

ASSOCIATION BETWEEN HEARING LOSS AND THE ACTIVITIES OF DAILY LIVING
IN OLDER ADULTS

Submitted as part of the requisite for the
Master of Science in Speech-Language Pathology Degree
Of the School of Health Sciences

By

ANDREA B. HERNÁNDEZ MESTRE

May, 2017

Thesis director: Lillian R. Pintado Sosa, AuD, CCC-A, FAAA

Association Between Hearing Loss and the Activities of Daily Living in Older Adults

Andrea B. Hernández Mestre – Principal Investigator

Mentor: Lillian R. Pintado Sosa. AuD, CCC-A, FAAA

Approved: May 2017

-electronic signature-

Lillian R. Pintado Sosa, AuD, MSc, CCC-A, FAAA - Mentor

-electronic signature-

María Centeno, PhD, CCC-SLP Program Director

-electronic signature-

Nydia Bou Ed. D. CCC-SLP Dean

UNIVERSIDAD DEL TURABO SPEECH-LANGUAGE
PATHOLOGY PROGRAM AUTHORIZATION TO PUBLISH
MATERIAL IN THE VIRTUAL LIBRARY

I, Andrea B. Hernández Mestre, the owner of the copyrights of Association Between Hearing Loss and the Activities of Daily Living in Older Adults yield, this document under the law at the University of Turabo to publish and disseminate in the UT MSLP Program's Web Site.

This assignment is free and will last until the owner of the copyright notice in writing of its completion. I also take responsibility for the accuracy of the data and originality of the work.

Given the inherently trans-border nature of the medium (internet) used by the Virtual Library at the University of Turabo for its bibliographic digitized content, the transfer will be valid worldwide.

-electronic signature-

Andrea B. Hernández Mestre– Principal Investigator

Mentor: Lillian R. Pintado Sosa. AuD, CCC-A, FAAA

May 2017

Abstract

Hearing loss is the most frequent sensory deficit that affects all population, including older adults. Recent studies have associated hearing loss in older adults with impaired Activities of Daily Living (ADL) such as walking, and also with impaired Instrumental Activities of Daily Living (IADL) such as talking on the phone.

The purpose of this study was to explore the association between hearing loss, ADL and IADL of the elderly from the central area of Puerto Rico. This research was a quantitative correlational study in which a hearing screening (pure tone and otoscopy) was performed on 18 females and 6 male adults ages 65 to 90, followed by the Complete Activities of Daily Living Section (OARS Questionnaire). We used SPSS for data analysis. Hearing screening results showed 16 of our participants have some kind of hearing difficulties. This confirms previous studies in which hearing loss is common in older adults ages 65 or more. We hypothesized that hearing loss is associated with impaired ADL and IADL. The results of this study show that there was an association between these variables in some participants; however, it was not statistically significant. These results could be affected by the small amount of participants. Therefore, we conclude that for future directions the same study should be repeated with a larger sample.

Table of Contents

Chapter I- Introduction-----9

Introduction-----9

Problem Statement-----10

Purpose of Research-----12

Hypothesis-----12

Justification-----12

Glossary-----14

Chapter II – Literature Review-----17

Introduction-----17

Hearing Loss-----17

Hearing Loss in Older Adults-----20

Hearing Screening-----21

Impact of Hearing Loss-----22

Activities of Daily Living-----23

Chapter III – Methodology-----25

Introduction-----25

Purpose of Research-----26

Justification-----27

Type of Research-----27

Permission to IRB-----27

Access to Participants-----28

Research Scenario-----28

Research Procedure-----28

Participants-----28

Inclusion Criteria-----	28
Exclusion Criteria-----	29
Procedure of the Informative Sheet-----	29
Procedure and Instruments-----	29
Data Analysis-----	31
Confidentiality-----	31
Potential Risks to Participants-----	32
Potential Benefits to Participants-----	32
Benefits to Society-----	33
Chapter IV – Results -----	34
Introduction-----	34
Purpose of Research-----	34
Participants-----	35
Data Analysis-----	35
Results-----	35
Chapter V- Discussion and Conclusion -----	39
Introduction-----	39
Discussion-----	40
Conclusion-----	41
Future Investigation-----	42
Recommendation-----	43
References -----	44

Figure List

Figure 1 Hearing Screening Results-----37

Figure 2 Questionnaire Results-----38

Table List

Table 1 Demographic Characteristics of Participants-----35

Table 2 Medical Questionnaire Results-----36

Chapter I

Introduction

Introduction

The World Health Organization (WHO,2012) states that 360 million people worldwide suffer from hearing loss and according to the National Institute on Deafness and other Communication Disorders (NIDCD, 2010),approximately one third of adults over 65 years' old are affected. Hearing loss is one of the most common chronic conditions in the United States, if untreated it leads to serious emotional and social problems for older adults (The National Council on the Aging, 1999).

A person that doesn't have a normal hearing of 25dB or better in both ears is said to have hearing loss (WHO, 2015). Hearing loss can be classified by being mild, moderate, severe or profound, and it can affect one ear or both ears (National Institutes of Health [NIH],2012). One of the most common signs of hearing loss is having difficulties in hearing conversational speech or loud sounds (WHO, 2015).Hearing loss in older adults is linked to age, genetics, excessive noise exposure, illness, or use of ototoxic medications for many years (American Speech Language & Hearing Association [ASHA], n.d.-c).According to the NIDCD (2010), men are more likely to experience hearing loss in their lifetime than women.

Studies have found that untreated hearing loss may lead to cognitive, communication and physical functioning impairments which can lead to emotional and social problems in older adults (Chen, Genther, Betz & Lin, 2014;Gopinath, Schneider, McMahon, Teber, Leeder, Mitchell, 2012; Lin, Yaffe, Xia, Xue, Harris, Purchase-Helzner, 2013 andMikkola, Polku, Portegijs, Rantakokko, Rantanen, Viljanen, 2015). Hearing loss is associated to depression (Savikko, Routasalo, Tivis, Strangberg, &Pitakala, 2005), risk of dementia (Lin, Metter,

O'Brien, Resnick, Zonderman, & Ferrucci, 2011), anxiety, frustration and social isolation (Perissinotto, StijacicCenzer, & Covinsky, 2012). According to the WHO (2015) hearing loss causes older people to be excluded from communication, affecting their everyday life, causing feelings of loneliness, isolation and frustration.

Other studies suggest that physical performance may be affected because of little or no participation in social activities (Chen et al. 2014 and Mikkola et al., 2015). Lin et al. (2013) found that cognitive decline in older adults is associated with hearing loss which consequently is a problem because specific cognitive abilities such as processing speed, working memory, and executive functioning are important for auditory communication. However, Krueger, Wilson, Kamenetsky, Barnes, Bienias, & Bennett (2009) found that social activity and social support are related to improved cognitive function.

In order to study the impact of hearing loss, it is important to take into account that it is an individual experience and therefore it should not be measured in decibels only, because each person copes in a different way depending on: the early versus late onset, severity of the hearing loss, communication demands, progressive nature of the hearing loss and personality (Kaland & Salvatore, 2002). Many of the older population don't accept or know about their hearing loss, and in order to live a better life with this impairment, they must recognize and accept it (Gagné, Southall, and Jennings, 2011).

Problem Statement

Hearing is a process of picking up sound and giving meaning to it. It is one of the five senses and it is one of the most important because it allows us to understand the world around us (ASHA, n.d.-b). If older adults can't hear, their abilities to socialize, work, interact or communicate will be compromised (WHO, 2015).

According to the Administration on Aging (2011) there will be an increase of individuals over 65 by 2030. Meaning that this population is expected to double between 2008 and 2030, an estimate of 72.1 million. The World Health Organization (WHO, 2012) states that 360 million people worldwide suffer from hearing loss and The National Institute on Deafness and other Communication Disorders (NIDCD, 2010), states that approximately one third of adults over 65 years' old are affected. The NIH released a report on 2015 about a study of hearing loss among Hispanic/Latino adults in the United States in which they found that 1 in 7 Latinos has hearing loss.

Studies have found that untreated hearing loss may lead to cognitive, communication and physical functioning impairments which can lead to emotional and social problems in older adults (Chen et al., 2014; Gopinath et al. 2012; Lin et al., 2013; Mikkola et al., 2015). Hearing loss in older adults has been associated with impaired activities of daily living (ADL) such as walking across a room and toileting, and also with impaired instrumental activities of daily living (IADL) such as shopping and talking on the phone (Dalton, Cruickshanks, Klein, Klein R., Wiley and Nondahl., 2003; Gopinath et al. 2012). This suggests that an important aspect of daily living is communication (Dalton et al., 2003). Therefore, hearing loss is now being considered an important health problem due to the decrease in exchange of information which impacts daily life for older adults (Ciorba A, Bianchini C, Pelucchi S and Pastore A, 2012).

