Purpose of Study	9
Research Question	10
Null and Alternative Hypothesis.....	10
Scope and Significance of Study	11
Assumptions and Limitations of the Study.....	12
Definitions of Key Terms	12
Summary.....	15
Chapter 2: Review of Literature	16
Introduction.....	16
Literature Search Strategy.....	16
Social Intelligence.....	17
Social Intelligence Theorists.....	22
Social Intelligence Development, Empathy, and Nonverbal Cues.....	29
Mirror Neurons and Social Intelligence.....	31
Interpersonal Sensitivity	32
Hearing Loss Effects.....	33
Social IntelligenceAdaptation.....	40

Social Intelligence and Short or Long-Term Hearing Loss	41
Gap in Literature	44
Summary	45
Chapter 3: Research Method.....	46
Introduction.....	46
Instrumentation	47
Research Question	49
Null and Alternative Hypothesis.....	49
Research Method	50
Research Design.....	51
Study Participants and Sampling	53
Ethical Concerns	55
Anonymity	55
Data Collection	56
Study Validity	57
Data Analysis	58
Summary	60
Chapter 4: Results.....	61
Introduction.....	61
Research Question Restatement.....	61
Null and Alternative Hypothesis Restatement.....	61
Data Collection	62
Study Results	63

Summary	67
Chapter 5: Discussion, Conclusion, and Recommendations	70
Introduction.....	70
Interpretations and Findings	70
Limitations of Study	76
Recommendations for Future Study	77
Implications.....	79
Conclusions.....	80
References.....	81
Appendix A: Permission Letter for the Tromso Social Intelligence Scale.....	102
Appendix B: Tromso Social Intelligence Scale with Divided Subsections.....	103
Appendix C: Sample Letter for Participant Agreement.....	104
Appendix D: Informed Consent Long-Term Hearing Loss	105
Appendix E: Informed Consent No Discernable Hearing Loss.....	108
Curriculum Vitae	111

List of Tables

Table 1. Frequencies and Percentages of Nominal Value	66
Table 2. Independent Samples t-Test for Total Social Scale Score for LTHL	67
Table 3. Independent Sample t-Test for Social Processing Composite for LTHL	68
Table 4. Independent Sample t-Test for Social Skills Composite for LTHL	69
Table 5. Independent Sample t-Test for Social Awareness Composite for LTHL	70

Chapter 1: Introduction to the Study

Introduction

The prevalence of hearing loss in the United States is currently at one in five people 12 years of age and older (Lin, Niparko, & Ferrucci, 2011). According to the World Health Organization (2013), 360 million people worldwide 15 years of age and older have a disabling hearing loss of 40 decibels or more. A loss of 25 decibels is considered a level of hearing loss where communication is impaired (Lin et al., 2011). There are many causes for hearing loss ranging from congenital abnormality, infection, environmental noise, and age related degeneration (Appold, 2012; Swann, 2009). While hearing loss can affect how a person communicates with others, a need to communicate and connect with others does not dissipate because of the hearing loss.

A person with hearing loss who has a need to communicate and connect does not specifically desire to be socially outgoing. The person with hearing loss wants to understand what is going on in conversation in order to communicate effectively. Children diagnosed with a perceptible hearing loss are frequently taught methods of communication at an early age in order to understand social interchange for purposes of providing meaning to what is being communicated by others (Decker, Vallotton, & Johnson, 2012). Communication that is taught to individuals with hearing loss include speech reading, in which visual cues in the face indicate what is being communicated, cued speech, which is how the communicator uses his or her hands to convey what is being communicated, and sign language, which is a language using nonverbal full hand communication (Auer & Bernstein, 2007; Movallali, Guita, Rafi, & Mahdi-Abdollahzadeh, 2012).

Helvik, Thurmer, Jacobsen, Bratt, and Hallberg (2007) reported that participants with hearing loss use nonverbal adaptation strategies for understanding communication more effectively than verbal strategies alone. One strategy explored by Helvik et al. included paying close attention to the person's face, but not specifically lip reading. The adaptation strategies interrelate well with the concept of social intelligence because many aspects of social intelligence are nonverbal (McKown, Gumbiner, Russo, & Lipton, 2009).

Nonverbal communication, much like verbal communication, is how one person expresses intention, perception, or sentiment to another person. Nonverbal communication involves looking at facial expressions, body language including hand and arm gestures, and identifying cues such as affection or lack of interest to understand what messages are being conveyed in conversation (Morris, 1995). Another way to refer to nonverbal communication is emotional body language or the physical behavior and characteristics that are present but not always obvious (de Gelder, 2006). Although people with hearing loss have shown a higher aptitude in nonverbal communication, many nonverbal cues are still culture specific, that is, values that are a quality of an individual culture that are not shared by other cultures (Morris, 1995). An understanding of nonverbal cues in one culture does not translate to understanding nonverbal cues in another culture, regardless of a person's hearing ability.

In the 1930s, notable psychologists Thorndike and Vernon developed the concept of social intelligence (SI). Albrecht (2004) referred to SI as an awareness of the social dynamic. The social dynamic provides an individual with the aptitude to have a conscious understanding of how to interact and comprehend other people. Goleman (2006) referred

to SI as being receptive to another person's thoughts, feelings, and intentions, as well as being attuned to the influence of social interaction. The background and current understanding of SI are imperative to connecting how those with long-term hearing loss (LTHL) gain an understanding of communication beyond spoken language.

In breaking down the aspects of social and intelligence, social is defined as how one interacts with others either individually or within groups (Gerrig & Zimbardo, 2002). Social involves skills, cues, and foreknowledge that allows for anticipation or expectation, of how to interact with others. Social interaction (subjective and cooperative) and social behavior are adaptive to the context of the social situation. Social interaction and social behavior are adapted by individuals with hearing loss by the use of nonverbal communication perception to understand what is being communicated to them by other individuals in conversation. Zeckveld, Deijen, Goverts, and Kramer, (2007) showed a compensatory cognitive function by use of visual components of speech, that is, nonverbal communication, for people with hearing loss. Individuals with severe hearing loss have shown higher working memory for nonverbal cognitive information processing than individuals with average hearing (Zeckveld et al., 2007). The purpose of this adaptation is the need for the individual to understand conversation when auditory cues are difficult to hear.

Society assumes intelligence to be a measure of mental ability, such as with the Stanford-Binet Intelligence Scale. Mental intelligence is based on a psychometric measurement of cognitive abilities gleaned from how one answers questions involving abstract and logic, spatial understanding, memory tasks, and understanding of verbal reasoning (Marom, 2013). Although this is the common definition of intelligence, other

theorists argued that it is not the only type of intelligence. Gardner (2011) and Sternberg (1985) emphasized the importance of theories involving social, emotional, naturalist, creative, and moral intelligences. For some theorists, psychological science's commitment to expanding the understanding of human intelligence beyond mental intelligence has allowed a more expansive understanding of how the human mind works.

For people with LTHL it is important to understand how these individuals comprehend verbal communication with limited auditory perception or sign language. For an individual with LTHL, there may be an increase in the extent such individual uses nonverbal communication, and how they read body language in order to gather an understanding of how to communicate with people and circumvent a lack of audition. This greater dependence on nonverbal cues may be based on a change in how the brain processes information to cover for the diminished ability to understand what is being spoken auditorily (Merabet & Pascual-Leone, 2010). The manner in which this compensatory communication occurs can be equal to or superior to the level of SI used in a person with no deficits in sensory function (Merabet & Pascual-Leone, 2010).

There are no previous researchers who have assessed the relation of SI and LTHL. It was the intention of this study to compare SI in those with LTHL to those with non-discernable hearing loss (NDHL). The investigation was driven by a theory which predicted that a person with LTHL adapted their communication strategy in order to understand social communication when auditory understanding is disabled. The potential positive change implication of this study was that individuals with LTHL were capable of understanding social conventions with little or no auditory cues.

Further research may indicate that this information can be used in educational programs to help enhance communication skills in those with hearing loss in the future. Further study may potentially demonstrate a level of social competence by people with LTHL that has often been misunderstood by people who do not understand the experience of hearing loss. This chapter includes the background supporting the study, along with the problem statement, purpose of the study, research hypothesis, and nature of the study.

Background of Study

Several different theories developed over the past 80 years explain how the concept of social intelligence has evolved. I focused on hearing loss and how SI is related to it. The literature review presented in Chapter 2 explains the protocol of communication that includes states, traits and nonverbal cues as well as hearing loss coping strategies, including how people with hearing loss manage to live in a hearing world and still communicate effectively. The literature review in Chapter 2 ends with provisions on why SI is adaptive, how interpersonal sensitivity is involved, and what theoretically would give one with LTHL a greater likelihood of having higher SI.

Currently, a gap exists in the knowledge of how communication is understood by people with LTHL when auditory cues are not clear. What is lacking in current and past research is how individuals with LTHL have developed nonverbal skills in order to engage in social interaction. Although it is known that sensory information incorporates sight and sound, less has been studied about impairments that may increase a person's ability in another area to compensate for sensory loss (Merabet & Pascual-Leone, 2010). Sensory loss is not equivalent to sensory deprivation. Individuals with LTHL have

varying levels of residual hearing. SI of two different populations was measured, a group with LTHL and a group with NDHL, this study used the Tromso Social Intelligence Scale (TSIS, Silvera, Martinussen, & Dahl, 2001).

This study required a sample with LTHL because this population utilizes nonverbal methods to enhance verbal communication more than a population still adapting to hearing loss (Pittman, Vincent, & Carter, 2009). There is a need for this study in order to provide information to the hearing loss community as well as professionals that work with them regarding their ability to communicate beyond verbal communication alone. SI is valuable for understanding social interaction and social cues, which are greatly based on nonverbal communication. By understanding components of SI and how it relates to those with LTHL, society learns how to improve communication with anyone who has hearing loss.

Theory of mind (TOM, Peterson & Wellman, 2009) is a concept often used to describe how one is able to perceive and interpret thoughts and feelings of other people. TOM is based on prediction, knowledge, and intention of others that involve facial recognition of emotions, empathy, and prediction of social impact (Tirapu-Ustarroz, Peres-Sayes, Erakatxo-Bilbao, & Pelegrin-Valero, 2007). TOM also includes understanding behaviors and emotional traits and states (Al-Hilawani, Easterbrooks, & Marchant, 2002). TOM comes from a neurological foundation that allows the prediction of behaviors in social interactions based on sensory awareness (Wolf, 2011). For those with hearing loss, this comes from conceptual learning and knowledge of how to interpret context in language, especially in cases where there is low proficiency of a spoken language (Peterson & Wellman, 2009).

Deaf or severe hearing loss children are atypical in how they learn patterns of social interactions due to lack of verbal cues, but are still found to perform accurately in pretense, or false belief in social pretending (Peterson & Wellman, 2009). Deaf children are able to pick up on cues and interactions in social pretending earlier than hearing children (Peterson & Wellman, 2009). Elementary school aged children with hearing loss use a lot of visual cues to, “interpret, understand, and predict behaviors, events, and objects,” (Al-Hilawani et al., 2002, p. 44). This is a key factor in research regarding the relation between hearing loss and SI as compensation for lack of auditory capability involving social interaction.

Children with hearing loss tend to have delays in academic performance and trouble with social inclusion in the mainstream public education system due to language delay (Bernstein, 2011; Eriks-Brophy, et al., 2012; Vosganoff, Paatsch, & Toe). Eriks-Brophy et al., demonstrated that young adults with a lifetime of hearing loss effectively integrate with normal hearing adults, and rate average or above-average on measures of communication and self-perception in comparison to young adults with no hearing loss. There are no published studies directly assessing the relationship between hearing loss and SI; this study will fill that gap by exploring whether or not there are differences in SI in LTHL individuals and NDHL individuals. Linking hearing loss with SI, especially social cues, interaction, and skills is in need of further research.

Statement of the Problem

There is a dearth of information regarding understanding and comprehending social communication in those with LTHL. There are studies on hearing loss and communication as well as how individuals with hearing loss often feel socially isolated;

this research will be discussed in Chapter 2. The relationship between SI and hearing loss has not been investigated. Studies about social outcomes and hearing loss cite a lack of ability to communicate appropriately through verbal methods (as tested by the Social Skills Rating Scales developed by Gresham and Elliot in 1990; Antia, Jones, Luckner, Kreimeyer, & Reed, 2011). Those researchers concluded that students with hearing loss integrate well socially when given the opportunity, and that hearing loss alone is not a good indicator of social ability or inability. It is difficult to speculate why researchers of hearing loss focus on social ability using verbal strategies and seem to ignore how people with hearing loss gather information about communication in social interaction that is often based on nonverbal resources and learned behavior. These behaviors are within the realm of SI. When SI and hearing loss are studied separately, there is an interesting cross-over regarding nonverbal understanding, memory and even how mirror neurons help people mimic in order to communicate. Still there is a gap in research with respect to investigating SI in individuals with LTHL.

The competence of those with hearing loss in regard to understanding communication and context of what is being communicated is essential, as it provides clues to how those with hearing loss communicate with a lack of an ability to hear some or much of what is verbally relayed. The relevance in this exploration is not only beneficial to those within the hearing loss community, it also presents an important understanding of the role of nonverbal communication in SI. The study was designed to explore what could be a potential benefit to those with hearing loss as a way of investigating the nature of communication beyond verbal communication alone.

Purpose of the Study

The purpose of this quantitative survey study was to explore whether LTHL was associated with higher SI compared to a population with NDHL. The focus of this study was not on individuals with more recent hearing loss, but rather individuals with long-term hearing loss who were diagnosed with hearing loss as children. Hearing loss for the purpose of this study referred to anyone who had experienced hearing loss, either bilaterally or unilaterally, based on the diagnosis of a professional audiologist who has tested the individual for hearing loss. The hearing loss could not have impaired spoken language development. I did focus on social isolation or quality of life of people with LTHL. Although those aspects were essential to the hearing loss experience, the importance of this study was to understand SI, and whether people with LTHL have higher SI as it related to social information processing and social awareness (two of the subscales in the TSIS) than people with NDHL.

Chapter 2 is a review of studies that detail how children with hearing loss have developed spoken language regardless of their hearing loss. One researcher indicated that early detection of hearing loss resulting in children fitted with hearing aids results in an increase in the child's speech understanding within proximal and distal sources (O'Callaghan, 2007). The ability to understand spoken language is multisensory for everyone. This is especially true for those with hearing loss. They need to see movement of the mouth (lip reading) and hear a level of sound that is audible to them to increase the chance of understanding language in conversation (Walden, Grant, & Cord, 2001). Another feature of the multisensory experience is the ability to perceive the emotional state of the speaker through audio and visual components. Children with moderate to

moderate-severe hearing loss are equally perceptible to the speaker's emotional state as a child with no hearing loss (Most & Michaelis, 2012).

