Communicative participation in adults with hearing impairment: Associated variables and correlations with the Communicative Participation Item Bank (CPIB) and existing measures.

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He aha te mea nui o te ao?
He tangata, he tangata, he tangata.

Abstract

Background: Although a multitude of assessment tools exist in the audiology field, there is a lack of tools which specifically target participation, and more specifically communicative participation.

Purpose: This study aimed to identify variables associated with self-reported communicative participation in a sample of community-dwelling older adults with hearing impairment (HI), and examine the relationship between the Communicative Participation Item Bank (CPIB) and existing measures of hearing and health-related quality of life (HRQoL).

Method: Demographic, audiometric and self-report data was collected from 68 older adults with HI in New Zealand. Self-report assessments included: the CPIB – a measure of communicative participation; Hearing Handicap Inventory for the Elderly (Ventry & Weinstein, 1982) and Adults (Newman, Weinstein, Jacobson, & Hug, 1990); Self-efficacy for Situational Management Questionnaire (Jennings, 2005); and a generic measure of HRQoL, the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36; Ware & Sherbourne, 1992).

Results: Measured HI and self-perceived hearing ability were significant (*p*-values .038 and <.001 respectively) predictors of communicative participation, accounting for 48% of the variance. The CPIB was highly correlated with condition-specific self-report measures used, but was not significantly correlated with the generic measure of HRQoL, the SF-36.

Conclusion: This study adds to the understanding of factors which influence the daily life of older adults with HI, and is the one of first studies to specifically examine communicative participation in this population. The CPIB may be appropriate for use in the assessment of communicative participation in adults with HI.

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List of Abbreviations

ACS	Activity Card Sort test
ANSI	American National Standards Institute
ASHA	American Speech-Language-Hearing Association
BEPTA	Better ear pure-tone average
COMCAT	Communicative Activities Checklist
CPIB	Communication Participation Item bank
dB HL	Decibel Hearing Level
HHI	Hearing Handicap Inventory (Elderly and Adult jointly)
HHIA	Hearing Handicap Inventory for Adults
HHIE	Hearing Handicap Inventory for the Elderly
HI	Hearing Impairment
HRQoL	Health related Quality of life
Hz	Herts
ICF	International Classification of Functioning, Disability, and Health
IPA	Impact on Participation and Autonomy questionnaire
MCS	Mental Component Scale
NZAS	New Zealand Audiological Society
PCS	Physical Component Scale
PDQ-8	Parkinson’s Disease Questionnaire – 8 Item version
PTA	Pure-tone average
SESMQ	Self-efficacy for Situational Management Questionnaire
SESMQ-C	Self-efficacy for Situational Management Questionnaire – Confidence
SESMQ-H	Self-efficacy for Situational Management Questionnaire – Hearing ability
SF-36	Medical Outcome Survey – 36-Item Short Form
SIP	Sickness Impact Profile
WEPTA	Worse ear pure-tone average
WHO	World Health Organization
WHODAS-II	WHO Disability Assessment Schedule II

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Chapter 1. Introduction

1.1 Overview

Hearing impairment (HI) is a chronic condition which affects an estimated 360 million people worldwide (World Health Organization [WHO], 2015), and 380,000 people (9% of the total population) in New Zealand (Statistics New Zealand, 2014). HI is the third most common disability among adults in New Zealand, preceded only by mobility and agility issues (Office for Disability Issues and Statistics New Zealand, 2013). HI affects people of all ages, with the largest group affected being those over the age of 65 (Exeter, Wu, Lee, & Searchfield, 2015; Greville, 2005; Statistics New Zealand, 2014), and is the most common acquired communication disorder in adults (Hickson & Scarinci, 2007; WHO, 2015).

HI has negative auditory and non-auditory impacts for the individual. The negative non-auditory consequences of HI are well documented in the literature. Non-auditory consequences include communication difficulties, social and emotional isolation, and decreased perceived quality of life (Chia et al., 2007; Hickson et al., 2008). The non-auditory impacts of HI can be conceptualised using the WHO's International Classification of Functioning, Disability, and Health (ICF; WHO, 2001).

There is a broad battery of tools in the field of audiology (Granberg, Dahlström, Möller, Kähäri, & Danermark, 2014), but there are a number of limitations in using the existing tools as measures of communicative participation (Miller, Baylor, Birch, & Yorkston, 2017). It is important to understand how HI impacts communicative participation so that rehabilitation can be adequately planned and outcomes assessed in a targeted and meaningful way for the individual with HI.

At present there is no tool which unambiguously assesses communicative participation in people with HI. A communicative participation specific tool presently used in other communication disorder populations has recently been examined for use with adults with HI (Miller et al., 2017). Therefore, this study aims to investigate factors which are related to communicative participation in older adults with HI, and how the measure of communicative participation correlates with existing measures within the field of audiology.

1.2 Hearing Impairment

1.2.1 Overview.

HI indicates a decrease in hearing sensitivity to auditory stimuli as a result of change to the structure and/ or function of some aspect/s of the auditory system (Yost, 2007). HI that occurs with age is termed *presbycusis*. Presbycusis is a permanent, sensorineural hearing loss, meaning that it originates from the cochlea (the inner ear) and/or neural structures beyond the cochlea. It is primarily characterised by a gradual HI which occurs bilaterally. The HI initially affects the high frequency hearing regions, and extends to lower frequencies with advancing age (Yost, 2007). There is general consensus in the literature that presbycusis is the result of multiple contributors, including: physiological degeneration, accumulative noise exposure, and genetic/ hereditary susceptibility factors (Q. Huang & Tang, 2010).

HI is quantified objectively by the degree of hearing loss, and subjectively by way of self-reported difficulties experienced (American Speech-Language-Hearing Association [ASHA], 2006; New Zealand Audiological Society [NZAS], 2016b; 2016c). Self-reported difficulties may be assessed using a measurement tool, or be anecdotal reports (Erber, 1993; NZAS, 2016a).

Assessment of HI is referred to clinically as an audiological assessment. The assessment consists of a number of tests, including pure-tone and speech audiometry. Pure-tone audiometry is a key component of the assessment battery. Pure-tone audiometry is utilised for the diagnosis and monitoring of HI (ASHA, 2005). Pure-tone audiometry testing is carried out using a standard procedure which involves two stages: familiarisation and threshold determination (ASHA, 2005). The Hughson-Westlake (1944) test procedure as modified by Carhart and Jerger (1959) is typically utilised in audiology. It requires a behavioural response from the individual to the presence of sound in the form of a raised hand or pushing of a button (ASHA, 2005; Schlauch & Nelson, 2015). Pure-tone audiometry determines an individual's lowest level of hearing sensitivity for a calibrated pure-tone sound; this is called a threshold (ASHA, 2005). Threshold is defined as the lowest sound level at which an individual responds at least fifty percent of the time (Schlauch & Nelson, 2015), and is measured in the unit decibel hearing level (dB HL). Hearing threshold results are plotted on a graph, called an audiogram, with standardised symbols. From the audiogram, the type, degree of severity, and configuration of the hearing impairment can be determined. Audiometric symbols used here-in are the standard symbols for use in New Zealand, as specified by the NZAS (2016b, p. 16).

The severity of an individual's hearing loss is defined by the threshold value, and then categorised with a descriptive label for that dB HL range. Severity of a hearing impairment may be described by a pure-tone average of three frequencies (500, 1000 and 2000 Hz), four frequencies (500, 1000, 2000 and 4000 Hz), by each measured frequency, or by frequency range (low, mid, and high). Multiple classification scales exist and are used internationally to define the severity of hearing loss (NZAS, 2016b; Schlauch & Nelson, 2015), including the Goodman scale (1965), Jerger and Jerger (1980), and Northern and Downs (2002). The NZAS recommends the use of the Goodman scale (1965) to classify HI severity (NZAS, 2016b). The Goodman scale classifies severity as follows; normal (≤ 15 dB HL), slight (16 - 25 dB HL), mild (26 - 40 dB HL), moderate (41 – 55 dB HL), moderately severe (56 - 70 dB HL), severe (71 - 90 dB HL), and profound (≥ 91 dB HL).

1.2.2 Prevalence.

Estimates of the prevalence of HI vary based on the measure and the definition that is utilised. Prevalence based on self-report can result in underestimates of HI due to factors such as denial and lack of awareness, particularly with mild HI, and the tendency of older adults to minimise health issues (Cruickshanks et al., 1998; Feder, Michaud, Ramage-Morin, McNamee, & Beauregard, 2015; Idler, 1993; Wiley, Cruickshanks, Nondahl, & Tweed, 2000). Objective measures of HI have been found to indicate greater prevalence compared with subjective measures (Chang, Ho, & Chou, 2009; Feder et al., 2015; Weinstein & Ventry, 1983).

1.2.2.1 Division by age.

It is well established that the prevalence of HI increases with advancing age (Cruickshanks et al., 1998; Feder et al., 2015; Greville, 2005; Stevens et al., 2013). Previous research by Greville (2005), examining the prevalence of hearing loss in New Zealand's population, indicated hearing loss among adults over the age of 65 years was more than three times that of the prevalence in younger adults (15 - 64 years). More recent statistics from the New Zealand Disability Survey indicate adults over the age of 65 remain the highest represented age group (Statistics New Zealand, 2014). New Zealand estimates suggest that among those over 65 years, 28% have a HI, in comparison 11% of adults aged between 45 and 64 years (Statistics New Zealand, 2014).

When considering how age and HI are related New Zealand's growing ageing population cannot be overlooked. The current relationship between ageing and HI is anticipated to continue. Recent research from the University of Auckland has projected the number of people aged 65 years and over residing in New Zealand with HI will increase in the years from 2011 to 2031 by 88.5% (Exeter et al., 2015).

1.2.2.2 Division by gender.

HI differentially affects men and women, with men experiencing a higher occurrence than women across both domestic and international data (Exeter et al., 2015; Feder et al., 2015; Greville, 2005; Statistics New Zealand, 2014; Stevens et al., 2013). Global estimates of adults with HI indicate the prevalence in males to be 12.2% versus 9.8% in females (Stevens et al., 2013). These global prevalence estimates are remarkably homogeneous with the most recent domestic prevalence data. In the New Zealand Disability Survey, when considering adults, HI affected 12% of males in comparison to 9% of females (Statistics New Zealand, 2014). This gender disparity is evident and consistent throughout the age groups examined in the survey, from childhood through to older adulthood. The gender disparity is also present in previous census studies from the 1990's through to the early 2000's (Greville, 2005). In adults 65 years and over, the sex disparity remains as the prevalence of HI increases, with 34% of men and 23% of women reporting that they experience HI. In contrast, amongst the 45 to 64-year age bracket, 13% of men and 9% of women report experiencing HI (Statistics New Zealand, 2014). Some researchers have suggested that the higher incidence of HI in males may be due to increased exposure to occupational noise through male dominated industries such as carpentry (Cruickshanks et al., 1998; Nelson, Nelson, Concha-Barrientos, & Fingerhut, 2005). Cruickshanks et al (2008) found that— even when controlling for noise exposure and occupation—a significant disparity remained between men and women.

1.2.2.3 Location of population.

Prevalence of HI varies not only with age and gender, but also with the location of the population under examination. Location may be thought of as a broad demarcation, such as a nation state, or can be considered in more narrow distinctions such as local regions, urban versus rural properties, and different types of residence. Stevens et al.'s (2013) analysis of the global and regional prevalence of HI indicates the highest prevalence of adult HI is located in developing, and low-income regions, particularly sub-Saharan Africa, South and Southeast Asia. In New Zealand, regional HI prevalence rates range from seven to eleven percent of the population. Northland, Taranaki and Southland have the highest prevalence of HI at 11% respectively (Statistics New Zealand, 2014). Auckland and Wellington have the lowest prevalence of HI at seven percent (Statistics New Zealand, 2014). The Canterbury region's reported prevalence is 10% (Statistics New Zealand, 2014).

The two common demarcations of residence type seen in audiology and geriatric literature are 'community-dwelling', and 'institutionalised'. The term 'institutionalised' is often used when referring to individuals who are no-longer living independently in the community, such as those residing in hospital or skilled nursing home facilities. Institutionalised and community-dwelling populations are often separated in analyses due to the significantly higher occurrence of HI in the institutionalised population (Chaffee, 1967 as cited in Venrty & Weinstein, 1982; Greville, 2005) and the differences in daily life activities/ requirements (Baylor et al., 2013). Recent New Zealand data shows 10% of the community-dwelling population report HI, compared with 43% of the residential care facilities population (Statistics New Zealand, 2014).

1.3 Impact of Hearing Impairment

HI impacts on an individual's ability to receive auditory information. A decline in hearing ability results in a number of negative auditory and non- auditory effects. While the degree of an individual's hearing loss is traditionally characterised by their audiometric hearing thresholds, it is well established that audiometric hearing thresholds are not equal to, and do not adequately describe, the impact that the hearing impairment has on the individual

(Chang et al., 2009; Chia et al., 2007; Gopinath, Schneider et al., 2012; Gopinath, Hickson et al., 2012; Hallberg, Hallberg, & Kramer, 2008).

1.3.1 Auditory.

Auditory effects of hearing impairment refer to the way in which the perception of sound is changed as a result of a change in the structure and or function of an aspect of the auditory system away from normal (ASHA, 1981). Auditory effects include: requiring a louder signal volume (decreased audibility), perceiving speech to be less clear (decrease in frequency resolution), decreased dynamic range, difficulty separating sound sources (decrease in temporal resolution) and difficulty hearing in the presence of background noise/ acoustic competition (Arlinger, 2003; Bayat et al., 2013; Ciorba et al., 2011; Dillon, 2012; Weinstein, 2015). The most common auditory impacts reported by adults with presbycusis relate to difficulty with the clarity of speech, and difficulty hearing in the presence of back ground noise (Saunders, Konrad-Martin, & Hull, 2011). Auditory effects can have a significant impact on the way an individual interacts with others and engages in everyday activities. Recent research indicates that self-perceived HI is a better indicator of the negative impacts a person experiences in everyday life, as compared to pure-tone audiometry (Gopinath, Schneider et al., 2012).

1.3.2 Non-auditory.

A number of research studies have established negative non-auditory consequences associated with HI (Helvik, Jacobsen, & Hallberg, 2006a; Strawbridge, Wallhagen, Shema, & Kaplan, 2000). Many of these negative consequences relate to compromised physical and psychosocial function, including: communication difficulties, social isolation and loneliness, depressive symptoms, and reduced health-related quality of life (Bess, Lichtenstein, Logan, Burger, & Nelson, 1989; Gopinath et al., 2009; Gopinath, Hickson et al., 2012; Hickson &

Worrall, 1997; C. Huang, Dong, Lu, Yue, & Liu, 2010; Mulrow, Aguilar, Endicott, Velez et al., 1990; Mulrow, Aguilar, Endicott, Tuley et al., 1990; Weinstein & Ventry, 1982). These are discussed in further detail below.

1.3.2.1Psychosocial impacts.

The connection between HI and social isolation in older adults is well established (Pronk, Deeg, & Kramer, 2013; Weinstein & Ventry, 1982). A greater severity of hearing impairment (both self-reported and measured) is associated with increased social and emotional loneliness (Chia et al., 2007; Pronk et al., 2013; Strawbridge et al., 2000; Ventry & Weinstein, 1982), particularly for non-hearing aid users (Pronk et al., 2013), and women (Mick, Kawachi, & Lin, 2014). In addition, a number of studies have reported an association between HI and depression (Gopinath et al., 2009; C. Huang et al., 2010; Lee, Tong, Yuen, Tang, & Van Hasselt, 2010; Strawbridge et al., 2000). However, this finding has not been universal (Chou, 2008; Pronk et al., 2013).

1.3.2.2 Health-related quality of life.

Quality of life is defined by the WHO as “an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns” (WHO, 1993, p. 153). When quality of life is considered in the context of health-status, it is typically referred to as health-related quality of life (HRQoL). It is related to the concept of wellbeing, and includes domains of physical and mental health, as well as emotional and social functioning associated with health or a health condition (Abrams, Chisolm, & McArdle, 2005; Revicki, 1989). As a result of HI, older adults have been found to exhibit reduced perceptions of HRQoL (Dalton et al., 2003; Mulrow, Aguilar, Endicott, Velez et al., 1990). The association between HI and HRQoL is evident across a number of studies investigating HI in older adults (Bess et al., 1989; Dalton et al., 2003; Helvik, Jacobsen, & Hallberg, 2006b). In addition, HI severity is significantly associated with HRQoL as an increasing severity of HI is predictive of a decline in HRQoL (Chia et al., 2007; Dalton et al., 2003; Gopinath, Schneider et al., 2012). As a result of this association, there is growing interest in learning how amplification impacts HRQoL. Current research suggests that the use of hearing aids improves HRQoL (Chisolm et al., 2007; Mulrow, Aguilar, Endicott, Tuley et al., 1990) and longitudinal data has demonstrated a slowing of HRQoL decline in hearing aid users as compared with non-HA users (Gopinath, Schneider et al., 2012).

As evidenced above, HI has impacts on an individual beyond what an audiogram alone can show. In order to effectively assess and manage these broader effects of HI, consideration needs to be given to the individual as a whole, and their engagement in everyday activities. The impacts of HI on an individual's life roles can be conceptualised within the WHO International Classification of Functioning, Disability and Health (ICF, WHO, 2001). The ICF provides a framework for which the impacts of HI can be explored, taking into account consequences which are beyond that of the HI alone (Hickson & Scarinci, 2007; ICF Research Branch, 2013; WHO, 2001).

1.4 ICF Framework/ Classifying the Impact of Health Conditions

The ICF was endorsed as the international standard to describe and measure health and disability on May 2001, at the fifty-fourth World Health Assembly (WHO, 2001). The framework incorporates biological, psychological and social aspects of functioning, also known as a *biopsychosocial* model approach (Danermark, Granberg, Kramer, Selb, & Möller, 2013; WHO, 2002b). The ICF superseded the International Classification of Impairments, Disabilities and Handicaps (ICIDH; WHO, 1980), and exists within the WHO international classification family alongside the International Statistical Classification of Diseases and

Related Health Problems (ICD-10, WHO, 2004). The ICD-10 classifies disease, disorder, injury and other health conditions by diagnosis for the purpose of monitoring disease incidence and prevalence (WHO, 2011), whereas the ICF classifies functioning and disability concomitant with health conditions (WHO, 2002b). In this respect the two classifications are complementary to each other, each with a differing focus. The ICD-10 is more commonly used in settings which use a medical model (WHO, 2011), whereas the ICF is utilised frequently in disciplines which employ a biopsychosocial model of practice (WHO, 2001), such as speech-language pathology, occupational therapy and audiology.

The ICF intends to provide a framework and common language for considering the effects of health and health-related conditions on individuals and their significant others (WHO, 2001, p. 3; WHO, 2002b) . It is intended to consider disability as a continuation of health and functioning, and a “universal human experience”, rather than a uniquely separate category (WHO, 2002b, pg. 3). The ICF examines human functioning on three levels – the body, the person, and the person in social context (WHO, 2002b).

1.4.1 Components of the ICF.

The four main components of the ICF are: (1) body structures, and body functions, (2) activities and participation, (3) environmental factors, and (4) personal factors (Granberg, Swanepoel, Englund, Möller, & Danermark, 2014; WHO, 2001). The interaction of these components is outlined in Figure 1.

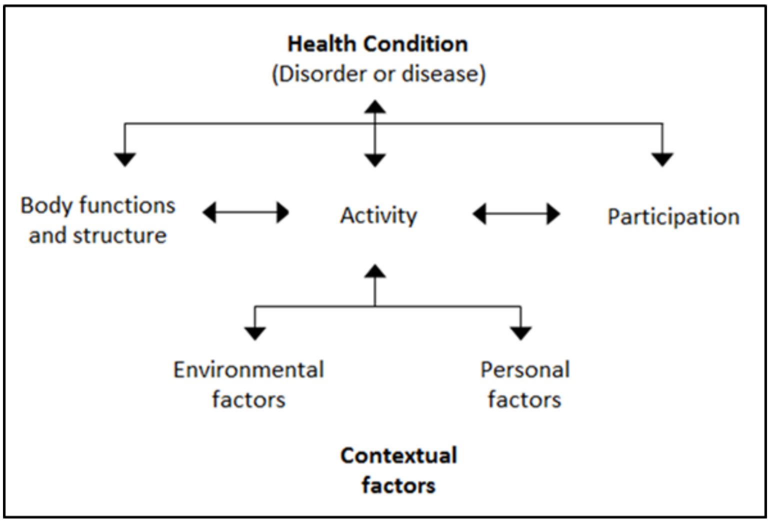

Figure 1. ICF Model showing the interaction of components (WHO, 2001).

Functioning and disability is conceptualised by components in the mid-line of the ICF model presented in Figure 1: body functions and structure, activity, and participation. *Body functions* refers to physiological or psychological functions of body systems, while *body structures* are the anatomical components of the body (Granberg, Swanepoel et al., 2014). Limitation at the body function or structure level was previously referred to as ‘impairment’ in the ICIDH (Hickson & Worrall, 2001; WHO, 1980). *Activity* refers to the ability to perform a given task or action. When this is difficult or impaired as a result of the health condition it is referred to as an *activity limitation* (WHO, 2001). Previously an activity limitation was labelled ‘disability’ in the ICIDH (Hickson & Worrall, 2001; WHO, 1980). *Participation* describes a person’s involvement in life situations, including social situations (WHO, 2001). When Participation is impaired it is referred to as a *participation restriction*. Under the ICIDH classification system a participation restriction was labelled ‘handicap’ (Hickson & Worrall, 2001; WHO, 1980). Participation restrictions result due to impairments and limitations of body and activity components (Stephens & Hetu, 1991). Activity and participation constructs (as well as their respective limitations and restrictions) are influenced by contextual factors (Granberg, Swanepoel et al., 2014; Hickson & Scarinci, 2007; WHO, 2002b).