After an intense search there is currently no studies found in Puerto Rico's older population and how hearing impairment affects the activities of daily living of Puerto Ricans over 65. With an increasing aging population (Administration on Aging, 2011) investigating the effects of hearing loss to the activities of daily living in Puerto Rico's older population is an interesting approach to contributing in this area of research.

Purpose

The purpose of this research was to determine the relationship between hearing loss and impaired Activities of Daily Living (ADL) and impaired Instrumental Activities of Daily Living (IADL) in Puerto Ricans older than 65 years.

Hypothesis

The approaches presented above, allow us to express the following assumptions:

- H1: Hearing loss is associated with impaired ADL and IADL in the elderly of Puerto Rico.
- H0: Hearing loss is not associated with impaired ADL and IADL in the elderly of Puerto Rico.

Justification

NIH (2015) released a report about a study of hearing loss among Hispanic/Latino adults in the United States in which they found that 1 in 7 Latinos has hearing loss. The researchers analyzed the differences between subgroups and found that the Puerto Rican descent population have the highest rate of hearing loss, making this population interesting to study. They also found that hearing loss is more pronounced in those ages 65-74.

Studies have been published about impaired functioning being related to hearing loss in older adults (Chen et al., 2014; Crews & Campbell, 2004). According to Lin et al. (2011, 2013) hearing loss in older adults is one of the reasons for cognitive decline among this population. They indicate that one possible effect for cognitive decline in older adults may be because of reduced social engagement. Complication in social interaction because of hearing loss does not only have consequences in communication, but also affects physical performance, perceived

mobility and activities of daily living (Mikkola et al., 2015), which in general means that hearing loss may have an impact on the everyday life of an older adult.

According to our search, in Puerto Rico there has not been data reported about the activities of daily living and hearing loss in older adults or how this impairment causes limitations to this population. Therefore, understanding the impact of hearing loss on everyday life of the elderly population in Puerto Rico is critical because by knowing if there is a correlation between poor hearing and activities of daily living we can proceed to bringing awareness on ways to slow the progression of this condition and inform this population of possible treatment options that might benefit them to having a better quality of life.

Glossary

A

Activities of daily living (ADL)

Is used to measure functional disability in older adults, it is divided into two categories: Activities of Daily Living (ADL) which include basic functions and Instrumental Activities of Daily Living (IADL) which are functions needed in the community (McCusker, Bellavance, Cardin, and Belzile, 1999). The ADL include a define set of activities necessary for normal self-care. The activities are movement in bed, transfers, locomotion, dressing, personal hygiene, and feeding (Katz, Downs, Cash &Grotz 1970).

- Movement in bed means sitting in, rising from, and moving around in.
- Transfers means moving from one seat to another, changing position from sitting to standing, and transferring to and from the toilet and bed.
- Locomotion means walking on the level, on gentle slopes and down stairs.
- Dressing means putting on socks, stockings, and shoes, as well as clothing the upper and lower trunk.
- Personal hygiene means grooming, and washing of face, trunk, extremities and perineum.
- Feeding means eating and drinking, but not the preparation of food.(Chapter 16: Activities of Daily Living, n.d.).

F

Functioning

According to International Classification of Functioning, Disability, and Health (ICF)

functioning is defined in Functioning and Disability which includes:

- Body Functions and Structures—describes actual anatomy and physiology/psychology of the human body.
- Activity and Participation—describes the person's functional status, including communication, mobility, interpersonal interactions, self-care, learning, applying knowledge, etc.

H

Hearing

It is one of the five senses. It is a complex process of picking up sound and give meaning to it. The ability to listen is fundamental to understanding the world around us (ASHA 2015).

Hearing loss

“Hearing loss is the result of impaired auditory sensitivity and/or diminished speech intelligibility of the physiological auditory system. Individuals with hearing loss are sometimes described as deaf or hard of hearing based on the type, degree, and configuration of hearing impairment.” (ASHA, n.d.-a).

Hearing Screening

It presents a rapid audiological assessment to identify people who may require an additional diagnosis (Tye-Murray, 2014).

I

Instrumental Activities of Daily Living (IADL)

Is used to measure functions needed in the community. Are a define set of activities necessary for an individual to live independently in a community. These include: Shopping, use the telephone, manage transportation, self medication, manage their own finances, cooking and cleaning (McCusker et al., 1999)

O

Older adults

According to the World Health Organization (2010) older adult is anybody 50 years of age and older.

P

Presbycusis

Hearing loss that occurs as a result of deterioration of the age-related auditory system (DeBonis& Donohue, 2008).

Chapter II

Literature Review

Introduction

Hearing loss is the most frequent sensory deficit that affects all population ranging from newborns, children, adults and elderly (Mathers, Smith and Concha, 2000). The major causes of hearing loss in adults is presbycusis, which is related to ageing, long periods of exposure to loud noise, acoustic and physical trauma, and use of ototoxic drugs (ASHA, 2012; Duthey, 2013; WHO,2015). In order to understand the world around us and also be able to interact with each other, the ability to hear is important. Hearing loss in older adults has been associated with impaired activities of daily living (ADL) such as walking across a room and toileting, and also with impaired instrumental activities of daily living (IADL) such as shopping and talking on the phone (Daltonetal., 2003 andGopinath et al., 2012). This suggests that an important aspect of daily living is communication (Dalton etal., 2003).

Hearing Loss

Hearing loss is one of the most common chronic condition that affects adults (ASHA, 2011). Approximately 36 millions of adults in the United States indicate having some degree of hearing loss in which one third of Americans ranging from 65 to 74 years of age and a 47% of adults older than 75 have hearing loss (NIH,2012). According to ASHA (2011) men are more likely to have hearing loss than women. Damage on the external, middle or inner ear caused by genetic or non-genetic factors, illness or injury, infections, loud noise, ototoxic medications and chemical exposure are some of the causes of hearing loss (ASHA, n.d.c).

According to the National Institute of Health (NIH, 2012) hearing loss can be categorized depending on which part of the ear was damaged, therefore there are three categories: conductive, sensorineural and mixed hearing loss. The type of hearing loss is determined by comparing the results obtained by air conduction with those obtained by bone conduction (ASHA, n.d-a).

According to ASHA, (n.d.-a)

When sound is not conducted efficiently through the external ear canal to the eardrum and the ossicles of the middle ear it is referred to as conductive hearing loss. People with this type of hearing loss may experience a reduction in sound level or not have the ability to hear faint sounds. Conductive hearing loss can be corrected medically or surgically. Some causes for conductive hearing loss may be because of fluids in the middle ear, infections, tumors, impacted earwax, etc. When the inner ear (cochlea) is damaged, or the nerve pathways from the inner ear to the brain is damaged, it is referred to as sensorineural hearing loss (SNHL). This type of hearing loss is the most common and cannot be medically treated so far. People affected by this type of hearing loss have difficulties in hearing faint sounds even when the speech is loud enough. Some causes for sensorineural hearing loss are: aging, genetic, illness, ototoxic drugs, loud noise, etc. Mixed hearing loss is the combination of both conductive hearing loss and sensorineural hearing loss (SNHL). In other words, damage may be localized in the outer or middle ear and in the inner ear (cochlea) or auditory nerve.

The severity of the hearing loss is available in many grades: mild, moderate, severe or profound, and it can affect one ear or both ears. According to the NIH (2012):

It can range from mild hearing loss in which a person loses certain high-pitched sounds, like the voices of women and children, to a profound hearing loss. A form of hearing loss,

presbycusis, is the loss of hearing that gradually occurs while a person ages.

Presbycusismay occur due to changes in the inner ear, auditory nerve, middle ear or outer ear. Some causes are aging, loud noises, heredity, head injury, infection, illness, certain prescription drugs and circulatory problems such as high blood pressure. It can be hereditary or can be caused by disease, trauma, certain medications, or prolonged exposure to loud noise(para. 2).

According toDeBonis& Donohue (2008):

The audiogram is a graph that illustrates the type, degree and configuration of the hearing loss. Frequency is measured in Hertz (Hz) and the intensity of the sound is measured in decibels (dB). The audiogram registers the hearing levels of a person for frequencies of 125 to 8,000 Hz. Registered hearing levels outside the normal range represent degrees of hearing loss in a continuum from mild to profound (p. 39).

