
**OUTCOMES OF GROUP AUDIOLOGIC REHABILITATION FOR
ADULTS WITH UNAIDED HEARING IMPAIRMENT AND THEIR
SIGNIFICANT OTHERS**

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ABSTRACT

Aim: *To evaluate an audiologic rehabilitation program previously piloted in the U.S. (Kelly-Campbell, in review) for unaided hearing-impaired working adults that was also modified to include their significant others.*

Method: *In this quasi-randomised repeated measures waitlist design, forty-eight participants (24 hearing-impaired adults and their 24 normal hearing significant others) aged 50-64 years were randomised into either a non-waitlist group (immediate treatment), or a waitlist group (treatment after 12-weeks). In these groups, participant couples attended three weekly 2-hour group sessions and completed health-related quality of life (HRQOL) assessments.*

Treatment outcomes for hearing-impaired adults (HIAs) were measured from self and significant other (SO) proxy reports of the Communication Profile for the Hearing Impaired (CPHI; Demorest & Erdman, 1986; 1987). Treatment outcomes for SOs were measured from self-reports of the Significant Other Scale for Hearing Disability (SOS-HEAR; Scarinci, Worrall & Hickson, 2009b). An investigation of the effect of treatment on the congruence of SO-proxy versus HIA HRQOL measures was also undertaken.

Results: *A series of analyses of variance and repeated-measures t-tests examined HRQOL outcomes for HIAs and their SOs between pre-treatment, post-treatment, and at 12-weeks follow-up. Results suggest a significant effect of time for all HRQOL assessments, with gender effects found for CPHI measures, but not for SOS-HEAR measures. Medium to large effect sizes were revealed for both HIAs and their SOs.*

Conclusions: *Group AR appears to be a beneficial treatment approach for reducing the consequences of hearing impairment for HIAs and for their normal hearing SOs.*

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LIST OF ABBREVIATIONS

Terms

CPHI	Communication Profile for the Hearing Impaired
HHIA	Hearing Handicap Inventory for Adults
HHIE	Hearing Handicap Inventory for the Elderly
HI	Hearing Impairment
HIA	Hearing Impaired Adult
HRQOL	Health Related Quality of Life
ICF	International Classification of Functioning, Disability, and Health
SO	Significant Other
SOS-HEAR	Significant Other Scale for Hearing Disability
WHO	World Health Organization

Units

dB HL	Decibel Hearing Level
dB SNR	Decibel Signal to Noise Ratio
Hz	Hertz

CHAPTER ONE: INTRODUCTION

Problem Statement: This thesis describes treatment outcomes for two types of participants: (1) working adults with unaided hearing impairment and (2) their significant others who have normal hearing. Participant couples attended three group audiologic rehabilitation sessions and completed health-related quality of life questionnaires prior to, immediately after, and 12 weeks following the rehabilitative process.

1.1. Introduction to the Problem

Hearing is an essential function that permits successful communication and forms the basis through which most individuals connect, establish, and maintain relationships with peers. An impairment of hearing function can negatively impact communication and can subsequently affect an individual's participation as a member of society in many areas of life; roles such as partner or colleague may be affected at home or in the workforce (Tye-Murray, 2009). Hearing impairment (HI) is a leading worldwide chronic condition (Danermark et al., 2010). While it is known that a significant portion of older adults experience this condition, there has been an explosive growth of HI amongst adults of working age (Kochkin, 2009).

Based on the International Classification of Functioning, Disability, and Health (ICF), the World Health Organization (WHO; World Health Organization, 2001) can recognise the complex and far-reaching consequences of HI. A HI can cause disabling effects for hearing-impaired adults (Laplanté-Levesque, Hickson & Worrall, 2010b), and by extension, through a concept termed 'third party disability', for their significant others (Scarinci, Worrall, & Hickson, 2009a). Self-report assessment tools such as the Communication Profile for the Hearing Impaired (CPHI; Demorest & Erdman, 1987) can be used to measure both the

consequences of HI on quality of life (QOL), and the effects of intervention. These tools have been developed to provide an insight into the impact of the disorder on the hearing-impaired adult (HIA) not only from the perspective of the HIA, but also from the perspective of their significant other (SO) as established through proxy estimations. Moreover, recent investigations of third party disability have allowed for the development of tools capable of examining the consequences of the HIA's HI on the QOL of the SO, such as the Significant Other Scale for Hearing Disability (SOS-HEAR; Scarinci, Worrall, & Hickson, 2009b). Consequently, while only one member of the couple may have a HI, it is now possible to examine and explore the effects and consequences the HI creates on both parties: the HIA and the normal-hearing SO.