Contextual factors may be internal, or external to an individual. Internal contextual factors are referred to as *personal factors,* and include factors such as age, gender, education, coping style, and social background. Contextual factors which are external to the individual are referred to as *environmental factors*. Environmental factors include the physical, social and attitudinal environments in which the individual lives (WHO, 2001). Contextual Factors, both internal and external, may act as facilitators or barriers to daily functioning (Granberg, Swanepoel et al., 2014). Contextual Factors are represented in the bottom row of the ICF model presented in Figure 1.

Qualifiers indicate the presence, and severity of a difficulty in functioning at the body, person, and societal level (WHO, 2002b). Impairment to body function and structure are qualified by the presence of impairment, the degree/severity of which is denoted by a five-point scale. The scale runs from *no-impairment* at one end of the scale to *complete impairment* at the other end (no impairment, mild, moderate, severe, complete). It is important to note that the way in which the ICF qualifies severity of impairment is different to how hearing loss severity is defined in audiology. The classification of hearing loss by severity has previously been discussed in this document (see section 1.2.1). Here-in where HI, hearing loss, or audiometric results are referred to, they will be discussed using the Goodman (1965) classification scale as recommended by the NZAS best practice guidelines (2016b).

Activity and participation components are qualified in terms of performance and capacity. Performance qualifiers describe what an individual does in their environment i.e.

their ‘lived experience’ (WHO, 2002b). Capacity qualifiers describe what an individual is capable of doing in a standard environment, and indicate the highest probable level of functioning. Performance qualifiers take into account an individual’s use of personal assistance, and/or assistive devices. Whereas the capacity qualifier assesses an individual without the use of assistance, i.e. it assumes a ‘naked person’ (WHO, 2002b, p. 11). A difference between capacity and performance indicates there is an element of the person’s environment which is acting as a facilitator (performance greater than capacity) or a barrier (performance less than capacity) (WHO, 2002b). The ICF lists activity and participation domains in a single list. The single list approach was elected due to the difficulty in separating activity from participation, as the two are so closely related (O'Halloran & Larkins, 2008). As a result of the combined activity and participation components, the WHO presents four different options which are accepted interpretations of the two components (O'Halloran & Larkins, 2008; WHO, 2002b). The four interpretation options are; 1) the codes are mutually exclusive, with some representing activity, and others participation; 2) Some codes represent activity, some participation and some represent both; 3) detailed/ specific codes represent activities, and general/ broad codes represent participation; and 4) all codes can be considered as activities and participation (O'Halloran & Larkins, 2008; WHO, 2001; WHO, 2002b). O’Halloran & Larkins (2008) state that the view point of the speech-language pathology profession is that activity and participation exist on a continuum, and are intrinsically related.

1.4.2 Participation.

Participation in the context of the ICF framework is the positive descriptor of an individual’s involvement in life situations. As people age, they experience changes in participation (Perlmutter, Bhorade, Gordon, Hollingsworth, & Baum, 2010). The importance of participation as a health-related outcome has been recognised as a factor which influences well-being in older adults (Arnadottir, Gunnarsdottir, Stenlund, & Lundin-olsson, 2011; Whiteneck, 2006). Participation is an important component of successful ageing, and is one of three areas of focus highlighted in the WHO's Active Ageing document (WHO, 2002a). The Active Ageing framework calls for the recognition, enablement, and encouragement of older adults' active participation in a number of life situations, taking into account "their individual needs, preferences and capabilities" (WHO, 2002a, p.51).

HI is associated with increased activity limitations and participation restrictions (Crews & Campbell, 2004; Dalton et al., 2003; Helvik et al., 2006a; Mikkola et al., 2015; Yamada, Nishiwaki, Michikawa, & Takebayashi, 2012). Adults with a HI experience increased activity limitations and participation restrictions compared with adults without HI (Crews & Campbell, 2004; Helvik et al., 2006a).

The standard audiological assessment battery (such as pure-tone and speech audiometry) focuses on the assessment of body functions and structure, and to an extent activity and activity limitation; however, participation is seldom explicitly assessed (Hickson & Worrall, 2001). The impacts of HI on participation cannot fully be understood by audiometric assessments alone. Some self-report measures incorporate activity and participation domains, but are weighted to better assess activity and activity limitations (Hickson & Worrall, 2001). Further, no outcome measures utilised in audiology practice specifically examine communicative participation.

1.5 Hearing Impairment and Participation

HI is one of the major causes of participation restrictions in older age (Heine & Browning, 2004). It is well documented that HI can lead to participation restrictions in a number of life domains, including civic and social engagement, emotional well-being, and communication (Dalton et al., 2003; Heine & Browning, 2004; Mikkola et al., 2016; Mikkola et al., 2015; Raymond, Grenier, & Hanley, 2014).

HI is associated with a number of negative psychosocial impacts, including feelings of embarrassment and diminished self-confidence, which can result in participation restrictions (Heffernan, Coulson, Henshaw, Barry, & Ferguson, 2015). Individuals with HI may make great efforts to participate in group activities, and maintain life roles, but the maintenance of that participation is difficult (Raymond et al., 2014). In a Canadian qualitative study, participants with HI reported maintaining participation in their life roles such as serving on a committee, volunteering, and attending board meetings was challenging, and despite requesting accommodations for their HI, those accommodations where not always adhered to (Raymond et al., 2014). Heine and Browning (2004) found communication breakdowns resulted in decreased social participation, fatigue and embarrassment, which participants were expressly aware of. Indeed, older adults with HI have an increased risk of being socially inactive and withdrawing from leisure activity, compared with their non-hearing impaired counterparts (Mikkola et al., 2016; Viljanen, Törmäkangas, Vestergaard, & Andersen-Ranberg, 2014).

The association between HI and reductions in social engagement is well researched throughout older-age and hearing-related and literature. Raymond and colleagues (2014) reported that individuals viewed attempts to manage communicative interactions and environments as ‘bothersome’, and even humiliating which led to withdrawal. Hull (1992, as cited in Heine & Browning, 2004) proposed older people with sensory loss may prefer to withdraw from communicative activities, rather than experience embarrassment caused by misheard conversations.

Mikkola and colleagues (2016; 2015) found an increase in participation restrictions in community-dwelling older adults with greater self-reported hearing loss. Adults with self-reported hearing loss and normal cognition (as measured with the Mini-Mental State Examination) had less frequent participation in social settings such as meeting with friends and attending group activities, in comparison to participants who did not report a HI (Mikkola et al., 2015). HI was also associated with less time spent outside of the home, independent of physical mobility issues (Mikkola et al., 2016). Less time spent out-side of home indicates a restriction in the opportunities for social and communicative interactions. However, older adults with or without HI did not differ in their engagement with non-social activities (i.e activities which did not require social/ communicative interactions) (Mikkola et al., 2015). This finding was supported by results from Crews and Campbell (2004) showing older adults with HI did not differ to those without HI in the frequency of family interactions/ meeting with relatives. Family interactions and relationships may be protected from decline in participation (Crews & Campbell, 2004; Mikkola et al., 2015). It is possible that the participation is passive, in that it may be sought out by family members, as opposed to the individual themselves. Further, family members may be more patient and better able accommodate the communication needs of their loved one.

In contrast to Mikkola and colleagues (2015) findings, a Japanese study reported a decline in the daily living activities of adults with HI, but did not find a decline in social participation (Yamada et al., 2012). Daily living activities were accomplishments such as shopping, paying bills, and preparing meals. These activities are akin to the ‘non-social activities’ described in the Mikkola and colleagues’ studies. Yamada et al. (2012) followed participants over a three year follow up period, and the authors concluded the activity decline could be related to other medical conditions, not specifically to hearing loss. The result of stable participation levels in this study is interesting, particularly given the follow up period.

Two limitations of the study may account for such a result. The measurement of HI was based on self-reported ability to hear in relatively optimal listening environment: one to one in a quiet room. Participants who report hearing difficulties in an optimal listening environment are likely to be already experiencing high levels of participation restrictions; as such a floor effect may have occurred. A floor effect may explain the lack of decline in participation, as this was already low. Secondly the measurement tool utilised in the study is a generic measure designed to assess older adults' ability to live independently (Yamada et al., 2012). The Tokyo Metropolitan Institute of Gerontology Index of Competence (TMIG-IC) assesses activities such as using public transport, paying bills and preparing meals (Koyano, 1987, as cited in Yamada et al., 2012). The TMIG-IC may be better suited to measuring Activity/ Activity Limitations, but not well-equipped to measure participation. Perlmutter et al (2010) also found no relationship between hearing impairment and participation; however, it is possible their assessment of hearing sensitivity confounded this result, and therefore makes the comparison of results to other studies difficult.

HI also results in marked communication difficulties (Heine & Browning, 2004; Mulrow, Aguilar, Endicott, Tuley et al., 1990). Some research has found communication difficulties increase with increasing severity of HI (Lutman, Brown, & Coles, 1987), however not all research supports this relationship (Chang et al., 2009; Wiley et al., 2000). A survey of hearing health professionals reported communication related activity limitations and participation restrictions are the most commonly described categories (Granberg, Swanepoel et al., 2014). However, this does not provide the perspective of a person with HI.

Communication occupies an important role in self-identity, the formation, and preservation of social connections (Yorkston, Bourgeois, & Baylor, 2010). Communication is pertinent to the performance of, and participation in, daily activities and life roles

(Granberg et al., 2014; Yorkston et al., 2010). Research by Cruice et al (2005) investigated how communication related to social participation and personal factors with a sample of Australian older adults. Cruice and colleagues (2005) found HI was not a significant predictor of social participation or communicative activities. Hearing impairment was based on the better ear pure-tone average (BEPTA) measure; with the majority of the sample having a mild degree of HI. Participants also had a large number of communicative activities and large social networks. The authors noted that there was a lower prevalence of HI in the study sample compared with community based studies (Cruice et al., 2005). Results suggest that a mild level of hearing impairment did not impose noticeable participation restrictions on participants. The use of assistive devices may also have mediated any limitations (Cruice et al., 2005). Participants were given maximal reporting time (no time limit), which may explain the larger than expected social networks and number of activities engaged in. Participants reportedly had “frequent involvement in a wide range of communication activities” (Cruice et al., 2005, p. 220). Indeed, the authors agree the non-significant association between HI, social participation, and communicative activities is contradictory to what others in the literature have reported (Cruice et al., 2005; Hickson & Worrall, 1997; Mulrow, Aguilar, Endicott, Tuley et al., 1990).

The types of participation examined by Cruice and colleagues (2005) involved a number of social activities that did not necessarily require communicative interaction or social participation, for example reading, watching television, and shopping. Additionally, a number of activities considered to be ‘communicative’ did not require communicative exchange, these included listening to the news, listening to the radio, reading, and writing shopping lists. Therefore, the measures used to assess communicative activities and social participation may not have been sensitive to communication difficulties experienced by people with HI.

In summary HI impacts on participation in a variety of life roles, although family life appears to be protected from these restrictions. Participation appears to be an important construct to consider and assess in people with HI, particularly for addressing and planning intervention and rehabilitation.

1.5.1 Satisfaction with participation.

Section 1.5 discussed absolute levels of participation in older adults with and without HI. Yet the absolute level is potentially meaningless if an individual is content with their level of engagement. It is therefore also important to assess whether older adults are satisfied with their Participation. Crews and Campbell (2004) assessed participants desired level of social activity, and found one fifth of older adults with ‘sensory loss’ (vision, or hearing, or both) reported ‘too little social activity’ (21.6%). Of those with HI alone, 25.1% reported they ‘would like to do more’ (Crews & Campbell, 2004). Conversely an Australian study found 81% of older adults were satisfied with their level of participation (Cruice et al., 2005). Additionally, those who were ‘satisfied’ did not differ to the 16% of participants who ‘wanted to be doing more’ on a number of personal factors, including hearing level, age and education (Cruice et al., 2005).

1.5.2 Predictors of participation.

Recent research has demonstrated both measured and self-reported HI are significant predictors of participation restrictions in older adults (Chia et al., 2007; Helvik et al., 2006a; Manchaiah, 2016; Pronk et al., 2013). However, measured and self-reported HI are reported to only account for between 13 and 30% of the variance in participation (Helvik et al., 2006a), indicating a need to look beyond hearing variables alone when considering how an individuals’ daily life participation is impacted (Helvik et al., 2006a; Manchaiah, 2016).

Personal factors such as age, gender, use of hearing aids and health are also associated with participation and HI (Cruice et al., 2005; Helvik et al., 2006a; Perlmutter et al., 2010).

1.5.2.1 Personal factors.

1.5.2.1.1 Age.

Increasing age in adults is associated with lower participation (Arnadottir et al., 2011; Perlmutter et al., 2010). Older adults differ to younger adults in terms of the listening demands and level of sound in which they spend time in (Wu & Bentler, 2012). Older adults spend time in social situations which have comparatively fewer listening demands, and lower sound levels compared with younger adults (Wu & Bentler, 2012). There is variability in how the lived experience of HI and age relate in the context of participation. The study by Cruice and colleagues (2005) reported personal factors of age, vision, communicative activities, education, and emotional health had strong interactions with social functioning and social participation (Cruice et al., 2005). Older participants had poorer hearing, and engaged in fewer communicative and social activities (Cruice et al., 2005). Education and emotional health seemed to have protective influences; higher education and emotional health were associated with greater communicative and social activity engagement (Cruice et al., 2005). Age, vison and education (number of years) were the strongest significant predictors of communicative activity. However, perceived hearing handicap has been found to decrease with increasing age, meaning older adults experience less handicap compared with relatively younger adults with the same degree of HI (Wiley et al., 2000). Several explanations have been suggested for this finding, including that older adults may possess better coping strategies, have different demands on their hearing, or have different communication goals compared to younger adults (Pichora-Fuller, 2003; Wiley et al., 2000; Wu & Bentler, 2012).

1.5.2.1.2 Gender.

In regards to gender, there are audiometric differences between men and women (Gates, Cooper, Kannel, & Miller, 1990; Jerger, Chmiel, Stach, & Spretnjak, 1993; Pearson et al., 1995). There is also evidence that men and women experience HI in different ways. Women have been found to experience greater participation restrictions (Helvik et al., 2006a) and negative psychosocial impacts from HI, including reduced quality of life, social isolation and feelings of anger, irritation, and frustration (Garstecki & Erler, 1999; Hallberg et al., 2008; Mick et al., 2014). Women may assign greater importance to communicative participation for social fulfilment and support, and therefore be more greatly impacted by HI which impedes communication (Garstecki & Erler, 1999; Mick et al., 2014). Women with acquired HI have also demonstrated poorer health-related quality of life, in comparison to men (Helvik et al., 2006b).

1.5.2.1.3 Coping style.

Coping factors such as sense of humour and use of communication strategies have been found to explain greater variance in participation restrictions (35%), compared to audiological factors which accounted for 13% (Helvik et al., 2006a).

1.5.2.1.4 Employment.

Employment is one of the major life areas within the ICF Activities and Participation component. HI results in a number of communication difficulties in the work place, as well as feelings of anger, fatigue and unease (Backenroth-Ohsako, Wennberg, & Klinteberg, 2003; Tye-Murray, Spry, & Mauzé, 2009). An individual’s occupation also impacts on the degree of noise they are exposed to in the work place, which may be connected to their underlying level of HI (Cruickshanks et al., 1998; Engdahl & Tambs, 2010). Difficulties in participating in the workplace can result from communication problems with co-workers and clients (Tye-Murray et al., 2009). Tye-Murray et al (2009) found good communication skills were imperative to job performance, and individuals with HI were most concerned with maintaining competency in their job. Based on research from the Australian survey of disability, ageing and careers (Australian Bureau of Statistics, 2003, as cited in Hogan, O'Loughlin, Davis, & Kendig, 2009), individuals with HI have an increased unemployment rates and reduced participation in employment compared with population based statistics. The presence of communication difficulties in addition to HI was associated with greater unemployment, as compared with HI alone (Hogan et al., 2009). Individuals with HI were also less likely to be employed in highly skilled jobs (Hogan et al., 2009). While these results provide valuable information in regards to the employment landscape of individuals with HI, caution must be taken when interpreting the effect of age-related HI. HI was based on self-report, and the severity and aetiology of HI was not reported. It is also important to consider the age of onset, as HI from childhood - particularly if not adequately identified and treated - can have an impact on a person’s educational, speech and language capabilities (Flexer & Madell, 2014). Indeed, of the participants who were not in paid employment, nearly half (45%) reported onset of HI at 20 years of age or younger. Thus adults who have a HI from early in their life differ considerably to adults with age-related or adult onset HI.

In regards to older adults and employment, many individuals are no-longer in paid employment, or are reducing their working hours. It is not clear if HI impacts on the decision to retire. However, health problems are reported to influence retirement decisions more strongly than economic variables (Dwyer & Mitchell, 1999). Cumulatively the incidence of retirement is significantly higher for individuals with HI (Fischer et al., 2014). However after adjusting for covariates including age, gender and self-reported health, there is no difference in rate of retirement (Fischer et al., 2014). Earlier research has identified self-reported sensory difficulties (vision or hearing) are related to earlier expected retirement age (Dwyer & Mitchell, 1999).

1.5.2.1.5 Use of hearing aids.

Hearing aid users experience more negative consequences of HI compared with non-HA users (Kelly-Campbell & Lessoway, 2015). The use of hearing aids appears to have a positive impact on participation. Hearing aids have been found to negate some of the negative consequences of HI including social, emotional, and communication domains, as well as perceived HRQoL (Chisolm et al., 2007; Chisolm, Abrams, & McArdle, 2004; Mulrow, Aguilar, Endicott, Tuley et al., 1990).

Individuals with hearing aids demonstrate significantly poorer speech in noise understanding as compared with non-HA users (Kelly-Campbell & Lessoway, 2015; Robertson, Kelly-Campbell, & Wark, 2012). Difficulty understanding speech in noise could lead to withdrawal from many social situations, and therefore impact a person's participation. The adoption of hearing aids or hearing assistive devices is related to ability to hear speech in noise (Robertson et al., 2012), measured hearing loss, self-perceived HI, and the negative consequences experienced (Blood, 2016; Helvik, Wennberg, Jacobsen, & Hallberg, 2008; Humes, Wilson, & Humes, 2003; Kelly-Campbell & Lessoway, 2015). A recent New Zealand based study reported significant relationships between hearing aid use, measured hearing (BEPTA) and self-perceived severity of HI (Blood, 2016). Social consequences have been found to distinguish HA-users from non-users (Kelly-Campbell, Thomas, & McMillan, 2015). Evidence suggests individuals with increased perceived activity limitations and participation restrictions are more likely to benefit from the use of hearing aids, and also have increased wear-time of hearing aids (Gopinath, Schneider et al., 2012; Kelly-Campbell & Lessoway, 2015).

The use of hearing aids has been found to improve the negative effects of HI, and perceived HRQoL (Chisolm et al., 2007; Chisolm et al., 2004; Mulrow, Aguilar, Endicott, Tuley et al., 1990). Improved communication and social functioning is reported by both participants and their family (Mulrow, Aguilar, Endicott, Tuley et al., 1990). Improvement in perceived HRQoL may in turn result in improved participation, such as in social life domains. However, participation is rarely assessed, or the focus of intervention in audiological practice (Hickson & Worrall, 2001). Indeed, it has been suggested participation restrictions are assumed to be resolved by the assessment and management of body level impairments and activity limitations (Hickson & Worrall, 2001). Hickson and Worrall (2001) recommend the direct assessment and management of participation in audiology. It is therefore important to better understand, and measure participation in adults with HI.

1.5.2.1.6 Other health factors.

Visual impairments as well as HI impact on an individual’s social participation (Crews & Campbell, 2004; Cruice et al., 2005; Worrall & Hickson, 2003). Visual impairments are common in older adults. Dual sensory impairment refers to the presence of both visual and hearing impairment. A hierarchical pattern has been observed when examining how vison and hearing impact on participation and social roles (Crews & Campbell, 2004; Viljanen et al., 2014). Dual sensory impairment is associated with the greatest effect on social participation, followed by vision alone, then HI alone (Crews & Campbell, 2004; Viljanen et al., 2014). The use of assistive devices (glasses and hearing aids) may reduce the impact of impairment on daily life (Cruice et al., 2005).

A reduction in mobility and physical ability are concomitant with ageing, and also impact on older adult’s participation. Mikkola et al’s (2016) research found social participation and time outside of home was restricted by HI, rather than physical limitations.

Overall older adults with self-reported hearing loss have been found to participate less in group activities and social engagements (Gopinath, Hickson et al., 2012; Mikkola et al., 2015), while maintaining similar levels of participation in family engagements as older adults without HI (Crews & Campbell, 2004; Mikkola et al., 2015). In addition to audiological factors, a number of personal factors also influence participation. These personal factors include age, gender, use of hearing aids, and HRQoL. It is clear that older adults with hearing impairment experience increased participation restrictions; hereby participation is an important construct to measure with people with HI. By neglecting the construct of participation, clinicians and researchers alike may miss important information about the lived experience of their client/ participants HI.

1.6 Hearing Impairment and Communicative Participation

Communicative participation is a sub-domain of the ICF's activity and participation component; it pertains to a particular form of participation. Communicative participation refers specifically to the ability to communicate in everyday life activities and fulfil life roles in social, occupational, familial, and community contexts (Baylor et al., 2013; McAuliffe, Baylor, & Yorkston, 2016). It is precisely defined in Eadie et al (2006) as "taking part in life situations where knowledge, information, ideas or feelings are exchanged" (p.309). This definition highlights the reciprocal nature of communication, the involvement of more than one person, and the importance of the situation in which the communicative exchange takes place (Baylor, Burns, Eadie, Britton, & Yorkston, 2011; Eadie et al., 2006). Communicative participation is imperative to the fulfilment of daily life roles (McAuliffe et al., 2016; Yorkston, Baylor, & Amtmann, 2014).