For adults, the following categories are typically used to classify the degree of hearing loss present(Bess &Humes, 1995 in DeBonis& Donohue, 2008).

-10 to 25 dB HL: normal

26 to40 dB HL: mild

41 to 55 dB HL: moderate

56 to 70 dB HL: moderately severe

71 to 90 dB HL: severe

91 + dB HL: profound

For children, the classification levels of hearing loss differ somewhat, emphasizing that even a small loss in hearing sensitivity can have a significant effect on a child who is

acquiring language. With this in mind, the degrees of hearing loss in children are categorized as follows:

-10 to 15 dB HL: normal

16 to 25 dB HL: slight

26 to 40 dB HL: mild

41 to 55 dB HL: moderate

56 to 70 dB HL: moderately severe

71 to 90 dB HL: severe

91 + dB HL: profound (p. 39).

Hearing Loss in Older Adults

Twenty-eight million American adults have hearing loss (Van Vliet, 2005). Hearing loss is the most common chronic health problem after hypertension and arthritis in older adults (Cruickshanks, Wiley, Tweed, Klein, Klein R., Mares Perlman, & Nonhdal, 1998). Studies show that the impact of hearing loss will increase in our society as baby boomers continue to age (Li-Korotky, 2012). This is due to the increase in number of the older persons and the age-specific prevalence of hearing loss (Yueh, Shapiro, MacLean, Shekelle, 2003).

Typical frequencies for normal conversation range from 500 to 3000 Hz at 45 to 60dB, but hearing generally declines about 1 dB annually after 60 years of age (Lee, Matthews, Dubno and Mills, 2005). Lee et al., (2005) show that men are more likely to experience greater hearing loss and earlier onset than women. Adults 61 to 70 years of age, about 37 % of adults, 60% of adults 71 to 80 years of age, and more than 8-% of adults older than 85 experience hearing loss of 25dB or more (Gates, Cooper, Kannel, Miller, 1990; Van Eyken, Van Camp, Van Laer, 2007).

No studies have shown evidence of a threshold age for the onset of hearing loss (Cruickshanks, Nonhdal, Tweed, Wiley, Klein, Klein R., Chappell, Dalton, & Nash, 2010).

Hearing loss has an impact in communication and functional ability, it is also associated with depression, cognitive decline, and quality of life (Yueh et al., 2003; Gates et al., 1990). Although its growing prevalence, hearing loss is not recognized by many as serious problem maybe due to its slow development or because of the belief that it is a normal part of aging.(Yueh et al., 2003; Walling and Dickson, 2012). Many older adults don't receive the adequate treatment due to the cost of hearing aids or assistive listening devices and social stigma of its diagnosis and management (Yueh et al., 2003).

About 90% or more of older adults with hearing impairment have sensorineural hearing loss (Yueh et al., 2003), but older adults may also have both conductive and sensorineural hearing loss (mixed hearing loss), which may affect cognitive abilities in sound interpretation. Genes are also involved in age-related hearing loss (VanEyken et al.,2007; Van Eyken et al., 2006). Another factor for hearing loss in older adults is noise exposure (regular exposure of 85dB or more) which contributes to the onset of the chronic condition damaging the cochlear hair cells (Cruickshanks et al., 2010). Other risk factor may be: alcohol use, hormones, illicit drug use, industrial chemicals, medical conditions, medications and tobacco use (Lee et al.,2005; Van Eyken et al., 2007; Van Eyken et al., 2006; Durga, Verhoef, Anteunis, Schouten, Kok,2007). Many older adults do not perceive hearing loss, only about 20% of adults 65 or older with moderate to profound hearing loss consider themselves as hearing impaired (Chou, Dana, Bougatsos, Fleming,&Beil, 2011).

Hearing Screening

Through the advancement of science, technology and medicine, assessing an individual's hearing capacity has received various benefits and modalities (DeBonis& Donohue, 2008). Assessing an individual's capacity of hearing now can be achieved by use of questionnaires, portable audiometers, otoscopes, and others (DeBonis& Donohue, 2008; McBride, Mulrow, Aguilar &Tuley, 1994). Formal audiological assessment involves a more sophisticated instrumentation known as a hearing screening (DeBonis& Donohue, 2008).

Weinstein (1986) defines a screening as the identification of an unrecognized disorder by procedures that can be applied quickly to separate people who have a disorder from those who do not. The goal of a hearing screening protocol, according to Weinstein (1986), is to identify hearing impaired older adults that require audiological attention.

Currently, hearing screenings are focused on the early detection to reduce the progressive deterioration of the condition, and the social and emotional impact on the patient's life and those around them(Ramírez et al., 2012). Ramirez also exposed that hearing screenings should be accurate and practical. According to the WHO (2015) these should include: a short questionnaire, otoscopy and an audiological examination.

A hearing screening on older adults involve three aspects (ASHA, 1997 andDeBonis& Donohue, 2008):Hearing disorders which is meant to discard biological and anatomical abnormalities of the ear, hearing disability which focuses on hearing loss, a tone of 25dB on frequencies of 1KHz, 2KHz and 4KHz is presented into both ears, and hearing impairment which focuses on measuring how hearing impairment interferes with daily activities and quality of life.

Impact of Hearing Loss

The impact of hearing loss is a different experience for everyone. Individuals will cope

with the situation differently depending on many factors such as early versus late onset, personality, severity of the hearing loss, whether its progression is gradual versus sudden, and the communication demands of each individual (Kaland and Salvatore, 2002).

Functional impact such as the individual's ability to communicate with others is one of the main impacts of hearing loss (WHO, 2015). Older adults with hearing loss are the most vulnerable when it comes to limited communication because it impacts their everyday life, causing them to feel lonely, isolated and frustrated (WHO, 2015). Hearing loss is also associated with depression, anxiety, frustration, social isolation, and fatigue (Oyler, 2012). With the increase of hearing loss in older adults, new studies suggest that because of the functional consequences of this impairment, it may be associated with the development of depression and loneliness (Chang-Quan et al., 2010; Pronk & Smits et al., 2011).

Gopinath et al. (2012) found that because of hearing loss, older adults were more likely to experience emotional distress and social engagement restrictions. Mick, Kawachi, and Lin (2013) suggest that women 60-69 years old with hearing loss have a higher possibility of becoming social isolated due to their impairment than men. According to the World Health Organization (WHO, 2015) hearing loss also has an economic impact because adults with this impairment have a higher unemployment rate.

Activities of daily living and older adults

The activities of daily living are used to measure functional disability in older adults, these are divided into two: Activities of Daily Living (ADL) which include basic functions (eating, dressing and undressing, grooming, walking, getting in and out of bed, bathing and continence), and Instrumental Activities of Daily Living (IADL) which include functions needed

in the community (using the telephone, travel, shopping, meal preparation, housework, taking medicine and management of finances) (McCusker et al., 1999). Several authors have found that there is an association between hearing loss and impaired ADL and IADL, although hearing loss is more likely to cause impaired IADL (Dalton et al., 2003; Gopinath et al., 2012).

Gopinath et al. (2012) found that older adults with a greater degree of hearing loss (>40 dB HL) were more likely to experience functional disability. The authors also found that there is a high risk of reduced capacity for independent living for those elders with moderate to severe hearing loss. Functions in everyday activities which depend on hearing, such as communication and social interaction, may be affected by negative self-perceptions and negative stereotypes of aging (Levy, Slade, & Kasl, 2002).

Yamada, Nishiwaki, Michikawa, and Takebayashi, (2012), investigated whether self-reported hearing loss in older adults had any association with impaired IADL or social participation. They found that there was no decline in social participation, but there was an association with future impaired IADL. Due to their results, they discuss that this decline in IADL may be because the sensory functioning is impaired with older age forcing older adults to rely more on their cognitive processing which can be exhausting making the IADL such as transportation, shopping or taking care of finances more tiresome and difficult to comprehend. Other possible explanations for their results may be family intervention, in which family members consider them disabled and don't allow them to perform IADL alone, and the combination between hearing loss and other medical conditions such as depression.

The ability to communicate with others is an important aspect of everyday life. Therefore, older adults that have hearing loss are at risk of having communication difficulties that can affect their quality of life because an important aspect of daily living is having to communicate (Dalton

et al., 2003). Therefore, hearing loss is now being considered an important health problem due to the decrease in exchange of information which impacts daily life for older adults (Ciorba et al., 2012).

Chapter III

Methodology

Introduction

Hearing loss is the most frequent sensory deficit that affects all population ranging from newborns, children, adults and elderly (Mathers, Smith and Concha, 2000). The major causes of hearing loss in adults is presbycusis, which is related to ageing, long periods of exposure to loud noise, acoustic and physical trauma, and use of ototoxic drugs (ASHA, 2012; Duthey, 2013; WHO, 2015).