Although treatment for HI typically includes the provision of hearing aids, their immediate adoption and regular use by HIAs is much lower than desired (Kochkin, 2009). Accordingly, investigations of alternative treatment options are warranted. Group audiologic rehabilitation (AR) is a common alternative treatment approach with a growing evidence base, which aims to optimise successful communication and improve hearing-related QOL. While most of the AR research contributing to the literature has focussed on an older adult population that uses hearing aids, recent investigations have focussed on both adults of working age and those who do not use hearing aids, with significant benefits reported (Hickson, Worrall, & Scarinci, 2007; Kelly-Campbell, in review). Additionally, a few studies have investigated outcomes of AR programs that have included SOs (Hickson et al., 2007; Preminger, 2003; Preminger & Meeks, 2010a), although the focus has generally been on examining HIA outcomes through proxy-versions of self-assessments, and on examining whether couples (i.e., HIAs and their SOs) display any agreement or congruence in these measures.

Given the current understanding of HI and third party disability, it is becoming apparent that SOs require some form of HI-related treatment as well, and as such, AR programs should have a special focus on their specific needs. Quality of life self-assessment tools can now be used to not only analyse the effect of group AR for adults of working age without hearing aids, but to also analyse the effect of group AR for their SOs. Consequently, this thesis aims to describe an AR program designed to provide HIAs in the workforce with group AR, while also including a SO portion to the program. Outcomes were measured pre-treatment, post-treatment, and at a follow-up stage.

This introductory chapter will provide a foundation of knowledge on which to base this thesis by reviewing literature relating to *HI and the HIA*, including: HI prevalence, consequences, and treatment. It will also focus on *HI and the SO*, including: the effect of HI on the normal-hearing SO, 'third party disability', perspectives of SOs on HI, and finally HI treatment that includes SOs. The overarching rationale and research questions of this thesis will evolve from the aforementioned review, and will be presented towards the end of this chapter.

1.2. Hearing Impairment and the Hearing-Impaired Adult

1.2.1. Overview

A hearing impairment (HI) is characterised by a reduction in auditory sensitivity that results in a need for acoustic stimuli to be of higher intensities than normal in order to be perceived by the listener (Stach, 2008). This reduction in auditory sensitivity is typically described with respect to its degree, origin, and configuration (Schlauch & Nelson, 2009). Firstly, the degree of HI can be quantified by determining the number of decibels above audiometric zero (0 dB HL) an individual's response thresholds are to frequency-specific pure-tone stimuli (Gelfand, 2009). It has been proposed that a pure-tone average (PTA, average pure-tone air-conduction thresholds at 500, 1000, and 2000 Hz) value of ≥ 26 dB HL is sufficient to constitute a HI (Goodman, 1965). Next, the origin of HI can be uncovered with regards to any impairment of the physiological auditory structures. Briefly, a reduction in hearing sensitivity arising from a disorder of the outer or middle ear may result in a conductive HI. A disorder of the cochlea and its neural connections and/or retro-cochlear structures can result in a sensorineural HI. A combination of disorders involving both the conductive and sensorineural mechanisms can lead to a mixed HI (Stach, 2008). Lastly, the configuration of a HI describes the overall shape or slope of the HI (i.e., flat or sharply sloping) by taking into account the position of individual frequency-specific thresholds with respect to one another (Schlauch & Nelson, 2009).

1.2.2. Prevalence and Growth of Hearing Impairment

The World Health Organization (WHO) recognises HI as one of the most widespread chronic conditions in adults today (Danermark et al., 2010). Impairments of > 26 dB HL comprise an estimated 10 % of the global population (World Health Organization, 2006). In a review of 42 studies carried out between 1973 and 2010 in 29 countries, it was estimated that 299 million men and 239 million women have a HI of a moderate or greater degree

(defined as > 35 dB HL across 500, 1000, 2000, and 4000 Hz) (Stevens et al., 2011). Agrawal, Platz, and Niparko (2008) investigated the prevalence of HI in a population aged 20-69 years in the U.S. Based on their sample, they reported HI (defined as a PTA of \geq 25 dB HL across 500, 1000, 2000, and 4000 Hz) in approximately 29 million Americans. This report is lower than Kochkin's (2009) surveyed estimation of over 34 million Americans with HI, which takes into account older adults above the upper age limit investigated by Agrawal et al. (2008). It is worthy to note that this survey is based on self-reported HI rather than HI confirmed through audiometric assessment; it is within the realms of possibility that erroneous estimations of HI may have occurred.