Ageing engenders changes in communication. Changes in communication associated with ageing include reductions in hearing acuity, rate of speech, and vocal endurance

(Worrall & Hickson, 2003). This can affect a person's ability to communicate, and therefore their capacity to maintain life roles, social and civic activities and interpersonal relationships can be challenged (Cruice et al., 2005; Lutman et al., 1987; Mikkola et al., 2016; Worrall & Hickson, 2003). These challenges can be further exacerbated by reduced opportunities for communication and social engagement (Cruice et al., 2005; Fricke & Unsworth, 2001; Mikkola et al., 2016). Indeed, impairments of hearing, vision and word retrieval are reported to be some of the 'unrecognised' contributors of reduced communicative functioning and restricted participation (Cruice et al., 2005).

While it seems intuitive that a HI would impact an individual's communicative participation, there is presently no evidence-base to support this. Communicative participation is clearly relevant to older adults with hearing loss, yet to date the majority of research on communicative participation has come from the field of speech-language pathology.

Communicative participation has been examined in a number of communication disorders including; Parkinson's disease (McAuliffe et al., 2016), multiple sclerosis (Baylor, Yorkston, Bamer, Britton, & Amtmann, 2010; Yorkston et al., 2014), aphasia (Baylor et al., 2016), and head and neck cancers (Eadie et al., 2014). Baylor and colleagues (2011) examined a range of communication disorders, and found that despite the differences in impairments and limitations experienced, participants described communicative participation restrictions which were analogous across a number of conditions. Additionally, communicative participation is associated not only with the communication disorder, but a number of variables beyond the condition itself (Baylor et al., 2010). However, there is paucity of communicative participation research in the audiology field (Cruice et al., 2005; Miller et al., 2017).

1.6.1 Predictors of communicative participation.

Due to the scarcity of literature pertaining to communicative participation in audiology, this section looks to other communication disorders in which communicative participation has been examined. Variables associated with communicative participation are discussed.

Based on studies from speech-language literature specific to communicative participation, and extant literature in the field of HI and participation it is expected that both demographic and hearing-based variables will be related to communicative participation.

Firstly, it appears likely that degree of HI will affect communicative participation. It is well known that older individuals with HL experience restriction in general participation, and that the severity of a disease is usually related to communicative participation outcomes (Baylor et al., 2010; Eadie et al., 2014; McAuliffe et al., 2016; Yorkston et al., 2014). Severity of speech symptoms is significantly associated with communicative participation in people with multiple sclerosis (Baylor et al., 2010; Yorkston et al., 2014), and laryngectomy (Eadie et al., 2016). In people with Parkinson's disease, a person's perceived level of speech impairment was found to contribute most to their communicative participation scores (McAuliffe et al., 2016). A moderate relationship between severity of voice disorder and communicative participation (which was tracked up to six months' post treatment) was demonstrated by Eadie et al (2014) in a population of people with head and neck cancer.

Age is known to interact with the perception of handicap and experience of participation in HI (Chang et al., 2009; Wiley et al., 2000). With increasing age, older adults report experiencing less negative impacts of HI compared to younger adults with the same degree of HI (Wiley et al., 2000). Age was not a significant predictor of communicative participation in adults with multiple sclerosis (Baylor et al., 2010; Yorkston et al., 2014).

However, in a study of adults with Parkinson’s disease, age was found to be significantly associated with communicative participation (McAuliffe et al., 2016). When controlling for associated variables, older participants reported higher levels of communicative participation. However, this association interacted with gender. The age-related increase in communicative participation experienced by men was not found for women.

McAuliffe and colleagues (2016) draw attention to the possibility communicative participation is experienced differently by men and women. As they aged, men with Parkinson’s disease reported higher self-perceived levels of communicative participation, compared with women with the condition. Indeed, there is evidence to suggest women with HI also experience more psychosocial impacts and restrictions in participation as a result of their condition (Garstecki & Erler, 1999; Hallberg et al., 2008). Gender differences in personal adjustment and acceptance of a HI may explain the variance. Garstecki and Erler (1999) found a gender difference for problem awareness; women were more likely to disclose communication difficulties than men. The authors concluded that it was unclear whether men were less willing to disclose difficulties, or whether they experienced communication difficulties to a lesser extent than women (Garstecki & Erler, 1999).

The relationship between communicative participation and quality of life varies from depending on the communication disorder examined (Eadie et al., 2014; McAuliffe et al., 2016). In adults who were treated for head and neck cancer, communicative participation had a weak, but statistically significant correlation with HRQoL (Eadie et al., 2014). This correlation is evident for both physical and social-emotional subscales. In regards to HI and quality of life, the relationship is also variable. Most research indicates an association between self-perceived HI and HRQoL (Chia et al., 2007; Gopinath, Schneider et al., 2012). However not all studies have established this association (Chew & Yeak, 2010). It appears audiometric data alone is a poor predictor of HRQoL (Gopinath, Schneider et al., 2012; Hallberg et al., 2008), and that generic measures of HRQoL lack sensitivity to assess communication and hearing related difficulties (Bess, 2000; Chew & Yeak, 2010; Chia et al., 2007). Given that severity of HI is associated with reduced HRQoL (Dalton et al., 2003), but generic HRQoL measures lack sensitivity in assessing HI, it is expected communicative participation will exhibit a similar relationship.

Intervention in the form of hearing aids is common among adults with acquired HI (Greville, 2005), although there is considerable variance in the relationship between ownership and use (Blood, 2016; Greville, 2005; Kochkin et al., 2010). The use of hearing aids is largely considered to improve the negative impacts of HI (Chisolm et al., 2004; Mulrow, Aguilar, Endicott, Tuley et al., 1990). Generic measures of HRQoL have failed to find a benefit of hearing aids (Chisolm et al., 2007), or indeed a difference between hearing aid users and non-users (Kelly-Campbell & Lessoway, 2015). However, condition-specific measures have indicated small to medium improvements in HRQoL of hearing aid users (Chisolm et al., 2007). Indeed, hearing aid use improved self-perceived communication at six months and one year post hearing aid fitting in a group of older adults (Chisolm et al., 2004). Further, a randomised control trial also found improvements in communicative, social and emotional function in participants who received hearing aids, as well as improvements in generic measures such as depression and cognitive function (Mulrow, Aguilar, Endicott, Tuley et al., 1990). People who adopt hearing aids experienced greater negative impacts of HI compared with non-hearing aid wearers. Individuals with HI who do not use hearing aids are more likely to believe they can adequately manage listening situations organically (Allan, 2015). It is known that the use of hearing aids has positive effects in negating some of the negative impacts experienced as a result of HI. It is not yet known if communicative participation differs between people with and without hearing aids. However, is seems likely that although individuals who use hearing aids experience positive impacts from their use, they may not return to level with individuals who do not use hearing aids, or do not perceive the need to do so.

Employment has a varied association with communicative participation. Involvement in paid employment was associated with higher communicative participation scores, indicating higher levels of participation (Baylor et al., 2010). However, in other studies of communication disorders, employment was not significantly related to communicative participation (McAuliffe et al., 2016; Yorkston et al., 2014). Based on hearing related studies, it appears likely communicative participation and employment will be related, with people experiencing greater communicative participation restrictions less likely to be in paid employment (Hogan et al., 2009).

It is clear from the research presented above, that participation restriction is a significant issue for adults with HI, and communicative participation is greatly impacted in a number of communication disorders, yet there is paucity of knowledge surrounding how HI affects communicative participation. Thus, it is important for the ICF construct of communicative participation to be investigated in relation to hearing impairment.

1.7 Measurement of Communication Participation

The direct assessment of participation, and more specifically communicative participation, is called for throughout audiology and speech-language pathology literature (Hickson & Worrall, 2001; Torrence, Baylor, Yorkston, & Spencer, 2016). The measurement of communicative participation is an important aspect of assessing communication disorders, planning and providing rehabilitation, and measuring rehabilitation outcomes/ effectiveness (Miller et al., 2017; Torrence et al., 2016). In order for clinicians to adequately assess and address their clients communicative participation restrictions appropriate instruments must be available to them (Miller et al., 2017). Eadie and colleagues (2006) reviewed self-report instruments measuring communicative participation in speech-language pathology literature. The researchers found six instruments which evaluated communicative participation and met the studies other review criteria. However, none of the instruments exclusively measured the construct of communicative participation (Eadie et al., 2006). Of the instruments reviewed, approximately a third (26%) of the items were consistent with communicative participation. Items predominantly focused on general communication domains (76%). Interestingly, several hearing related instruments were identified in the review, but excluded from the analysis as they focussed on the measurement of hearing and auditory processing, as opposed to communicative exchanges (Eadie et al., 2006). There is great diversity in assessment tools aimed to assess participation, with few tools specifically focussed to communicative participation. The authors concluded that in the field of speech-language pathology, no self-report instruments existed which were dedicated to the measurement of communicative participation (Eadie et al., 2006). The specific measurement of communicative participation is important as it gives clinicians insight into the daily life impacts of their client's condition. The Communicative Participation Item Bank (CPIB; Baylor, Yorkston, Eadie, Miller, &Amtmann, 2009) is a self-report assessment tool developed with the specific purpose of evaluating participation restrictions in communicative situations for people with a variety of communication disorders.

1.7.1 The Communicative Participation Item Bank.

The CPIB has been designed specifically to assess communicative participation across a range of everyday communication settings. It is a reliable and valid measure of the effect of communication disorders on communicative participation in individual's daily life function (Baylor et al., 2013; 2009; Yorkston et al., 2008). The CPIB is a unidimensional self-report instrument which focuses on the construct of communicative participation, and appropriate for use across a range of communication disorders (Baylor et al., 2013). It is intended to be used with community dwelling adults, who use speech as their primary form of communication. Items within the CPIB assess the extent which a communication disorder affects an individual in a range of social and every-day life situations where auditory-verbal communication is mandatory. Individuals are asked to rate how much their condition impedes on their day to day verbal communication in a range of everyday settings, such as talking on the phone, or having a conversation in a small group. Research using the CPIB has been conducted with a number of communication disorder populations such as Parkinson disease (McAuliffe et al., 2016), multiple sclerosis, head and neck cancers (Eadie et al., 2014), and stroke (Baylor et al., 2011; Baylor et al., 2014). In research thus far, it is evidenced that people with various communication disorders experience similar impacts on communicative participation (Baylor et al., 2011).

The CPIB has been designed to explicitly assess communicative participation in populations of communication disorders, and therefore avoids problems other generic health measures have encountered when attempting to address communication disorders. An advantage of using the CPIB for clinicians and researchers alike is the ability to compare across communication disorders and thus give insight to similarities and differences in experienced communicative participation (Baylor et al., 2011). As such, the CPIB can be used by clinicians in participation-focused assessment and intervention/ rehabilitation plans (Baylor et al., 2011; Torrence et al., 2016). Additionally, it is well aligned with the ICF framework. Recent research has validated the CPIB specifically for use with individuals from New Zealand (Baylor et al., 2014). The examination of the CPIB with individuals with HI - another communication disorder- is in its initial stages (Miller et al., 2017). As such, it is not yet known how the CPIB relates to other self-report measures used in audiology by clinicians and researchers alike.

1.7.2 Measures used in audiological research.

A vast selection of self-report measures exists in the field of audiology (Granberg, Dahlström et al., 2014; Granberg, Swanepoel et al., 2014; Souza & Lemos, 2015). The large variability seen in the literature is indicative of the wide-ranging measures available in the field (Granberg, Dahlström et al., 2014). However, there is a lack of consensus as to which measures are most optimal for use, both clinically and in research (Granberg, Dahlström et al., 2014).

Literature pertaining specifically to communicative participation and HI is sparse. At present, there is no assessment tool which specifically examines communicative participation in people with HI. Some of the self-report measures utilised in the field of audiology are discussed in the following section.

1.7.2.1 Condition-specific measures.

Negative impacts of HI are best assessed with condition-specific assessment tools (Mulrow, Aguilar, Endicott, Velez et al., 1990). A recent systematic review provides information on condition-specific instruments which assess auditory participation in the field of audiology (Souza & Lemos, 2015). Nine instruments were identified which evaluated auditory participation, five of which are derivatives of the same parent tool (Souza & Lemos, 2015). Instruments identified in the systematic review are outlined in Table 1.

The Hearing Handicap Inventory for the Elderly (HHIE; Ventry & Weinstein, 1982) and for the Hearing Handicap Inventory for Adults (HHIA; Newman, Weinstein, Jacobson, & Hug, 1990) are two condition-specific measures commonly utilised in audiological literature

(Granberg, Dahlström et al., 2014; Souza & Lemos, 2015). The HHIE and HHIA are used extensively in research, as well as clinical practice in New Zealand and overseas (Gopinath, Schneider et al., 2012; Kelly-Campbell et al., 2015). Within this document, HHI is used when referring to the HHIE and HHIA collectively.

Table 1. Self-report instruments assessing auditory participation.

Instrument		Constructs examined	Number of items (Total)	Author/s
HHI	HHIE	Emotional and social	25	Ventry & Weinstein (1982)
	HHIA	Emotional and social	25	Newman, Weinstein, Jacobson, & Hug (1990)
	HHIE-S	Emotional and social	10	Ventry & Weinstein (1983)
	HHIA-S	Emotional and social	10	(Newman, Weinstein, Jacobson, & Hug, 1991)
	HHIE-SP	Spousal view of partners HI. Emotional and social	25	(Newman & Weinstein, 1988)
HDHS		Sound perception and social	20	Hétu et al (1994)
AIADH		Auditory disability and handicap	60	(Kramer, Kapteyn, Festen, & Tobi, 1995)
HHQ		Personal and social effects of HI	12	Gatehouse & Noble (2004)

Note. Adapted from Souza & Lemos (2015) under Creative Commons Attribution Non-Commercial Licence. **HHIE** = Hearing Handicap Inventory for the Elderly; **HHIA** = Hearing Handicap Inventory for Adults; **HHIE-S** = Hearing Handicap Inventory for the Elderly – Screening; **HHIA-S** = Hearing Handicap Inventory for Adults – Screening; **HHIE-SP** = Hearing Handicap Inventory for the Elderly – Spouse; **HDHS** = Hearing Disability and Handicap Scale; **AIADH** = Amsterdam Inventory for Auditory Disability and Handicap; **HHQ** = Hearing Handicap Questionnaire.

The HHIE assesses perceived effects of HI on social activity, and emotional consequences (Ventry & Weinstein, 1982). The HHIE has demonstrated a moderate correlation with other condition-specific audiological assessment tools (Jennings, Cheesman, & Laplante-Lévesque, 2014), but weaker correlations with measures of hearing aid benefit and satisfaction (Dillon, James, & Ginis, 1997). The social scale of the HHI has been found to differentiate hearing aid users from non-users (Kelly-Campbell & Lessoway, 2015); indicating social consequences in daily life may be driving help-seeking actions.

The Self-Efficacy for Situational Management Questionnaire (SESMQ; Jennings, 2005) is a condition-specific self-report tool which assesses perceived HI, and ability to manage in a variety of listening and communication environments. Self-efficacy is the belief of an individual in their ability to complete a task, and manage situations. Self-efficacy is logically described by Bandura (1997, p. 37) as “not a measure of the skills one has but a belief about what one can do under different sets of conditions”. It has been suggested an individual’s confidence in managing communication situations could influence experienced activity limitations and participation (Jennings et al., 2014). Low self-efficacy has been found to be a barrier in effective management of chronic health conditions (Glasgow, Toobert, & Gillette, 2001). Adults with HI who experience greater social withdrawal and participation restrictions have been found to have poorer perceived self-efficacy (Jennings et al., 2014). Presently much of the research regarding the self-efficacy in audiology focuses on the outcome of intervention with hearing aids (Ferguson, Woolley, & Munro, 2016; Hickson, Meyer, Lovelock, Lampert, & Khan, 2014; Kelly-Campbell & McMillan, 2015). The SESMQ has demonstrated weak to moderate correlations with other condition specific self-report tools (Jennings et al., 2014). It is not known how the SESMQ relates to communicative participation/ the CPIB. However, it seems intuitive for the two to be related. As reported by Jennings and colleagues (2014) persons with poorer self-perceived hearing ability and low confidence in their ability to manage communication environments experience greater participation restrictions.

Presently it is not known how the HHI, SESMQ measures are related with the CPIB. However, communication disorder based research has shown condition-specific measures are more strongly correlated with the CPIB as opposed to condition-generic measures (Eadie et al., 2014; Eadie et al., 2016; McAuliffe et al., 2016).

1.7.2.2 Generic measures.

A number of studies investigating the negative impacts of HI have utilised measures which can be considered condition-generic instruments (Cruice et al., 2005; Mikkola et al., 2016; 2015; Perlmutter et al., 2010). Tools employed in these studies include: the Activity Card Sort test (ACS; Baum, 1995); the Impact on Participation and Autonomy questionnaire (IPA; Cardol, de Haan, van den Bos, de Jong, & de Groot, 1999; 2001); and the Communicative Activities Checklist (COMCAT; Cruice et al., 2005). The ACS and IPA tools do not specifically index the construct of communicative participation, but focus more generally on global activity and/ or participation (Baum, 1995; Cardol et al., 1999; 2001; Doney & Packer, 2008; Packer, Boshoff, & DeJonge, 2008; Perlmutter et al., 2010). The study by Cruice et al (2005) appears to come closest to assessing communicative participation in people with HI; however, this study too has issues with the measurement tool. The COMCAT assesses a number of activities related to communication including: talking, listening, reading and writing. However participation is not directly assessed. Further, a number of these activities do not require communicative exchange/ interaction or involve communicative participation, for example writing a shopping list, or listening to the news. In this way, the generic instruments discussed share a number of limitations, particularly that they do not directly assess communicative participation.

1.7.2.2.1 Health-related quality of life measures.

Generic instruments measure an individual’s overall perceived HRQoL, without stipulating a particular disease or condition of focus. Several generic HRQoL instruments are used in the field of audiology. There is concern in the literature that generic HRQoL measures are not sensitive to the impacts of HI (Chew & Yeak, 2010; Cruice, Worrall, & Hickson, 2000; Morgan, Hickson, & Worrall, 2002), or indeed hearing-related intervention such as benefit from amplification (Bess, 2000). Instruments which do not include communication domains lack sensitivity for assessing communication based participation restrictions of people with HI (Cruice et al., 2000). Generic HRQoL assessments which include domains specific to hearing and communication have demonstrated validity for assessing activity limitations and participation restrictions in adults with HI (Chisolm, Abrams, McArdle, Wilson, & Doyle, 2005). Some of the assessments of generic HRQoL used in audiology research are outlined below.

The Sickness Impact Profile (SIP; Bergner, Bobbitt, Pollard, Martin, & Gilson, 1976; Bergner, Bobbitt, Carter, & Gilson, 1981) is a standardised measure intended for assessment of physical and psychosocial functioning in relation to health/ health conditions. The SIP has been used in studies of a variety of health conditions, including HI (Bess, 2000; Bess et al., 1989). The SIP contains 136 items grouped into12 subscales within three main scales (overall, physical, and psychosocial). Within the psychosocial scale are subscales pertaining to communicative participation, including: communication, social interaction, and recreation/ past times. In comparison to other instruments, the length of the SIP is disadvantageous. The SIP is time consuming to complete, and poses potential issues of fatigue when used with an older population. Additionally, the SIP is reported to be time consuming to score, and some items may be offensive to people with HI, and therefore is “not clinically friendly” (Bess, 2000, p.79).

The WHO’s disability Assessment Schedule II (WHODAS-II; WHO, 1999) is a generic measure of HRQoL which has been evaluated for use with adults with acquired HI (Chisolm et al., 2005). The WHODAS-II is based on the ICF, and assesses six life domains: communication, mobility, self-care, interpersonal, life activities, and participation (WHO, 1999). The instrument is much shorter than the SIP - containing 36 items – making it better suited to use clinically and in research. Convergent validity of the WHODAS-II has been examined in individuals with adult onset HI (Chisolm et al., 2005). The study examined the relationships between the WHODAS-II and another generic measure, the Medical Outcome Survey – 36-Item Short Form (SF-36; Ware & Sherbourne, 1992), as well as two condition-specific instruments (Chisolm et al., 2005). The WHODAS-II was moderately and significantly correlated with scores on the SF-36, and communication domains had a moderate significant association with the condition-specific scores for the HHIE, and Abbreviated Profile of Hearing Aid Benefit (Cox & Alexander, 1995) measures.

The SF-36 is another generic outcome measure of HRQoL which is commonly utilised in health, and audiological research. Like the WHODAS-II, the instrument has 36 items. The SF-36 provides an indication of overall self-perceived health across a wide range of health domains. As a result, the measure does not provide information specific to HI, and may not be sensitive enough to assess communication and communicative participation restrictions. The SF-36 has demonstrated significant associations with perceived HI (Chia et al., 2007; Dalton et al., 2003; Morgan et al., 2002), and another measure of HRQoL (Chisolm et al., 2005). The relationship between the SF-36 and the CPIB has not yet been explored.

Specifically examining communicative participation and HRQoL, a variety of measures are related, although the strength of correlations is varied. Eadie and colleagues (2014) found a significant but weak, association between the CPIB and the University of Washington Quality of Life Questionnaire (Hassan & Weymuller, 1993; Rogers et al., 2002). McAuliffe and colleagues (2016) used a different measure of HRQoL and reported a significant, moderate association between communicative participation and HRQoL on three sub scales; physical, mental, and social roles.