According to WHO (2012) 360 million people worldwide suffer from hearing loss and according to the NIDCD(2010) approximately one third of adults over 65 years' old are affected. If untreated, hearing loss leads to serious emotional and social problems for older adults (The National Council on the Aging, 1999). According to the WHO (2015) it causes older people to be excluded from communication, affecting their everyday life, causing feelings of loneliness, isolation and frustration.

Hearing loss in older adults has been associated with impaired activities of daily living (ADL) such as walking across a room and toileting, and also with impaired instrumental activities of daily living (IADL) such as shopping and talking on the phone (Daltonetal., 2003; Gopinath et al., 2012). This suggests that an important aspect of daily living is communication (Daltonetal., 2003).

Purpose

The purpose of this study was to describe the association between hearing loss and impaired activities of daily living in older adults living independently. This was achieved by performing a hearing screening and administration of a questionnaire.

Justification

Hearing loss is more pronounced in those ages 65-74 who are Puerto Rican descent making this population interesting to study (NIH, 2015). Studies have been published about impaired functioning being related to hearing loss in older adults (Chen et al., 2014; Crews & Campbell, 2004). According to Lin et al. (2011, 2013) hearing loss in older adults is one of the reasons for cognitive decline among this population. They indicate that one possible effect for cognitive decline in older adults may be because of reduced social engagement. Complication in social interaction because of hearing loss does not only have consequences in communication, but also affects physical performance, perceived mobility and activities of daily living (Mikkola et al. 2015), which in general means that hearing loss may have an impact on the everyday life of an older adult.

The Activities of Daily Living (ADL) are used to measure functional disability in older adults, such as basic functions and the Instrumental Activities of Daily Living (IADL) measure functions needed in the community (McCusker et al., 1999). Several authors have found that there is an association between hearing loss and impaired ADL and IADL, although hearing loss is more likely to cause impaired IADL (Dalton et al., 2003; Gopinath et al., 2012).

Therefore, understanding the impact of hearing loss on everyday life of the elderly population in Puerto Rico is critical because by knowing if there is a correlation between poor hearing and activities of daily living we can proceed to bringing awareness on ways to slow the

progression of this condition and inform this population of possible treatment options that might benefit them to having a better quality of life.

Type of research

This research used an intra-method of quantitative descriptive type. Quantitative studies propose relationships between variables in order to arrive at precise propositions and make recommendations (Hernández, Fernández and Baptista, 2003). Intra-quantitative studies can collect data using two procedures, such as questionnaires and data (Denzin, 1989).

Obtaining permission from the IRB

This study was presented to the University System Ana. G. Mendez (SUAGM) for the approval of the Institutional Review Board (IRB). After the approval of the IRB, we proceeded to conduct this investigation.

Access to Participants

A support letter with permission to go to the organization from the dean of the program Masters in Speech Language Pathology was acquired. We then proceeded to have a meeting with the person in charge of the organization to explain the procedure and purpose of the study, giving space to clarify any questions. After they agreed to be part of the study, they gave us a Support Letter indicating their cooperation and authorization, we then proceeded by placing flyers explaining the study and inviting the elderly to participate in the same, we also acquired our participants by direct contact. The days and hours to do the research were coordinated with the center director based on availability after receiving authorization from the IRB to begin the study. Once the participants are identified, an individual dialogue was set between the investigator and

the participant in order to provide an Informative Letter about the investigation in which we explained the procedure and purpose, we gave space to clarify any questions and we stated that it is completely voluntary, private and confidential. All participants were told that they can withdraw at anytime without being penalized. The whole research scenario tookplace at the organization contacted in a private space offered by the center.

Research Scenario

The scenario where this research was conducted in a center housing seniors who are independent living (Retirement Homes). The data was obtained by performing various screenings and a questionnaire that will help meet the goal of this research.

Procedure

The researcher contacted a housing center to determine the possible participation of the center in this study. The administrator was oriented about the research process and its commitment to offer a private and confidential space to conduct the research. Administrator of the housing centers who agreed to participate handed over a letter of support. The day and time that we visited the center for data collection was set due to the availability of the housing center and was coordinated with the administration. Data collection was notified to the residents through an advertisement and direct contact. On the agreed days, the researcher met individually with the older adults interested in participating in the investigation. The research was conducted in the space previously assigned by the administration.

Participants

Participants of this research were 24 older adults from housing centers in the center area of Puerto Rico. These must meet the following criteria:

Inclusion Criteria

To participate in this research subjects had to meet the following research criteria:

1. Aged 65 years or more.
2. Not be hearing aid users.

Exclusion Criteria

Subjects that present the following exclusion criteria could not participate in this study:

1. Elderly who are not 65 years or older.
2. Elderly that have blockage due to ear wax in ear canal observed in the otoscopy.

Procedure of the Informative Sheet

The researchers met individually with the people interested in participating in the investigation and they will be handed an informative sheet. The orientation of this document was clear, using a simple and easy to understand vocabulary. In this fact sheet, we explained the research including its purpose, the procedure that will take place in order to realize the investigation and also the confidentiality process. In addition, we oriented that the approximate maximum participation time would be approximately 45 minutes. We emphasized that the participation is completely voluntary and that they have the right to withdraw at any time. We exposed the risks and benefits to be gained by deciding to participate. Each potential participant had time to clarify doubts or questions related to the research. Finally, information about the researchers was provided in case of any additional questions.

Procedure and Instruments

The procedure of this study was conducted in a private, confidential and free space distractor, where only the participant and the researchers were present. As soon as the consent for participation was obtained, we proceeded to start with the investigation. All screenings and questionnaires used in this research were only administered by the researchers. The specific

order of the procedure followed in this study will be proposed shortly. With the use of this particular order, we corroborated the inclusion and exclusion criteria with each of the participants.

Medical Questionnaire

We started by administering the medical questionnaire. This questionnaire was used to investigate Pintado, Weinstein, Rivero and Rodriguez (2014) and was adapted and verified by the researchers, for this present study. Through the use of this questionnaire, demographic data was obtained, which included information on gender, age and auditory status.

Otoscopy

An inspection of the external auditory canal (otoscopy) was performed by *Welch Allyn otoscope 2.5 V Halogen Otoscope Pocket Scope*. A result sheet was used to evaluate the otoscopy.

Hearing Screening

Pure tone screening was performed according to the protocol of Ventry and Weinstein (1983). The researchers performed it with a pure tone audiometer which was properly calibrated. The intensity at which the screening was held was 40dB and the frequencies to evaluate are 1kHz and 2kHz. The criterion of hearing impairment was "no pass" (does not respond to pure tone sound) in both ears at 1 kHz or 2 kHz or in any of the ears at 1 kHz and 2 kHz.

Complete Activities of Daily Living Section (ADL, IADL, SUMMARY SCALE)from the OARS

We received permission to use the Complete Activities of Daily Living Section (ADL, IADL, SUMMARY SCALE)from the OARS Questionnaire (Appendix A) designed by Fillenbaum, G.G. (1988 updated 1996) and translated to Puerto Rican Spanish by Migda M. Dieppa Mendoza (2000), available only from Center for the Study of Aging and Human

Development, Duke University Medical Center. The Activities of Daily Living (ADL) Questionnaire is a component of the OARS Multidimensional Functional Assessment Questionnaire that assess both basic ADLs and the more complex instrumental ADLs important for independent living in the community (Fillenbaum, G.G., 1988). The OARS ADL Questionnaire consists of 14 questions administered by a rater who solicits a self-report response from the participant. For each question, the client responds by indicating whether the tasks can be performed independently, with some assistant, or not at all. The participants ADL performance is then classified on a 6-point summary scale describing the degree of independence or impairment in all of the rated activities of daily living (Fillenbaum, 1988).

Data Analysis

Data from this study was analyzed using the Statistical Package for the Social Sciences (SPSS) version 23. The variables and data was analyzed descriptively and quantitative, identifying the mean, standard deviation, frequency and percentage. Multivariate and regression analysis was used to evaluate correlation or associations between different variables obtained through the hearing screening and the questionnaire, such as the Fisher correlation coefficient. The Excel program was used to save and encrypt data.

Confidentiality

All of the participant's information will remain anonymous. Any information that could identify the participant was not collected. For purposes of data analysis, we assigned a code number for each participant and the results were coded, in order to carry out the statistical analysis. Only the statistics had the encoded information and in Excel format. All documents associated with the investigation will remain confidential. All results and questionnaires will be kept in an accordion, which will be guarded by the researchers who are took samples. No one

outside of the researchers will have access to the information of the results and questionnaires. The researchers are the only people who had access to the raw data for analysis purposes.