Nonetheless, it appears that HI has a sizeable occurrence worthy of attention, more so now than ever due to evidence suggesting that the number of people with HI is rising. Within a generation's time, the population of individuals with HI is predicted to rise to 33% of the total population, thus reaching a grand total of 40 million just in the U.S. (Kochkin, 2005a). Comparing survey figures from 2008 to 1991, the largest increase in HI has been observed in the following age groups: (1) 75-84 years, with a growth of 76%; (2) 55-64 years, with a growth of 70%, and (3) 45-54 years, with a growth of 55% (Kochkin, 2009). Although based solely on survey figures, which may be inaccurate due to under- or over-reporting, this suggests a growing population of HIAs. Growth is occurring for individuals at different age brackets; as such, individuals require appropriate methods of intervention that can cater to their different life stages and treatment preferences. Hearing impairment is a hidden disorder that left untreated can cause a disability that markedly affects an individual's everyday life, often extending towards work and relationships with family and SOs (Armero, 2001; Tye-Murray, 2009).

1.2.3. Hearing Impairment, the Disability

Hearing impairment is a health condition (i.e., a disorder or a disease) that causes a disability; a notion recognised by the WHO-based International Classification of Functioning, Disability and Health (ICF) (World Health Organization, 2001). The ICF is a conceptual framework and a categorisation system for health and health-related states. It allows for a health condition to be viewed from multiple perspectives and acknowledges the interactive nature of its effects on an individual's everyday functioning through various factors.

'Functioning' is suggested to be an *"umbrella term covering all body functions, activities, and participation."* (World Health Organization, 2001, p.3), while 'disability' *"serves as an umbrella term for impairments, activity limitations, or participation restrictions"* (World Health Organization, 2001, p.3). The ICF consists of two parts, each consisting of two components that can be represented in either positive or negative terms, described below:

Part 1. Functioning and Disability

- (a) *Body Functions and Structures*
- (b) *Activities and Participation*

Part 2. Contextual Factors

- (c) *Environmental Factors*
- (d) *Personal Factors*

Under part 1, *Body Functions and Structures* relate to the physiological function and anatomical parts of the body, respectively; 'impairment' is the negative expression of this component. *Activities and Participation* relate to the ability to execute tasks or actions and the ability to be involved in a life situation, respectively. Negative expressions of these components are 'activity limitations' and 'participation restrictions', which appear when a health condition impedes the above abilities.

Under part 2, *Environmental Factors* are related to external elements such as the *"physical, social and attitudinal environment in which people live and conduct their lives."*

(WHO, 2001, p.171). Examples can be the workforce, immediate family, and attitudes. Negative expressions of environmental factors are considered 'barriers'. Lastly, *Personal Factors* relate to internal factors, or the "*background of an individual's life and living, and comprise features of the individual that are not part of a health condition or health states,*" such as race, age, and gender (World Health Organization, 2001, p.17). The ICF does not classify *Personal Factors*, yet their contribution to an individual's functioning in relation to a health condition is well known (World Health Organization, 2001).

While the effects of an *impairment* on the functioning of an individual with HI are clear, contextual factors, that is, *environmental* and *personal factors*, also play a substantial role on the extent of hearing-related *activity limitations* and subsequent *participation restrictions* experienced by an individual with HI (Wiley, Cruickshanks, Nondahl, & Tweed, 2000). The relationship between the various ICF components is shown in Figure 1. This figure displays the ways in which the concept of 'functioning' involves a complex interaction between a health condition and contextual factors. For example, in the 'hearing domain' of the ICF, individuals with presbycusis, commonly known as age-related HI (*health condition*) may exhibit a moderate bilateral sensorineural HI (*impairment*), which leads them to experience difficulty understanding speech in background noise (*activity limitations*), subsequently leading them to withdraw from social activities in which there might be speech present in background noise (*participation restrictions*). The manifestations and extent of the above interactions may be affected by contextual factors, such as the negative attitudes of other people (*environmental barrier*), and personal factors, which are inherent to the individual and are viewed from the perspective of the individual. Examples include perception of locus of control, age, or life stage.