1.7.2.3 Summary of measures

It seems likely that condition-specific tools will have a relationship with HRQoL. There is currently no condition-specific measure available which exclusively looks at hearing related communicative participation, an important component of the ICF framework. While the HHIE/A, SESMQ are condition-specific measures which examine constructs related to communicative participation, they have not been designed to examine this construct. The CPIB is an instrument which has been designed to measure communicative participation, with all items focusing on participation in a range of everyday communication situations (Baylor et al., 2013; Baylor et al., 2009). The SF-36 is a generic self-report measure, which is frequently used to examine HRQoL. Studies of the CPIB are yet to utilise the SF-36 as a measure of HRQoL, thus it is not known if, or how the two are related. However, it is expected that the SF-36 will have similar correlations with the CPIB as previously investigated measures of HRQoL.

The CPIB is more recently designed, and its vocabulary is better aligned with the ICF framework, compared with HHI measures which include the term ‘handicap’. Recently the CPIB’s relevancy to individuals with HI has been investigated (Miller et al., 2017). But it is not known how the CPIB is related to existing measures, which index constructs similar to communicative participation. It is important to understand the relationship between the CPIB and existing self-report measures, to determine if there is a need for such an instrument in the field of audiology.

As demonstrated above, the measurement of participation in the audiology literature is highly variable, with a number different instruments employed (Granberg, Dahlstrm et al., 2014; Souza & Lemos, 2015). The majority of these instruments are proxy measures in that they are not specifically intended for assessing participation, or more specifically communicative participation. There is considerable heterogeneity in audiological literature when examining measures of participation. A number of studies use activity, social functioning, loneliness, and time spent out of home as proxy measures of participation; all of which indirectly represent communicative participation to an extent, but are not designed to specifically assess this construct (Mikkola et al., 2016; Perlmutter et al., 2010). The Communication Participation Item Bank (CPIB) is a relatively new instrument, which addresses the lack of participation focussed assessment tools available to researchers and clinicians alike.

1.8 Study Rationale

HI results in a number of communicative difficulties and negative psychosocial impacts including social withdrawal. Understanding changes in communication and its effects on participation for older adults is important not only for the individuals with HI, but also a number of health professionals, and is arguably most imperative to speech -language pathologists and audiologists who work with this population (Worrall & Hickson, 2003). Further, the WHO calls for participation of older adults to be advocated for, promoted and enhanced by organisations and people who represent older adults (WHO, 2002a). It is therefore an important aspect for audiology to seek to assess and address (Hickson & Worrall, 2001).

As of yet, there is no evidence base for how communicative participation is affected by HI. A number of studies from the field of speech-language pathology have examined communicative participation, and have found communicative participation is not explained by the symptom-variables alone. Based on literature from speech-language pathology research, and extant HI participation restrictions, it is expected that HI will have communicative participation impacts for older adults.

While communicative participation is receiving more attention across a number of communication disorders, there is paucity of assessment instruments dedicated to this construct (Eadie et al., 2006), particularly in the field of audiology (Miller et al., 2017; Souza & Lemos, 2015) . When considering HI and hearing research there is no consensus on which assessment tool is appropriate for the measurement of participation, let alone communicative participation. Additionally, it is not yet known how the CPIB is related to existing measures used in audiology.

1.9 Aims and Hypotheses

This study aims to examine: (1) how demographic and hearing related variables are associated with communicative participation, as measured with the CPIB in community-dwelling older adults with HI; and (2) the relationship/s between the CPIB and assessment tools used to assess participation in adults with hearing impairment. It is hypothesised that;

1. Both demographic and hearing-related variables will be associated with communicative participation. Specifically:
    a. Age will not be associated with communicative participation.
    b. Women will experience higher levels of communicative participation restriction compared to men.
    c. HRQoL will be weakly associated with communicative participation.
    d. Hearing aid users will experience higher levels of communicative participation restriction compared to non-users.
    e. Individuals with a greater degree of hearing loss (as measured by BEPTA) will experience significantly greater levels of communicative participation restriction.
    f. Individuals with poorer self-perceived hearing ability will experience greater levels of communicative participation restriction.

2. There will be a relationship between the CPIB and existing measures of hearing and HRQOL. However, these measures will not be highly correlated. This will provide evidence that the tolls are indexing different constructs. Specifically:
    a. CPIB scores will be moderately correlated with the HHIE and HHIA.
    b. CPIB scores will be strongly correlated with SESMQ scores (for both hearing and confidence scales).
    c. CPIB scores will be weakly correlated with the SF-36, a measure of HRQoL.

Chapter 2. Method

2.1 Sample Size

A required sample size was calculated using *a priori* sample size analysis for linear multiple regression analysis. Parameters were as follows; level of significance (α) of .05, statistical power ($1-\beta$) at .8, an effect size (R^2) of .2, with six predictor variables. Based on these parameters, a minimum sample size of 61 participants was required.

2.2 Ethical Approval

Ethical approval for this study was granted by the University of Canterbury Human Ethics committee on 26th August, 2016 (Appendix A). All procedures in the study were carried out in accordance with this approval.

2.3 Participants

Data are reported from 68 participants. Participants are a self-selected group, who responded to an invitation to participate (discussed further in section 2.4). Participants in the study met the following inclusion criteria: (1) community-dwelling adults residing within New Zealand, (2) are 55 years of age or older (≥ 55), (3) have an acquired hearing impairment with adult onset, (4) have a BEPTA of 16 dB HL or greater, (5) able to read and complete the information sheet, consent form and questionnaires in the English language, and (6) able to return the forms and questionnaires via post.

This study focussed on older adults with hearing impairment. The second, third and fourth inclusion criteria ensured that individuals who were invited to take part belonged to the group of interest. The first inclusion criterion relates to the residence type of the study population, as many of the measures utilised in the research have been validated for use with community-dwelling adults. The fifth and sixth inclusion criteria ensured that participants were able to understand and complete the questionnaires and consent form which they were provided with.

All persons who met these criteria were invited to take part in the study on a voluntary basis. The study aimed to primarily recruit community dwelling older adults with an acquired hearing impairment.

2.4 Recruitment

Potential participants were identified from two databases available to the researcher: the University of Canterbury Speech and Hearing Clinic patient database and the New Zealand Institute of Language, Brain and Behaviour Language and Ageing participant database.

Only people who had indicated an interest in being contacted for research purposes were invited to take part in the study. The participants were primarily from the Canterbury region of New Zealand. Recruitment began on the 6th September 2016 and continued until the 8th December 2016. During the recruitment stage, invitational packs including information about the study were sent via email and post to potential participants identified from the aforementioned databases. Recruitment is further discussed in the procedure section and in Figure 2.

2.5 Procedure

Potential participants were identified, and contacted using methods outlined above. Initially 149 invitational packs were sent out. The invitational packs included an information sheet (Appendix B), and consent form (Appendix C). Seventy-seven (response rate of 51.7%) of those invitations were returned expressing an interest in participating in the research. The progression of participants through the study is demonstrated visually in Figure 2.

When a person indicated their interest in participating and had signed and returned the consent form they were assigned a participant code, and entered into the research project's database. A questionnaire pack was then posted out to each enrolled participant. The participant questionnaire pack included; a demographic questionnaire (Appendix D), the hearing surveys (Appendices E and F), and an addressed postage-paid return envelope.

When the completed questionnaire packs were returned, the questionnaires were scored and data was entered into an Excel spreadsheet under the participant's identification code. All questionnaires returned to the researcher were only identifiable by the participant's identification code. No identifying information was available in either the Excel spreadsheet, or the physical questionnaires.

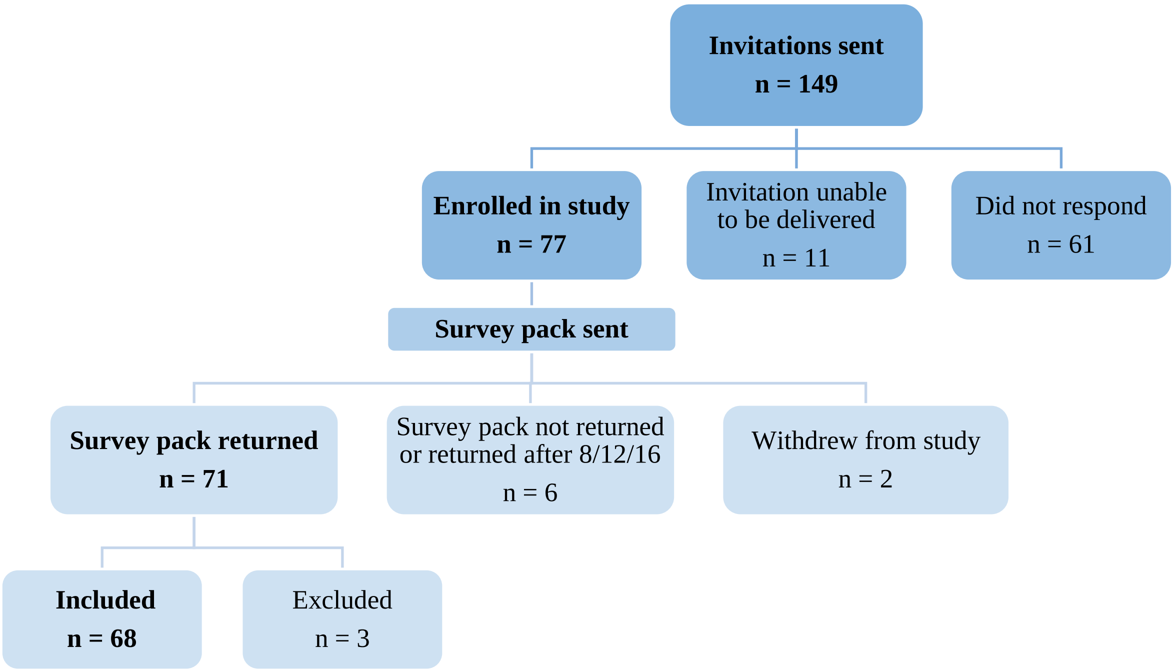

Figure 2. Participant recruitment process schematic.

2.6 Measures

The questionnaires used to assess demographic, hearing, and self-report variables are discussed below.

2.6.1 Questionnaires.

2.6.1.1 Demographic Information.

The demographic information questionnaire (Appendix D) was included in the research packet sent out to participants. This questionnaire included questions relating to; age, gender, primary language, ethnicity, relationship status, employment status, education, and type of residence. It also included questions regarding the self-reported hearing variables, which is further detailed in section 2.6.2.1.

2.6.1.2 Hearing Handicap Inventory.

The HHIE and HHIA are condition-specific measures of self-perceived hearing handicap. Where the HHIE and HHIA are referred to collectively they will be referred to as 'HHI'.

The HHIE is a self-report assessment tool which examines the effects of HI. The HHIE is designed to be used with community-based older adults, over the age of 65 years (Ventry & Weinstein, 1982). The inventory contains 25 items in total, and consists of two subscales: emotional consequences (13 items), and social and situational effects (12 items). Each question item in the inventory is answered by the selection of one of the three response categories; 'yes', 'sometimes', and 'no'. Responses are scored four points for a 'yes', two for 'sometimes' and zero for 'no'. Total possible scores range from 0 to 100, with higher scores indicating greater self-perceived hearing impairment. A score of 0 to 16 indicates 'no handicap', 17 – 42 is deemed 'mild to moderate handicap', and a score of ≥43 indicates a 'severe handicap' (Ventry & Weinstein, 1983).

Examination of the HHIE has shown high internal consistency, as indicated with Cronbach's α for the inventory as a whole, as well as the emotional and social subscales (0.95, 0.93, and 0.88 respectively) (Ventry & Weinstein, 1982). The HHIE can be administered in two formats: face to face (i.e. with a researcher/clinician), and pencil and paper (i.e. without the presence of a researcher/clinician) (Ventry & Weinstein, 1982). Both the administration formats have high test-retest reliability (face-to-face, r = 0.96; pencil and paper, r = 0.88) (Weinstein, Spitzer, & Ventry, 1986). The pencil and paper administration method has a large standard error (SE = 13), indicating it is not an appropriate administration format if the aim is to examine change over time, for example when considering intervention (Weinstein et al., 1986). However, the authors concluded that the HHIE in pencil and paper based administration is an appropriate and reliable index of self-perceived hearing handicap (Weinstein et al., 1986). The pencil and paper administration format is considered appropriate for the currently presented research, as it is intended to examine self-perceived hearing handicap at a snap shot in time, and is not being used as a measure of change.

The Hearing Handicap Inventory for Adults (HHIA) is a modification of the HHIE developed for use in younger adults (< 65 years of age) with HI (Newman et al., 1990). The HHIA consists of 25 items, with the same emotional and social/situational subscale item splits as the HHIE. It is answered and scored in the same way as the HHIE (yes =4, sometimes = 2, no = 0). The HHIA differs to the HHIE in only three items, which relate to occupational effects of HI, for example "Does your hearing problem cause you difficulty hearing/ understanding co-workers, clients or customers?" (Newman et al., 1990). Psychometric analysis of the HHIA indicated high internal consistency for the overall inventory and the two subscales (Cronbach's α = 0.93, HHIA; 0.88, emotional subscale; 0.85, social/ situational subscale), low standard error of measurement (SE =6), and high test-retest reliability (r = 0.97) (Newman et al., 1990; Newman et al., 1991). The complete (25 item) versions of these assessments were used in this study.

An HHI questionnaire was included in the participants' survey packet. Participants received either the HHIE (>65), or the HHIA (<65), conditional on their age at the time the questionnaire pack was sent out. Participants completed the HHIE/A in their own home, in pencil and paper manner as per the other questionnaires in the survey.

2.6.1.3 Communicative Participation Item Bank.

The CPIB is a unidimensional self-report questionnaire designed to measure communicative participation for a range of communication disorders (Baylor et al., 2009). The CPIB is intended to be used across a range of communication disorders, with community-dwelling adults, who use speech as their primary form of communication (Baylor et al., 2009). The CPIB is not recommended for use with people in skilled nursing facilities due to the differences in communication demands and situations this population is likely to experience, compared with community-dwelling older adults (Baylor et al., 2013). The CPIB was developed using item response theory methodology, and underwent psychometric analysis in a sample of individuals with spasmodic dysphonia (Baylor et al., 2009). Item response theory uses mathematical models (which include personal and item characteristics) to link behaviours such as responses to questionnaires to estimates of underlying traits (Baylor et al., 2009; Embretson & Reise, 2000). Differential item functioning analysis indicated the CPIB is appropriate for use as a disorder generic assessment (Baylor et al., 2013). This was established with three communication disorder populations; multiple sclerosis, Parkinson's disease, and Head and Neck cancer.

There are two versions of the CPIB available for use, the complete 46-item version (CPIB-46), and the ten-item short form (CPIB-10; Baylor et al., 2013). The CPIB-46 item version can be found in Appendix E, and the CPIB-10 is presented in Appendix G. The correlation between the CPIB-46 and CPIB-10 is high (r = .971, p < .001). The 46-item shape of function is preserved in the ten-item short from, however the short from provides less information due to the restricted item set (Baylor et al., 2013).

The CPIB is appropriate for both clinical and research applications (Baylor et al., 2013; Baylor et al., 2009). Cross cultural applicability of the CPIB has been established in a previous study, and it has been deemed appropriate for use with a New Zealand population (Baylor et al., 2014). The relevancy of the CPIB to individuals with HI was recently examined (Miller et al., 2017), but it has not yet been validated for use in this population.

The CPIB-46 version was included in the participant questionnaire pack posted out to participants; however only the short form was used in this analysis. The short form results in a summary score range from zero to thirty. With “0” representing severely restricted communicative participation. Summary scores can be converted to item response theory theta values (logit scale) using the table presented in Appendix H. Using the logit scale, theta typically ranges from -3.0 to 3.0, with 0 representing the mean for the calibration sample (Baylor et al., 2013). Logit scores for the CPIB-10 range from -2.58 to 2.10, with high (positive) scores being favourable.

To complete the CPIB, participants are asked to rate how much their condition interferes with their participation in a range of daily life situations which involve aural communication. There are four response categories, and participants were instructed to choose the category which best represents their experience of the degree to which their HI interferes with the situation; ‘not at all’, ‘a little’, ‘quite a bit’, and ‘very much’ (‘not at all’ =

3, to ‘very much’ = 0). The CPIB is scored by summing the response value for each item resulting in a summary score. Higher scores indicate more favourable communicative participation (less interference with communicative participation) (Baylor et al., 2013). The CPIB provides researchers and clinicians with an overall view of communicative participation

2.6.1.4 Self-Efficacy for Situational Management Questionnaire.

The Self-Efficacy for Situational Communication Management Questionnaire (SESMQ) is a measure of perceived self-efficacy (PSE) for managing communication (Jennings, 2005). PSE is defined as “belief in one’s capabilities to organise and execute the course of action required to manage prospective situations” (Jennings et al., 2014, p. 221). The SESMQ assesses an individual’s belief in their a) ability to hear in a given situation (SESMQH) and b) confidence in their ability to manage communication in the situation (SESMQC). Items in the SESMQ assess a variety of communication environments, in private and public settings, and with familiar and unfamiliar communication partners. The SESMQ is appropriate for use with adults over the age of 50 years, with acquired hearing loss. Jennings et al (2014) found that PSE scores were unrelated to age and degree of hearing loss, supporting the notion that confidence is a personal factor which impacts experienced activity and participation in communicative situations. The SESMQ has high test-retest reliability, and high internal consistency as indicated with Cronbach’s α (SESMQ 0.94; SESMQH 0.93; SESMQC 0.94) (Jennings et al., 2014).

The SESMQ was sent to participants as part of the participant questionnaire packets. To complete the SESMQ participants were instructed to rate each of the 20 situations for hearing ability and confidence PSE scales. For the hearing ability scale (SESMQH), participants rated how well they could hear in the situation on a zero to ten scale. Zero being ‘not well at all’, and ten being ‘very well’. Participants then rated how confident they werein their ability to manage the same communication situation (SESMQC), from zero (‘not confident at all’) to ten (‘very confident’). Total scores for each scale can range from 0 to 200. Higher scores are indicative of greater perceived hearing ability/confidence.

2.6.1.5 Medical Outcomes Study – 36 Item Short Form Health Survey.

The SF-36 is a generic measure of patient’s overall perceived HRQoL (Ware & Sherbourne, 1992). The SF-36 was designed for clinical and research applications, as well as evaluation of health policy and general population surveys (Ware & Sherbourne, 1992). It is widely used in audiological research. The SF-36 is appropriate for pencil and paper based self-administration in individuals over the age of 14 years (Ware & Sherbourne, 1992). Clinical and psychometric validity, internal consistency, and reliability have been established for the SF-36 (McHorney, Ware, & Raczek, 1993; McHorney, Ware, Rachel Lu, & Sherbourne, 1994).

The SF-36 consists of two component scales: physical, and mental, which are measured over eight subscales (McHorney et al., 1993; Ware & Sherbourne, 1992). The subscale components are: (1) physical health, (2) bodily pain, (3) role limitations due to physical health, (4) general health, (5) mental health, (6) vitality, (7) role limitations due to mental health, (8) social functioning (Abrams & Chisolm, 2009; Ware & Sherbourne, 1992). The first four subscales pertain to the physical component scale (PCS) and the subscales five to eight pertain to the mental component scale (MCS). The SF-36 consists of 36 items; each item is scored on a range from 0 to 100, with higher scores denoting a more positive health state. Item scores are averaged to give an overall score for each scale/ subscale.

The measure gives information regarding overall perceived health and HRQoL, but does not specifically assess the impact of HI.

The SF-36 was included in the participants' questionnaire pack, and was completed in their own home. Participants responded to questions by ticking a check box, or circling a number in response to the question item.

2.6.2 Hearing variables.

2.6.2.1 Self-reported.

Self-reported view of hearing and other hearing variables were assessed as part of the demographic questionnaire, which can be viewed in Appendix D. Participant's onset of HI, use of hearing aid/s, subjective rating of their HI, and perceptions of how others viewed their hearing.

Participants' subjective view of hearing was recorded on a scale of one to ten. One corresponded to the statement 'I have no hearing difficulties'; ten corresponded to the statement 'I have severe hearing difficulties'. The scale is not a validated measure.

2.6.2.2 Audiometry.

As part of the consent form (Appendix C) participants consented to records of their audiometric data being obtained for the research. If the participant did not have a previous audiogram, or wished to have an updated audiogram, the researcher arranged with the participant to have an assessment at the University of Canterbury Speech and Hearing Clinic. This was done at no cost to the participant.

Audiometric data was collected for each participant's ear. Degree of HI was quantified by a four frequency pure-tone average (PTA) of air conduction thresholds, at the frequencies 500, 1000, 2000 and 4000 Hz. Participants better ear pure-tone average (BEPTA) and worse ear pure-tone average (WEPTA) were calculated using the average of the four frequency bands. For inclusion in the study, all audiometric tests were required to have taken place longer than 24 months prior to the beginning of data collection.

For participants who received their hearing test at the University of Canterbury Speech Language and Hearing Clinic the equipment used is detailed here-in. A Grason-Stadler GSI-61 Audiometer was used to present stimuli, air conduction stimuli were presented via EARtone 3A insert earphone, or TDH-39 supra-aural headphones. Bone conduction stimuli were presented via the Radioear Type B-71 bone vibrator, which was placed on the mastoid bone of the participant’s test ear. All equipment was in current calibration. Testing took place in a Whisper Room sound booth, which met the ANSI S3.1-1999 standard (reaffirmed in 2008, American National Standards Institute, 1999) which specifies the maximum permissible ambient noise levels for rooms in which audiometric testing takes place. Thresholds were tested at octave intervals from 250 Hz to 8,000 Hz as well as the inter-octaves 1,000 and 3,000 Hz, using the modified Hughson-Westlake (1944) descending method as per the NZAS pure-tone audiometry best practice guidelines (2016b). Bone conduction and masking (air conduction and bone conduction) was carried out as required in accordance with current NZAS protocols (2016b). Otoscopy and tympanometry were performed prior to pure-tone audiometry testing, but are not reported.