A pen drive for the exclusive purpose of the investigation was used. All documents, results, pen drive, questionnaires, medical history, referrals, information sheet, hearing screening result, otoscopy result and coding information of participants generated in the course of this investigation will be kept in a locked file under key in the house of the principal investigator, Andrea B. Hernández Mestre for a period of 5 years. Then after 5 years, all documents mentioned before related to the investigation will be destroyed using a shredder. The information stored in the pen drive will be deleted.

Potential Risks to Participants

The risks associated with this study were presented to answering questions related to this study and were such as minimum;

1. Discomfort
2. Tiredness
3. Stress
4. Boredom
5. Emotional feelings when realizing the impact of hearing loss in their activities of daily living, while they answered the questionnaire.

Potential Benefits to Participants

Among the potential benefits to participating older adults on this research were:

1. Gaining awareness of how hearing loss has an impact on their daily activities.
2. Performing otoscopy and hearing screening, free of cost.

3. According to the results obtained, the participant can receive a referral with recommendations for follow-up in different areas.

Benefits to Society

There is an increase in the population of older adults, therefore the processes of early identification are fundamental. This study established the relationship between hearing loss and its influence in the activities of daily living in elderly Puerto Ricans, which, until now, could not be identified in the literature. Schneider et al. (2010) emphasizes that given the growth of the elderly population in most countries, we must raise awareness in the planning of social and health services for this population with hearing loss which could predispose them to reduced independence and increase need for help.

This is valuable information for health professionals interested in improving the quality of life of the elderly population, to know the extent of damage that hearing loss has on the activities of daily living in older adults. This may show the need to provide better methods of identifying older adults with hearing loss in order to improve the quality of life or to provide more methods to give out awareness about how hearing loss can affect this population (Dalton et al., 2003).

Chapter IV

Results

Introduction

Hearing loss in older adults is associated with loneliness social and physical dysfunction, frustration, isolation, dependence and communicological disorders (Ciorba et al., 2012). In the United States, 35 million or one-third of Americans over 65 years of age have significant hearing loss (He, Sengupta, Velkof and De Barros, 2005). According to the Office of the Attorney for Pensioners and Senior Citizens (2010) 26% of Puerto Rico's population is 65 years and by 2030, 30% of the population will be 60 years or older (US Census Bureau, 2010). Therefore, Puerto Rico is one of the countries with one of the highest percentages of older adults in the Caribbean and Latin America (Huenchuan&Morlachetti, 2010).

Chen et al. 2014 states that untreated hearing loss may lead to cognitive, communication and physical functioning impairments which can lead to emotional and social problems in older adults. A report by the NIH on 2015 found that 1 in 7 Latinos has hearing loss.

Hearing loss in older adults has been associated with impaired activities of daily living (ADL) such as walking across a room and toileting, and also with impaired instrumental activities of daily living (IADL) such as shopping and talking on the phone (Dalton et al., 2003; Gopinath et al., 2012). This suggests that an important aspect of daily living is communication (Dalton et al., 2003)

Purpose

The purpose of this study was to describe the relationship between hearing loss and the activities of daily living in older adults that live independently. This was acquired by a hearing

screening and questionnaires.

Participants

In this study we had 24 older adults participate that were 65 years or more and lived independently from the central area of Puerto Rico.

Data Analysis

Data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 23 to obtain descriptive statistics and for the descriptive analysis of the data and to explore the possible significant differences between the variables contemplated in the study.

Results

The findings of the research will be discussed below. Table 1 shows the results of the demographic characteristics of the sample. 75% of the participants were female, while 25% were male. The average age of participants was 76 years.

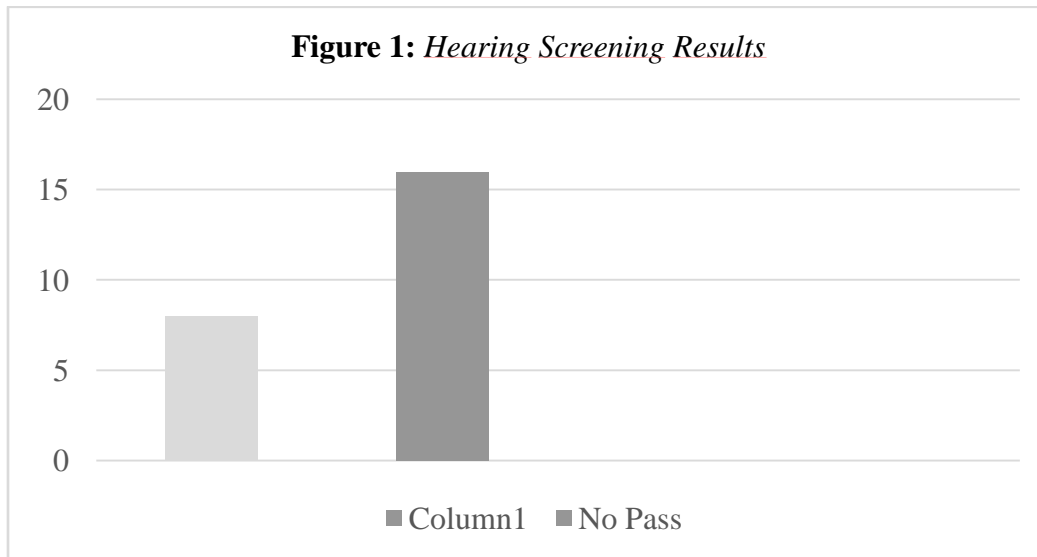
Table 1 *Demographic Characteristics of Participants n=24*

Characteristics		F (%)
Gender	Male	6 (25%)
	Female	18 (75%)
Age	65-90	
	Mean 76	
	Std. Deviation 7.27	

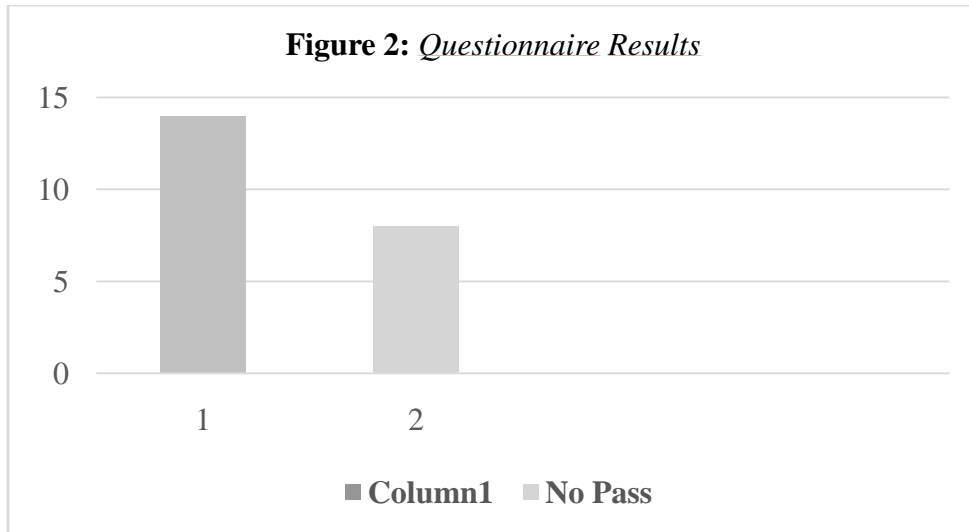
Table 2 shows the results of the medical questionnaire of the sample. 50% of the participants had diabetes. 87% of the participants claim to have been exposed to loud noises due to past work environment and home environment. 54% claim to have experience tinnitus. High blood pressure was present in 16 participants and 8 participants had osteoporosis. Of the 24 participants, 9 had a family history of hearing loss.

	F (%)
Diabetes	50%
Noise Exposure	87%
Tinnitus	54%
HBP	66%
Osteoporosis	33%
Family History of Hearing Loss	37%

Figure 1 shows the results obtained in the hearing screening. The pass criterion was to hear the tones presented at 40dB at 1KHz and 2KHz by both ears. It was found that 8 participants (33.3%) passed the pure tone screening, while 16 (66.7%) did not pass it.



In Figure 2 we can see the results obtained in the Complete Activities of Daily Living Section (ADL, IADL, SUMMARY SCALE) from the OARS Questionnaire. The results obtained showed that 10 participants (41.7%) had a score of 1 or 2, therefore they showed no disrupted ADL, while 14 participants (58.3%) scored below 3 or more, meaning that they had lightly deteriorated ADL or severely deteriorated ADL, receiving a non-pass in this study.