This research was a quantitative survey study as it related to measurements of subscales of the TSIS (Silvera, Martinussen, & Dahl, 2001) and a comparison between two groups. The two groups for this study were individuals with LTHL and individuals with NDHL. The independent variable was group membership, with two levels (NDHL and LTHL). The dependent variable was SI, defined as the total score and three subscale scores of the TSIS (Silvera et al., 2001).

Research Question

Social intelligence has been investigated in populations of aggressive individuals and those with learning disabilities or autism. There are no studies of SI as it relates to hearing loss. The intention is to answer the following research question:

RQ: Are there differences in social intelligence as measured by the TSIS between individuals with long-term hearing loss and individuals with no discernable hearing loss?

Null and Alternative Hypotheses

HO: There will be no significant differences on all of the scales of the TSIS between individuals with long-term hearing loss and individuals with no discernable hearing loss.

H1: Individuals with long-term hearing loss will score higher than individuals with no discernable hearing loss on the social information processing subscale of the TSIS.

H2: Individuals with long-term hearing loss will score higher than individuals with no discernable hearing loss on the social awareness subscale of the TSIS.

H3: Individuals with no discernable hearing loss will score higher than individuals with long-term hearing loss on the social skills subscale of the TSIS.

H4: Individuals with long-term hearing loss will score higher than individuals with no discernable hearing loss on the total scale score of the TSIS.

Scope and Significance of the Study

This study presents an expanded understanding of SI in individuals with hearing loss, and explores whether those with hearing loss have a higher SI. Proficiency in SI may be related to the amount of time one has had hearing loss. Specifically, proficiency in SI was selected to assess whether adult individuals who have had hearing loss since childhood rated higher in SI, and this proficiency was compared to those with NDHL. Although I could have focused on SI as an innate ability, it was more significant to explore how SI could serve a compensatory function in social situations where audition was impaired and nonverbal language was more significant to understanding communication through social interaction.

Assessing SI could be useful in determining if those with LTHL rate higher on the SI scale than those with NDHL in the future through further research. It may indicate the use of compensatory SI as a way to understand communication through social interaction. It is important to understand the depth of social communication and how audition may not be the most important factor in social interaction. It may be a slight disadvantage when it comes to understanding nonverbal communication in social interaction.

Assumptions and Limitations of the Study

As with any study, assumptions allow for the basis of the problem to be explored as well as a framework for study outcomes. The framework specifically relied on a community of participants with LTHL and the TSIS scale to determine whether or not SI was comparable between a community with LTHL and a community with NDHL. One assumption was that individuals who took part in this study would be able to understand the TSIS and answer the questions honestly. Another assumption was that individuals who met the conditions for participation were willing to participate in the study.

A limitation to the study could be the lack of qualitative information for the study as this might have added a different insight to the study. Quantitative studies allow for easy access to a larger number of participants with a reliable and valid scale. However, they do not allow for the specific case details of how individuals with hearing loss have developed the use of social cues for the purpose of increased understanding within social communication. Another limitation is the researcher having no control over subjects who fail to complete test items, which would cause the subject to be eliminated from the study. There may have been individuals who were reluctant to complete the survey online, had inadequate bandwidth to complete the survey, or may have had poor computer skills. One more limitation could have been the potential difference in the two groups based on the need to recruit the groups from different sources.

Definitions of Key Terms

Adaptive: Using learned skills to increase understanding of the environment to choose what is in one's best interests (Herzog & Hertwig, 2009).

Cognitive Intelligence: A term that is generally considered quantifiable intelligence through mental quotient such as the tests designed by Weschler (1955). Cognitive is considered significant as a cross over for other intelligences as it helps one understand one's own effectiveness in dealing with others.

Communication: Often spoken language, but there is also a nonverbal form in which articulatory gestures, body language and movement of mouth are considered as ways of transference of information from one person to another person (Zaidman-Zait & Dromi, 2007; Stone, 2006).

Crystallized intelligence: Gathered from long-term memory and allows one to access previous experiences of social behavior and social situations in order to interact with others in a present situation (Jones & Day, 1997).

Hearing Loss: The reduction in one's ability to receive sound due to genetic or sensorineural (ear hair cells) loss, the consequences are in sound impairment, pitch reduction, and temporal modulation that can occur in one or both ears (National Institute on Deafness and Other Communication Disorders, 2011).

Interpersonal Sensitivity: Involves empathy and the ability to connect through personal inferences of one's own intention and familiarity of response to others in a given situation (Schulte-Ruther, Markowitsch, Fink, & Piefke, 2007).

Long-Term: That which occurs over a considerably extended period of time; what becomes more effective over a long period (American Speech-Language-Hearing Association, , 2015). For consideration of this study, long-term would refer to adults who were diagnosed with hearing loss as children.

Micro-Expression: A nonverbal facial expression that is not always noticeable, but indicates a person's true feelings (Ekman, 1993).

Mirror Neurons: Neurons that reside in the inferior frontal cortex and the posterior parietal cortex and involve encoding through the activation of observing other people's executed movements which includes facial expressions (Bonaiuto & Arbib, 2010).

Multiple Intelligence: Based on Gardner's (2006) theory of multiple intelligences in which a person has a series of different types of intelligence for which social intelligence is included through the integration of interpersonal and intrapersonal ability.

Nonverbal Language: Uses signals of intention through prediction and anticipation from cues of body language and facial expressions which are based upon representative memory (McCowan et al., 2005). This can be particularly important for those with hearing loss as well as when there are differences in spoken languages.

Social Behavior: Based upon operations of convergent and divergent construction that involves figural and symbolic implications of interaction between two or more people that corroborates the thoughts, intentions and feelings of other people (O'Sullivan, Guilford & de Mille, 1965).

Social Intelligence: The ability to engage in social interaction through awareness that is ingrained through learning or instinct in a way that one understands the multifaceted expressions and needs of others (Markopoulos, 2009).

Social Interaction: Occurs between two or more people, which is often verbal, but is also enhanced through familiarity with the person or people or social cues in order to provide meaning to the interaction (Markopoulos, 2009).

Summary

Individuals use SI in order to understand social cues and significance of what is being conversed in social interaction. This is the basis for which individuals with LTHL can effectively interact and communicate with others in lieu of auditory clarity. SI is adaptive in that skills learned for the purpose of effective communication are used for interpersonal expression.

Communication is not limited to verbal, auditory understanding. The key to SI is beyond simple social skills. SI encompasses nonverbal understanding of another person's motives through facial expressions and physical movement (body language), which allows one to infer intended communication for effective social interaction. The field of SI is still in the prime of its discovery. Each researcher that explores its meaning is contributing to the overall understanding of how different it is from mental intelligence.

SI as it started was so simple, but years of exploration have demonstrated that there are so many factors that contribute to the complexity of what researchers currently know about SI. Chapter 2 presents the literature reviewed for this study, as well as the theoretical basis of the study. Following the literature review, Chapter 3 presents the methodology used to address the research questions and hypotheses posed for this study. Chapter 4 presents the results of the study, and chapter 5 provides the conclusion of the study.

Chapter 2: Review of the Literature

Introduction

The purpose of this literature review is to focus on social intelligence, hearing loss, and how the two topics may connect. The literature review is an exploration of the development of SI, how SI functions, and how SI correlates with other perceptions of intelligences. The history of theories on SI will be discussed as well as how SI has developed and changed over the past 80 years. The literature review will also focus on hearing loss, and includes how those with hearing loss use communication protocols that influence states, traits, and nonverbal cues. Hearing loss coping strategies is presented to explain how people with hearing loss living in a hearing world and communicate effectively. The literature review concludes with a discussion on why SI is adaptive, how interpersonal sensitivity is involved, and what specifically would give someone with LTHL a greater likelihood of having higher social intelligence.

Literature Search Strategy

The literature search strategy used for this research came from combined sources including Google Scholar, Bing Search, and the Walden Online Library, all of which provided the research information necessary to compile the literature review. The following databases in the Walden Online Library were used: EBSCO, Thoreau Multiple Databases Search, PsycINFO, and PsycARTICLES. I used the following key terms in my search of the literature: *social, social intelligence, social connection, social behavior, hearing loss, nonverbal, theory of mind, visual cues, interpersonal sensitivity, mental intelligence tests, mirror neurons, transmission of sound, perception of speech, and adaptation*. Articles date back as far as 1920, which serves as the foundation for the study

and theorists of SI. Articles about hearing loss focus on adaptations as well as deficits from hearing loss.

Social Intelligence

SI is gaining prominence in psychology and social neuroscientific fields. SI is not a recent discovery. SI has been discussed as a form of intelligence by psychologists such as Thorndike (1920) and Vernon (1933). Vernon's exploration of SI has been referred to as a social technique, knowledge of social matters, engendering a "susceptibility to stimuli from other members of a group as well as insight into the temporary moods or underlying personality traits of strangers," (Vernon, 1933, p. 44). Mental intelligence has cognitive traits; but SI has cognitive traits as well.

Cognition gives one an ability to understand social cues using working and long-term memory. The skills of working and long-term memory have been developed to increase cognitive efficiency about current and future social interactions (Hoffman, Schraw, & McCrudden, 2012). Using this idea, SI can be thought of as an interpersonal construct. When a one approaches an unknown person, often the first thing one notices is the unknown person's facial expression and body language (Goleman, 2006). A person's experiences with social interaction provide advanced knowledge of common human behaviors (Albrecht, 2005). This knowledge helps indicate the type of interaction that will occur.

SI can involve self-interest since SI can help a person to manipulate a situation to have a desired outcome. Wawra (2009) believed this is possible when one is competent at communication enough to manipulate one's social environment in order to achieve a desired outcome. SI uses an awareness system (knowledge of social protocol) that is so

cognitively ingrained and automatic, no effort is needed to connect socially to others. Individuals with high SI are able to engage in social interaction demonstrating an understanding of the multifaceted diversity of the needs of others (Markopoulos, 2009). One benefit of this is the cohesion that occurs from feeling connected to others, which also means greater empathy for others (Romero et al., 2007).

Although there are many positive aspects of higher SI, there also are negative aspects. There may be feelings of vulnerability due to the amount of social sharing and social obligation with continuous reciprocation of actions expected of individuals with high SI (Romero, et al., 2007). Another negative aspect may be source error. The source error is one person's assumption of self-actions rather than the true actions of others. The anticipation of others' actions may disable the ability of how to act in a given situation based on the assumption of the anticipated action of others. (Barber, Franklin, Naka, & Yoshimira, 2010).

Cobb and Mayer (2000) believed cognitive intelligence accounts for only 20% of mental intelligence. The influence of environment and neural pathways make up the rest of how the brain develops for individual survival. Cognition is usually related to mental intelligence and emotion is often considered its own area, emotional intelligence. SI is a compendium of both cognition and emotion. Cognitive intelligence involves problem solving and performance in task related fundamental knowledge (Brody, 2004). Brody also referred to cognition as latent, specifically meaning that it is present, but not active. However, the emotional aspect of cognition is also latent, using predictive information processing and task performance, but not necessarily proved to be active unless assessed, or brought forth consciously. This may relate to the adaptive ability of cognitions and

emotions as we are unaware of the constant self-assessment improving our perceptive abilities in relating to others. Emotional intelligence is an abstract of intelligence conveying interpersonal and intrapersonal skills (Locke, 2005). Emotional intelligence has predictive validity even though it is based on a correlation between personality dimensions based on self-report measures.

Researchers consider emotional intelligence to be a measurement of personality based on the big five factor personality test, especially the traits of neuroticism and extroversion (Libran, 2006). Thilam and Kirby (2002) state that emotional intelligence is based on emotional perception and emotional regulation while Mayer and Salovey (1997) improve upon this concept by adding emotional reasoning, understanding, and regulating of emotions. SI is an older concept than emotional intelligence and has been developed based on the assumptions of general intelligence.

The exploration of human effectiveness relating to interpersonal behavior was specifically considered a function of SI even before aspects of emotional intelligence were even developed (Bar-On, 2006). Gardner (2006) defines the differences between emotional and social as intrapersonal (emotional) and interpersonal (social). Gardner's approach stems from his exploration of multiple intelligences. Part of what Gardner conceptualizes is that intelligence, as explored by Terman in 1925 and Weschler in 1958, has importance through correlation to linguistic and scholastic success (Gardner, 2006). However, in the real world application, there is a limit to the concept of intelligence as it relates solely to cognition and education (Gardner & Moran, 2006). The interpersonal (social) concept specifically addresses how one relates to other people. The intrapersonal (emotional) intelligence is an indicator of how one relates to the self (Gardner & Moran).

The ways these two concepts interrelate involves multiple intelligences as developed by Gardner. Gardner explains that intelligence in general is biopsychological in nature and is used to help the individual explore the predictable nature of our world through episodic (event) and procedural memory (knowing how).

Individuals with hearing loss may be quite facile at interpreting visual patterns and body movement. SI is a more abstract concept than what can be explored concretely. SI involves moral judgment based on adaptations one has made in order to evolve and socially function (Stone, 2006). This requires a certain amount of cognitive functioning and reliance on an established emotional system. While spoken language is symbolic and relies on syntax, the inclusion of SI in communication involves theory of mind as it relates to inference on others' mental states, and the capacity to inhibit one's actions while processing information about another person's behavior and moral judgments (Stone, 2006). Babies learning language actually learn environmental cues first, including perception. Young children establish an understanding of spoken language, but still struggle with understanding how to inhibit behavior related to their environment (Kirkham, Cruess, & Diamond, 2003). SI does not specifically infer that a person with higher SI is more sociable in comparison to one with lower SI. Individuals with hearing loss who are unable to segregate audio streaming, auditory symbols, metapresentation and syntax, may have difficulty with general information processing not social information processing (Corballis, 2003).

Weschler (1975) was aware that intelligence was greater than the intelligence quotient since life experiences would direct coping and responses in social situations. Picture arrangement and Comprehension subtests in the WAIS-R were used as an

indication of social judgment responding to social stimuli relating to social interactions (Blatt & Allison, 1981; Weschler, 1943). Weschler (1958) did not believe social intelligence was a separate function from general intelligence. He believed social intelligence was the application of general intelligence in social situations.