2.7 Analyses

To examine which factors are associated with CPIB score, statistical analysis was completed using backwards stepwise multiple linear regression. Model testing began with all variables of interest entered into the model. The independent variables used in the full model were age, gender, hearing aid use, self-perceived hearing level, objective level of hearing impairment (BEPTA), and general health (SF-36 score). The dependent variable was participants’ communicative participation scores (CPIB, as measured with theta).

To address the second aim of determining relationships between the CPIB and existing measurement tools used (e.g., HHEI/A), Pearson product-moment correlation coefficients were used.

All statistical analyses were performed using R software, version 3.3.2 (R Core Team, 2016).

Chapter 3. Results

3.1 Sample characteristics

3.1.1 Demographic variables

Of the 77 people who responded to the invitation to participate, 71 participants returned the hearing survey pack within the data collection period. Three people were excluded from analysis. One person was excluded because they did not have audiometric data available. Another two participants were excluded because they did not meet the audiometric inclusion criteria. Hence, a total of 68 people with HI completed the study.

Participants ranged in age from 58 to 93 with an average age of 75 years (SD 8.62). Males and females were relatively evenly represented, with 47.06% of participants identifying as male (n=32), and 52.94% as female (n=36). All participants indicated that they used English as their primary language. Each participant lived independently in the community, or within a retirement village. There were no participants who resided within care facilities. The majority (73.53%) of participants were not currently in paid employment. Approximately half of the participants reported using a hearing aid/s (45.59%). Participants were also highly educated, with 44.12% reporting that they had an undergraduate or postgraduate qualification. Further demographic details of the participants are presented in Table 2.

Table 2. Demographic details of the participants.

Descriptor	**Data**	***n* = 68**
Age (years)	Mean (SD)	75.12 (8.62)
	Range	58 - 93
Gender	Male	32 (47.06%)
	Female	36 (52.94%)
Ethnicity	NZ European	62 (91.18%)
	Maori	2 (2.94%)
	European	4 (5.88%)
Employment	Currently in paid employment	18 (26.47%)
Education	Attended High school	4 (5.88%)
	Graduated High school	15 (22.06%)
	Vocational/ Technical training	6 (8.82%)
	Attended University	13 (19.12%)
	Completed undergraduate study	12 (17.65%)
	Completed postgraduate study	18 (26.47%)
Hearing aid user	Yes	31 (45.59%)
	No	37 (54.41%)
Relationship status	Married/ Committed relationship	52 (76.47%)
	Widowed	11 (16.18%)
	Divorced	3 (4.41%)
	Single	2 (2.94%)

Note. Education was categorised based on the highest level attained.

3.1.2 Audiometric variables

The majority of participants had a slight or mild HI in their better hearing ear. Hearing impairment by severity of BEPTA is presented in Table 3. The average BEPTA was 32.28 dBHL, and 40.57 dBHL for the WEPTA. Audiometric values by hearing aid (HA) use are presented in Table 4. The average audiogram (for 500 to 4000 Hz) for the total sample is presented in Figure 3. The average audiogram indicates an overall symmetrical hearing loss, with a sloping configuration, consistent with age related HI/ presbycusis.

Table 3. Hearing loss by severity of better ear pure-tone audiometry.

Better Ear PTA hearing loss	***n* (%)**
Slight	26 (38.24%)
Mild	23 (33.82%)
Moderate	15 (22.06%)
Moderately severe	3 (4.41%)
Severe	1 (1.47%)
Total	**68**

Note. **PTA =** pure-tone average. Pure-tone average is calculated from the frequencies 500, 1000, 2000 and 4000 Hz. Classification based on the Goodman scale (1965).

Table 4. Mean pure-tone average thresholds by hearing aid use.

HA use	**Better Ear PTA (dBHL)**				**Worse Ear PTA (dBHL)**			
	Mean	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
Yes	39.28	14.39	18.75	76.25	49.84	18.56	26.25	103.75
No	25.95	8.07	16.25	43.75	32.8	13.27	17.5	86.25
Total	**32.28**	**13.33**			**40.57**	**18.02**		

Note. Pure-tone average is calculated from the frequencies 500, 1000, 2000 and 4000 Hz.
PTA = Pure-tone average. **dBHL** = decibel hearing level.

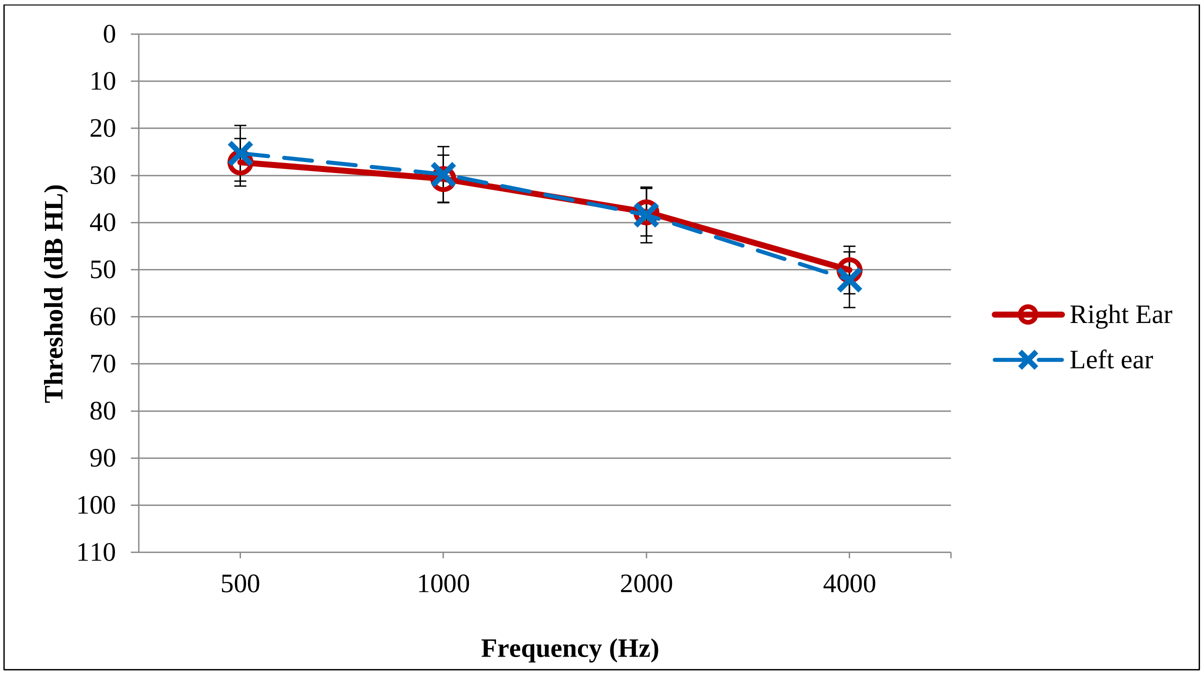

Figure 3. Average audiogram for the right and left ear air conduction hearing thresholds.

Note. Bars indicate standard error. **dBHL** = decibel Hearing Level. **Hz** = Hertz.

3.2 Missing Data

There were several instances where participants did not complete all items in every questionnaire. Seventeen participants had one or more missing questionnaire responses, with the majority of these participants (n=10) having one missing data point. When a missing data point occurred, the participant's median answer on the questionnaire was inputted in its place (Acuna & Rodriguez, 2004). This method was used to address missing data in the following questionnaires: HHI, CPIB, and the SESMQ. In the demographic questionnaire, for the item 'Education', the median of the entire participant sample was used. Missing data from the SF-36 was also treated slightly differently, as it contained alternating negative and positive answering scales, resulting in different answering scales for different items. For the SF-36, the median item response from all participants was inputted in instances where a data points was missing. A summary of the missing data points is presented in Table 5.

Table 5. Missing data points by questionnaire.

Questionnaire	**Number of missing data points (% of missing data points)**
HHI	2 (0.12%)
CPIB-10	2 (0.29%)
SESMQ-H	13 (0.96%)
SESMQ-C	13 (0.96%)
SF-36	13 (0.53%)
Education	3 (4.41%)
Total	**46 (0.6%)**

Note. **HHI** = Hearing Handicap Inventory. **CPIB-10** = Communicative participation Item Bank – 10 item version. **SESMQ** = Self-efficacy for Situational Management Questionnaire. **SF-36** = Medical Outcomes Survey 36 Item Short Form.

3.3 Summary of scores

A summary of the group's results on each of the questionnaires is provided in Table 6.

Table 6. Summary of participant results from measures employed.

Construct/ Questionnaire	**Score**	***n* = 68**
Communicative participation (theta)	Mean (SD)	0.90 (0.87)
	Range	-0.89 – 2.10
Self-perceived hearing ability	Mean (SD)	4.57 (2.29)
	Range	0 - 10
HHI (Total)	Mean (SD)	27.16 (21.23)
	Range	0 – 86
	No impairment (0-16)	22 (32.35%)
	Mild to moderate (17-42)	31 (45.59%)
	Severe impairment (>43)	15 (22.06%)
HHI (Emotional)	Mean (SD)	12.07 (11.25)
	Range	0 - 44
HHI (Social)	Mean (SD)	15.09 (10.63)
	Range	0 - 42
SESMQ (Hearing ability)	Mean (SD)	104.82 (42.66)
	Range	24 - 191
SESMQ (Confidence)	Mean (SD)	123.7 (49.26)
	Range	24 - 200
SF-36 (Total)	Mean (SD)	72.23 (16.50)
	Range	22.64 – 96.81
SF-36 (Physical component scale)	Mean (SD)	70.22 (20.50)
	Range	15.45 – 97.73
SF-36 (Mental component scale)	Mean (SD)	74.22 (13.66)
	Range	33.93 – 98.57

Note. **HHI** = Hearing Handicap Inventory. **SESMQ** = Self-efficacy for Situational Management Questionnaire. **SF-36** = Medical Outcomes Survey 36 Item Short Form.

3.4 Question 1: Variables associated with communicative participation.

Prior to developing a model of participants' CPIB scores, scatter plots were used to visually inspect relationships between the dependent variable (CPIB score as indicated by theta) and predictor variables. This was performed to determine if there were any large outliers or erroneous data points present in the dataset. No issues were identified.

Secondly, within the participant data, sources of multicollinearity were examined to identify appropriate predictor variables for use in the regression analysis. A correlation matrix containing all continuous independent variables is presented in Table 7. Participants' BEPTA and WEPTA scores were identified as highly correlated, *r* (66) = .807, *p* < .01. WEPTA was discarded as a predictor variable, and BEPTA retained. BEPTA was retained as the primary hearing variable so results could be compared with other hearing-related studies (Cruice et al., 2005). Conceptually, the remaining variables were considered to index separate participant qualities. There were no further risks of multicollinearity identified amongst these variables.

Table 7. Correlation matrix of continuous independent variables.

	Age	BEPTA	WEPTA	Self Ax	SF-36
Age	1.000				
BEPTA	0.425	1.000			
WEPTA	0.297	0.807	1.000		
Self Ax	0.173	0.616	0.650	1.000	
SF-36	-0.476	-0.319	-0.127	-0.530	1.000

Note. **BEPTA** = Better ear pure-tone average. **WEPTA** = Worse ear pure-tone average. **Self Ax** = Self-assessed hearing ability. **SF-36** = Medical Outcome Survey 36 Item Short Form. Pure-tone average is calculated from the frequencies 500, 1000, 2000 and 4000 Hz.

A backwards stepwise multiple linear regression analysis was undertaken to identify which demographic and hearing variables were most strongly predictive of participants' CPIB scores (theta). Model selection proceeded in a backward-stepwise iterative fashion seeking to create a model that contained only significant effects (with alpha set at 0.05). The analysis began with the variables: age, gender, hearing aid use, BEPTA, self-perceived hearing and general health (SF-36 score) entered into the model.

To compare the relative effect of these variables, all regression coefficients were standardized. Hearing aid use had a negative effect on communicative participation, but this did not reach statistical significance. In combination, two variables accounted for statistically significant, unique variance in participants' communicative participation scores: self-perceived hearing ratings and BEPTA scores. Hence, the final model included a main effect for self-perceived hearing [β = - 0.449 (0.10), $p < .001$], indicating that participants with lower self-perceived hearing acuity exhibited lower levels of communicative participation. There was also an additional significant effect for the objective BEPTA measurement of hearing [β = -0.209 (0.10), $p = .038$]. This indicates that participants with lower BEPTA scores exhibited lower levels of communicative participation, and BEPTA scores had a significant effect on CPIB scores even when self-perceived hearing ratings were controlled for. Overall, this model accounted for approximately 48% of the variance in participants' CPIB scores (F(2, 65) = 29.77, $p < .001$, $R^2 = 0.478$). The final model is presented in Table 8.

Table 8. Final regression model detailing predictors of communicative participation.

	Est. Std.	SE	*t*-value	*p*-value
(Intercept)	0.902	0.077	11.670	<.001***
BEPTA	-0.209	0.099	-2.118	.038*
Self Ax	-0.449	0.099	-4.541	<.001***

Note. Dependent variable was the Communicative Participation Item Bank (CPIB) score, as indicated by theta. Estimate (Est.) is a standardised beta coefficient. **SE** = standard error. **BEPTA** = Better ear pure-tone average. Pure-tone average is calculated from the frequencies 500, 1000, 2000, and 4000 Hz. **Self Ax** = Self perceived hearing ability. Significance: *** $p \leq .001$. * $p \leq .05$

3.5 Question 2: Relationship between the CPIB and other measures

The second aim of this research study was to examine the relationship between the CPIB and other assessment tools used to assess participation in adults with hearing impairment. A Pearson's product moment correlation was used to assess these relationships. Table 9 details the correlations between the CPIB and self-report measures common in audiology practice and literature. The relationship between communicative participation (CPIB score) and total HHI and SF-36 scores are shown in Figure 4 and Figure 5 respectively.

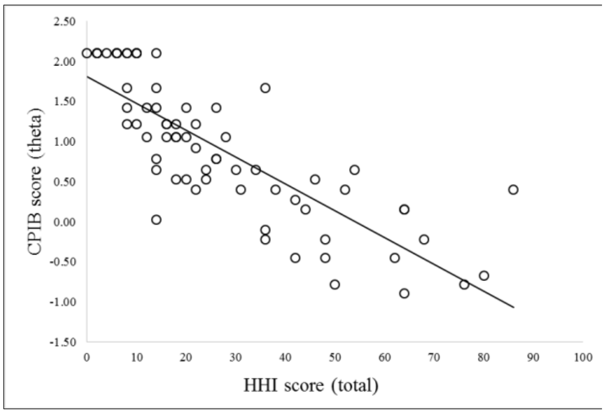

Figure 4. Relationship between communicative participation and the HHI.

Note. **HHI** = Hearing Handicap Inventory. **CPIB** = Communicative Participation Item Bank.

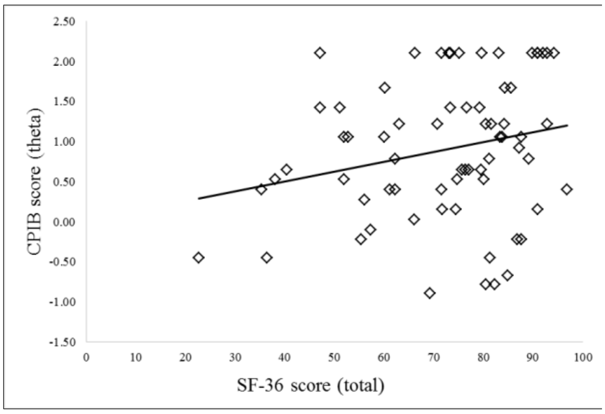

Figure 5. Relationship between communicative participation and the SF-36.

Note. **SF-36** = Medical Outcome Survey Short Form**.** **CPIB** = Communicative Participation Item Bank.

Table 9. Pearson r correlations among the CPIB and other self-report measures.

Variable	Correlation with CPIB (*r*)	*p*-value	CI (95%)
HHI (total)	-0.812**	<.001	-0.880 – -0.711
HHI (emotional)	-0.769**	<.001	-0.851 – -0.650
HHI (social)	-0.809**	<.001	-0.878 – -0.706
SESMQ-C	0.695**	<.001	0.547 – 0.801
SESMQ-H	0.689**	<.001	0.540 – 0.797
SF-36 (total)	0.235	.054	-0.004 – 0.448
SF-36 (mental)	0.307	.011	0.074 – 0.508
SF-36 (physical)	0.349*	.004	0.120 – 0.542

Note. ** Significant at $p < .001$. * Significant at $p < .01$. Degrees of freedom = 66. Two-tailed. Higher scores on the HHI questionnaire indicate greater impairment, whereas higher scores on the CPIB indicate better communicative participation. Therefore a negative correlation is expected. **HHI** = Hearing Handicap Inventory (Elderly and Adult combined). **SESMQ** = Self-efficacy for Situational Management Questionnaire. **SF-36** = Medical Outcome Survey 36 Item Short Form. **CPIB** = Communicative Participation Item Bank.

Communicative participation was significantly correlated with all hearing specific questionnaires used in the research. Specifically, communicative participation was significantly correlated with the HHI overall (total), as well as the emotional and social subscales; HHI (total), r (66) = -.812, $p < 0.001$; HHI emotional, r (66) = -.769, $p < 0.001$; HHI social, r (66) = -.809, $p < 0.001$.

Communicative participation was also significantly correlated with the SESMQ for both the Confidence and Hearing ability scales (both significant to $p < 0.001$). However, the SESMQ measures accounted for less variance (as indicted by R^2) in communicative participation in comparison to the HHI measures.

There also appeared to be an association between the CPIB and the SF-36 (total), r(66) = .235, , $p = 0.054$, but this did not reach statistical significance. Further examination of the subscales of the SF-36 revealed that there was a significant association between the CBIP and the physical component scale (PCS), but not the mental component scale (MCS); PCS, r(66) = .349, p =.004; MCS, r(66) = .307, $p = 0.011$.

Chapter 4. Discussion

4.1 Overview

This study investigated the effect of HI on communicative participation in the daily life of 68 community-dwelling older adults residing in Canterbury, New Zealand. The study sought to examine which demographic and hearing-related variables were associated with communicative participation in people with HI, and how the CPIB related to existing self-report measures common in audiological clinical practice and research.

Using backwards stepwise linear regression modelling with six potential predictor variables, two variables were identified as significant predictors of communicative participation in older adults with HI. Results of this study suggest self-reported communicative participation is statistically significantly associated with the symptom-related variables measured degree of HI, and self-perceived HI in this sample of older adults with HI. Results contrasted that of other studies, which found complex sets of variables influenced communicative participation (Baylor et al., 2010; McAuliffe et al., 2016; Yorkston et al., 2014). Pearson product moment correlations revealed the CPIB had strong correlations with condition-specific assessment tools, but was not significantly correlated with overall HRQoL scores.

It is common to see the terms ‘impairment’ and ‘handicap’ utilised in audiological literature (previously discussed in section 1.4.1). Hearing handicap refers to “non-auditory problems that result from hearing impairment” (Stephens & Hetu, 1991, p. 191). Within the current document the term ‘self-perceived hearing impairment’ is used in place of ‘disability’ and or ‘handicap’.

4.2 Variables associated with communicative participation

The first research question sought to examine how demographic and symptom-related variables related to communicative participation in community-dwelling older adults with HI. It was hypothesised that communicative participation would be influenced by a number of demographic, hearing and HRQoL variables. This study found no significant effect of the variables: age, gender, HRQoL, and hearing aid use on communicative participation. The hearing variables BEPTA and self-perceived hearing had significant effects on communicative participation. Results are discussed in order of non-significant variables, followed by significant variables.

4.2.1 Non-significant variables.

This study found a number of variables were not statistically significant predictors of communicative participation in community dwelling older adults with HI in the final regression model. These variables were age, gender, HRQoL, and hearing aid use. The finding that demographic variables are not significant predictors of communicative participation is consistent with previous research which examined different communication disorder populations (Baylor et al., 2010; Yorkston et al., 2014). However, other communication disorder populations have demonstrated complex sets of variables contribute to communicative participation (Baylor et al., 2010; McAuliffe et al., 2016; Yorkston et al., 2014). Non-significant variables of the present study are discussed below.

4.2.1.1 Age.

In the current study, age was not significantly associated with self-perceived communicative participation. This is in support of the hypothesis (1a) and related literature, particularly studies which have utilised the CPIB. This result was not unexpected, as hearing literature has established that the negative impacts of HI appear to be less burdensome to those of advancing age (Chang et al., 2009; Wiley et al., 2000). With increasing age, adults with HI report less self-perceived negative impacts in their everyday lives (Lutman et al., 1987). Specifically looking at communicative participation, a number of studies have also found age was not a predictor of communicative participation (Baylor et al., 2010; Baylor, Amtmann, & Yorkston, 2012; Yorkston et al., 2014), although not all (Cruice et al., 2005; McAuliffe et al., 2016). In the Yorkston et al., (2014) study, a number of demographic variables including age, were not included in the final regression model as they were not significant predictors of communicative participation for individuals with multiple sclerosis. Indeed, other research examining communicative participation in adults with multiple sclerosis also found that age was not a significant predictor (Baylor et al., 2010). Conversely, a study which also utilised the CPIB did find age had a significant effect on communicative participation in adults with Parkinson’s disease (McAuliffe et al., 2016). McAuliffe and colleagues (2016) results showed older participants reported significantly greater communicative participation; however, this also interacted with gender. Age-related enhanced communicative participation was true only for men (McAuliffe et al., 2016). The main difference between the current study and that of McAuliffe and colleagues is the communication disorder under examination. McAuliffe and colleagues (2016) investigated communicative participation in adults with Parkinson’s disease. Parkinson’s disease is a motor speech disorder affecting the production of speech. Cruice and colleagues (2005) found age to be significantly associated with communication activities in a sample of typically aging adults. Conversely, Cruice and colleagues finding was in the opposite direction to that of McAuliffe et al. Older adults with HI had decreased social and communicative activities (Cruice et al 2005). The study used a very different measurement of participation to the current study. Their focus was on the number of activities, social network size and communication partners. Cruice et al (2005) reported participants had large social network sizes. The population under examination in the study may not have been a representative sample, as other studies have reported older adults have smaller social networks compared with younger adults (Wu & Bentler, 2012).