The purpose of this study was to explore the association between hearing loss, ADL and IADL of the elderly from the central area of Puerto Rico. In order to establish the relationship between these two variables, we used the Fisher statistical test, where a value of $p = .517$ was obtained. According to these results, there was an association between these variables in some participants; however, it was not statistically significant ($p < .05$).

Chapter V

Discussion and conclusions

Introduction

Hearing problems is common among older adults and is associated with decreased cognitive, physical, and mental health (Contrera et al., 2016). It should be noted that the population of older adults is increasing (Office of the Attorney for Pensioners and Senior Citizens, 2010). Maintaining adequate care for the growing number of older adults with some kind of need is a major factor (Schneider Schneider, J., Gopinath, B., Karpa, M., McMahon, C. Rohtchina, E., Leeder, S. & Mitchell, P., 2010). Chen et al. (2014), found an association between hearing loss and poor functioning in self reported measures including ADL, IADL, leisure and social activities, lower extremity mobility, general physical activities, work limitation, walking limitation and limitations due to confusion and memory.

Wallhagen, Strawbridge, Shema, Kurata & Kaplan (2001) looked at the association of hearing loss with the ability to perform activities of daily living (ADLs), instrumental activities of daily living (IADLs), physical performance, depression, and social participation, and found no consistent association between hearing loss and performance of ADL, IADL, or physical performance, however they did see a clear association with social functioning, as measured by feeling left out, feeling lonely or remote, finding difficulty in feeling close to others, or not being able to pay attention, with the association of hearing loss. However, other studies have been published about impaired functioning being related to hearing loss in older adults (Chen et al., 2014; Crews & Campbell, 2004; Dalton et al., 2003 & Gopinath et al., 2012). Therefore, hearing loss is now being considered an important health problem due to the decrease in exchange of information which impacts daily life for older adults (Ciorba et al., 2012).

In order to study the impact of hearing loss, it is important to take into account that it is an individual experience and therefore it should not be measured in decibels only, because each person copes in a different way depending on: the early versus late onset, severity of the hearing loss, communication demands, progressive nature of the hearing loss and personality (Kaland & Salvatore, 2002). Many of the older population don't accept or know about their hearing loss, and in order to live a better life with this impairment, they must recognize and accept it (Gagné, Southall, and Jennings, 2011). Gopinath et al. (2012) suggest that severe hearing loss could make a difference between independence and the need for formal support services or placement.

Discussion

Globally the population of older adults is increasing, having an impact on economic, social and mainly in health, who must provide more services (Cervantes, Villareal, Galicia, Vargas and Martinez, 2015). Hearing disorders are common in older adults, where most hearing loss occurs gradually and insidiously for years, many older adults are unaware of their hearing loss (Contrera et al., 2016).

There is increasing recognition of the problems faced by older adults in their hearing health care (Contrera et al., 2016). Mikkola et al. (2015) report that complication in social interaction because of hearing loss does not only have consequences in communication, but also affects physical performance, perceived mobility and activities of daily living, which in general means that hearing loss has an impact on the everyday life of an older adult.

The aim of this study was to describe the relationship between hearing loss and the activities of daily living (ADL) in older adults living independently. A relationship was obtained between the two variables, which reflected that participants with hearing loss had impaired ADL

than those without hearing loss. According to the statistic results (p value $>.05$), it is established that there is no significant relationship between hearing loss and ADL in the elderly living independently. Therefore, the research hypothesis can't be accepted because no association was observed statistically.

An important aspect of daily living is communication, if a person has impaired ADL, communication is more likely to be affected due to the lack of social interaction. (Dalton et al., 2003). Dalton also exposes that hearing impaired older adults have shown greater functional disability than non impaired adults. Hearing loss is now being considered an important health problem due to the decrease in exchange of information which impacts daily life for older adults (Ciorba et al. 2012).

Conclusion

Health professionals should be aware of the relationship between hearing loss and the activities of daily living. Our study did not suggest a relationship, however 42% of our participants had both impaired hearing and impaired activities of daily living, similar to other studies (Ciorba et al., 2012; Dalton et al., 2003; Gopinath et al., 2012). Lin et al. (2013) states that hearing loss may be associated with cognitive decline, possibly due to social isolation, which suggest that may also cause impaired ADL. This auditory impairment could in itself be the cause of impaired physical functioning through various mechanisms such as sensory deprivation (Chen et al., 2014).

Health professionals should play a very important role in the identification of hearing loss and in the appropriate referral mechanisms for their eventual intervention. Cervantes et al. (2015) discuss the importance of services to older adults and propose the use of simple and reliable

instruments that consume less time.

Primary health care providers are in a privileged position to improve the outcomes of older adults through knowledge of the system in which patients can obtain treatment and rehabilitation for their hearing problems, where hearing screening remains one of the first steps in the acquisition of primary care (Contrera et al., 2016). It is of the utmost importance that health professionals can identify and treat auditory problems in the older adult population, in order to prevent impaired activities of daily living.

Future Investigations

According to the results in this research, different areas could be investigated. An association between hearing loss in the elderly and diabetes could be identified. There are more studies investigating this area, and this study found that half of our participants had diabetes. Another important aspect to evaluate is the impact of hearing loss at the central level in older adults with independent living. Auditory impairment of older adults could also be assessed in order to relate it to auditory recognition by means of speech tests. Gopinath et al. (2012) found that there was a pronounced association in the instrumental activities of daily living (IADL) than in the activities of daily living (ADL). Therefore, another future research on the subject could be to repeat the same study of association of hearing loss and the execution of ADL and IADL with a larger sample and to further more explore which of the activities is more affected by the hearing loss.

Recommendation

In conclusion of this study, several topics were identified that could be included in similar research to be carried out:

- This study could be extended taking samples of other geographical areas of the island. This could create comparisons between different zones.
- This study could be extended taking a larger sample of older adults and create a comparison between males and females.
- Finally, this study could be modified for older adults institutionalized.
- The results dissemination process of this study will continue.

References

- Administration on Aging (AoA). (2011). A Profile of Older Americans. Retrieved from http://www.aoa.gov/Aging_Statistics/Profile/2011/4.aspx
- American Speech-Language-Hearing Association. (1997). *Guidelines for Audiologic Screening* [Guidelines]. Available from www.asha.org/policy.
- American Speech-Language-Hearing Association (ASHA). (n.d.-a). The Audiogram. Retrieved from <http://www.asha.org/public/hearing/Audiogram/>
- American Speech-Language-Hearing Association (ASHA). (2011). Hearing Loss. Retrieved from <http://www.asha.org/public/hearing/Hearing-Loss/>
- American Speech-Language-Hearing Association (ASHA). (n.d.-b). Hearing Loss: Beyond Early Childhood Content Development. Retrieved from <http://www.asha.org/Practice-Portal/Clinical-Topics/Hearing-Loss/Hearing-Loss-Content-Development/>
- American Speech-Language-Hearing Association (ASHA). (n.d.-c). International Classification of Functioning, Disability, and Health (ICF). Retrieved from <http://www.asha.org/slp/icf/>
- American Speech-Language-Hearing Association (ASHA). (2012). Untreated Hearing Loss in Adults-A Growing National Epidemic. Retrieved from <http://www.asha.org/Aud/Articles/Untreated-Hearing-Loss-in-Adults/>
- Becerril-Ramírez, P. B., González-Sánchez, D. F., Gómez-García, A., Figueroa-Moreno, R., Bravo-Escobar, G. A., & Miguel A. García De La Cruz. (2013). Hearing Loss Screening Tests for Adults. *Acta Otorrinolaringologica* (English Edition), 64(3), 184-190. doi: 10.1016/j.otoeng.2013.06.001
- Bodmer, D. (2008). Protection, regeneration and replacement of hair cells in the cochlea: implications for the future treatment of sensorineural hearing loss. *Swiss Medical Weekly*,

138(47-48), 708-712. Retrieved from <http://www.smw.ch/docs/pdf200x/2008/47/smw-12260.pdf>

Cervantes. R., Villareal, E., Galicia, L. Vargas, E. & Martínez, L. (2015). Estado de salud en el adulto mayor en atención primaria a partir de una valoración geriátrica integral. *Atención Primaria*, 45(6): 329-335. Doi: 10.1016/j.aprim.2014.07.007

Ciorba, A., Bianchini, C., Pelucchi, S., & Pastore, A. (2012). The impact of hearing loss on the quality of life of elderly adults. *CIA Clinical Interventions in Aging*, 159. doi:10.2147/cia.s26059

Chang-Quan H, Bi-Rong D, et al. (2010) Chronic Diseases and Risk for Depression in Old Age: A Meta-Analysis of Published Literature. ; 9:131–141.