An early test of SI was the George Washington Social Intelligence Test (GWSIT), developed by Hunt originally in 1928 (subsequent versions were codesigned by Hunt with fellow contributors in 1949 and 1955) which was made up of a compilation of subtests such as Judgment in Social Situations, Memory for Names and Faces, Observation of Human Behavior, and Recognition of Mental States from Facial Expression. Critics believed the GWSIT was merely a composite of cognitive tests (Woodrow, 1939) or involved ideas that were more related to abstract intelligence than SI (Thorndike & Stein, 1937). The emergence of SI as a scale and further SI contributions will be explored shortly.

As with mental intelligence, emotional and social intelligence can change over time (Goleman, 2006; Mayer & Salovey, 1997). Cognitive measurements are easier to assess because they are not based on how a person believes they should respond, but on intrinsic knowledge with no predictors as to how one will respond and whether or not it is an appropriate response (Brody, 2004). An individual who takes into consideration what is a most viable, or acceptable answer is showing a level of emotional intelligence (Mayer & Salovey, 1997). Whether or not the individual can perceive what is an acceptable answer is difficult to assess. Assessment of SI may need to have an experimental study in order to ascertain a qualitative measurement of SI. Assessment parameters of an experimental study would involve testing to see if the subject acted in a

socially intelligent manner. Yet knowing how much time and money would need to be spent in order to ascertain the outcome of such study, the survey method still offers benefits in the exploration of SI as it relates to one's adaptation due to hearing loss.

Social Intelligence Theorists

The study of SI emerges from already established fields in theoretical development and allows for the development of concepts and theoretical framework that generate greater knowledge of the subject (Lin, Wang, & Tsai, 2010). Thorndike and Vernon were early proponents in conceptualizing what SI could be. The focus on mental intelligence took precedence over SI because the parameters were easier to define in mental intelligence than SI. From its inception, SI was not the easiest subject to explore or measure reliably or validly. This did not stop theorists from exploring the subject.

Thorndike (1920), through his exploration of facets of intelligence that included abstract, mechanical, and social, believed that SI was demonstrated in the way a person got along, or showed cooperation with others. Thorndike was aware that, while SI could be observed, it was difficult to standardize for testing. Thorndike posited in 1920 that social intelligence was important for interpersonal outcome toward success in employment, especially those that are leaders in their fields. It was not long after that, Vernon (1933), in his exploration of SI, asserted that SI was a person's ability to "get along with people in general, social technique . . . knowledge of social matters, susceptibility to stimuli from other members of a group, as well as insight into temporary moods or underlying personality traits of strangers," (p. 44).

Hunt (1928) validated the first standardized SI test through correlations of sociability, extraversion, and abstract intelligence, or the GWSIT, as mentioned above.

After its initial formation, more theorists joined in to add or alter the contents of the test which became a composite of subtests which formed a final, aggregated score. Some of the subtests were observation of human behavior, memory for names and faces, judgment of social situations, sense of humor, and recognition of mental states from facial expression. From 1928 until 1955, various subtests were either included or dropped due to lack of consistent reliability. Thorndike and Stein (1937) opposed the GWSIT positing that abstract intelligence was too big of a focus and did not properly measure SI. The last revision of the GWSIT was in 1955. Use of this test diminished shortly afterward.

Chapin (1936) studied concepts of social interdependence leading to socially desirable goals. Specifically, Chapin noted social impulsiveness was like wildfire burning through dry grass. It spreads quickly, but can be ineffective or even destructive. What this enforced was that impulsive nature did not allow for learned socially intelligent response. Chapin divided normative social theory from non-normative social theory. The normative was characteristic of expected ideologies that people assume guided social action. What happened instead was chaos from subjective assumption of social behavior. The non-normative measure was able to predict actual results of social behavior based on personal principles that seem abstract and impersonal. In 1942, Chapin formulated a scale for the purposes of understanding social insight and found social insight differed from social intelligence. By current standards of social intelligence, his method of studying social insight was enveloped into social intelligence. Within Chapin's measure, social insight specifically explained a person's capacity to, "see into a social situation, to appreciate the implications of things said and to interpret effectively the attitudes expressed so as to appreciate the significance of past behavior, or to estimate the trend of

future behavior,” (Chapin,1936, p. 215). Chapin conducted several studies of his social insight measure on social workers with graduate training, undergraduate and graduate students of sociology, members of the University of Minnesota staff, and social agencies ($n=375$), to determine the validity of the social insight measure. What he found was a higher validity on social insight for those with professional training, especially social workers; however, overall reliability for his measure was low. Yet again, this early trend reached a standstill toward validity and reliability for SI.

For decades, researchers ignored SI while studies of mental intelligence flourished. SI re-emerged because concepts of SI did not fit into the mental intelligence criteria. During the 1960s renewed interest in SI became the focus of researchers O’Sullivan and Guilford. O’Sullivan and Guilford (1966) pressed for the inclusion of social cognition and social behavior. Guilford (1967) believed SI lay within the domains of behavioral operations such as divergent and convergent construction, figural, symbolic transformations and implications. Guilford based his assumptions on Thorndike’s tripartite model and its correspondence including the behavioral aspect where Thorndike specifically outlined correlates for SI. Guilford corroborated his findings in a study with O’Sullivan and de Mille (1965) where social skills were based on a system of how one interprets thoughts, feelings and intentions of other people.

In 1975, Guilford and O’Sullivan developed a scale measuring six factors of SI including nonverbal facial expressions; understanding of abstract behavior that have similarities, but are expressed differently according to a given situation; social awareness of interpersonal relationships; behavioral sequence of events in which one has a natural comprehension of the event; ability to transform or redefine the meaning of a behavioral

event; and the ability to make predictions about behavior based on what is known or given of social information. Although further testing during the 1970s of this six factor design failed to yield the constructs, it did provide a basis for further SI scale development during the 1980s. Ford and Tisak (1983) measured 600 high school students for empathy (using Hogan's 1969 empathy scale) as well as SI measurement for each student using self, peer and teacher ratings. The ratings for SI and empathy were good predictions of social competence than were academic background (verbal and math ability based on standardized tests) of each student. Study findings demonstrated verbal ability was not a good predictor of SI.

The predictability of psychosocial factors, in which there are consistent social responses within social interactions, is based on a good understanding of social conventions, and generally increase with greater emotional maturity (Furth, 1980; Greenberger, 1971; Taylor, 1990). While most people learn the concept of society and social systems as they age, there are some people more attuned to the subtleties and differences among social systems, cues and manner of communication. This could be from years of learning what works and does not work in social situations. Researchers exploring social cues and learned social skills as well as the likelihood of SI being a nonverbal adaptation found increasing validity by the 1970s (Osipow & Walsh, 1973). Barnes and Sternberg (1989) found that participants decoding nonverbal cues in photographs demonstrated greater SI. Nonverbal, or visual cues make up a more representative memory for people than audio alone, or audio in combination with a visual (McCowan et al., 2005).

Studies of SI continued to evolve during the 1980s as theorists found studying the evolution of SI from childhood onward was a good determination of outcome for when and how SI developed. Researchers tested children to determine stage dependency of social growth, and results indicated that a child's perception of social interaction advanced with age. The older a child is the greater understanding of interaction and the concept of the social system (Furth, 1980, Taylor, 1990). The exploration of SI during this time period was to take away the cognitive understanding of SI to expand on the behavioral and emotional elements adding a facet of validity previously missing.

In 1986, a study of 1400 children was conducted using the Adaptive Behavior Inventory for Children (from the System of Multicultural Pluralistic Assessment). Findings indicated that academic and practical (social) intelligence were independent functions (Mercer, Gomez-Palacio, & Padilla, 1986). Magnetic resonance imaging (MRI) was added to SI studies to explore areas of the brain that were damaged areas by head injuries and mental disorders. Findings indicated there were corresponding social deficits which included social problem solving and social judgment and concentration (Stuss & Benson, 1984).

Cattell proposed the concept of crystallized intelligence in 1941, but spent years developing the theory to the point of explaining it as perceptual learning based upon experience (Cattell, 1963). The essence of crystallized intelligence is founded on the premise of access to previous experiences of social behavior and social situations in long-term memory, which then shows how to interact in a present situation (Jones & Day, 1997). Crystallized intelligence is nonacademic in nature and is based more definitively on declarative, procedural knowledge (Cantor & Harlow, 1994). Information is retrieved

to allowing individuals to apply knowledge of similar situations to make the most appropriate response in social interaction.

In 1980s, the field of psychology saw a surge of interest in social behavior, and how it interrelated to SI. SI became more of a multidimensional construct for exploring behavioral aspects (Ford & Tisak, 1983) as well as cognitive aspects (Marlowe, 1986) that were easily replicated to provide successful empirical solidity. Wong, Day, Maxwell, and Meara (1995) continued the empirical exploration of the multidimensional nature of SI and established three social factors of SI: insight, perception, and knowledge. Jones and Day (1997) used the characteristics of Wong et al.'s research to include attributes of crystallized intelligence to SI. Jones and Day were unable to establish differences from fluid intelligence in problem-solving and information processing. This has been the bane of SI research as researchers tend to focus on populations in academia with topics that relate specifically to cognition, which are then indistinguishable from testing behavioral and emotional aspects that do not require fluid intelligence in order to function. Jones and Day were able to provide reasonable validity for social competence by relating scores on the measurement to teacher feedback of behavioral characteristics of particular students.

Gardner (2006) expanded the idea of intelligence to include the multiple view of intelligence. His idea diverges from the common theme of cognitive based intelligence in order to be more encompassing of the many ways one could be intelligent. Gardner postulated that children learn different methods of intelligence based on their environment and because of this environment; certain types of intelligences thrive over others. Gardner was aware different cultures value different types of intelligences, and children of different cultures are often raised to develop particular skills that reflect the

type of intelligence of cultural value. Gardner notes there are seven forms of intelligence and two are related to SI: interpersonal and intrapersonal intelligence. Gardner explored the idea of multiple intelligences through anthropology, neurology, cognition, and evolutionary science, using empirical evidence from these disciplines to add plausibility to the theory (Gardner & Moran, 2006).

Goleman (2006) brought the subject of SI to the general public. The intention was to promote person to person interaction and social facility. Goleman also stated that when people suffer higher levels of anxiety and stress, the ability to focus, and be attuned to social cues diminishes and a corresponding empathy and recognition of another person's intentions diminishes. Goleman refers to interaction between two people as an emotional contagion that is shaped by neural circuits forming a feedback loop. This allows the output of one person and the input of another person to connect creating an interbrain circuit. Although this cannot be explored through SI testing, it can be explored through fMRI.

The modern exploration of SI offers a number of factors that make up SI. Buzan (2002) found a formulation of SI including knowing people based on their body signals with verbal and nonverbal communication, sociability, social problem solving, persuasion, and correct social behavior in a variety of social mediums. Albrecht (2005) did design an SI profile test for businesses based on his book. This book does not qualify for testing due to a lack of quantifiable information such as reliability and validity. Some tests are imbedded in a multipurpose measurement of social, emotional and cognitive testing like the Multiple Intelligences Developmental Assessment Scale (Shearer, 2005). There is only one test designed for SI that is solely for the purpose of determining one's

degree of SI. This is the Tromso Social Intelligence Scale (Silvera, Martinussen, & Dahl, 2001). This scale has demonstrated good test, re-test reliability and validity (Dogan & Cetin, 2009).

As with any subject on intelligence, at some point the number of theories and studies outnumbers the amount of space to explain them. The theories explored above exemplify the origins and procession of the field of social intelligence in order to explain how LTHL may relate with SI. Although SI may be inherent in many people, level of SI may be adaptable when one has to adapt to a lack of auditory input.

Social Intelligence Development, Empathy and Nonverbal Cues

The concept of SI seems simple as it relates to self-selection of appropriate behavior to achieve a socially desired goal (Björkqvist, Österman, & Kaukiainen, 2000). Björkqvist, et al. (2000) believe that SI overlaps with empathy and allows the individual to provide socially acceptable responses that include appropriate reactions to the feelings of others (Braza et al., 2009). While there is an assumption that verbal understanding plays a role in SI, studies of 5 year olds by (Braza, et al., 2009), bottlenose dolphins (Tomonaga, Uwano, Ogura, & Saito, 2010), great apes (Call & Tomasello, 1999; Penn & Povinelli, 2007), and dogs and wolves (Hare & Tomasello, 2005; Lakatos, Gacsi, Topal, & Miklosi, 2012) have produced young child and nonhuman studies that indicate social cognition based on understanding intention and a representation of theory of mind (TOM; ability to understand feelings, desires and intentions of others). TOM allows for prediction and anticipation of the behavior of others from nonverbal cues from body language and facial expressions. With the bottlenose dolphins, some cues were learned through the object choice task where the trainer used their gaze to direct the dolphins.

The dolphins then demonstrated an understanding of their trainers' expectations for untrained directional cues based on their familiarity with the trainers' general expectations (Tomonaga, et al., 2010).

Nonverbal behavior as it relates to SI is based on empathy where social meaning is interpreted, allowing for interpretation of behavior based upon observation. Observation becomes a learned skill gathered by attention focus and impulse inhibition (Barkley, 2001). Using the concept of TOM, one interprets the intentions of others, forms an emotional empathic response, and then correlates to enhanced interpersonal skill to improve social functioning (McKown, Gumbiner, Russo, & Lipton, 2009). Further social outcomes are determined by delay in gratification and control of behavioral impulses, founded on one's ability with self-regulation. Self-regulation is learned through memory and emotion based social learning through perception, appraisal and reasoning (Adolphs, 2003). McKown, et al. (2003) used nonverbal assessments such as facial affect recognition, posture recognition, gait recognition, and two verbal explorations: prosody and strange stories (vignettes with characters saying one thing, but meaning something else). Although there are measures of SI based on verbal cues, the dominant testing uses nonverbal cues. Ekman (1993) studied micro-expressions for years and discovered that nonverbal facial expressions not only detail a lot of information about a person's intentions and feelings, but are identical across cultures. Ekman points out that what is spoken verbally is not always congruent with what a person is actually feeling. Knowing how to recognize nonverbal facial cues enables one to understand another person's true feelings (Ekman, 1993).