Due to the nature of participant demographics, particularly age, there may be changes in communication as a result of life change. For example, older people are more likely to be retired, and have the potential to engage in fewer communicative activities and have less communication partners, as a result of no longer taking place in the workforce. Moreover, older adults have been found to have quieter auditory lifestyles, which impose fewer listening demands (Wu & Bentler, 2012). Differences in the associations between age and communicative participation reported in the literature may therefore be due to aspects of the condition itself, or the way in which communication difficulties are measured. Measures which focus on the quantity of social interactions or situations may be missing deeper emotional consequences. For example, an individual may report attending a certain number of social events in a month, however this does not inform us of how they felt at the event, if they thought their condition hindered them, or if they were able to engage with others.

Older adults with HI experience of communicative participation looks to be different from older adults with speech disorders. A potential explanation for the difference is the degenerative nature of many speech disorders, such as Parkinson’s disease. While HI is a progressive condition, and is associated with other health conditions, it does not have direct impacts on other functions such as mobility and dexterity in the way Parkinson’s disease and multiple sclerosis do. HI may progress/ become more severe, but not to the same extent as other communication disorders. In this way, speech disorder populations may experience greater difficulties in communicative participation with advancing age due to the degenerative nature of their condition.

The finding that age is not a useful predictor of self-perceived communicative participation in adults with HI is a new finding in this field, and adds to the knowledge base on communicative participation in different communication disorder populations. The finding appears to indicate that although older adults perceive themselves to experience less negative effects from HI, communicative participation is not experienced in the same way.

4.2.1.2 Gender.

Gender did not have a significant effect on communicative participation in adults with HI. Thus, the hypothesis (1b) that women would experience higher levels of communicative participation restriction was not supported. This finding was somewhat unexpected; however, it is not a unique finding. The finding is supported by previous research examining communicative participation using the CPIB (Baylor et al., 2010; Yorkston et al., 2014), and hearing impairment (Lutman et al., 1987). In adults with multiple sclerosis, gender is not a significant predictor of communicative participation (Baylor et al., 2010; Yorkston et al., 2014). This is in contrast to other studies of communicative participation with communication based conditions. Gender has been found to influence communicative participation of people with Parkinson's disease, with men reporting more favourable communicative participation (McAuliffe et al., 2016).

There is also variability in the literature pertaining to gender and HI. Indeed, a number of hearing-related research studies suggest women are more likely to experience greater negative impacts of HI than men (Garstecki & Erler, 1999; Hallberg et al., 2008; Helvik et al., 2006b; Mick et al., 2014). Mick et al (2014) found women had increased likelihood of experiencing social isolation, which increased with degree of HI. There was no significant association between men and social isolation. Gender differences in self-reported impacts of HI are suggested to originate from differences in men and women's willingness to acknowledge and disclose HI (Garstecki & Erler, 1999) and indeed gender differences in the way men and women utilise communication (Wood & Inman, 1993). However other research has found gender is not a significant predictor of self-reported disability or hearing handicap (Lutman et al., 1987). The difference between the current study's results and those before it could be to do with the way in which data was collected from participants. In the study by Hekvik et al (2006b) participants were recruited from a waiting list for audiological examination, and it is not clear if the participants completed the questionnaires in their own home, or in the presence of a researcher. Thus participants on a waiting list for services may have different motivations for disclosure of difficulties, versus participants who have volunteered for a student run research project. Additionally, completing a questionnaire in the presence of a researcher or clinician may impact on what the participant reports/ discloses. The difference between a researchers presence versus non-presence was not examined in this project. However other studies with contrasting results do not appear to have significant methodological differences from the currently presented research (Garstecki & Erler, 1999; Hallberg et al., 2008).

If HI (measured or self-perceived) is controlled for/ held constant, any differences in gender could be presumed to originate from personal factors. This study found no difference between men and women in their experience of communicative participation, indicating there was no difference for disclosing difficulties based on gender. This is potentially due to the self-selected nature of the sample. Participants agreed to participate in the study with the knowledge that the study was investigating HI, and was specifically recruiting people with a known HI. As such, participants in the sample have likely already acknowledged they have a HI. Further, participants may be more willing to disclose their difficulties because of the nature of the data collection. Participants were able to complete the surveys from their own home with anonymity. Face to face or interview based data collection may have revealed differences in disclosure between men and women.

Based on this study's result, it appears men and women with HI do not differ in their experience of communicative participation restrictions. This finding provides unique information on communicative participation and HI.

4.2.1.3 Health-related quality of life.

HRQoL (as measured with the SF-36) did not have a significant effect on communicative participation, thus the hypothesis (1c) is not supported. The result is consistent with other studies which have found generic measures of quality of life are poor measures of the negative impacts of HI. Chew and Yeak (2010) also used the SF-36 as a measure of HRQoL and concluded the generic measure "lacked sensitivity and specificity in assessing the impact of hearing loss" (p. 837). This sentiment is shared by a review of generic HRQoL measures, which found the tools reviewed lacked sensitivity for use with individuals with HI, and in assessing benefit of amplification (Bess, 2000).

Severity of HI has demonstrated a significant association with decreased scores on both the physical and mental components of the SF-36 (Dalton et al., 2003). Helvik and colleagues (2006b) used a different measure of HRQoL, the Psychological General Well-Being Index (Dupuy, 1984), and found the index was significantly associated with activity limitations and participation restrictions. People who experienced high levels of limitations/ restrictions demonstrated lower well-being scores (Helvik et al., 2006b). However, the current study's result contrasts related literature examining HRQoL in different communication disorder populations. HRQoL has a weak, but statistically significant relationship with communicative participation of adults with head and neck cancer (Eadie et al., 2014). McAuliffe and colleagues (2016) found a moderate relationship between communicative participation and a generic HRQoL measure in a sample of adults with Parkinson’s disease. The finding that communicative participation is statistically significantly relates to HRQoL in other communication disorder populations may be due to the degenerative nature of the conditions. While HI is a progressive and chronic condition it does not have physical impacts as a direct cause of the HI, despite the associations between HI and a number of health conditions. This is in contrast to conditions such as multiple sclerosis and Parkinson’s disease which have physical limitations such as mobility and dexterity issues which are primary symptoms of the condition. It is therefore not surprising that these populations would experience greater impacts on their HRQoL as a result of the condition, as compared to people with the condition of HI.

While significant, some associations between communicative participation and HRQoL are weak. Eadie et al (2014) suggested the weak relationship between communicative participation and HRQoL may be due to the multidimensionality of HRQoL measures, and lack of focus on specific domains, such as communication. The sensitivity of generic HRQoL measures towards HI is suggested to depend on whether the measure includes domains relating to hearing and communication (Chisolm et al., 2005). The SF-36 evaluates physical and mental health and wellbeing, and does not contain subdomains or indeed items which pertain to communication. In this way, it is not surprising that this study found HRQoL as measured with a generic tool did not significantly affect communicative participation. Other hearing related studies have found an association between HRQoL and constructs related to communicative participation (Dalton et al., 2003; Helvik et al., 2006b). There are a number of differences between the current studies and those before it which may account for the disconnect. Differences include the severity of HI and sample size (Dalton et al., 2003; Helvik et al., 2006b). While the studies are similar in that severity of HI was based on a four frequency PTA, the current study included participants based with a slight (≥ 16 dBHL) HI. Whereas Dalton et al (2003) inclusion criteria was a HI of ≥ 26 dBHL, and Helvik et al's (2006b) study population had greater mean BEPTA than the current study. The lack of effect of HRQoL on communicative participation can be viewed in a positive light, as it can be extrapolated that physical impacts of age and other health conditions are not impacting on the communicative participation of older adults with HI. The finding adds to current understanding of the relationship between communicative participation and HRQoL in a newly examined population.

4.2.1.4 Hearing aid use.

The use of hearing aids was negatively associated with communicative participation, indicating hearing aid users experienced greater communicative participation restrictions than non-users. However, when controlling for hearing ability (perceived and measured) this result was not significant. A significant relationship between hearing aid use and self-perceived severity of HI was found in a recent New Zealand based study (Blood, 2016), as well as a number of previous studies (Helvik et al., 2008; Humes et al., 2003; Kelly-Campbell & Lessoway, 2015). Blood's (2016) study used statistical analysis methods which differed to the current study, and which did not control for other contributing variables. This may explain why the present study did not find hearing aid use to be a significant predictor variable. Additionally, while the two studies are akin in the measurement of BEPTA and self-perceived severity, they differ in measurement of hearing aid use. Multiple definitions of hearing aid use exist throughout the literature (Jerram & Purdy, 2001; Ng & Loke, 2015). Blood (2016) asked participants about ownership of hearing aids, as well as hours of use. The current study employed a more rudimentary assessment of hearing aid use in that participants were asked only if they wore a hearing aid/s (see Appendix D). In this way the present study cannot discern the level of participants hearing aid use. Participants in this study who reported wearing hearing aids were potentially quantitatively different to those in Blood's research (2016).

The communicative participation as measured with the CPIB had not previously been examined in any population which utilised an assistive device. In this way, the examination of hearing aid use and communicative participation is novel.

Communicative participation is not predicted by hearing aid use. Although not significant, there is a negative relationship between communicative participation and the use of hearing aids, indicating people with hearing aids experience more restrictions in communicative participation than non-users. This finding is not surprising particularly as hearing aid users in the sample had greater mean pure-tone averages, and that hearing aid non-users are known to have higher self-efficacy for communication management (Allan, 2015). Hearing aids are an assistive device, as opposed to a corrective device and thus cannot restore normal hearing function. However, targeting communicative participation through rehabilitation approaches may have a positive impact on the restrictions hearing aid users currently demonstrate, and close the gap between hearing aid users and non-users.

Hearing aid use did not account for significant variance in communicative participation scores over and above the effects of BEPTA and self-perceived hearing. Thus measured hearing ability (BEPTA) and self-perceived hearing provide the strongest indicators of a person's communicative participation.

4.2.2 Significant variables.

Two symptom-related variables were significant predictors of communicative participation; measured HI, and self-perceived severity of HI. Self- perceived severity of HI showed a stronger relationship with communicative participation than measured HI. These are discussed below.

4.2.2.1Measured hearing impairment.

Measured hearing ability (BEPTA) was identified in the regression analysis as a significant predictor of communicative participation for adults with HI. This result supported the hypothesis. BEPTA and communicative participation had a negative relationship; this was expected as a greater HI is indicated by a high BEPTA value, and low scores on the CPIB indicate reduced communicative participation. As HI increased (became more severe), communicative participation decreased. The result is consistent with previous research which have also identified severity of measured HI to be significantly associated with self-reported communication difficulties (Helvik et al., 2006a) and participation restrictions (Chew & Yeak, 2010; Dalton et al., 2003; Hickson & Worrall, 1997). Helvik et al (2006a) found degree of measured HI (using BEPTA) was the most significant predictor of activity limitations, but not a predictor of participation restrictions. The study found behavioural variables such as sense of humour and coping style best predicted participation restrictions. Comparisons between the study and the current research are difficult, as the current research did not assess coping factors or behaviours such as sense of humour. In contrast to the current study’s finding Cruice and colleagues (2005) found measured HI was not a significant predictor of communication activities or social participation. The study used the same measurement of HI, however the authors reported participants had a lower prevalence of HI compared with other community-based research, and suggested that HI may be affecting the quality of interactions, as opposed to quantity which was the variable they measured (Cruice et al., 2005). Indeed, the current study's measurement of communicative participation focuses on quality, which may explain the difference in result. A number of studies have utilised the better ear four frequency average to quantify the degree of measured HI (Cruice et al., 2005; Dalton et al., 2003; Helvik et al., 2006a). The present study used a more liberal classification of HI compared with other studies by including people with a 'slight' degree of HI. This meant that participants with a BEPTA of greater than or equal to16 dBHL were classified as having a HI, whereas other studies classified participants as having a HI if their BEPTA was mild (26 dBHL) or greater (Cruice et al., 2005; Dalton et al., 2003). In this way, the current study represents a larger range of HI, and has a number of participants with milder severity of HI comparative to other studies in the literature base. It is encouraging that despite the present study having participants with less severe HI's, and lower mean BEPTA compared with other studies, the relationship between BEPTA and participation restrictions is consistent. It is possible previous studies have failed to show a relationship between measured HI and participation because they did not use a measure which focussed specifically on this construct. The current study utilised a measure specific to participation, and goes a step further by focussing on a communicative participation, a sub construct of participation.

As demonstrated, a number of studies have found relationships between severity of measured hearing impairment (via pure-tone audiometry), communication difficulties, and participation restrictions. However, none of these studies have specifically examined communicative participation. Unfortunately, studies which have specifically examined the construct of communicative participation have not used objective measures of disease severity. A recent study examining communicative participation in persons with aphasia (Baylor et al., 2016) utilised an objective assessment of aphasia. However, the measure was used in analysis to compare the level of assistance people required to complete the communicative participation measure; therefore it is not known how measured disease-severity related to communicative participation in people with aphasia.

This study's findings confirm that communicative participation is impacted by measured HI in similar ways to other activity and participation domains. The present study result is not able to be directly compared with other studies of communicative participation, due to a lack of objective measures reported.

Measured HI is a significant predictor of communicative participation in adults with HI. It is important for audiologists and hearing health professionals to be aware of this relationship. The results indicate it is important for hearing professionals to consider communicative participation and its measurement when clients present with a measured HI, even when the degree of impairment is slight. Audiologists and hearing health professionals should consider communicative participation in their assessments as well as rehabilitation plans and outcome measures with their clients.

4.2.2.2 Self-perceived hearing impairment.

Self-perceived severity of HI was identified in the regression analysis as the main predictor of communicative participation. Participants who perceived their HI as more severe experienced greater communication participation restrictions. This finding supports the hypothesis (1f), and is synonymous of previous literature. While previous audiological literature has not specifically examined communicative participation, a number of studies have reported similar associations between self-perceived hearing difficulties, communication difficulties and participation restrictions (Crews & Campbell, 2004; Helvik et al., 2006a; Hickson & Worrall, 1997; Weinstein & Ventry, 1983).

There are two main distinctions between the current study and previous hearing-related literature. The first distinction is the construct of communicative participation, which has been mentioned previously. The second is the measure of self-perceived hearing ability. The present study used an un-validated tool to assess self-perceived hearing ability (presented in Appendix D, and described in section 2.6.2.1). This is in contrast to many of the studies discussed which used a variety of validated self-assessment tools, including the HHIE.

Consistent with the current study's finding, there is a depth of research reporting self-perceived disease severity is a significant predictor of communicative participation in various other communication disorder populations. Populations include: multiple sclerosis (Baylor et al., 2010; Yorkston et al., 2014), Parkinson's disease (McAuliffe et al., 2016), head and neck cancers (Eadie et al., 2014), and laryngectomy patients (Eadie et al., 2016). Studies investigating communicative participation in these populations utilised a range of measures to assess self-perceived disease severity.

For individuals with Parkinson's disease, greater perceived speech disorder and lower levels of speech use are predictive of decreased levels of communicative participation (McAuliffe et al., 2016). Self-perceived severity of speech symptoms (Yorkston et al., 2014) and severity of voice disorder (Eadie et al., 2014; 2016) are significant predictors of communicative participation in other communication disorder populations. A key difference between these communication disorder populations and HI as examined by the present study is the origin of the communication disorder. The communication disorders previously examined affect the production of speech, whereas HI primarily affects speech comprehension. In this way one might expect that communicative participation of individuals with HI would be differentially affected. However, it appears that regardless of a person's diagnosis, their perception of the effect of their condition is strongly associated with their communicative participation.

In contrast to the present research, a number of the studies which report self-perceived symptom severity as a significant predictor also found demographic variables were significant predictors (Baylor et al., 2010; McAuliffe et al., 2016; Yorkston et al., 2014). Additionally cognitive function is reported to effect communicative participation (Baylor et al., 2010; McAuliffe et al., 2016; Yorkston et al., 2014), this is discussed further in section 4.5. The current study results indicate only disease related symptoms (objective, and self-perceived) are predictive in the sample of older adult with HI.

Overall, this finding supports current literature regarding the assessment and treatment of hearing difficulties. Measured HI, such as BEPTA, does impact on an individual's communicative participation it does not give the full picture of the lived experience. It is the self-perceived hearing ability which provides audiologists and related health professionals with the greatest insight. This finding supports the recommendation of using a self-report measure in order to accurately assess communicative participation.

It is recommended best practice for audiologists and related clinicians to assess hearing impairment at the body structure and function level, i.e. via measured HI, as well as at the activity and participation level, primarily via self-report assessment tools (ASHA, 2006; Hickson & Worrall, 1997; NZAS, 2016a). The present study is reflective of literature indicating participation restrictions are not predictive by measured HI alone. The use of self-report assessment tools such as the CPIB gives the clinician better insight into the lived experience of HI, and can be used for intervention planning and goal setting, as well as outcome assessment.

4.3 Relationship between the CPIB and Existing Self-Report Measures

The second aim of the study was to examine the relationship between the CPIB and existing measures of hearing and HRQoL; The HHI (E and A), the SESMQ, and the SF-36. The measures selected are common in clinical audiology practice and research. No previous studies had investigated the relationship between these measures and the CPIB.

4.3.1 Hearing Handicap Inventory.

A strong and statistically significant negative correlation existed between CPIB and HHI scores. This was evident for the overall score, as well as the emotional and social subscales. The strength of the correlation was greater than expected. A negative association was expected due to the scoring scales of the two measures. A high score on the HHI indicates greater self-reported impairment, whereas a high score on the CPIB indicates better communicative participation. This is the first time the relationship between the HHI and the CPIB has been investigated, however other condition-specific assessment tools have also shown strong correlations. McAuliffe and colleagues (2016) found a strong association between the CPIB and the Parkinson's Disease Questionnaire-8 (PDQ-8; Jenkinson, Fitzpatrick, Peto, Greenhall, & Hyman, 1997), a self-assessment tool for individuals with Parkinson's disease. However, the variance shared between the CPIB and PDQ-8 was much smaller than that between the CPIB and the HHI. This is likely because the PDQ-8 has a number of items targeting the assessment of speech production, with fewer items assessing communication. Although the HHI does not specifically target communicative participation, it targets constructs of social situations and the emotional consequences of HI, which are likely to have their genesis in communication based experiences. Eadie and colleagues' studies from 2014 and 2016 also demonstrated strong relationships between condition-specific assessment tools and the CPIB. The studies by Eadie et al (2014; 2016) present results more similar to the current study, in terms of the strength of correlation, and the shared variance. Both studies used the Voice Handicap Index (Rosen, Lee, Osborne, Zullo, & Murry, 2004), a patient-report measure of the impact from voice disorders. The Voice Handicap Index had strong and significant correlations with the CPIB in populations of individuals with head and neck cancer (Eadie et al., 2014), and laryngectomy (Eadie et al., 2016).

In addition to the strength of the correlation, measures of shared variance indicate the CPIB and HHI could be used interchangeably. While the two measures did not completely overlap, the HHI (total) accounted for a large amount of the shared variance (approximately 65%). This suggests the two measures are indexing similar constructs, and that the two measures are not appropriate for joint use. However, this does indicate that the CPIB is indeed measuring restrictions experienced by people with HI akin to the widely used self-report assessment tool – the HHIE/A. Clinicians and researchers alike could therefor use the CPIB when participation, and more specifically communicative participation is of interest.

4.3.2 Self-efficacy for situational management.

As predicted, both of the SESMQ scales (hearing and confidence) had a strong, positive correlation with CPIB scores. The hearing and confidence scales had similar strength of relationship, as well as amount of shared variance. Previous research has shown weak to moderate associations between the SESMQ and other condition specific self-report tools (Jennings et al., 2014). The strength of relationship between the SESMQ and the CPIB in this study is not unexpected. The SESMQ examines communication in a number of everyday listening environments. The CPIB and SESMQ utilise similar communication environments and situations, for example public and private environments, familiar and unfamiliar communication partners. Nevertheless, the two are investigating different constructs; communicative participation, and self-efficacy respectively. Interestingly, the HHI was more strongly associated with the CPIB than the SESMQ. This was unexpected, as the HHI focuses on the emotional and social impacts of HI. While emotional and social impacts of HI as measured with the HHI were expected to interact with the CPIB, it was thought the SESMQ would have a stronger relationship as the two have similar items, and examine communication in a number of similar settings. This result ties into the first research question's finding, that it is the person's view of their condition which is the best predictor of communicative participation.

This study provides information on how the two measures; the CPIB and SESMQ are related. The relationship between these two self-assessment measures has previously not been examined. While the two measures do not overlap entirely, the strength of correlation and shared variance suggest it is likely the two measures examine similar communication-oriented constructs. It therefore seems reasonable to suggest the use of either tool when examining communicative participation with adults with HI. The use of both tools in conjunction is not recommended, as this would likely provide the researcher or clinician redundant information, for limited informational pay-off.