Chapter 16: Activities of Daily Living. (n.d.). Retrieved from <http://www.vrb.gov.au/pubs/garp-chapter16.pdf>

Chen,D.S. et al. (2014). Association between hearing impairment and self reported difficulty in physical functioning. *J Am GeriatrSoc*, 850-856.

Clark, J. G. (1981). Uses and abuses of hearing loss classification. *Asha*, 23, 493–500.

Crews,J.E. et al. (2004). Vision impairment and hearing loss among community-dwelling older americans: Implications for health and functioning. *American Journal of Public Health*, 823-829.

Cruickshanks KJ, Nondahl DM, Tweed TS, et al. (2010). Education, occupation, noise exposure history and the 10-yr cumulative incidence of hearing impairment in older adults. *Hear Res.*;264(1–2):3–9.

- Cruickshanks KJ, Wiley TL, Tweed TS, et al. (1998) Prevalence of hearing loss in older adults in Beaver Dam, Wisconsin. The Epidemiology of Hearing Loss Study. *Am J Epidemiol.*;148(9):879–886.
- Dalton, D.S. et al. (2003). The impact of hearing loss on quality of life in older adults. *The Gerontologist*,661-668.
- DeBonis, D. A. & Donohue, C. L. (2008). Acoustics of Sound and Preliminary Clinical Application. Second Edition, Survey of Audiology: Fundamentals for Audiologists and Health Professionals (pp. 39). Pearson Education, Inc.
- Denzin NK (1989) The Research Act: A Theoretical Introduction to Sociological Methods. Third edition. Prentice Hall, New York NY.
- Duthey, B. (2013). Background Paper 6.21 Hearing Loss. Retrieved from http://www.who.int/medicines/areas/priority_medicines/BP6_21Hearing.pdf
- Formiga, F. et al. (2006). Relacion entre la perdida sensorial y la capacidad funcional en personas mayores de 89 años. EstudioNonaSantfeliu. *Rev EspGeriatrGerontol.* 258-263.
- Gagné, J.-P., Southall, K., & Jennings, M. B. (2011). Stigma and self-stigma associated with acquired hearing loss in adults. *Hearing Review*, 18(8), 16–22.
- Gates, G. A., Cooper, J. C., Kannel, W. B., & Miller, N. J. (1990). Hearing in the Elderly. *Ear and Hearing*, 11(4), 247-256. doi:10.1097/00003446-199008000-00001
- Gopinath,B. et al (2012). Severity of age related hearing loss is associated with impaired activities of daily living. *Age and Aging*, 195-200.
- Gopinath, B.et al. (2012). Hearing impaired adults are at increased risk of experiencing emotional distress and social engagement restrictions five years later. *Age and Aging*. 1-6.
- Hernández, R., Fernández, C., & Baptista, P. (2006). Metodología De La Investigación.México:

McGraw-Hill.

He, W., Sengupta, M., Velkoff, V.A., & DeBarros, K. A. (2005). 65+ in the United States: 2005.

Issued December 2005. Washington, D. C: USA Department of Health and Human Services.

Heyl, V., & Wahl, H. (2012). Managing daily life with age-related sensory loss: Cognitive

resources gain in importance. *Psychology and Aging*, 27(2), 510-521.

doi:10.1037/a0025471

Huenchuan, S. & Morlachetti, A. (2010). Derechos sociales y envejecimiento: Modalidades y

perspectivas respeto y garantía en América Latina. Censo de Envejecimiento Poblacional de América Latina (CEPAL). (pp. 145-159).

Kaland, M., & Salvatore, K. (2002). The psychology of hearing loss. *The ASHA Leader*, 7(5), pp. 4-5, 14-15.

Katz S., Down, TD, Cash, HR, et al. (1970) progress in the development of the index of ADL.

Gerontologist 10:20-30. Copyright The Gerontological Society of America. Reproduced by permission of the publisher.

Krueger, K. R., Wilson, R. S., Kamenetsky, J. M., Barnes, L. L., Bienias, J. L., & Bennett, D. A.

(2009). Social Engagement and Cognitive Function in Old Age. *Experimental Aging Research*, 35(1), 45-60. doi:10.1080/03610730802545028

Lee FS, Matthews LJ, Dubno JR, Mills JH. (2005). Longitudinal study of pure-tone thresholds in older persons. *Ear Hear.*;26(1):1-11.

- Levy, B. R., Slade, M. D., & Kasl, S. V. (2002). Longitudinal Benefit of Positive Self-Perceptions of Aging on Functional Health. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 57(5). doi:10.1093/geronb/57.5. P.409
- Li-Korotky, H., (2012). Age related hearing loss: Quality of care for quality of life. *The Gerontologist*, 265-271.
- Lin, F. R., Metter, E. J., O'Brien, R. J., Resnick, S. M., Zonderman, A. B., & Ferrucci, L. (2011). Hearing loss and incident dementia. *Archives of Neurology*, 68, 214–220.
- Lin F. R., Yaffe K., Xia J., Xue Q. L., Harris T. B., Purchase-Helzner E., et al. (2013). Hearing loss and cognitive decline in older adults. *JAMA Intern. Med.* 173, 293–299.
- Lodeiro-Fernandez, L. et al. (2015). The impact of hearing loss on language performance in older adults with different stages of cognitive function. *Clinical Interventions in Aging*, 695-702.
- Lopez- Torres Hidalgo, J. et al. (2008). The hearing dependent daily activities scale to evaluate impact of hearing loss in older adults. *Annals of family medicine*, 441-447.
- Mathers C., Smith A. and Concha M(2000). Global burden of hearing loss in the year 2000 World Health Organization (WHO) retrieved from http://www.who.int/healthinfo/statistics/bod_hearingloss.pdf
- McBride, W. S., Mulrow, C. D., Aguilar, C., & Tuley, M. R. (1994). Methods for Screening for Hearing Loss in Older Adults. *The American Journal of Medical Sciences*, 307(1).
- Mikkola, T.M. et al. (2015). Self reported hearing status is associated with lower limb physical performance, perceived mobility, and activities of daily living in older community-dwelling men and women. *Jags*, 1164-1169.

National Institutes of Health (NIH). (n.d.). Nearly 1 in 7 Hispanic/Latino adults has some hearing loss. Retrieved from [https://www.nih.gov/news-events/news-releases/nearly-1-7-](https://www.nih.gov/news-events/news-releases/nearly-1-7-hispanic/latino-adults-has-some-hearing-loss)

[hispanic/latino-adults-has-some-hearing-loss](https://www.nih.gov/news-events/news-releases/nearly-1-7-hispanic/latino-adults-has-some-hearing-loss)

National Institutes of Health (NIH). (n.d.). Hearing Loss. Retrieved from

<https://nihseniorhealth.gov/hearingloss/hearinglossdefined/01.html>

National Institute on Deafness and other Communication Disorders (NIDCD). (2010). Age-

Related Hearing Loss. Retrieved from <https://www.nidcd.nih.gov/health/age-related-hearing-loss>

Oficina del Procurador de las Personas Pensionadas y de la Tercera Edad (2010). Recuperado de:

<http://www.oppte.pr.gov/>

Oyler, A. L. (2012). Untreated Hearing Loss in Adults-A Growing National Epidemic. Retrieved from <http://www.asha.org/Aud/Articles/Untreated-Hearing-Loss-in-Adults/>

Perissinotto CM, Stijacic-Cenzer I, & Covinsky KE (2012). Loneliness in older persons: A predictor of functional decline and death. *Arch Intern Med.*; 172:1078-1083.

Pronk M, Deeg D, Smits C, et al. (2011). Prospective effects of hearing status on loneliness and depression in older persons: Identification of subgroups. *Int J Audiol.*; 50:887-896.

Schneider, J., Gopinath, B., Karpa, M., McMahon, C. Rohtchina, E., Leeder, S. & Mitchell, P.