Bjorkqvist, Osterman, and Kaukiainen (2000) found a link between lower SI ability and increased physical aggression. Feshbach and Feshbach's (1982) evaluation of empathy found that perception and determination of emotions of others through visual recognition, the ability to take the perspective of others (different viewpoint), and being emotionally responsive, increase with age and are generally based on nonverbal learning. Empathy is inherent to SI due to overlapping concepts and has a significant correlation (Bjorkqvist, et al.). Zaki, Bolger, and Ochsner (2009) found empathic cues were more accurate for those watching a video with auditory cues; however, there was no indication about the hearing levels of those within the study and whether there were conditions that would separate how people with certain disabilities make up for lack of auditory or visual cues.

Mirror Neurons and Social Intelligence

Mirror neurons are providing a compelling piece of evidence for SI. Mirror neurons involve a level of encoding through activation by observing actions of others, and processing an association between an observed movement and an executed movement (Bonaiuto & Arbib, 2010). Mirror neurons in humans reside in the inferior frontal cortex and the posterior parietal cortex (Koski, Iacoboni, Dubeau, Woods, & Mazziotta, 2003). These areas of the brain are where abstract intentions and emotional states also reside (Carr, Iacoboni, Dubeau, Mazziotta, & Lenzi, 2003). A notable characteristic of mirror neurons is empathy. Empathy is learned from interaction, as well as observation of facial expressions and perceptions based on facial expressions. There is an inference of the intentions of another based upon TOM allowing one to distinguish his

or her own thoughts from others in order to have successful interpersonal interaction (Schulte-Ruther, Markowitsch, Fink, & Piefke, 2007).

Neuro-imaging testing for empathy and understanding the differences in self-perspective versus other's perspective was conducted by Schulte-Ruther, et al. (2007) and concluded that interpersonal related to empathy fires up the mirror neurons in the temporal and parietal subregions of the brain. The mental state of others are often subjected to inference by our own intentions and familiar responses, but that is not solely how we relate interpersonally. A person with a behavioral impairment such as autism has problems with their mirror neurons as demonstrated by neuroimaging showing deficits in the inferior parietal and prefrontal cortex (Oberman & Ramachandran, 2007). This may be one reason why individuals within the autism spectrum have difficulty with empathy and interpersonal relations. Mirror neurons, now proven to exist through neuroscientific imagery, provide meaning to the expression, 'mindreading'. The mirror neurons allow for understanding of the mental states of others in order to have social interactions that are sophisticated and based on human development and evolution (Ramachandran in Pineda, 2010).

Interpersonal Sensitivity

Interpersonal sensitivity in which one assesses nonverbal facial and body cues as well as the state and trait of another's personality characteristics is a process of SI. It is a perceptive ability that allows one to identify the behavior of another person and apply meaning based on prior knowledge of what that behavior entails (Cliff, 1962). In order to use interpersonal sensitivity effectively, a person has to be aware of their own biases to avoid projecting personal behaviors onto others. Greenspan's (1982) social awareness

taxonomy includes social sensitivity, which leads to social insight and social communication. According to Greenspan, social sensitivity involves interpretation of the meaning of a social event and includes the ability to understand the meaning of another person's viewpoint and feelings.

Everyone has some perceptual ability about behavior and body language. The gauge of ability is determined by personal skill acquired when an individual is able to make accurate inferences about characteristics of another person. Interpersonal sensitivity is based on the skills, which come from life experiences, understanding of behavior values and attitudes, and one's development of self-concept (Hall, Andrzejewski, & Yopchick, 2009). From personality and behavior inferences that are learned through interpersonal and intrapersonal interaction, a person is able to predict the intention of others by decoding their nonverbal face and body cues (Hall, Andrzejewski, & Yopchick). Meta-analysis by Davis and Kraus (1997) reveal a high level of interpersonal sensitivity is directly correlated with SI including higher scores for emotional empathy and higher self-monitoring.

Hearing Loss and Effects

Hearing loss is a decrease in hearing the transmission of sound. Sound loudness is measured in decibels on a logarithmic scale in which 0 decibels is not the absence of sound, but the ultimate lowest threshold for sound (Occupational Safety and Health Administration, United States Department of Labor, 2011). Every ten decibels after 0 are a ten-fold increase in the loudness of sound, so 30 decibels are 100 times louder than ten decibels. Mild hearing loss is defined as a loss of 26 to 40 decibels. Moderate hearing loss is defined as a loss of 41 to 60 decibels. Severe hearing loss is defined as a loss of 61

to 80 decibels, and profound loss is more than 80 decibels (National Institute of Deafness and Other Communication Disorders, 2011). Frequency for sound is the measure of the vibration of a sound wave and is measured on a logarithmic scale by Hertz, or sound vibration per second (Veggeberg, 2008). Pitch is used to refer to level of frequency and is determined by an individual's audiometric threshold for sound (McCarron, 2013). Higher frequency is related to a higher pitch in sound. High frequencies are the first sounds to diminish from the spectrum of overall hearing due to hearing loss. Hearing aids and cochlear implants use frequencies to transmit sound through transduction which then sends a message to the brain about the frequency and loudness of the sound (Hoth, 2006). The terms decibel and frequency are often used interchangeably even though they refer to different aspects of sound. Reception of speech has little impairment until there is a 30 decibel loss (National Institute of Occupational Safety and Health, Center for Disease Control and Prevention, 2011). Hearing aids improve hearing conditions to a degree, with frequency modulation technology, that conducts sounds through two parts, a transmitter and a receiver (Lewis, Gallun, Gordon, Lilly, & Crandell, 2010). While hearing aids can be beneficial, there is still an issue of missing articulation in speech, especially in a noisy environment. Individuals with hearing loss can become withdrawn and isolated, or they can learn to compensate in order to communicate.

Hearing loss affects more men than women (National Institute of Health, Senior Health, 2013). With aging, this gap widens, with more men experiencing hearing loss than women (National Academy on an Aging Society, 1999). Although many people experience hearing loss as they age, aging is not the only cause of hearing loss. Due to the advancement of neonatal hearing screening, congenital hearing loss is often detected

within the first year of life. Sensorineural hearing loss is a congenital loss where the hair cells translating sound waves into nerve impulses in the ears are unable to transmit a typical range of sound (0 to 140 decibels) to travel from the inner ear to the brain (Center for Disease Control, 2011). Sensorineural hearing loss can be congenital or it can occur from continuous exposure to loud sounds along with some age related degeneration. Infants born with bilateral hearing loss account for one to three in every 1,000 births, which makes hearing loss the most common congenital anomaly (Erenberg, Lemons, Sia, Trunkel, & Ziring, 1999). There is also an age related reduction in hearing referred to as presbycusis, or reduction of hearing high pitched sounds. The loss of high pitched sounds reduces one's ability to hear clearly women's and children's voices as well as the sound distinction of the letters s and f. Sensorineural hearing impairment alters sound perception such as harmonics and temporal modulation and can affect speech perception due to the inability to detect modulations (Edwards, 2003). Hearing loss is usually bilateral (affecting both ears), but can also be unilateral in some individuals. Hearing loss affects 17 in 1000 of those ages 18 and under (National Institute on Deafness and Other Communication Disorders, 2011). Although some conditions are congenital, infection and disease can cause hearing loss in children and adolescents. Children with hearing loss are fitted with hearing aids as early as possible to increase audio perception for speech in proximal and distal sources (O'Callaghan, 2007). The benefit of hearing aids is to increase audio understanding and improve a child's chance of understanding speech based on acoustics (pitch, timbre, and loudness). Phonemes and syntactic auditory awareness are important in speech. Learning these skills through the use of hearing aids will also benefit the child in conversation with normal hearing children and adults. When

not wearing hearing aids, or if there is no availability of hearing aids, children with hearing loss can still learn how to communicate verbally through speech reading. Hearing aids, while beneficial, do not by any means bring hearing into the normative range for everyone who has hearing loss. No device is a fix for hearing loss. Early intervention for children who are hard of hearing such as speech and language therapy enable the child to learn through speech and language perception, phonology, and articulation including the complexity of expressive language (Fairgray, Purdy, & Smart, 2010). Children who are diagnosed early with a profound hearing loss are often fitted with cochlear implants and can have greater difficulty learning speech and language than children with moderate to profound hearing loss. One of the reasons for this is the distortion of sound through a cochlear implant (Petrov & Pisavera, 2011). Training is an essential tool for assisting those with cochlear implants to understand speech through phonological training and speech perception (Pascoe, Randall-Pieterse, & Geiger, 2013). Although cochlear implants are beneficial to people with profound hearing loss, individuals with cochlear implants will not be included in this study.

The perception of speech is accomplished through spoken language, but also involves articulatory gestures, including movement of the mouth to form words. Speech reading (also called lip reading) is part of a multimodal method for understanding speech. Speech reading involves the visual enhancement of speech through learning what sounds certain mouth, tongue, and lip movements make. The understanding of speech is improved through this training; however, only 40% of speech is identifiable through speech reading (Centers for Disease Control, 2012). Children with severe to profound hearing loss adapt the skill of speech reading better than children with mild hearing loss

(Ghergut & Paduraru, 2011). The ability to hear some auditory input as well as speech read increases speech perception in children with moderate to profound hearing loss (Woodhouse, Hickson, & Dodd, 2005). The skills that enhance speech reading in order to understand what is being communicated include body language, facial expression, and knowledge of the topic being discussed. The perception of speech through speech reading includes the formation of the lips with the position of the teeth, jaw, and tongue to form separate but distinct words (Chu, et al., 2013). The method of transference of physical signals enacts a somatosensory response, which gives clarity to what is being communicated (Thomas, Sink, & Haggard, 2013).

A difference in life dissatisfaction exists between those with long-term hearing loss and those with time related degenerative hearing loss (National Center for Health Statistics, 1998). For people with recent hearing loss, there is a decrease in phonological processing based on cognitive tests such as the Weschler, showing decreased judgment in verbal communication (Zeckveld, Deijen, Goverts, & Kramer, 2007). The trouble with cognitive tests for those with hearing loss is that the one who is testing often does not compensate for the fact that verbal instruction alone is not the best method for testing those with hearing loss. One study demonstrated that when there was compensation through the use of sign or nonverbal instruction in intelligence testing, individuals with hearing loss had higher IQ scores compared to previous studies that did not accommodate in this manner (Braden, 1992). When tested using nonverbal and visual cognition tests, people with moderate to severe hearing loss were similar to people without hearing loss in regards to working memory (Zeckveld, Deijen, Goverts, & Kramer). Those with hearing loss of a duration of five years or less are more likely to experience depression

and life dissatisfaction (National Academy on an Aging Society, 1999), but it is likely based on an individual's comparative difference between life before and after hearing loss. Individuals with long-term hearing loss adjust to the loss and learn to compensate for what is not heard by learning different approaches to communication and social understanding.

There is often an assumption about those with long-term hearing loss are withdrawn, unsocial, and incapable of social interaction (Atcherson, 2002). This assumption is unfounded. Those with hearing loss will often withdraw from social interactions due to their discomfort over missed conversation, or feeling a stigma about their hearing loss that causes social withdrawal (Southall, Gagne, & Jennings, 2010). People often conceal or deny hearing loss in order to avoid the stigma attached to hearing loss (Erler & Gostecki, 2002; Southal, Gagne, & Jennings, 2010). Part of the stigma is the perception of others toward people with hearing loss, either from knowing of the hearing loss, or because of a person's need to wear hearing aids (Doggett, Stein, & Gans, 1998). In a face to face study by Doggett, Stein and Gans (1998) the observers rated their peers who wore hearing aids negatively on measures of confidence, intelligence, and friendliness. Compensating for the hearing loss to reduce negative stigma can be done through gaining assertiveness, increasing social interaction skills, and emphasizing self-attributes that are socially acceptable and empower one to better function in society (Shih, 2004; Corrigan & Penn, 1999). It is also empowering for people with hearing loss to seek out support from others with hearing loss to reduce feelings of isolation (Hétu, 1996). Hearing loss and hearing aids do not have the same social acceptance as vision loss and eyeglasses (Blood, 1997). The term that is cited by Blood and Blood and

Danhauer (1978) is “The Hearing Aid Effect.” The stigma often starts in childhood when a child with hearing loss needs to wear hearing aids in order to maintain a level of hearing suitable for education and social interaction, but struggles with acceptance from peers because of the hearing loss and hearing aids. This is one of the reasons why hearing aids underwent a cosmetic overhaul to become more visually appealing (Blood, 1997). Those with hearing loss also may compensate by paying special attention to nonverbal techniques to understand conversation and social interaction by use of working memory for language and familiarity of emotions (Zeckveld, Deijen, Goverts, & Kramer, 2007).

Parving, Parving, Erlendsson, and Christensen (2001) reported that adults with sensorineural hearing loss have lower social functioning and less social interaction than adults without hearing loss; however, the study included those with both long-term and recent onset hearing loss. Another study of hearing loss in children found that children with severe or a profound hearing loss had better psychosocial functioning than children with mild hearing loss (Wake, Hughes, Collins, & Poulakis, 2004). Also, children with unilateral hearing loss had more trouble emotionally and socially than children with bilateral hearing loss (Borton, Moss, & Lieu, 2010). Children between the ages of eight and 17 with moderate hearing loss rate their quality of life equal to children with normal hearing (Borton, Moss & Lieu). These studies indicate that emotional and social functions are not diminished due to hearing when it is permanent and long-term. The reason for this may be social inclusion during formative school age years and incorporation of parents and speech pathologists to integrate methods of communication either through audio-visual therapy or individualized attention to improve speech intelligibility (Eriks-Brophy, et al., 2012). The results for the participants in the

University of Toronto hearing loss research study indicate that the young adults with hearing loss that were integrated in school and community environments, “perform at average or above-average levels on selected measures of communication, academics, and self-perception when compared to their peers with typical hearing,” (Eriks-Brophy, et al., 2012, p. 28). The adaption that is necessary in those with long-term hearing loss may reduce the amount of discomfort felt in social situations. This may be aided by hearing devices that improve hearing perception, but also indicate emotional and social adjustments based on long-term hearing loss.

Social Intelligence Adaptation

A study of social cognition indicates that the average person often relates to people and events based on his or her own self-interest, but does not always consider social inference such as the intentions of others (Herzog & Hertwig, 2009). This leads to systematic errors of reasoning acquired from biases and cognitive illusions (Hertwig & Herzog, 2009). From these errors comes the assumption of social expectations and behavior that are riddled with confidence bias based on speculation which leads to social misinterpretation. A person with a high level of SI is able to understand social objectives by perceiving information that is socially relevant to a conversation as well as conversational meaning when much of the conversation is not audibly discerned. In order to be able to maintain social confidence, a person with hearing loss would have to adapt a method of social understanding in which the person picks up on situational cues in order to determine the mental states of other people (Conzelmann, Weis, & Sub, 2013).