4.3.3 Health-related quality of life.

The SF-36 was used as a measure of HRQoL. As expected there was a weak correlation between the CPIB and SF-36 scores. This correlation was positive, but did not reach statistical significance. When examining the sub scales of the SF-36, both mental and physical subscales were weakly associated, however the physical scale had a larger effect, and was significant at a $p < .01$ level. Additionally, measures of shared variance indicate the HRQoL and the CPIB measures are not interchangeable. The SF-36 is a generic measure of self-reported general well-being. It is often used as a measure of HRQoL in audiological research. This is the first time that the relationship between the CPIB and the SF-36 has been examined. The finding is analogous to previous research indicating weak to moderate correlations between the CPIB and other measures of HRQoL (Eadie et al., 2014; McAuliffe et al., 2016).

The finding indicates the SF-36 and the CPIB are not interchangeable, and are indexing different aspects of health and functioning. The SF-36 is examining a broader aspect of physical health and general wellbeing, rather than communication. The SF-36 does not contain any items which pertain directly to hearing, or indeed communication. The SF-36 is not an effective measure of communicative participation, supporting the need for a condition-specific tool to measure this construct. In both clinical and research settings, the use of separate assessment tools to evaluate HRQoL and communicative participation is necessary and appropriate, as demonstrated in older adults with HI, as well as other populations of communication disorders.

4.4 Clinical Implications

This study aimed to examine what variables effect communicative participation in older adults with HI, and how the CPIB, a measure of communicative participation related to existing measures. Only one previous study has examined communicative participation using the CPIB assessment tool in people with HI (Miller et al., 2017). The current study presents novel information regarding communicative participation and older adults with hearing impairment, and the relationship between the CPIB and existing measures used in the audiology field. The relationships between these tools was previously unknown.

This study established that HI has an effect on communicative participation in older adults. Both objective and subjective measures of HI appear to be the best factors in predicting communicative participation. Prior to this research, this was not known, but was presumed based on a number of other assessments of participation. This study has also shown that even in older adults with a slight HI, the CPIB is sensitive to communicative participation restrictions experienced by older adults. The use of an assessment tool specifically targeting communicative participation may be helpful to audiologists in their clinical practice, particularly for assessing the life area's their client is experiencing restrictions in, and assessing if rehabilitative or intervention options are adequately addressing these areas. The direct and targeted assessment of communicative participation in older adults with HI can therefore aid clinicians and their clients alike in participation focused rehabilitative goals, and outcome measurement.

The relationships between the CPIB and existing measures have important impacts for clinical and research applications. It appears that the CPIB can be used interchangeably with condition-specific measures, namely the SESMQ and HHI. The use of the CPIB in conjunction with either of these two measures would likely be inefficient in terms of time, and redundancy of information obtained. Clinicians and researchers alike therefore have a selection of assessment tools which can provide information on communicative participation. However, there are instances where the use of the CPIB may be beneficial over other tools. One such instance is that of multidisciplinary service delivery settings. The CPIB is a self-report assessment tool with its conception and development based in the speech and language pathology field (Baylor, 2007; Baylor et al., 2009). It has been validated for use with a number of communication disorders (Baylor et al., 2012; Eadie et al., 2014; Eadie et al., 2016; McAuliffe et al., 2016; Yorkston et al., 2014), and more recently its relevancy to people with HI has been examined (Miller et al., 2017). Future studies examining the validity of the CPIB with adults with HI are planned (Miller et al., 2017). The use of the CPIB in a multidisciplinary setting has potential advantages as related health professionals, such as speech language pathologists, may be familiar with the assessment tool and thus aid interdisciplinary communication, and rehabilitative approaches. Additionally, clients with comorbid conditions may benefit from the use of a single communicative participation assessment tool, which can be interpreted and used for rehabilitation planning and outcome assessment by the team of health professionals involved in their care.

The CPIB is not interchangeable with condition-generic measures of HRQoL. Thus it is recommended a HRQoL measure is used when general well-being is the aim of assessment.

A variety of measures already exist in the store of assessments available to audiologists, hearing health professionals, and researchers in the field. It is therefore important that any new measures are addressing constructs which are absent, or underrepresented in existing measures. The direct and targeted assessment of participation has been called for in the audiology field, and participation is identified as a construct which previously has been poorly assessed. This study recommends the CPIB is a suitable participation focused self-assessment tool for older adults with varying degrees of HI.

4.5 Limitations and Future Research

4.5.1 Limitations.

Findings should be considered within the context of the participant sample, and the cross-sectional nature of the data. Participants are a reasonably small, self-selected sample, who are relatively healthy, and have high levels of education. The sample is therefore potentially different from other studies samples. Additionally, due to the high number of participants with slight to mild HI, and low number of more severe HI the CBIP scores were higher (more positive) than what otherwise may be expected.

Similar to many studies, demographic diversity was an issue in the present study. The study sample consisted of mainly New Zealand European older adults who had high levels of education. High homogeneity of the sample means the generalisation of results beyond the study sample is limited. Future research could employ a nationwide sampling area, and have a specific focus on obtaining a sample which is culturally representative of the New Zealand population. Additionally, due to the sample size a limited number of variables were able to be examined. A larger sample size would enable more variables to be examined and included in the regression analysis.

Due to the cross-sectional design, data is indicative of the experience of HI at the specific time of data collection. It is not possible to determine if perceived communication difficulties proceeded HI, or vice versa.

A number of participants had missing data points. There are several reasons which may explain missing data, one of which is the participant's freedom to choose whether to answer. Other potential reasons for missing data are fatigue, and dexterity. Participants were given unlimited time to complete the surveys in their own home, in this way it was hoped by the researcher that fatigue would be avoided. In addition, it appears dexterity may have impeded the survey completion of surveys. Some participants had missed an entire page of the survey, potentially due to dexterity issues with turning the paper pages. One way to avoid this is to have the questionnaire battery available for completion online. Giving participants the option to complete the survey online or by pencil and paper would assist in ease of data collection, and potentially reduce missing data points.

A limitation of the current research is the possible confounding of comorbid conditions which were not examined. Two possible comorbid conditions which were not accounted for are vision and cognitive function. The combination of vision and hearing impairment, referred to in the literature as *sensory loss*, has greater impacts on participation than either of the impairments individually (Crews & Campbell, 2004). Due to the relationship between dual sensory loss and participation restrictions an assessment of vision should be incorporated into future research. This could be an objective measure, or a self-report assessment which could be incorporated into demographic questions. No formal assessment of cognitive function was utilised in the currently presented research. A number of similar studies investigating variables which predict communicative participation have reported cognitive function is a significant predictor (Baylor et al., 2010; McAuliffe et al., 2016; Yorkston et al., 2014). Future research would benefit from including a measure of cognitive function, such as the Mini Mental State Examination (Folstein, Folstein, & McHugh, 1975).

Another limitation of the current study is the possibility the CPIB will not be found to be valid with HI. The recent publication by Miller and colleagues' (2017) examined the relevancy of the CPIB to HI via cognitive interviews with adults with HI and audiologists. The researchers' concluded that the majority of the items were relevant to adults with HI as their primary communication condition, however, further validation of the CPIB tool is required with this population before its use is recommended. The authors state it is possible that there will be no meaningful differential item functioning, in which case the CPIB will be able to be used with individuals with HI in its current form. The CPIB has already demonstrated no meaningful differential item functioning across different communication disorder populations (Baylor et al., 2016, 2013). However, it may also be the case that a HI specific CPIB will need to be generated (Miller et al., 2017). It remains to be seen if this is the case, however results should be considered with this in mind.

4.5.2 Future research.

This study exclusively examined participants' self-reported views of health and hearing. It did not seek to incorporate the views of family members and communication partners. The inclusion of communication partners could provide a novel perspective of the negative impacts of HI on communication for the individual with HI, as well as how it affects broader family life. Future studies may wish to consider communication partners' views and experiences.

Future research should seek to recruit individuals with greater degree of HI. Participants in the current study predominantly had slight or mild HI in their better hearing ear. Additionally, the findings are examined in a pooled group. If the degree of HI was similarly represented in a sample, it would be interesting to examine findings based on the grouping of the degree of HI.

The CPIB has not yet been validated for use with individuals with HI. However, this process has recently been initiated in the examination of the relevancy of the CPIB for people with HI (Miller et al., 2017). Future psychometric analysis is required to validate the use of this measure for use with people with HI.

A number of questionnaires were selected to be examined in the current research, however due to the length of the questionnaire battery and consideration for the participants, only one HRQoL measure was selected. The WHODAS-II is a condition-generic HRQoL assessment with its foundation in the ICF model, much like the CPIB. It would be interesting for future research to examine the relationship between the CPIB and other measures, such as the WHODAS-II, particularly considering their ICF based development.

Speech in noise testing is not typically completed as part of a standard audiological test battery in New Zealand. Due to the way in which audiological data was collected for the current study, it was not feasible for speech and noise to be included as a variable in the present research. Future studies could also seek to investigate other audiological measures which may be predictive of communicative participation, such a speech in noise testing.

4.6 Conclusion

The purpose of this study was to examine the CPIB in relation to HI. Until recently, the CPIB had not been studied with this population. The aims of the study were to examine the factors which are predictive of communicative participation in older adults with HI, and investigate the relationships between the CPIB and existing measures which are commonly used in the audiology field, in research and in clinical practice. Results indicated that only hearing related variables were statistically significant predictors of communicative participation. There variables were measured HI (BEPTA) and self-perceived hearing ability. The CPIB had strong relationships with both condition-specific assessment tools; the HHI and the SESMQ. However, the CPIB was not significantly related to the condition-generic measure of HRQoL, the SF-36. Communicative participation is an important construct for audiologists to measure and address in their clients' assessments and rehabilitative plans. However, to do so valid and reliable assessment tools are required. The CPIB's validity for use with adults with HI is currently underway. The present study adds to the small pool of literature pertaining to communicative participation in this population.

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Appendix A – Human Ethics Committee Approval

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

HUMAN ETHICS COMMITTEE

Secretary, Rebecca Robinson
Telephone: +64 03 364 2987, Extn 45588
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2016/84

26 August 2016

Natalie Maree Price
Communication Disorders
UNIVERSITY OF CANTERBURY

Dear Natalie

The Human Ethics Committee advises that your research proposal “Communicative Participation and Adults with Hearing Impairment : a New Zealand Perspective” has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 18th August 2016.

Best wishes for your project.

Yours sincerely

pp. R. Robinson

Kelly Dombroski
Deputy Chair
University of Canterbury Human Ethics Committee

University of Canterbury Private Bag 4800, Christchurch 8140, New Zealand. www.canterbury.ac.nz

Appendix B – Information Sheet

Communicative participation and adults with hearing impairment: A New Zealand perspective

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Information Sheet for Interested Persons

Researchers:

Natalie Price
Master of Audiology Student
Dept of Communication Disorders
University of Canterbury
Email: natalie.price@pg.canterbury.ac.nz

Dr Megan McAullife
Associate Professor, Research supervisor
Dept of Communication Disorders
University of Canterbury
Email: megan.mcauliffe@canterbury.ac.nz
Phone: 03 364 2987 EXT 7075

Dr Carolyn Baylor
Associate research supervisor
Dept of Rehabilitation Medicine
University of Washington

Why have we contacted you?

You are invited to take part in the study: Communicative participation and adults with hearing impairment. We have invited you to participate in this study as we believe you will have valuable information about the study's focus; hearing and communication.

What is the aim of the study?

Natalie is an audiology student, in her final year of her master of audiology degree. She is interested in finding out how hearing difficulties affect daily living and interactions of New Zealand adults, and how this information may help audiologists in their clinical practice.

We want to find out about how hearing difficulties influence communication in adults living in New Zealand.

Who do we need for the study?

We are looking for adults who identify as having hearing difficulties. You will ideally be over the age of 55 years, and living independently in New Zealand. You ideally will have had a hearing test before, however this is not compulsory.

What will happen in the study?

Natalie Price (researcher) will send you a packet in the post. The packet will have papers in it for you to fill out. These papers will include; (1) a consent form to agree to be part of the study and provide a copy of your hearing test, (2) an information sheet for you to tell us about yourself, (3) four surveys about your hearing, and (4) a postage-paid envelope to return the forms to the researchers. It will take you about one hour to complete the forms. If you have not had a hearing test recently, we can arrange to see you at the University of Canterbury Speech and Hearing Clinic, the test should take approximately half an hour.

What are your rights?

You choose if you do, or do not take part in the study, it is completely up to you. Participation is voluntary and you have the right to withdraw at any stage without penalty. You may ask for your raw data to be returned to you or destroyed at any point. If you withdraw, I will remove information relating to you. If you do withdraw this will not affect you or your interactions with the University of Canterbury in any way.

What are the benefits and risks?

There are no direct benefits to you. But we hope that the information gathered will be beneficial for hearing professionals to better understand and support adults with hearing difficulties.

There are no direct risks to you taking part in this study. But, you may feel distressed talking about your hearing or communication difficulties. At the end of this letter there is a list of support services you may like to contact.

What about privacy?

No information that could identify you will be published, your identity will be kept confidential throughout the study. The data will be kept in locked facilities and password protected computers in the Department of Communication Disorders. Only the research team listed at the start of this letter will have access to your information.

The results from the study will be published in Natalie's Master of Audiology thesis. A thesis is a public document, and will be available from the University of Canterbury Library.

How do you find out about the study's findings?

You are welcome to find out about the study's findings. There is a place to indicate you would like to receive this on the consent form. We will post you a summary of the study results once the study is completed.

Has the study been approved?

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any complaints to;

Post: The Chair, Human Ethics Committee, University of Canterbury,
Private Bag 4800, Christchurch 8140
Email: human-ethics@canterbury.ac.nz

What do you do next?

If you would like to take part in the study please return the **consent form** and **participant information form by post** in the addressed envelope which has been provided to you.

OR you can contact the researchers (contact details provided at the beginning of this form).

Once you have consented to taking part, you will then be sent the hearing surveys to complete. There are four surveys in total.

If you do not wish to take part, you do not have to do anything.

Thank you for taking the time to read about this study

Who can you contact if you feel distressed?

Lifeline Aotearoa is a free 24 hour a day, 7 day a week service. Phone: 0800 543 354

Who can you contact for more information about hearing and hearing difficulties?

New Zealand Audiological Society
Phone: 0800 625 166
Email: mail@audiology.org.nz

Ministry of Health
Phone: 0800 855 066
Email: info@health.govt.nz

Appendix C – Consent Form

Communicative participation and adults with hearing impairment: A New Zealand perspective

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Consent Form for Participants

Information about this research study has been explained to me to my satisfaction, and I have had the opportunity to ask questions.

I understand what I need to do if I agree to take part in the research.

I know that participation is voluntary (my choice) and I may withdraw at any time without penalty. If I withdraw, my information will also be removed from the research.

I know that any information or opinions I give will be kept private to the researchers. I know that any published or reported results will not identify myself. I understand that a thesis is a public document and will be available through the University of Canterbury Library.

I understand that all data collected for the study will be kept in locked and secure facilities and in password protected electronic form/ computers, and will be destroyed after five years.

I understand the risks associated with taking part and how they will be managed.

I understand that I am able to receive a report on the findings of the study at the conclusion of the project.

I consent to my hearing test results from the University of Canterbury being accessed by the researchers for the purpose of this study.

I know that I can contact the researcher or supervisor for further information. They are;
Natalie Price: natalie.price@pg.canterbury.ac.nz
Dr Megan McAuliffe: megan.mcauliffe@canterbury.ac.nz, (03) 364 2987 EXT 7075

If I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch. Email: human-ethics@canterbury.ac.nz

- I would like a summary of the results of the project YES / NO (circle one)
- I consent to my data collected being made available for future studies (within the next 5 years) that have received ethical clearance from the University of Canterbury Ethics Committee.
  YES / NO (circle one)

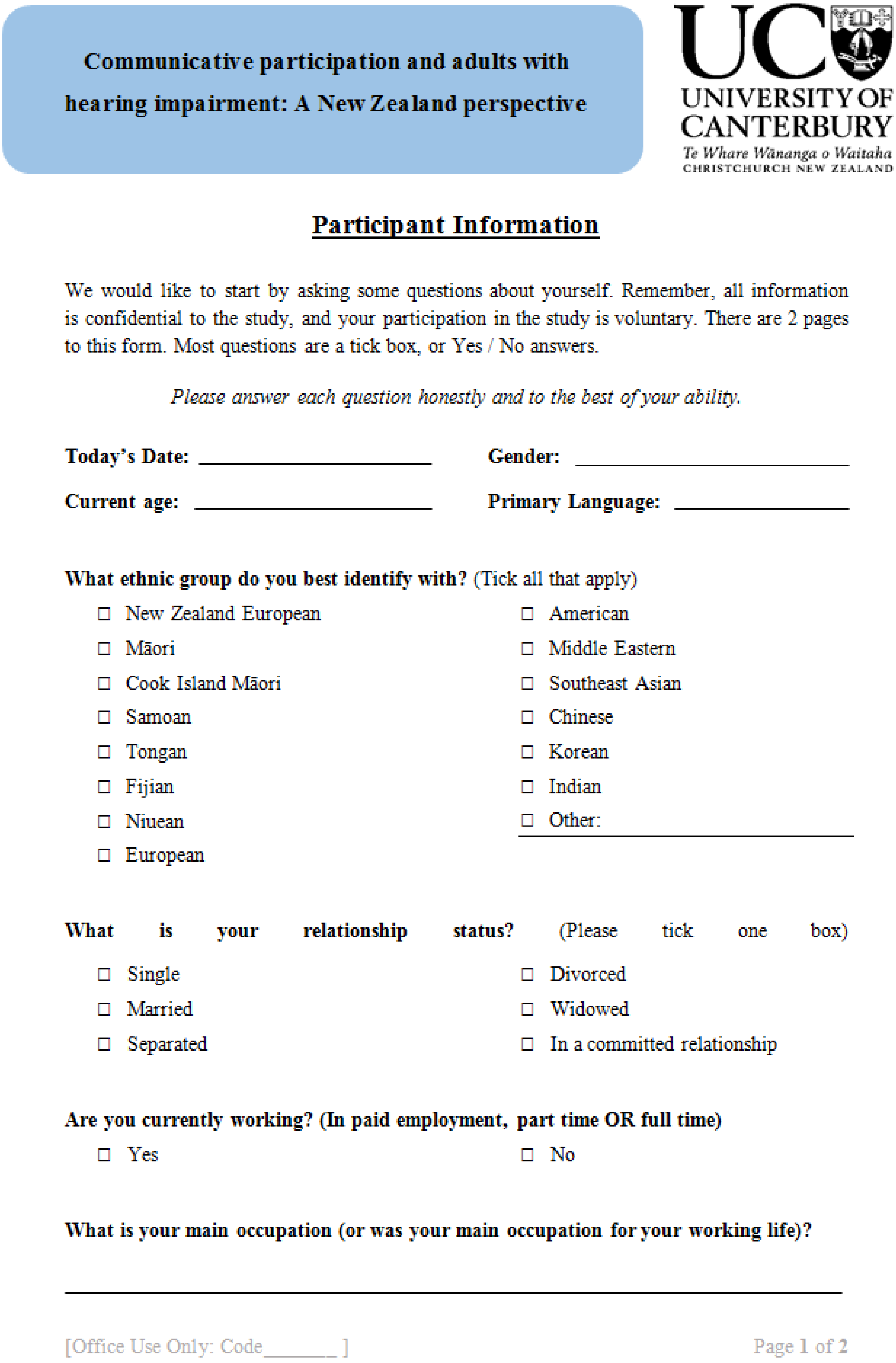
By signing below, I agree to take part in this research project.

Name (please print): ____________________

Signature: ____________________ Date: ____________

Please return this form via post
(We have provided you with an addressed, postage paid envelope)

Appendix D – Demographic Questionnaire



Communicative participation and adults with hearing impairment: A New Zealand perspective

UC UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Participant Information

We would like to start by asking some questions about yourself. Remember, all information is confidential to the study, and your participation in the study is voluntary. There are 2 pages to this form. Most questions are a tick box, or Yes / No answers.

Please answer each question honestly and to the best of your ability.

Today's Date: ______________________

Gender: ______________________

Current age: ______________________

Primary Language: ______________________

What ethnic group do you best identify with? (Tick all that apply)

- ☐ New Zealand European
- ☐ Māori
- ☐ Cook Island Māori
- ☐ Samoan
- ☐ Tongan
- ☐ Fijian
- ☐ Niuean
- ☐ European
- ☐ American
- ☐ Middle Eastern
- ☐ Southeast Asian
- ☐ Chinese
- ☐ Korean
- ☐ Indian
- ☐ Other: ______________________

What is your relationship status? (Please tick one box)

- ☐ Single
- ☐ Married
- ☐ Separated
- ☐ Divorced
- ☐ Widowed
- ☐ In a committed relationship

Are you currently working? (In paid employment, part time OR full time)

- ☐ Yes
- ☐ No

What is your main occupation (or was your main occupation for your working life)?

____

[Office Use Only: Code_______]

Page **1** of **2**

What is the highest level of education you completed?

- ☐ Completed Post-graduate level (Masters, Ph.D.)
- ☐ Completed undergraduate university (Degree level)
- ☐ Attended some University
- ☐ Vocational or technical school (e.g. apprenticeship, polytech)
- ☐ Completed High school
- ☐ Attended some High school
- ☐ Primary or Intermediate school

How many other people live with you, in your home? ____________________

Where do you currently live?

- ☐ In your own home
- ☐ Renting
- ☐ With family/ relatives
- ☐ Retirement village/ apartment
- ☐ Other: (Please describe) ____________________

Do you think you have a hearing difficulty?

☐ Yes ☐ No

If yes, when did you notice your hearing difficulty?

☐ As an adult ☐ Since I was a child/ teenager

Please indicate approximately when you began to notice hearing difficulties, for example "In my 40s": ____________________

Do others (friends or family) think you have a hearing difficulty?