(2010). Hearing loss impacts on the use of community and informal supports. *Age and Ageing*, 39, 458-464. doi:10.1093/ageing/afq051

- The National Council on the Aging (NCOA). (1999). The Consequences of Untreated Hearing Loss in Older Persons. Retrieved from <https://www.ncoa.org/wp-content/uploads/NCOA-Study-1999.pdf>
- Tye-Murray, N. (2014). Foundations of Aural Rehabilitation: Children, Adults, and Their Family. 4th ed. *Delmar Cengage Learning*.
- Van Eyken E, Van Camp G, Van Laer L. (2007). The complexity of age-related hearing impairment: contributing environmental and genetic factors. *Audiol Neurootol*.;12(6):345–358.
- Van Eyken E, Van Laer L, Fransen E, et al. (2006). KCNQ4: a gene for age-related hearing impairment? *Hum Mutat*.;27(10):1007–1016.
- Van Vliet D. (2005). The current status of hearing care: can we change the status quo? *J Am AcadAudiol*. ;16(7):410–418.
- Wallhagen MI, Strawbridge WJ, Shema SJ, Kurata J, Kaplan GA.(2001). Comparative impact of hearing and vision impairment on subsequent functioning. *Journal of the American Geriatrics Society*.49(8):1086–1092.
- Walling AD and Dickson GM.(2012). Hearing Loss in Older Adults. *Am Fam Physician*.;15;85(12):1150-1156
- Weinstein, B (1986). Geriatric hearing loss: Myths, realities, resources for physician. *Geriatrics*, 44(4), 42-58.
- WHO (n.d.). Proposed working definition of an older person in Africa for the MDS Project. Retrieved from <http://www.who.int/healthinfo/survey/ageingdefnolder/en/>
- WHO. (2015). Deafness and hearing loss. Retrieved from <http://www.who.int/mediacentre/factsheets/fs300/en/>

- Yamada, M., Nishiwaki, Y., Michikawa, T., & Takebayashi, T. (2012). Self-Reported Hearing Loss in Older Adults Is Associated with Future Decline in Instrumental Activities of Daily Living but Not in Social Participation. *Journal of the American Geriatrics Society*, 60(7), 1304-1309. doi:10.1111/j.1532-5415.2012.04039.x
- Yueh B, Shapiro N, MacLean CH, Shekelle PG. (2003). Screening and management of adult hearing loss in primary care: scientific review. *JAMA*. ;289(15):1976–1985.

Appendix

Appendix A

**CUESTIONARIO DE EVALUACIÓN FUNCIONAL
MULTIDIMENSIONAL DE OARS**

Número del sujeto _____

Fecha de entrevista _____
Mes Día Año

Hora comienzo entrevista _____

Nombre del entrevistador _____

***PROGRAMA DE RECURSOS Y SERVICIOS PARA AMERICANOS MAYOR EDAD
DEL CENTRO PARA EL ESTUDIO DEL ENVEJECIMIENTO
Y EL DESARROLLO HUMANO DE LA UNIVERSIDAD DE DUKE
DURHAM, CAROLINA DEL NORTE 2771***

Revisado 1988

Derechos de autor @ 1975 Centro Universidad de Duke para el Estudio del Envejecimiento y el Desarrollo Humano. Todos los derechos reservados.

Traducido @ 2000 Migda M. Dieppa Mendoza

ACTIVIDADES DE LA VIDA DIARIA

Ahora, me gustaría preguntarle sobre las actividades de la vida diaria que todos tenemos que realizar como parte de nuestras vidas diarias. Me gustaría saber si usted puede hacer estas actividades sin ninguna ayuda, o si necesita algún ayuda para hacerlas, o si no las puede hacer en lo absoluto.

[ASEGURESE DE LEER AL ENTREVISTADO TODAS LAS ALTERNATIVAS EN LAS PREGUNTAS DE LA 56. HASTA LA 69. SI APLICAN]

AVD INSTRUMENTALES

56. ¿Puede usar el teléfono...

2 sin ayuda, incluyendo el buscar los números y marcarlos;

1 con alguna ayuda, (puede contestar el teléfono o marcar el número de la operadora en una emergencia, pero necesita un teléfono especial o ayuda para buscar el número o marcarlo);

0 está completamente imposibilitado para usar teléfono?

- No contestó

57. ¿Puede llegar a lugares distantes (a los que no se puede llegar caminando)...

2 sin ninguna ayuda (guía su propio carro, viaja solo/a en guagua o taxis);

1 con alguna ayuda (necesita alguien que le ayude o vaya con usted cuando viaja); o

0 no puede viajar a menos que se hagan arreglos para transportarlo en un vehículo especial como una ambulancia?

- No contestó

58. ¿Puede ir a comprar alimentos o ropa [ASUMIENDO QUE SUJETO TIENE

TRANSPORTACION]...

2 sin ayuda (se encarga usted de todas sus necesidades de compra, asumiendo que tiene transportación).

1 con alguna ayuda (necesita que alguien vaya con usted cuando va de compras) o;

0 está totalmente imposibilitado/a para ir de compras usted solo/a?

-No contestó

59. ¿Puede prepararse sus propias comidas?

- 2 sin ayuda (planifica y cocina comidas completas usted solo/a);
- 1 con alguna ayuda (puede prepararse algunas cosas pero no puede prepararse comidas completas; o
- 0 está totalmente imposibilitado/a para prepararse cualquier comida?
- No contestó

60. ¿Puede hacer las tareas del hogar...

- 2 sin ayuda (puede limpiar pisos, etc.)
- 1 con alguna ayuda (puede hacer el trabajo liviano, pero necesita ayuda con el trabajo pesado); o
- 0 está totalmente imposibilitado/a para cualquier tarea?
- No contestó

61. ¿Puede tomarse su medicina...

- 2 sin ayuda (se toma la dosis correcta a la hora indicada);
- 1 con alguna ayuda (puede tomarse la medicina si alguien se la prepara y/o le recuerda tomarla); o
- 0 está totalmente imposibilitado/a para tomar sus medicinas?
- No contestó

62. ¿Puede encargarse de su dinero por sí mismo/a?

- 2 sin ayuda (escribe cheques, paga las cuentas, etc.);
- 1 con alguna ayuda (se encarga de las compras diarias, pero necesita ayuda para cuadrar su chequera y pagar sus cuentas); o
- 0 está totalmente imposibilitado/a para manejar el dinero?
- No contestó

AVD FISICAS

63. ¿Puede comer...

- 2 sin ayuda (puede alimentarse solo/a por completo);
- 1 con alguna ayuda (necesita ayuda para cortar los alimentos, etc.); o
- 0 está totalmente imposibilitado/a para alimentarse por usted mismo?
- No contestó

64. ¿Puede vestirse y desvestirse solo/a...

- 2 sin ayuda (puede escoger la ropa, vestirse y desvestirse solo/a);
- 1 con alguna ayuda; o

- 0 está totalmente imposibilitado/a para vestirse y desvestirse solo/a?
- No contestó

65. ¿Puede cuidar de su apariencia por sí solo/a, por ejemplo peinarse y (para hombres) afeitarse...

- 2 sin ayuda
- 1 con alguna ayuda; o
- 0 está totalmente imposibilitado/a para cuidar de su apariencia por usted mismo/a?
- No contestó

66. ¿Puede caminar...

- 2 sin ayuda (excepto la de un bastón)
- 1 con ayuda de alguien o usando un andador o muletas, etc.; o
- 0 está totalmente imposibilitado/a para caminar?
- No contestó

67. ¿Puede acostarse y levantarse de la cama...

- 2 sin ninguna ayuda o asistencia;
- 1 con alguna ayuda (de una persona o con la ayuda de algún artefacto); o
- 0 depende totalmente de que alguien lo/a levante?
- No contestó

68. ¿Puede darse un baño o ducharse?

- 2 sin ayuda
- 1 con alguna ayuda (necesita ayuda para meterse y salirse de la bañera, o necesita aparatos especiales en la bañera); o
- 0 está totalmente imposibilitado/a para bañarse solo/a?
- No contestó

69. ¿Alguna vez ha tenido dificultad para llegar al baño a tiempo?

- 2 No
- 1 Sí
- 0 Tiene un catéter o colostomía
- No contestó

[SI CONTESTACION ES "SÍ", HAGA LA PREGUNTA a.]

a. ¿Cuán a menudo se orina o se evacua encima (ya sea de día o de noche)?

- 1 Una o dos veces a la semana
- 0 Tres veces ó más a la semana
- No contestó

70. ¿Hay alguien que le ayude con cosas tales como ir de compras, hacer las tareas del hogar, bañarse, vestirse o moverse dentro de la casa?

- 1 Sí
- 0 No
- No contestó

[SI CONTESTACION ES “SÍ”, HAGA LAS PREGUNTASa. Y b.]

a ¿Quién es su ayudante principal?

Nombre _____ Relación _____

b. ¿Quién más lo ayuda?

Nombre _____ Relación _____