The adaptive aspect of SI relates to how people cope with and adjust to their social environment. The adaptation of SI begins with observations of the environment

and infers a social protocol about the gender, age, and ethnicity of those present. SI is a part of one's distinctive personality and is adapted or developed based on social learning for purposes of adequate response within a social environment. Artificial intelligence is currently being programmed with SI ability to increase a robot's chance of portraying accurate social behavior, and to be able to give socially adequate responses in noisy environments. The noisy environment may procure unintended behavior due to the robot's inability to reduce sensory input of sound and relay to its detection of human behavioral intention (Mohammad & Nishida, 2007). This is relevant to the current study because of the need for those with hearing loss to adapt skills in order to understand communication in person to person interactions in both quiet and noisy environments. Individuals with LTHL may learn and adapt SI skills in a rule-oriented manner (similar to artificial intelligence) in addition to the passive learning those without hearing loss probably engage in exclusively. Thus, those with hearing loss may be particularly adaptable through the use of SI.

Social Intelligence and Short or Long-Term Hearing Loss

Hearing loss creates a communication disability affecting the social-emotional quality of life and can cause a feeling of isolation (Dalton, 2011). This sense of isolation particularly applies to those with recent (within five years) hearing loss (Dalton, 2011). People with hearing loss since childhood, in contrast, have more adaptable social abilities and self-concept due to the length of their hearing loss experience (Eriks-Brophy, et al., 2012). The reason cited in the ongoing research study on social integration of children with hearing loss by Eriks-Brophy, et al., is that social integration at a young age allows children with hearing loss to learn how to function in a hearing world, and to encourage

those with no hearing loss to learn how to be more sensitive to their communication needs. Most of the children with hearing loss that are integrated in a non-disability school at a young age report low social isolation (Eriks-Brophy, et al., 2012).

Individuals with long-term mild hearing loss often do not need to use other methods for understanding social situations and spoken language and rarely use hearing aids, although some studies show there is a benefit to using hearing aids even with mild hearing loss, especially if the person has unilateral (one ear) hearing loss (McKay, Gravel, & Tharpe, 2008; Briggs, Davidson and Lieu, 2011). People with LTHL spend years learning compensative language (such as speech reading or sign language) and social skills in order to communicate. Dalton (2011) has shown in his study that children with mild to moderate hearing loss have an intense need to fit in with those without hearing loss. What Dalton was referring to is the three needs of self-determination, which are autonomy, relatedness, and competence in both motivation and performance in school and around peers. A person who is motivated by intrinsic reasons to overcome the barriers of hearing loss wants to be able to communicate with others with a level of confidence that facilitates a sense of relatedness with others (Dalton, 2011; Ryan & Deci, 2000). To understand human nature as it relates to social context, the intention to foster motivation toward personal well-being and improved social functioning, one must understand intrinsic versus extrinsic motivation. Intrinsically, a person with hearing loss may be motivated to understand what is being communicated in order to avoid being teased or embarrassed, or may have a desire to connect to another person. Extrinsically, a person with hearing loss may be motivated by expectations of others to appear normal instead of disabled (Dalton, 2011).

People with hearing loss have difficulty self-advocating their needs to people without hearing loss. It is easier to let others assume one can hear than to tell others about the hearing loss (Warick, 1994). People who develop hearing loss later in life have more social isolation and depression than people with no hearing loss, and one reason may be this lack of self-advocation (Reinemer & Hood, 1999). Studies by Lin, et al. (2011), and Preminger and Meeks (2010), found that some individuals with hearing loss have poor self-concepts and often withdraw from social interaction. One study compared child siblings with no hearing loss to child siblings with severe hearing loss and found that there were no differences in social competence between the sibling groups (Verte, Hebbrecht, & Roeyers, 2006). Hearing may not be adaptive (unless one considers the use of hearing aids as an audiological adaptation), but social skills are adaptive. In the absence of auditory cues in communication, nonverbal cues (i.e., facial expressions, learning responsive behavior from watching social interactions including sequence of events, studying behavioral predictions and outcomes, and learning social perceptions and empathy) the individual with LTHL may develop social intelligence that is higher than individuals with normal hearing. This allows for the individual with LTHL to communicate effectively with others as well as predict behavior and approachability of others through body language. A study of toddlers and hearing loss found that a three year old child with hearing loss used the same communicative intentions as hearing children, but without the subsequent linguistic connections (Zaidman-Zait & Dromi, 2007). Another study of school age children with hearing loss found that children with hearing loss used a wider range of communicative intentions than hearing children (Nicholas, Greers, & Kozak, 1994). The children with hearing loss learn to rely more on

visual cues for understanding social situations and language than children with no hearing loss (Meadow-Orlans, & Spencer, 1996). There is a gap in the research, however, when it comes to direct assessment and comparison of SI in LTHL and individuals with no hearing loss.

There are a number of studies that focus on the consequences of not understanding verbal communication and speech perception by people with hearing loss. Older adults with recent hearing loss have difficulty with cognitive performance tests requiring verbal ability (Stewart & Wingfield, 2009). Young children diagnosed with hearing loss often receive auditory-verbal therapy to improve communication skills and also improve scores on standardized tests (Eriks-Brophy et al., 2012). Pichora-Fuller, Schneider, and Daneman (1995) found cognitive compensations by individuals with hearing loss in that they were able to recover information missed through audition by using working memory inferences. During cognitive testing, individuals with hearing loss scored in the normal range when nonverbal visual tests for memory were used, and individuals with severe hearing loss made greater use of working memory in an efficient search strategy as a compensation for hearing loss (Zeckveld, Deijen, Goverts, & Kramer, 2007). Previous studies have found that people with hearing loss had lower working memory, but these studies did not take into account that tests were biased by use of verbal, spoken directions on the tests (Zeckveld et al., 2007).

Gap in the Literature

Although there is a lot of information about SI and hearing loss, there are no studies that have linked the two subjects together. The above literature review has provided evidence that there are reasons to link SI to hearing loss, and specific to this

study, SI to LTHL. There is a significant benefit to provide documentation on positive aspects within hearing loss that are so often overlooked. Although there are a number of peer reviewed articles that report negative effects of hearing loss, there are fewer peer reviewed articles with information on adaptation of communication in people with hearing loss. There is a need for those with hearing loss to socially connect with their peers. The literature has examined how people with hearing loss make use of nonverbal language in order to understand what is being communicated. This study investigated a potential link of SI and LTHL. Future study on this subject is encouraged.

Summary

SI is a construct individuals learn. It is not like the fixed quotient of mental intelligence. There are different degrees of competence in SI. The research study sought to investigate potential and hypothesized differences in SI between LTHL and normal hearing groups. Given the literature referenced above as well as the theoretical framework used for this research, it was proposed that adult individuals with LTHL would score significantly higher on a measure of SI in comparison to peers without LTHL.

Chapter 3: Research Method

Introduction

This chapter provides information about the research method, study design, instruments, data collection procedures, ethical considerations for the protection of human subjects, study validity, and data analysis. The chapter closes with a summary and transition to the next chapter. The exploration of a possible connection between LTHL and SI is provided in the literature review.

Although there are elements of emotional intelligence in social intelligence, the issue of social intelligence is, on a whole, a separate subject. Specifically, social intelligence is a person to person interaction. This interaction involves empathy and recognition of another person's intentions through an understanding of nonverbal body movement and facial micro expressions as they apply to social situations (Eckman, 1993). Although there is an element of social intelligence that involves verbal communication, most of the components of social intelligence come from nonverbal communication.

Social intelligence also involves mirror neurons that fire based on observation of one person's actions, which in turn allows the observer to perform or have a memory of the observed action (Carr, Iacobini, Dubeau, Mazziotta, & Lenzi, 2003). More specifically, mirror neurons encode data of physical responses (facial, body movement) so that the viewer can reference the memory of the physical response and replicate it. The purpose is not for imitation, but for empathy and familiarity of how to respond when the action is seen again (Goleman, 2006). Interpersonal sensitivity, assesses nonverbal facial and body cues to ascertain the state and trait of another individual's personality

characteristics. This is based on one's perceptual ability of these nonverbal cues and how reliant one has been on using these cues for purposes of identifying what is being conveyed during communication (Hall, Andrzejewski, & Yopchick, 2009). Although all people are capable of these connections, people with LTHL spend more time observing (visually assessing) nonverbal language in order to understand what is being communicated (Meadow-Orlans & Spencer, 1996).

The purpose of this quantitative non-experimental study was to explore whether or not there were differences in SI between LTHL individuals and individuals with NDHL.

Instrumentation

In this quantitative non-experimental study, I used one instrument; the TSIS (Silvera, Martinussen, & Dahl, 2001, see Appendix B) for data collection. The TSIS was used to measure SI and assessed whether or not there were differences between individuals with LTHL and individuals with NDHL as it related to SI. The intention of the TSIS was to explore what differentiated characteristics of social intelligence by way of a total score as well as three subscale scores: social information processing, social skills, and social awareness.

The TSIS has demonstrated high reliability and validity. Silvera et al., reported test-retest and split reliability coefficients of .81, .86, and .79 for the three subscales of the TSIS, and reliability coefficients were reported as .83, .80, and .75 for the three subscales respectively by Dogan and Cetin (2009). The developers of the TSIS looked for ways to make the scale short but succinct, and they looked upon many domains of SI which empirically identified specific elements of SI. The only issue the original

researchers were able to identify is self-report bias, which the researchers found to be satisfactorily addressed by the measure of social desirability response bias done through reverse scoring.

The TSIS is a 21 item self-report scale and takes approximately five to seven minutes to complete. The scale is divided into three subscales: social information processing, social skills, and social awareness. Each of the subscales is made up of seven items using a seven point Likert scale of *Describes Me Poorly* (1) to *Describes Me Very Well* (7). The subscale questions are distributed randomly to reduce response bias. The subscale for social information processing (SIP) measures the way a person understands human relations. Dogan and Cetin (2009) included empathy, ability to read or understand hidden meaning, and ability to understand explicit messages in the definition of SIP. Social skills (SS) are defined as the level of comfort one has with others and also the ability to connect socially with others. Social Awareness (SA) is one's capacity to act appropriately in a given social situation, particularly an awareness of the behaviors of others. The TSIS measures construct were appropriate for this study and provided useful and meaningful information on the SI of LTHL and NDHL individuals.

No demographic form was used to collect information to describe the participants in the study because no identifying information was asked of the participants. Participants were informed within the invitation to the study that certain requirements were necessary to take the survey. The participants in one group were required to have no hearing loss, while the participants in the other group were required to have long-term hearing loss. Both groups had to be over the age of 18 with no upper age limit, and have at least a high school diploma, but no degree over bachelors. The Institutional Review Board (IRB)

would not allow for the collection of specific demographics due to the anonymity of the survey.

Research Question

There is no previously published research exploring social intelligence in the hearing loss population. For that purpose, in the interest of this research, the intention is to answer the following research question:

RQ: Are there differences in the social intelligence as measured by the TSIS between individuals with long-term hearing loss and individuals with no discernable hearing loss?

Null and Alternative Hypotheses

H₀: There will be no significant differences on all of the scales of the TSIS between individuals with long-term hearing loss and individuals with no discernable hearing loss.

H₁: Individuals with long-term hearing loss will score higher than individuals with no discernable hearing loss on the social information processing subscale of the TSIS.

H₂: Individuals with long-term hearing loss will score higher than individuals with no discernable hearing loss on the social awareness subscale of the TSIS.

H₃: Individuals with no discernable hearing loss will score higher than individuals with long-term hearing loss on the social skills subscale of the TSIS.

H₄: Individuals with long-term hearing loss will score higher than individuals with no discernable hearing loss on the total scale score of the TSIS.

Research Method

I sought to determine whether or not there are differences in social intelligence between individuals with LTHL, and individuals with NDHL using the TSIS (Silvera et al., 2001). Three research paradigms are available to researchers to conduct a study: qualitative, quantitative, and mixed methods. A quantitative research method was chosen over both qualitative and mixed-method research to meet the needs of the study. When attempting to establish whether or not there are significant differences between two or more variables using numerical data, a quantitative method is an appropriate choice over qualitative or mixed methods (Cooper & Schindler, 2013). Cooper and Schindler identified a quantitative methodology as being beneficial when working with larger samples, for removing potential researcher bias, and applying the results to a general population.

Qualitative methodology using interviews or observations might have benefits in exploring SI for individuals with hearing loss because their views, reactions, and interpretations of SI might be useful. However, bias is always a possibility when researchers are in direct contact with the research participants as is required in qualitative research (Cooper & Schindler, 2008). Qualitative researchers also tend to use small samples and might not cover the breadth of LTHL individuals and their use of SI.

A mixed-method study might allow the best of quantitative and qualitative research methodologies to be used in one study (Creswell, 2008). Using a mixed-method might not allow a researcher to measure the variables accurately and the knowledge produced might not generalize to other populations, which is the intention of this study (Cooper & Schindler, 2008). A quantitative approach was deemed as the most

appropriate method for this study in order to include and compare individuals with LTHL to individuals with NDHL on SI. A quantitative study is optimal as it enables the least amount of bias while still providing valuable information.

Research Design

I used a cross sectional survey design to compare LTHL individuals and individuals with NDHL (Ary, Jacobs, Sorenson, & Razavieh, 2010). When gathering information, quantitative survey methods are useful and appropriate for gathering information from a large number of participants. Research questions in quantitative research are designed to gather data that are measurable and specific regarding quantifiable variables (Creswell, 2005).

In this study, the independent variable is group, with two levels, one with NDHL and the other, LTHL. The dependent variable was the total score and the three subscale scores of the TSIS (Silvera, et al., 2001). I investigated self-reported beliefs about SI and used cross-sectional survey design methodology that utilized Internet survey technology. In a cross-sectional study, the data were collected from the respondents of different ages and or in different phases of professional and or personal lives. In studying participants for long periods of time, longitudinal studies may be used; but, cross-sectional research is an alternative to gathering data from participants over a long period of time. Cross sectional studies provide the advantage of sample attrition not being an issue as the data is collected at one point in time (Gall, Borg, & Gall, 1996). The expense incurred is less because of the time necessary to complete the investigation is shorter (Salkind, 2003).