☐ Yes ☐ No

Have you ever had a hearing test?

☐ Yes ☐ No

Do you wear hearing aid/s?

☐ Yes ☐ No

How would you describe your hearing / hearing difficulties? (Circle one number)

0	1	2	3	4	5	6	7	8	9	**10**
I have no hearing difficulties										**I have severe hearing difficulties**

Please return this form via post
(We have provided you with an addressed, postage paid envelope)

Appendix E – Hearing Surveys (HHIE Version)

Communicative participation and adults with hearing impairment: A New Zealand perspective

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Hearing Surveys

There are 4 surveys in this packet. At the beginning of each survey there is a description about the survey. Please read each one carefully. It will also tell you how to answer the questions. The questions are a tick box style, or circling a number or word. All you will need to do these surveys is a pen.

Thank you in advance for your interest in this study, and for taking part.

Hearing Handicap Inventory (HHI-E)

The purpose of this scale is to identify the problems your hearing loss may be causing you.

Answer YES, SOMETIMES or NO for each question.

Do not skip a question if you avoid a situation because of your hearing problem.

If you use a hearing aid or assistive listening device, please answer the way you hear without the hearing aid/ device.

Tick **one** box on each line.

	Yes	**Sometimes**	**No**
1. Does a hearing problem cause you to use the phone less often than you would like?	☐	☐	☐
2. Does a hearing problem cause you to feel embarrassed when meeting new people?	☐	☐	☐
3. Does a hearing problem cause you to avoid groups of people?	☐	☐	☐
4. Does a hearing problem make you irritable?	☐	☐	☐
5. Does a hearing problem cause you to feel frustrated when talking to members of your family?	☐	☐	☐
6. Does a hearing problem cause you difficulty when attending a party?	☐	☐	☐
7. Does a hearing problem cause you to feel “stupid” or “dumb”?	☐	☐	☐
8. Do you have difficulty hearing when someone speaks in a whisper?	☐	☐	☐
9. Do you feel handicapped by a hearing problem?	☐	☐	☐
	Yes	**Sometimes**	**No**

	Yes	**Sometimes**	**No**
10. Does a hearing problem cause you difficulty when visiting friends, relatives or neighbours?	☐	☐	☐
11. Does a hearing problem cause you to attend religious services less often that you would like?	☐	☐	☐
12. Does a hearing problem cause you to be nervous?	☐	☐	☐
13. Does a hearing problem cause you to visit friends, relatives, or neighbours less often than you would like?	☐	☐	☐
14. Does a hearing problem cause you to have arguments with family members?	☐	☐	☐
15. Does a hearing problem cause you difficulty when listening to TV or radio?	☐	☐	☐
16. Does a hearing problem cause you to go shopping less often than you would like?	☐	☐	☐
17. Does any problem or difficulty with your hearing upset you at all?	☐	☐	☐
18. Does a hearing problem cause you to want to be by yourself?	☐	☐	☐
19. Does a hearing problem cause you to talk to family members less often than you would like?	☐	☐	☐
20. Do you feel any difficulty with your hearing limits or hampers your personal or social life?	☐	☐	☐
21. Does a hearing problem cause you difficulty when in a restaurant with relatives or friends?	☐	☐	☐
	Yes	**Sometimes**	**No**

	Yes	Sometimes	No
22. Does a hearing problem cause you to feel depressed?	☐	☐	☐
23. Does a hearing problem cause you to listen to TV or radio less often than you would like?	☐	☐	☐
24. Does a hearing problem cause you to feel uncomfortable when talking to friends?	☐	☐	☐
25. Does a hearing problem cause you to feel left out when you are with a group of people?	☐	☐	☐
	Yes	**Sometimes**	**No**

Office use only:

Total: _____

Subtotal E: _____

Subtotal S: _____

Communicative Participation Item Bank (CPIB)

The following questions describe a variety of situations in which you might need to speak to others. For each question, please mark how much your condition interferes with your participation in that situation. By “condition” we mean your hearing. If your hearing varies, think about an AVERAGE day for your hearing– not your best or your worst days.

Here is one sample item to get you ready for the questionnaire:

Does your condition interfere with talking on the phone to family and friends?

- ☐ Not at all
- ☐ A little
- ☐ Quite a bit
- ☐ Very much

There are lots of questions in this section. Some of them sound similar to each other. We have done that on purpose.

Please check one box on every line/ question. Do not skip any questions.

The questions start below

	Not at all	A little	Quite a bit	Very much
1. Does your condition interfere with… **…talking with people you know?**	☐	☐	☐	☐
2. Does your condition interfere with… **…having a conversation in a noisy place?**	☐	☐	☐	☐
3. Does your condition interfere with… **…making a phone call to get information?**	☐	☐	☐	☐
4. Does your condition interfere with… **…communicating in a small group of people?**	☐	☐	☐	☐
	Not at all	A little	Quite a bit	Very much

	Not at all	**A little**	**Quite a bit**	**Very much**
5. Does your condition interfere with… **…talking with a shop assistant in a store about a problem with a bill or purchase?**	☐	☐	☐	☐
6. Does your condition interfere with… **…saying something to get someone's attention?**	☐	☐	☐	☐
7. Does your condition interfere with… **…having a long conversation with someone you know about a book, movie, show, or sports event?**	☐	☐	☐	☐
8. Does your condition interfere with… **…communicating when you need to say something quickly?**	☐	☐	☐	☐
9. Does your condition interfere with… **…making new acquaintances?**	☐	☐	☐	☐
10. Does your condition interfere with… **…giving personal advice to help a family member or friend?**	☐	☐	☐	☐
11. Does your condition interfere with… **…getting your point across when you are upset?**	☐	☐	☐	☐
12. Does your condition interfere with… **…communicating at home?**	☐	☐	☐	☐
	Not at all	A little	Quite a bit	Very much

	Not at all	**A little**	**Quite a bit**	**Very much**
13. Does your condition interfere with… **…greeting someone you know at a social gathering?**	☐	☐	☐	☐
14. Does your condition interfere with… **…having a conversation about a serious topic?**	☐	☐	☐	☐
15. Does your condition interfere with… **…trying to persuade a friend or family member to see a different point of view?**	☐	☐	☐	☐
16. Does your condition interfere with… **…making a witty or funny comment in a conversation?**	☐	☐	☐	☐
17. Does your condition interfere with… **…talking with people you do NOT know?**	☐	☐	☐	☐
18. Does your condition interfere with… **…having a conversation while travelling in a car?**	☐	☐	☐	☐
19. Does your condition interfere with… **…talking to a shop assistant who is in a hurry?**	☐	☐	☐	☐
20. Does your condition interfere with… **…talking with important people in your life about your wishes regarding long-term planning?**	☐	☐	☐	☐
	Not at all	A little	Quite a bit	Very much

	Not at all	**A little**	**Quite a bit**	**Very much**
21. Does your condition interfere with… **…bringing up a new topic in casual conversations?**	☐	☐	☐	☐
22. Does your condition interfere with… **… expressing thanks or appreciation?**	☐	☐	☐	☐
23. Does your condition interfere with… **…making comments to family or friends about a TV show or movie you are watching together?**	☐	☐	☐	☐
24. Does your condition interfere with… **…sharing personal feelings with people who are close to you?**	☐	☐	☐	☐
25. Does your condition interfere with… **…communicating when you are out in your community?** **(e.g. errands; appointments)**	☐	☐	☐	☐
26. Does your condition interfere with… **…getting your turn in a fast-moving conversation?**	☐	☐	☐	☐
27. Does your condition interfere with… **…taking a phone message?**	☐	☐	☐	☐
28. Does your condition interfere with… **…talking with your family or friends about something you are planning to do with them?**	☐	☐	☐	☐
	Not at all	A little	Quite a bit	Very much

	Not at all	**A little**	**Quite a bit**	**Very much**
29. Does your condition interfere with… **…making small talk?**	☐	☐	☐	☐
30. Does your condition interfere with… **…giving someone DETAILED information?**	☐	☐	☐	☐
31. Does your condition interfere with… **…asking questions in a conversation?**	☐	☐	☐	☐
32. Does your condition interfere with… **…comforting a friend or family member?**	☐	☐	☐	☐
33. Does your condition interfere with… **…communicating at social gatherings where you know most of the people?**	☐	☐	☐	☐
34. Does your condition interfere with… **…negotiating?**	☐	☐	☐	☐
35. Does your condition interfere with… **…ordering a meal in a restaurant?**	☐	☐	☐	☐
36. Does your condition interfere with… **…communicating with others when and where you choose?**	☐	☐	☐	☐
37. Does your condition interfere with… **…starting a conversation with someone you know?**	☐	☐	☐	☐
	Not at all	A little	Quite a bit	Very much

	Not at all	**A little**	**Quite a bit**	**Very much**
38. Does your condition interfere with… **…sharing your opinion with family and friends?**	☐	☐	☐	☐
39. Does your condition interfere with… **…visiting with others in a public place? (e.g. park, restaurant, sports activity)**	☐	☐	☐	☐
40. Does your condition interfere with… **…taking about an emotional issue with family of friends?**	☐	☐	☐	☐
41. Does your condition interfere with… **…communicating in a large group of people?**	☐	☐	☐	☐
42. Does your condition interfere with… **…answering questions from a doctor or health care provider who you know?**	☐	☐	☐	☐
43. *Would* your condition interfere with… **...communicating during an emergency?**	☐	☐	☐	☐
44. *Would* your condition interfere with… **…giving directions to someone who is lost and has asked you for help?**	☐	☐	☐	☐
45. *Would* your condition interfere with… **…asking for help from a stranger?**	☐	☐	☐	☐
46. *Would* your condition interfere … **…if you were with someone you knew and needed to ask them for help right away?**	☐	☐	☐	☐
	Not at all	A little	Quite a bit	Very much

Self-Efficacy for Situational Management Questionnaire (SESMQ)

We are interested in **how well you believe that you can hear** and **how confident you are that you can manage communication** in the following 20 situations when wearing your hearing aid or another assistive listening device (if you use one).

Please read each of the following situations. For each situation, please rate **how well you believe you can hear** and **how confident you are that you can manage communication** by circling the number that best applies to you.

Circle one number on each line.

---

1. You are having a conversation with a friend or family member in your home. The room is dark because the curtains are partially closed and the light is off.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

2. Your friend/ family member is trying to talk to you when she/he is in another room.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

3. You are at a party where the conversation is noisy. Someone who you have never met before comes over to speak to you.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

4. You are at the doctor's office. The receptionist calls you from across the room to let you know that it is your turn to see the doctor.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

5. You are watching television at home. The actors speak amid the background music.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

6. You hold a card party in your home. You are seated at a table with people who you do not know very well.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

7. You are at home watching television with a family member. She/he turns and speaks to you.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

8. You are going to a public lecture. There are no seats available near the speaker.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

9. You are waiting for a train/plane at a busy station. Your friend is sitting beside you and says something without looking at you.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

10. You hold a party in your home. Someone you do not know very well starts up a conversation. She/he puts one hand over her/his mouth when they are speaking.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

11. You are having a family dinner in your home. There is more than one conversation occurring at a time.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

12. You are at a wedding reception with 200 guests. Your friend/family member starts talking to you.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

13. You are in a restaurant with a family member or friend. You are seated in a dim and noisy spot.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

14. You telephone a family member/ friend using a pay phone. There is a lot of noise from people passing behind you.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

15. You are at home. The telephone rings. You do not recognize the caller’s voice and cannot understand what she/he is saying.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

16. You answer the door. The postal carrier hands you a package and asks you a question.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

17. You attend a meeting with 3 other persons. You have attended this meeting on a regular basis.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

18. You are in a grocery store. The person at the checkout tells you the total of your bill.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

19. You are at home watching television with a friend/family member. The volume on the television is too soft.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

20. You are in the bank. You go to the teller to ask about your bank balance.

How well can you hear in this situation?

0 1 2 3 4 5 6 7 8 9 10

Not well at all Moderately well Very well

How confident are you that you can manage this situation?

0 1 2 3 4 5 6 7 8 9 10

Not Confident at all Moderately confident Very confident

Medical Outcomes Survey - Short form-36 (MOS-SF-36)

This survey is about your general health.

Please answer every question, by ticking the box, or circling the number that best applies to you.

Do not skip a question.

For questions 1 and 2 below, please tick the box which best applies to you.

1. In general, would you say your health is;

☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor

2. **Compared to one year ago**, how would you rate your health in general **now**?

☐ Much better than one year ago

☐ Somewhat better than a year ago

☐ About the same

☐ Somewhat worse than one year

☐ Much worse now than one year ago

The following items are about activities you might do during a typical day.

Does your health now limit you in these activities? If so, how much?

Tick one box on each line

	Yes, Limited a Lot	Yes, Limited a Little	No, Not limited at all
3. **Vigorous activities**, such as running, lifting heavy objects, participation in strenuous sports	☐ 1	☐ 2	☐ 3
4. **Moderate activities,** such as moving a table, pushing a vacuum cleaner, bowling or playing golf	☐ 1	☐ 2	☐ 3
5. Lifting or carrying groceries	☐ 1	☐ 2	☐ 3
6. Climbing **several** flights of stairs	☐ 1	☐ 2	☐ 3
7. Climbing **one** flight of stairs	☐ 1	☐ 2	☐ 3
8. Bending, kneeling, or stooping	☐ 1	☐ 2	☐ 3
9. Walking **more than a mile**	☐ 1	☐ 2	☐ 3
10. Walking **several blocks**	☐ 1	☐ 2	☐ 3
11. Walking **one block**	☐ 1	☐ 2	☐ 3
12. Bathing or dressing yourself	☐ 1	☐ 2	☐ 3
	Yes, Limited a Lot	Yes, Limited a Little	No, Not limited at all

During the past **4 weeks**, have you had any of the following problems with your work or other regular activities **as a result of your physical health?**

Circle one number on each line

	Yes	No
13. Cut down the amount of time you spent on work or other activities	1	2
14. Accomplished less than you would like	1	2
15. Were limited in the kind of work or other activities	1	2
16. Had difficulty performing the work or other activities (for example, it took extra effort)	1	2

During the **past 4 weeks**, have you had any of the following problems with your work or other regular activities as a result of any **emotional problems**?

(such as feeling depressed or anxious/ worried)

Circle one number on each line

	Yes	No
17. Cut down the amount of time you spent on work or other activities	1	2
18. Accomplished less than you would like	1	2
19. Didn't do work or other activities as carefully as usual	1	2

20. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Circle one option

1. Not at all	2. Slightly	3. Moderately	4. Quite a bit	5. Extremely

21. How much bodily pain have you had during the past 4 weeks?

Circle one option

1. None	2. Very Mild	3. Mild	4. Moderate	5. Severe

22. During the past 4 weeks, how much did pain interfere with your normal work? (Including both work outside the home and housework)

Circle one option

1. Not at all	2. A little bit	3. Moderately	4. Quite a bit	5. Extremely

These questions are about how you feel and how things have been with you during the **past 4 weeks**.

For each question, please give the one answer that comes closest to the way you have been feeling.

Circle one number on each line

	All of the time	Most of the time	A Good bit of the time	Some of the time	A little of the time	None of the time
23. Did you feel full of pep?	1	2	3	4	5	6
24. Have you been a very nervous person?	1	2	3	4	5	6
25. Have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5	6
26. Have you felt calm and peaceful?	1	2	3	4	5	6
27. Did you have a lot of energy?	1	2	3	4	5	6
28. Have you felt down hearted and blue?	1	2	3	4	5	6
	All of the time	Most of the time	A Good bit of the time	Some of the time	A little of the time	None of the time

These questions are about how you feel and how things have been with you during the **past 4 weeks**.

For each question, please give the one answer that comes closest to the way you have been feeling.

Circle one number on each line

	All of the time	Most of the time	A Good bit of the time	Some of the time	A little of the time	None of the time
29. Did you feel worn out?	1	2	3	4	5	6
30. Have you been a happy person?	1	2	3	4	5	6
31. Did you feel tired?	1	2	3	4	5	6

32. During the **past 4 weeks**, how much of the time has **your physical health or emotional problems** interfered with your social activities?
(Like visiting with friends, relatives, etc.)

Circle one option

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

How **TRUE** or **FALSE** is each of the following statements for you?

Circle one number on each line

	Definitely True	Mostly True	Don’t Know	Mostly False	Definitely False
33. I seem to get sick a little easier than other people	1	2	3	4	5
34. I am as healthy as anybody I know	1	2	3	4	5
35. I expect my health to get worse	1	2	3	4	5
36. My health is excellent	1	2	3	4	5

Hearing survey checklist

- ☐ Survey 1 – Hearing Handicap Inventory
- ☐ Survey 2 – Communication Participation Item Bank
- ☐ Survey 3 – Self efficacy for Situational Management Questionnaire
- ☐ Survey 4 – Medical Outcomes Survey (Short form-36)

You have reached the end of the surveys!

Thank you for taking the time to complete these surveys.

What do you do next?

Place all pages in the addressed envelope provided. The postage has already been paid. Place the envelope in the post, back to us.

The address on the envelope will be;

Attention Natalie Price
Department of Communication Disorders, University of Canterbury,
Private Bag 4800, Christchurch 8140

Appendix F – HHIA

Hearing Handicap Inventory (HHI-A)

The purpose of this scale is to identify the problems your hearing loss may be causing you.

Answer YES, SOMETIMES or NO for each question.

Do not skip a question if you avoid a situation because of your hearing problem.

If you use a hearing aid or assistive listening device, please answer the way you hear without the hearing aid/ device.

Tick **one** box on each line.

	Yes	**Sometimes**	**No**
1. Does a hearing problem cause you to use the phone less often than you would like?	☐	☐	☐
2. Does a hearing problem cause you to feel embarrassed when meeting new people?	☐	☐	☐
3. Does a hearing problem cause you to avoid groups of people?	☐	☐	☐
4. Does a hearing problem make you irritable?	☐	☐	☐
5. Does a hearing problem cause you to feel frustrated when talking to members of your family?	☐	☐	☐
6. Does a hearing problem cause you difficulty when attending a party?	☐	☐	☐
7. Does a hearing problem cause you difficulty hearing/ understanding co-workers, clients, or customers?	☐	☐	☐
8. Do you feel handicapped by a hearing problem?	☐	☐	☐
	Yes	**Sometimes**	**No**

	Yes	Sometimes	No
9. Does a hearing problem cause you difficulty when visiting friends, relative or neighbours?	☐	☐	☐
10. Does a hearing problem cause you to feel frustrated when talking to co-workers, clients or customers?	☐	☐	☐
11. Does a hearing problem cause you difficulties in the movies or theatre?	☐	☐	☐
12. Does a hearing problem cause you to be nervous?	☐	☐	☐
13. Does a hearing problem cause you to visit friends, relatives, or neighbours less often than you would like?	☐	☐	☐
14. Does a hearing problem cause you to have arguments with family members?	☐	☐	☐
15. Does a hearing problem cause you difficulty when listening to TV or radio?	☐	☐	☐
16. Does a hearing problem cause you to go shopping less often than you would like?	☐	☐	☐
17. Does any problem or difficulty with your hearing upset you at all?	☐	☐	☐
18. Does a hearing problem cause you to want to be by yourself?	☐	☐	☐
19. Does a hearing problem cause you to talk to family members less often than you would like?	☐	☐	☐
20. Do you feel than any difficulty with your hearing limits or hampers your personal or social life?	☐	☐	☐
21. Does a hearing problem cause you difficulty when in a restaurant with relative or friends?	☐	☐	☐
	Yes	**Sometimes**	**No**

	Yes	Sometimes	No
22. Does a hearing problem cause you to feel depressed?	☐	☐	☐
23. Does a hearing problem cause you to listen to TV or radio less often than you would like?	☐	☐	☐
24. Does a hearing problem cause you to feel uncomfortable when talking to friends?	☐	☐	☐
25. Does a hearing problem cause you to feel left out when you are with a group of people?	☐	☐	☐
	Yes	**Sometimes**	**No**

Office use only:

Total: ______

Subtotal E: ______

Subtotal S: ______

Appendix G – CPIB Short Form Questions

	Not at all	A little	Quite a bit	Very much
1. Does your condition interfere with… **…talking with people you know?**	☐	☐	☐	☐
2. Does your condition interfere with… **…communicating when you need to say something quickly?**	☐	☐	☐	☐
3. Does your condition interfere with… **…talking with people you do NOT know?**	☐	☐	☐	☐
4. Does your condition interfere with… **…communicating when you are out in your community (e.g. errand; appointments)?**	☐	☐	☐	☐
5. Does your condition interfere with… **… asking questions in a conversation?**	☐	☐	☐	☐
6. Does your condition interfere with… **…communicating in a small group of people?**	☐	☐	☐	☐
7. Does your condition interfere with… **… having a long conversation with someone about a book, movie, show or sports event?**	☐	☐	☐	☐
8. Does your condition interfere with… **…giving someone DETAILED information?**	☐	☐	☐	☐
9. Does your condition interfere with… **…getting your turn in a fast moving conversation?**	☐	☐	☐	☐
10. Does your condition interfere with… Trying to persuade a friend or family member to see a different point of view?	☐	☐	☐	☐

Appendix H – CPIB Short Form Theta Conversion

CPIB-10	Theta
30	2.10
29	1.67
28	1.42
27	1.22
26	1.06
25	0.92
24	0.78
23	0.65
22	0.53
21	0.40
20	0.27
19	0.15
18	0.03
17	-0.10
16	-0.22
15	-0.33
14	-0.45
13	-0.56
12	-0.67
11	-0.78
10	-0.89
9	-0.99
8	-1.10
7	-1.22
6	-1.34
5	-1.46
4	-1.60
3	-1.76
2	-1.94
1	-2.18
0	-2.58