The study was also be descriptive as it explored specific data about LTHL and NDHL groups through subscale and total score of the TSIS. A more descriptive method

that described the beliefs and attitudes of a group of LTHL and individuals with NDHL could have enriched the study, but was not used due to the limitations of anonymity in the quantitative survey. Descriptive analysis is a modest design and is easy to carry out. It can provide meaningful data and information for informing future research (Gall, Borg, & Gall, 2003). Ary et al. (2010) noted there are six basic steps involved when conducting the survey design: planning, describing the population, sampling, designing the instrument, collecting the data, analyzing the data, and reporting the results.

Survey design and data collection have gone through many changes (Dillman, 2007). The use of computers and the Internet is a current innovation. Use of the Internet eliminated costs associated with postage and the need for paper and pencil surveys. The Internet has gained great popularity because it has increased the possibility of using a larger sample size and has shortened the time needed to collect data (Dillman, 2007). As there are advantages to Internet based surveys, there are also disadvantages. One disadvantage might be limited sampling and the availability of respondents. Some respondents may not have access to computers or may not be very skilled in using computers. There did not seem to be an issue with participant access since the required number of participants responded to the survey. However, it is unknown if there were any participants that did not participate due to lack of access. There might also be problems with cooperation from respondents and response rates. Respondents may be reluctant to participate in a survey online or the email may end up in the person's spam mail and may be deleted without even being opened. In an Internet survey, there is also no one to assist with explaining items and no one asking other probing questions. While there are disadvantages to Internet based surveys, the advantages outweigh the disadvantages.

The QuestionPro.com website was used for this study and permitted the researcher to format a survey. The use of this site facilitated the collection of data in a usable format. I was able to format and change the background, colors, and font to make the survey attractive, easy to understand, and easy to complete. Respondents read an informed consent and agreed to continue to the survey by clicking on the box that stated they read and agreed with the informed consent. The agreement checkbox for informed consent was used because no names or identifiable information was used. Demographic data, such as age, gender, and other information was not collected in this study. Due to the anonymous nature of the survey, no follow-up with participants occurred. I provided e-mail and phone number information for any participant that had questions or wanted information about the conclusion of the study.

Internet surveys allow a researcher to have control about the number of items a participant may respond to at any time (Dillman, 2007). For this reason, I had set the number of participants at 64 due to a priori sample size determination, but managed up to 70 participants for each group.

Study Participants and Sampling

The study used a convenience, non-random sampling procedure to identify study participants consisting of two groups, individuals with NDHL and LTHL individuals. Participants with NDHL were recruited through an anonymous online survey system at www.QuestionPro.com. QuestionPro.com maintains a database of millions of people who volunteer to participate in surveys. QuestionPro.com benchmarks their potential participants to ensure their members are representative of the United States population (www.QuestionPro.com, 2013). The survey that was approved by the initially set the

survey up as voluntary with no monetary compensation. After 6 weeks, the survey failed to progress to reach the required number of participants. I requested to the IRB to change the requirement so that monetary compensation of \$5.00 per survey would be allowed. The IRB approved the change and the remainder of the participants took the survey to reach the required sample size expectation.

The participants self-identified as having no discernable hearing loss for one group, and having long-term hearing loss for the second group. There were no screened questions as the survey was completely anonymous. Within the informed consent, participants who checked the box that the informed consent expectations were understood, agreed that they were over the age of 18, and had an education between high school diploma and bachelor's degree. If participants did not meet the criteria of the informed consent, they were directed to exit the survey.

Participants with LTHL were recruited through national chapters of the Hearing Loss Association of America. These support groups were willing to help solicit study participants (example Letter of Agreement, Appendix C) and posted the survey site at QuestionPro.com to their members. I did not have access to individual emails. I sent the first request to take the survey to chapter leaders and the Facebook hearing loss group leader at the beginning of the 12 week period. The Facebook group leader requested that only one post to the group could be sent for participation requests. A follow up e-mail was sent to chapter heads 4 weeks later to remind participants of the survey.

The study question asked if there were differences between LTHL and NDHL individuals in social intelligence. Determining the appropriate sample size for the study is important. Cohen noted for a study with two groups (hearing and non-hearing) using a t

test, it would be necessary to have 64 individuals in each group with power = .80 and an alpha of .05. Cohen (1992) proposed effect size be operationally defined as small, medium or large effect size of .2, .5, or .8. For a *t* test, the effect size index is the standard deviation of the population means divided by the common within population standard deviation. Power is the ability to find a statistically significant difference if the null hypothesis is false or the researcher's ability to identify a difference if one really exists.

Ethical Concerns

Creswell (2009) asserted that the fundamental role for ethical research was to do no harm: physical, psychological, social, economic, or legal. Participants in a study had the right to privacy and the expectation the data were anonymous at all times. Participants in this study were informed of the intent of the study, the voluntary nature of the study, the rights of study participants, contact information if the participant has questions, and procedures to be used. The participants of the study read and agreed to the Informed Consent Form (Appendix D and Appendix E) in order to participate in the study. The collection of Informed Consent Form included all participants over the age of 18 and were legally able to provide consent to participate. The informed consent explained the intent and purpose of the study, any risks involved in the study, the voluntary nature of the study, that participants could withdraw from the study at any time before survey submission, an explanation there were no recriminations for not participating, and university and research contact information.

Anonymity

Every participant in this research study had a right to privacy. Disclosure about the nature of the study and anonymity procedures to participants prior to the start of a

research project is important because this allows participants to decide whether or not to participate (Creswell, 2009). Every research participant has the right to expect they will not be identified by name at any time before, during, or after a study.

The identities of participants remained anonymous. Participants voluntarily agreed to participate in the study and no one other than the researcher had access to the individual data. Identifying information was not collected. An informed consent at the beginning of the survey (Appendix C and Appendix D) explained the purpose of the survey and the anonymity of the survey prior to collection of any data from participants.

The data collection process did not include collection of any personally identifying information as a part of the study and data were reported only in an aggregated format. All data was stored in a file on the researcher's personal computer. The data gathered in the course of this study was used only for the purposes of the current research study. There was no paper data, only electronic files. Data in an electronic format will be kept for a period of 5 years on a jump drive. At the end of the 5 year period, the data files on the jump drive will be erased.

Data Collection

Prior to collecting any data for this study, permission to conduct the study was obtained from the Walden University IRB. The questionnaires were entered on the QuestionPro.com website and the cover letter (Appendix C) was sent to the chapter leaders of the Hearing Loss Association of America and to the leader of the Facebook hearing loss group, The Hearing Exchange in order to recruit their members. The cover letter contained a link to the survey. When participants clicked on the link they were taken to the informed consent form (Appendix D). The participants for NDHL were

recruited directly by QuestionPro.com from their survey bank of qualified participants. The NDHL participants clicked on a link and were taken to the informed consent form (Appendix E for NDHL). Once the participants completed the informed consent and confirmed that they met the inclusion criteria by clicking on the agreement box, they were taken to the survey. Upon survey completion, the participant was taken to a thank you page and the survey was submitted. The survey was open for a period of twelve weeks, and at the close of the data collection, the data was downloaded into Statistic Solutions Accelerated Quantitative Statistical Software and prepared for analysis.

Study Validity

There is no treatment in survey research; however, the validity and reliability of the study is important. Validity can be internal or external. External validity refers to the generalizability of the findings of a study or would the same result be found with a similar group of participants, setting, or time period. Internal validity refers to the elimination of confounding or extraneous variables. Volunteers used in a study can have unique characteristics which are not always assessed quantitatively (Ary, et al., 2009). Campbell and Stanley (1963) also developed ideas about internal validity in research design and how extraneous variables can be controlled by the researcher. Campbell and Stanley noted eight factors affecting the internal validity of a study: history, maturation, testing, instrumentation, statistical regression, differential selection, experimental mortality, and selection maturation interaction. Maturation was not problematic as the participants were all adults and not a purpose of assessment for this study. The study was also of short duration and the time period was not affected by changes in the adults. History was not problematic as there was no occurrence in the population or the world at

large that addressed social skills that were beyond the control of the researcher. There was no pretesting in the study, and testing did not present problems. The instrument selected for the study has been used previously and has established validity and reliability. Statistical regression was not a problem, as there were no repeated measures. Differential selection could have been a problem, as not all members of the no discernable hearing loss population, and long-term hearing loss population were invited to participate in the study: it was only accessible to certain groups of individuals. Selection maturation interaction was not a problem as the study's participants were all adults and not likely to change over the short time of the study. Experimental mortality (subjects dropping out of a study) or a low response rate could have been problematic in this study. In survey research, a possibility may exist that a participant might start a survey but not complete it, or the response rate might be very low. There was also a possibility a participant might skip items and not answer all of the items. If the items on the survey were skipped, the survey was considered incomplete and not submitted for scoring. QuestionPro.com was programmed to not allow skipped responses. It is unlikely any of these had any affect the outcome of this study. There were incidences of participants who did not finish the survey either due to inability to answer the questions, or because they did not fit the criteria for the study.

Data Analysis

The data was downloaded from the QuestionPro.com website and uploaded into Statistic Solutions Accelerated Quantitative Statistical Software for analysis. All responses were converted to numbers as described above, and entered into a spreadsheet. The study participants who neglected to respond or did not respond to all items on the

TSIS (Silvera, et. al, 2001), were treated as missing data. No attempt was made to impute a response for any missing responses. Reverse scoring to reduce self-report bias in the TSIS was performed in accordance with the scoring procedures set forth by the TSIS developers. Items that were reversed scored on the scale were items 2, 4, 5, 8, 11, 12, 13, 15, 16, 20 and 21. When the data was entered, visual inspection was used to check the data for any errors or outliers, and to obtain an overall view of the numerical data. Means, medians, mode, standard deviations, and frequencies were used to describe the data.

The hypotheses were tested using independent samples *t* tests. *T* test assumptions include independence, normal distribution, and homogeneity of variance. Independence refers to whether or not the observations in each group are independent and do not influence each other. Independence was a design issue, and the two groups used for this study did not interact with each other at any time. Normal distribution referred to the scores in each group that were normally distributed. Homogeneity of variance referred to the two groups as having equal variances, or the degree to which the two distributions are spread out as approximately equal. Normality was assessed using the Shapiro-Wilk test which was detailed in the results section. The Levene test was used to assess homogeneity of variance.

The *t* test is robust to the presence of unequal variances, but the degrees of freedom are adjusted if the assumption is not met (Glass & Hopkins, 2008). A probability level of accepting or rejecting the null hypothesis was set a priori at $p=.05$ or less. The independent variable in the research question was group membership with two levels; long-term hearing loss or no discernable hearing loss. The dependent variables in the research question were operationalized using of the subscales of the TSIS. A probability

level of $p=.05$ or less was used as the criteria for accepting or rejecting the null hypothesis.

Summary

Chapter 3 has presented the methodology, to be used to address the question and hypothesis posed for the study. A quantitative method was selected for the study using a survey design. The data was collected using an electronic web based survey site. The participants and criteria for participation in the study were articulated. The TSIS (Silvera, et. al, 2001) was used to collect data along with an informed consent for LTHL and NDHL. The data analysis used a t test to test for differences between LTHL and NDHL groups. Chapter 4 presents the results of the analysis of the data for this study.

Chapter 4: Results

Introduction

The purpose of this study was to test the hypotheses that people with LTHL have a higher social intelligence than people with NDHL. In this study, data were collected through the survey site, QuestionPro.com. The survey that was used was the TSIS, a 21 question survey with three subsections that focused on social skills, social participation, and social awareness. There were no modifications to the survey. The survey was scored as a total scale score, and then by subsections as it applied, for the LTHL group. There have been no previous studies on SI and hearing loss. The literature review provided information regarding why people with LTHL may have a higher social intelligence based upon the use of nonverbal language skills, interpersonal sensitivity and theory of mind (TOM). Below, the research question and hypotheses are restated and an analysis of the data is explored.

Research Question Restatement

Social intelligence has been investigated in populations of aggressive individuals and those with learning disabilities or autism. There are no studies of SI as it relates to hearing loss. The intention was to answer the following research question:

RQ: Are there differences in social intelligence as measured by the TSIS between individuals with long-term hearing loss and individuals with no discernable hearing loss?

Null and Alternative Hypotheses Restatement

HO: There will be no significant differences on all of the scales of the TSIS between individuals with long-term hearing loss and individuals with no discernable hearing loss.

H1: Individuals with long-term hearing loss will score higher than individuals with no discernable hearing loss on the social information processing subscale of the TSIS.

H2: Individuals with long-term hearing loss will score higher than individuals with no discernable hearing loss on the social awareness subscale of the TSIS.

H3: Individuals with no discernable hearing loss will score higher than individuals with long-term hearing loss on the social skills subscale of the TSIS.

H4: Individuals with long-term hearing loss will score higher than individuals with no discernable hearing loss on the total scale score of the TSIS.

Data Collection

A total of 134 participants completed the survey. The NDHL group had 70 completed surveys. The LTHL group had 66 completed surveys, with four that could not be counted due to lack of completion. The participants were recruited in two different ways. The participants in the NDHL group were recruited through QuestionPro.com, first with no monetary compensation, and then with \$5.00 in monetary compensation when the first recruitment method did not provide enough participants after 5 weeks. The participants in the LTHL group were recruited through a letter of invitation sent to chapters of the Hearing Loss Association of America across the nation as well as an invitation that was extended to the Facebook Hearing Exchange, hearing loss group. The participation of the LTHL group initially provided a greater amount of participation than the NDHL. The initial data collection was scheduled to be 8 weeks, but was extended another 4 weeks to allow for recruitment of the required number of participants. No demographic information was collected, and the survey was completely anonymous.

Study Results

Frequencies and Percentages

The majority of participants fell into the category of No for No Discernable Hearing Loss ($n = 70, 51\%$). Frequencies and percentages for nominal variables are presented in Table 1.

Table 1

Frequencies and Percentages for Nominal Variables

Variables	<i>n</i>	%
Hearing Loss		
No	70	51
Yes	66	49

Independent Sample *t* Test for Total Score

An independent sample *t* test was conducted to assess if there were differences in Total Social Scale Score by Hearing Loss (NDHL vs. LTHL). Prior to analysis, the assumption of normality was assessed using a Shapiro-Wilk test. The result of the test was not significant, $p = .212$, validating the assumption of normality. The assumption of equality of variance was assessed using Levene's test. The result of the test was not significant, $p = .142$, indicating the assumption of equality of variance was met.

The results of the independent sample *t* test were not significant, $t(134) = 0.71, p = .480$, suggesting that there was not a difference in Total Social Scale Score by Hearing Loss. Results of the independent sample *t* test are presented in Table 2. Figure 1 shows the averages of Total Social Scale Score by Hearing Loss.

Table 2

Independent Sample t Test for Total Social Scale Score by Hearing Loss

Variable	<i>t</i> (134)	<i>p</i>	Cohen's <i>d</i>	NDHL		LTHL	
				<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Total Score	0.71	.480	0.12	4.71	0.80	4.61	0.87

Independent Sample *t* Test for Social Processing Composite

An independent sample *t* test was conducted to assess if there were differences in Social Processing Composite by Hearing Loss (NDHL vs. LTHL). Prior to analysis, the assumption of normality was assessed using a Shapiro-Wilk test. The result of the test was significant, $p = .028$, violating the assumption of normality. However, Howell (2010) suggested that the *t* test is robust despite violations of normality. The assumption of equality of variance was assessed using Levene's test. The result of the test was not significant, $p = .508$, indicating the assumption of equality of variance was met.

The results of the independent sample *t* test were not significant, $t(134) = 0.28$, $p = .779$, suggesting that there was not a difference in Social Processing Composite by Hearing Loss. Results of the independent sample *t* test are presented in Table 3. Figure 2 shows the averages of Social Processing Composite by Hearing Loss.

Table 3

Independent Sample t Test for Social Processing Composite by Hearing Loss

Variable	<i>t</i> (134)	<i>p</i>	Cohen's <i>d</i>	NDHL		LTHL	
				<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Social Processing Composite	0.28	.779	0.05	4.85	1.12	4.79	1.11

Independent Sample *t* Test for Social Skills Composite

An independent sample *t* test was conducted to assess if there were differences in Social Skills Composite by Hearing Loss (NDHL vs. LTHL). Prior to analysis, the assumption of normality was assessed using a Shapiro-Wilk test. The result of the test was not significant, $p = .296$, validating the assumption of normality. The assumption of equality of variance was assessed using Levene's test. The result of the test was not significant, $p = .253$, indicating the assumption of equality of variance was met.

The results of the independent sample *t* test were not significant, $t(134) = 0.51$, $p = .608$, suggesting that there was not a difference in Social Skills Composite by Hearing Loss. Results of the independent sample *t* test are presented in Table 4. Figure 3 shows the averages of Social Skills Composite by Hearing Loss.

Table 4

Independent Sample t Test for Social Skills Composite by Hearing Loss

Variable	$t(134)$	p	Cohen's d	NDHL		LTHL	
				M	SD	M	SD
Social Skills Composite	0.51	.608	0.09	4.49	1.14	4.39	1.27

Independent Sample t Test for Social Awareness Composite

An independent sample t test was conducted to assess if there were differences in Social Awareness Composite by Hearing Loss (NDHL vs. LTHL). Prior to analysis, the assumption of normality was assessed using a Shapiro-Wilk test. The result of the test was significant, $p = .007$, violating the assumption of normality. However, Howell (2010) suggested that the t test is robust despite violations of normality. The assumption of equality of variance was assessed using Levene's test. The result of the test was not significant, $p = .094$, indicating the assumption of equality of variance was met.

The results of the independent sample t test were not significant, $t(134) = 0.76$, $p = .449$, suggesting that there was not a difference in Social Awareness Composite by Hearing Loss. Results of the independent sample t test are presented in Table 5. Figure 4 shows the averages of Social Awareness Composite by Hearing Loss.

Table 5

Independent Sample t Test for Social Awareness Composite by Hearing Loss

Variable	<i>t</i> (134)	<i>p</i>	Cohen's <i>d</i>	NDHL		LTHL	
				<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Social Awareness Composite	0.76	.449	0.13	4.78	1.03	4.64	1.17

Summary

The study compared responses to the TSIS survey in two groups. One group consisted of participants with NDHL, while the other group consisted of participants with LTHL. The hypotheses were tested for total TSIS score per group and, scores for the three subscales of the TSIS. The findings did not support rejection of the null hypotheses:

HO: There will be no significant differences on all of the scales of the TSIS between individuals with long-term hearing loss and individuals with no discernable hearing loss.

As shown in Table 2, through the use of the Levene's test ($p \geq .05$), there is no significant difference found between the two groups total scale scores. The null hypothesis cannot be rejected.

H1: Individuals with long-term hearing loss will score higher than individuals with no discernable hearing loss on the social information processing subscale of the TSIS.

Table 3 presents the social processing composite scores for the two groups. There was no significant difference between groups in regard to social information processing. The null hypothesis cannot be rejected.

H2: Individuals with long-term hearing loss will score higher than individuals with no discernable hearing loss on the social awareness subscale of the TSIS.

Table 4 presents the social awareness composite scores for the two groups. There was no significant difference between groups in regard to social awareness. The null hypothesis cannot be rejected.

H3: Individuals with no discernable hearing loss will score higher than individuals with long-term hearing loss on the social skills subscale of the TSIS.

Table 5 presents the social skills composite scores for the two groups. There was no significant difference between groups in regard to social awareness. The null hypothesis cannot be rejected.

H4: Individuals with long-term hearing loss will score higher than individuals with no discernable hearing loss on the total scale score of the TSIS.

Individuals with long-term hearing loss did not score higher than individuals with no discernable hearing loss on the total scale score. This null hypothesis could not be rejected.

The following chapter provides an overview of this study. An interpretation of the findings of this study as well as limitations, future study recommendations, and implications for positive social change are discussed.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

This study was meant to explore the hypothesis that people with LTHL had a higher social intelligence than people with NDHL. The purpose of the study was to find out if the LTHL population, which rely on a good amount of nonverbal communication (facial expressions, use of hands, body language) to understand what is being communicated, would demonstrate a higher level of social intelligence because of this communication. In the review of the literature, I examined aspects of social intelligence that relate to nonverbal language skills. There is a great amount of knowledge about interpersonal sensitivity, mirror neurons, and theory of mind; all of which are aspects of social intelligence (Davis & Kraus, 1997; Goleman, 2007). The skills that make up social intelligence often correspond with specific communication skills relied on by people with LTHL. Peterson and Wellman (2009) found that people with long-term hearing loss have a sensory awareness for conceptual learning and knowledge, even with a low proficiency of spoken language, an aspect of TOM. While no one has previously done research to connect SI to LTHL, there is a compelling reason to explore this connection.

Interpretation of Findings

The purpose of this study was to find a definite connection between SI and LTHL through the use of the TSIS survey conducted on the survey site, QuestionPro.com. This study attempted to determine if people with LTHL have developed characteristics of SI that are greater than those in an NDHL population. The method used to gather data for this study was a survey posted on an internet survey site. The study had one research question and four hypotheses. A group with NDHL was recruited for a comparison of

TSIS scores. Two of the three subscale scores of the TSIS were compared to determine if participants with LTHL would rate higher on social information processing and social awareness. Data were collected via an anonymous online survey, in which no demographic information was collected. The anonymity of the survey did not allow the researcher to monitor who took the survey; however, the respondents all agreed that they fit the inclusion criteria described in the informed consent.

After analysis of the data, the conclusion was that there were no significant differences between groups for total TSIS scores as well as total scores for the three subscales of the TSIS. Individuals with LTHL did not score higher on SI than individuals with NDHL, and so the null hypotheses were not rejected. The study methodology did not allow for greater depth of exploration regarding specific skills participants use to improve their communication, either nonverbal or verbal.

The subscale for social skills was compared between groups to determine if participants with NDHL would score higher than participants with LTHL. The findings of this hypothesis showed there were no significant differences in the scores for those with NDHL than those with LTHL. The basis for this hypothesis was the assumption that those with hearing loss may feel isolated from the hearing population and be more withdrawn, and hence would score lower in social skills. Social isolation from hearing loss has been studied in older adults who experienced hearing loss later in life (Mick, Kawachi, & Lin, 2014). However, adults who with hearing loss since childhood often learn to interact socially despite their hearing loss even though some experienced language delays as children (Bobzien et al., 2013).

Children who received special services to improve speech development had better verbal comprehension and expressive language in order to understand communication (Vohr et al., 2012). This inclusion of speech development can improve social skills in children with hearing loss. It is possible that children that did not receive speech development or intervention by parents or school therapists to integrate children with hearing loss into regular school activities would have greater issues with social skills.

It is also possible that children with hearing loss grow up with those who are deaf or have hearing loss, which is a social community. The person who grows up in this environment may be more comfortable communicating with people in this community than with a hearing community. The experience of hearing loss is very different for those who have grown up with hearing and acquire hearing loss as they get older. A person who acquires hearing loss in adulthood may feel isolated because their community is made up of people without hearing loss.

The subscale for social awareness was compared between groups to test the hypothesis that participants with LTHL would score higher on this subscale than participants with NDHL. This hypothesis was based on Greenspan's (1982) social awareness taxonomy. This includes an understanding of social sensitivity which is an interpretation of events based on an understanding of the meaning of another person's viewpoint and feelings. The literature review described how people with LTHL look for nonverbal cues to understand a social situation in lieu of verbal cues. The social sensitivity of one with LTHL may be based on similar sensory processing as observed in nonhuman species such as those mentioned in chapter two. With nonhuman species, the

finding is that TOM accounts for social cognition in how a person or animal understanding of nonverbal cues (Acevedo, Aron, Aron, et al., 2014).

The social sensitivity carries on the nonverbal cue understanding, by allowing the nonhuman species to strategize for the purpose of survival when there is a threat, or be more alert to emerging situations in which attention to environmental details can make the nonhuman species quicker to respond (Acevedo, et al., 2014). The reason this is similar to the LTHL experience is because of the tendency for those with LTHL to look for nonverbal cues in order to understand social situations to compensate for hearing loss (Meadow-Orlans, & Spencer, 1996). The social awareness by one with LTHL would be based on the familiarity of facial cues, make predictions about another person's behavior, and to know the behavioral sequence of events when communicating with another person (Guilford & O'Sullivan, 1975).

Regardless of these findings, the subscale for the TSIS survey showed no difference in social awareness between LTHL and NDHL. Demographics for this study to assess for variables such as age, sex, education level, and for the LTHL group, how long the participant had hearing loss, were not used for this study. If these demographics had been implemented, it could have added a layer of understanding of how participants responded to the TSIS survey questions based on differences between groups could not be assessed or were not assessed.

The subscale for social information processing was included in the study to test the hypothesis that participants with LTHL would score higher on this subscale than participants with NDHL. The assumption was based on the manner in which human relations are established through empathy, clarity of hidden (nonverbal) meaning, and

explicit messages that are understood without any words spoken (Dogan & Cetin, 2009). Nonverbal communication is considered a cornerstone or best asset of communication based on the literature review of hearing loss and nonverbal language skills.

The theory about social information processing is about how social cognition enables stages of information processing through encoding, mental representation through meaningful cues, mental search for proper response to a situation, evaluation of the best response, and enactment of the chosen response (Dodge & Rabiner, 2004; Hersh, 2012). The processing patterns of experiential antecedents are stored in memory and used as a guide when processing future social situations (Dodge & Rabiner, 2004). TOM, as it relates to the inference of the mental states of others judgments and moral behaviors, involves social processing for the purpose of knowing when to inhibit one's actions, or allow certain response actions after evaluation of a social situation (Dodge & Rabiner, 2004; Hersh, 2012). While social information processing can be helpful to ascertain how one with LTHL may use experiential antecedents to interact socially, it is important to note that social information processing is still considered a work in process. It requires more concrete research to prove the dimensions of how it works in social interaction. The findings for this subscale showed no difference in social information processing between LTHL and NDHL. Inclusion of demographics, as listed above, could have added a layer of understanding of individual differences in how one processes social information.

The TSIS uses reverse scoring to avoid random response patterns, and none of the surveys that were submitted were eliminated due to invalid responses. The validity and reliability of the Turkish study of the TSIS was compared to a Social Skills Inventory to determine if the questions asked in the TSIS provided a good correlation of social

intelligence through use of specific social skills (Dogan & Cetin, 2009). The findings of the Turkish study indicated there was good internal consistency of the scale (using Cronbach's alpha) that resulted in a reliability coefficient of .83 for the whole scale score; a reliability coefficient of .77 for the social information processing subscale; a reliability coefficient of .84 for the social skills subscale; and a .64 reliability coefficient for the social awareness subscale (Dogan & Cetin, 2009).

The possibility exists that all respondents viewed their social abilities as superior and responded to items with that ideal in mind. The reason for this possibility could be that people often rate themselves as having better abilities in understanding social situations than they would be able to demonstrate in front of a researcher (Kruger & Dunning, 1999). The subscale scores and total scale score for this study are consistent with the TSIS in another study. The means of the subscale scores for the TSIS are compatible with an Irish study on TSIS psychometric properties done in 2013 (Grieve & Mahar, 2013). The study, which tested the TSIS on university undergraduates ($n = 328$), results show the following means for women's scores: social information processing, 5.28, social skills, 5.64, and social awareness, 5.63. These are comparable to the means of this study: social information processing 4.85, social skills 4.49, and social awareness, 4.78. It is possible that with a larger sample for each group and an inclusion of demographics that indicate sex, level of education, and ethnicity, significant differences could be found in the overall TSIS score and the subscale scores. The reason this could change the outcome of the TSIS responses is because it could indicate differences in SI that may or may not have anything to do with LTHL. The findings of this study indicate that there are no differences between the LTHL and NDHL groups as it relates to SI. It is apparent in the

literature review that hearing loss adaptations for communication often develop in early childhood, and continue to be useful to understand social interaction and communication when the child becomes an adult. It may be that whatever the different style of social information processing and social skills are for those with LTHL, it is not SI, but some other construct that is not tapped into with a SI measure.

Limitations of the Study

There are several limitations to this study. The anonymity and use of an online survey to collect data may have reduced the accuracy of responses due to lack of accountability for responses. Specifically, the responses could not be verified for veracity by the researcher. In addition, a mixed methods research design could have led to a richer exploration of participant beliefs and interpretations of the questions. This could have been valuable for the LTHL participants with consideration that they may not view the questions as representative of how they understand nonverbal communication.

The two groups were recruited from different sources. The researcher believes this could be a factor in the outcome of the study. The reason for this could be the possibility of different make ups in terms of sex distribution, ethnic background, and education. These factors could indicate differences in the LTHL and NDHL groups as specific variables that could enrich the data through the breakdown of these demographics. There was no way to control for environmental or ethnic factors in a way for groups to be more similar and more comparable.

The method that approved for the study did not allow for distribution of the variables mentioned above. The NDHL group could have contained a higher percentage of females which could artificially raise the mean SI in the group to make it closer to the

LTHL group. There is no way to construct an outcome of specific details without authorization for collection of demographics.

A phenomenological study component that focused on the ways in which those with LTHL understood communication may have improved the overall consideration of the lived experience of hearing loss and social interaction. An interpretive phenomenological study is based on hermeneutics, or the manner in which the participants' experiences are understood and interpreted (Tuohy, Cooney, Dowling, Murphy, & Sixsmith, 2013). A qualitative focus on LTHL and the social experience would bracket the researcher's presuppositions and interpret the phenomenological lived experience of one with LTHL.

Recommendations for Future Study

The research for this study covers the exploration of SI. Although there have been continuous studies over the years to understand and solidify the holistic purpose of SI, the methods to test SI are still rather new. Ultimately it is more difficult to study SI quantitatively than qualitatively. Individuals may have perceptions of their social intelligence skills that does not match their lived experience of these skills. While tests such as the Minnesota Multiphasic Personality Inventory have undergone considerable restructuring to reduce participant responses that put them in a favorable light (lie responses), most scales and inventories have not gone through the same level of scrutiny to reduce these type of responses. This research study did not find a difference between LTHL and NDHL groups in SI, and that may be because the differences between the groups in communication do not reflect the construct of SI as it is defined and measured by the instruments that are currently available. Consideration for future research might

include a qualitative study of the lived experience of hearing loss and how the LTHL individual adapts to understand communication due to hearing discrepancies. A qualitative study could focus on participants with LTHL and demonstrate how they use nonverbal skills and how these skills work in communication. This could be done through LTHL participant observation of a speech. Participants could rate afterward what they understood of the presenter verbally as compared to what they understood from body language and other nonverbal skills.

People with LTHL often lack confidence about their social skills usually because of issues with self-esteem (Punch & Hyde, 2005). This could be due to feelings of social isolation due lack of understanding of auditory cues in group settings. It could also be due to difficulty in being socially accepted among people with no hearing loss (Punch & Hyde, 2005). Future research of LTHL needs to follow a different path than this study in order to identify the constructs that are associated with perception of nonverbal versus verbal communication, and the connection of those skills to SI. It could be that research into emotional intelligence may yield a level of information about LTHL and social compensatory skills that was not observed in this study. It is worth looking into what types of unique skills those with LTHL have, and how they use these skills to understand social communication. In a qualitative study, participants could provide their reasons for their lack of confidence as well as explain how they personally use nonverbal skills to understand communication, even if it means there is no interaction for them to use social skills. Participants in an interview situation with a researcher could be given a social scenario and then answer questions on how they would assess the social situation. This

type of interview could also be done as a comparison between an LTHL group and an NDHL group to assess the manner in which each group understands social interaction.

Implications

The findings of this study did not produce an effective understanding of the social communication abilities of those with LTHL. There were no identified differences between the LTHL and NDHL groups in regard to SI as measured by the questionnaire employed by this study. The current research is limited in scope by the use of anonymous survey with no identifying demographics. An exploration into differences in social communication with demographics and qualitative detailed experience could provide richer context of the lived experience of hearing loss and social communication.

Much of the current research on hearing loss focuses on the negative facets and deficits in this population. There is hope that this research inspires future investigation of potential strengths rather than weaknesses of hearing loss populations. Studies that provide what people with hearing loss are capable of doing, or capable of learning, or are superior to hearing populations, could improve self-worth and encourage better social interaction among those with hearing loss and the hearing communities. The findings of this study indicate that, although the hearing loss group was not superior to the non-hearing loss group in SI, they were equivalent, and no deficits in social abilities are present in those with LTHL. This information can be beneficial to those with hearing loss and their families, as well as those that work with this population. A lack of significant findings can have implications for social change: in this case, the data adds to information that a population that is commonly considered impaired does not suffer social impairment as a result of hearing loss.

The literature review provided information about TOM, interpersonal sensitivity, mirror neurons and nonverbal language. While the intention of the literature review was to tie in these factors to SI, these factors may tie in to other methods that were not explored in this research. A framework of continued study into hearing loss and social communication and compensation could impact the future understanding of techniques used by those with hearing loss to participate in the social world.

Conclusions

The intention of this study was to explore two groups and determine if there was a difference in SI based on LTHL. The study meant to provide an association between methods of social communication and interpretation that is used by people with LTHL, and also characteristics of SI that align with the nonverbal methods that are used by people with LTHL. SI was investigated in the literature review, but what might be perceived as SI in the nonverbal skills of those with LTHL, is not really SI, but some other construct that needs to be investigated. Insight into the association between LTHL and interpersonal sensitivity, TOM, mirror neurons, and skills children with hearing loss have developed because of their hearing loss, provides a decent base for further exploration. Direct observation of social technique of nonverbal cues, phenomenological study, or quantitative focus on emotional intelligence of the social capabilities of those with LTHL could provide answers about the unique abilities of the hearing loss community. Any future research of hearing loss could prove to be an optimistic addition when the focus is on what those with hearing loss are capable of doing instead of what they are missing.

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Appendix A: Permission Letter for the Tromso Social Intelligence Scale

Dear Debbie,

I've attached the materials you should need to run the Tromso Social Intelligence Scale (TSIS), and you are welcome to use it for your research.

The attached PDF file is a copy of the article in which we validated the TSIS. In terms of administering the TSIS, you can use any generic header (e.g., Please answer the following items.), the response scale we used was a 1-7 scale with 1 labeled "Describes me extremely poorly" and 7 labeled "Describes me extremely well" (no semantic labels on 2-6), and the items for the English version of the TSIS are in Appendix A of the PDF file. The attached DOC file should explain the scoring, which is pretty straightforward (basically code the items all in the same direction, then average them).

If you have any questions, let me know and I'll be happy to do what I can to clarify.

Good luck with your dissertation.

Best,
David Silvera

Appendix B: Tromso Social Intelligence Scale with Divided Subsections

This scale consists of 21 items. Respondents are asked the degree to which each statement described them on a scale from 1 (“describes me extremely poorly”) to 7 (“describes me extremely well”).

Factor 1: Social information processing (SP)

1. I can predict other peoples' behavior.
3. I know how my actions will make others feel.
6. I understand other peoples' feelings.
9. I understand others' wishes.
14. I can often understand what others are trying to accomplish without the need for them to say anything.
17. I can predict how others will react to my behavior.
19. I can often understand what others really mean through their expression, body language, etc.

Factor 2: Social skills (SS)

4. I often feel uncertain around new people who I don't know.
7. I fit in easily in social situations.
10. I am good at entering new situations and meeting people for the first time.
12. I have a hard time getting along with other people.
15. It takes a long time for me to get to know others well.
18. I am good at getting on good terms with new people.
20. I frequently have problems finding good conversation topics.

Factor 3: Social awareness (SA)

2. I often feel that it is difficult to understand others' choices.
5. People often surprise me with the things they do.
8. Other people become angry with me without me being able to explain why.
11. It seems as though people are often angry or irritated with me when I say what I think.
13. I find people unpredictable.
16. I have often hurt others without realizing it.
21. I am often surprised by others' reactions to what I do.

Appendix C: Sample Letter for Participant Agreement

January 4, 2014

Institutional Review Board

Minneapolis, MN

To: The Institutional Review Board – Walden University

Debbie Finken has the permission of the Colorado Division of the Hearing Loss Association of America to obtain subjects and conduct research for her study on The Relationship between Social Intelligence and Hearing Loss through this organization. The details of this study have been explained to us and we support the research.

Please contact me for any further questions at

Sincerely,

Debbie Mohnney
Colorado Division of the Hearing Loss Association of America

Appendix D: Informed Consent Long-Term Hearing Loss

Walden University

Debbie Finken, Researcher

Thank you for taking this survey. This is a study about differences in social intelligence between those with no discernable hearing loss (no diagnosis of hearing loss) and long-term hearing loss. There is no intervention involved in this study and there are minimal risks involved with this study. This study involves participants taking a social intelligence survey. The purpose of this study is to determine if people with long-term hearing loss have improved social intelligence skills because of the manner in which they use coping strategies in order to manage life in a hearing world and still communicate effectively.

If you are on this page, you are a participant who has long-term hearing loss. You should have an education range of high school diploma to bachelor's degree. If you have an education beyond a bachelor's degree, you do not qualify for this survey.

All participants should be over the age of 18 and consent to participate. Participation is voluntary and participants can withdraw from taking the survey before submitting the survey. If you decline or discontinue the survey, there will be no negative impact for the participant or the researcher. All participants have a right to privacy and anonymity. The survey will not include collection of any personally identifying information. The survey information will only be used for this research study. There is a monetary compensation of \$5.00 for taking this survey. The benefit of your participation in this study is the chance to add to the growing knowledge about long-term hearing loss and what aspects

of long-term hearing loss have unexpected advantage because of the hearing loss. If you have questions about your rights as a participant you can contact the Walden University representative who can discuss this with you at 612-312-1210. If you have general questions about the study, including the purpose of the study, you can contact the researcher, Debbie Finken, at 720-289-6637.

The survey is a 21 item self-report scale and takes approximately 10 to 15 minutes to complete. If all of the questions in the survey are not answered the researcher may not be able to use your information in the study. All data will be stored in a file on the researcher's personal computer. The data gathered in the course of this study will be used only for the purposes of the current research study. If there is any paper data, it will be destroyed at the end of the study in a cross cut shredder. Data in an electronic format will be kept for a period of five years on a jump drive. At the end of the five year period, the data files on the jump drive will be erased.

This study has been reviewed by the Institutional Review Board at Walden University and has been approved. If you would like to find out more information about the conclusion of this study, you may contact the researcher at finkenhealth@comcast.net.

Taking this survey means that you acknowledge that you have read the informed consent. You have the opportunity to ask questions about this survey and any questions that you ask have been answered to the best ability of the researcher. By taking the survey you are

demonstrating that you voluntarily consent to participant in this study. You can print out a copy of this consent for your records.

Appendix E: Informed Consent No Discernable Hearing Loss

Walden University

Debbie Finken, Researcher

Thank you for taking this survey. This is a study about differences in social intelligence between those with no discernable hearing loss (no diagnosis of hearing loss) and long-term hearing loss. There is no intervention involved in this study and there are minimal risks involved with this study. This study involves participants taking a social intelligence survey. The purpose of this study is to determine if people with long-term hearing loss have improved social intelligence skills because of the manner in which they use coping strategies in order to manage life in a hearing world and still communicate effectively.

If you are on this page, you are a participant who does not have hearing loss. To qualify for this survey, participants should have no discernable hearing loss, meaning that you are unaware of hearing loss, or have not been diagnosed with hearing loss. Also, you should have an education range of high school diploma to bachelor's degree. If you have an education beyond a bachelor's degree, you do not qualify for this survey.

All participants should be over the age of 18 and consent to participate. Participation is voluntary and participants can withdraw from taking the survey before submitting the survey. If you decline or discontinue the survey, there will be no negative impact for the participant or the researcher. All participants have a right to privacy and anonymity. The survey will not include collection of any personally identifying information. The survey information will only be used for this research study. There is a monetary compensation

of \$5.00 for taking this survey. The benefit of your participation in this study is the chance to add to the growing knowledge about long-term hearing loss and what aspects of long-term hearing loss have unexpected advantage because of the hearing loss. If you have questions about your rights as a participant you can contact the Walden University representative who can discuss this with you at 612-312-1210. If you have general questions about the study, including the purpose of the study, you can contact the researcher, Debbie Finken, at 720-289-6637.

The survey is a 21 item self-report scale and takes approximately 10 to 15 minutes to complete. If all of the questions in the survey are not answered the researcher may not be able to use your information in the study. All data will be stored in a file on the researcher's personal computer. The data gathered in the course of this study will be used only for the purposes of the current research study. If there is any paper data, it will be destroyed at the end of the study in a cross cut shredder. Data in an electronic format will be kept for a period of five years on a jump drive. At the end of the five year period, the data files on the jump drive will be erased.

This study has been reviewed by the Institutional Review Board at Walden University and has been approved. If you would like to find out more information about the conclusion of this study, you may contact the researcher at finkenhealth@comcast.net.

Taking this survey means that you acknowledge that you have read the informed consent. You have the opportunity to ask questions about this survey and any questions that you

ask have been answered to the best ability of the researcher. By taking the survey you are demonstrating that you voluntarily consent to participant in this study. You can print out a copy of this consent for your records.

Curriculum Vitae

DEBBIE FINKEN**Education**

Ph.D., Health Psychology, Walden University, in progress with completion in January, 2015

Honors: Psi Chi: International Honor Society of Psychology

MS, General Psychology, Walden University

Honors: Psi Chi: International Honor Society of Psychology

BA, General Psychology, University of Colorado at Denver

Honors: Psi Chi: International Honor Society of Psychology

Liberal Arts Dean's List

National Dean's List

Accomplishments

Provide research and editorial work for a peer reviewed journal. The International Journal of Childbirth Education puts out a quarterly journal every year that is dedicated to practitioners for the purpose of improving the lives patients through research into infertility, childbirth and post-partum care.

Inform magistrate of children's specific needs, assuring children permanency plans through court. Court advocate who represents neglected/abused children. Creates safe environment for children. Assists in taking children to human service visitations and therapy. Report children's progress and needs to social worker, guardian-ad-litem, and therapists. Facilitates children's transition to foster care, reuniting with parent, or termination of parental rights. Work with Human Services to develop permanency plans for kids aging out of the social services system.

Associate Professor with curriculum planning for undergraduate studies in psychology. Professor of psychology with a background in health and clinical outcomes. Creates own curriculum for undergraduate level class.

Career History

Associate Professor, Metropolitan State University, Department of Psychology, 2015. Teaches class in developmental psychology at the undergraduate level.

Court Appointed Special Advocate and External Consultant, CASA, 2011 to present. Serves as an advocate for children in Child Protective Services in Jefferson and Gilpin Counties. Support child throughout court proceedings. Establish relationship, communicate court information and attend hearings. Research and communicate child's needs to court. Ensure court approved plans implemented for child. Includes work as an external consultant for the Department of Human Services Children, Youth, and Families.

Volunteer, National Alliance of Mental Illness, 2012 to present. Provide education, support, and advocacy to families affected by mental illness. Rewrites for manual updates that provide trainings for parents with children that have mental illness. Strategize and formulate support/training groups.

Legal Assistant, Linda M. Rediger and Associates, 1988 to 2000. Performed research and documentation for attorneys in personal injury cases, wills and testaments, divorce, child custody, and adoption. Met with clients to provide information for attorneys and determine goals for legal cases.