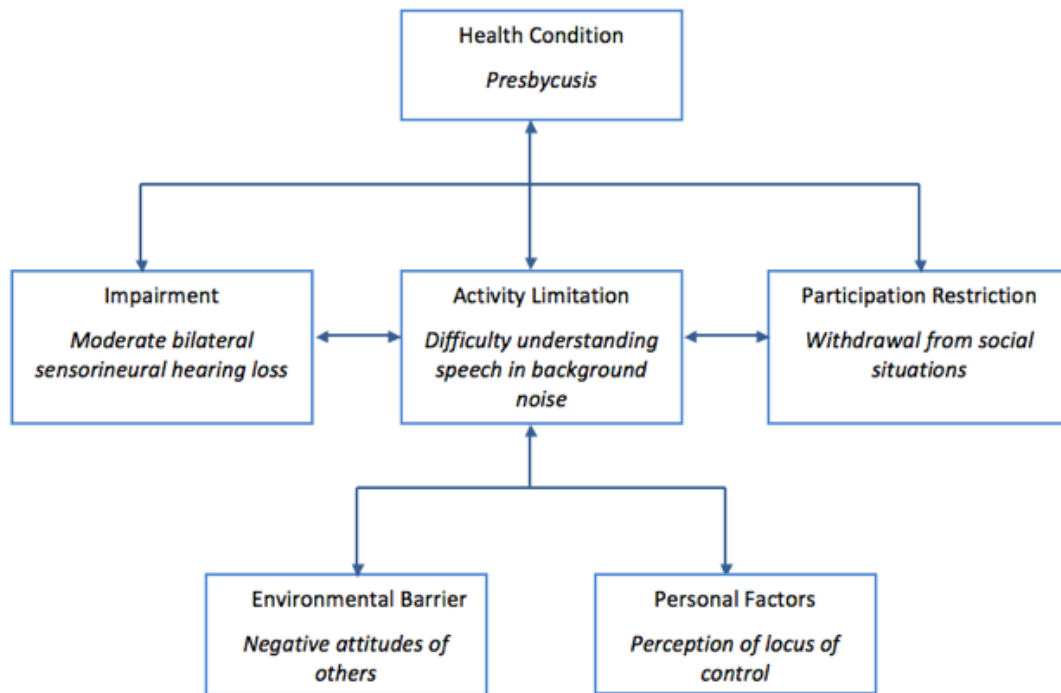


Figure 1: WHO Flowchart depicting the relationship between hearing impairment and contextual factors as they influence activity limitations and participation restrictions. Adapted from the World Health Organization (2001).

1.2.4. Consequences of Hearing Impairment on the Hearing Impaired Adult

1.2.4.1. Quality of Life

Beyond the obvious effect of HI on communication, HI can also have an impact on an individual's functioning in a complex manner, often extending beyond activity limitations and participation restrictions, and affecting his or her quality of life (QOL) (Dalton et al., 2003; Helvik, Jacobsen, & Hallberg, 2006; Laplante-Lévesque, Hickson, & Worrall, 2010b). It has been argued that while the dimensions of the ICF and QOL are separate, they are related concepts (Hickson et al., 2008; World Health Organization, 2001). Quality of life is a broad concept with numerous meanings (Hallberg, Hallberg, & Kramer, 2008). In simple terms, it is defined as, "how good or bad you feel your life to be." (Bradley, Todd, Gorton, Symonds, Martin, & Plowright, 1999, p. 80). Quality of life is typically viewed in relation to health,

termed health-related QOL (HRQOL). This multifaceted concept, which has been the focus of research in audiology, centres on the impact of diseases and their treatments on an individual's wellbeing (Fairclough, 2002). The extent to which a health condition (for example, a HI) and its treatments can affect physical, emotional, and social wellbeing can be examined through HRQOL assessments, of which there are two types (Abrams & Chisolm, 2009). The two types of HRQOL self-assessment measurements are: (1) generic instruments, which provide an overview of the overall health of the individual, and (2) disease-specific instruments, which focus on a specific health condition (such as a HI) and its treatments on an individual (Abrams & Chisolm, 2009).

1.2.4.2. Health-Related Quality of Life and Hearing Impairment

Self-Assessments

Although a HI is typically determined through the 'gold standard' approach of pure-tone audiometry (Roeser & Clark, 2007), HRQOL self-report assessments have played an important role in investigating its negative consequences. Common generic HRQOL instruments used within the literature include the Short Form Health Survey (SF-36; Ware & Sherbourne, 1992), Sickness Impact Profile (SIP; Bergner, Bobbitt, Carter, & Gilson, 1981), and the World Health Organization's Disability Assessment Schedule II (WHO-DAS II; World Health Organization, 1999). It has been argued that their use in uncovering the relationship between HI and HRQOL is limited likely because the majority of them do not assess communication or hearing, and those that do have only a few questions relating to communication and hearing (Abrams & Chisolm, 2009). The relationship between HRQOL and HI based on generic measures is also unclear based on different study methodologies, definitions of HI and QOL, and differing population samples used within the literature. For example, some studies have reported associations between increasing levels of HI and poorer generic HRQOL measures (Chia et al., 2007; Dalton et al., 2003), while some have not

(Helvik et al., 2006; Hickson et al., 2008). On the whole, generic measures of HRQOL are also largely insensitive to treatment effects (Chisolm et al., 2007; Hawkins, 2005), although small effect sizes pre-treatment versus post-treatment have been found (Abrams et al., 2002; Hickson et al., 2007).

In contrast, disease-specific (i.e., HI-specific) HRQOL instruments, are in more widespread use and are more suited to uncovering the effects of HI as they in fact do relate to hearing and communication (Abrams & Chisolm, 2009). Abrams and Chisolm (2009) argue that these generic measurements are also more sensitive in displaying the effects of hearing-related treatment, with medium to large effect sizes found for hearing aid-focused intervention and for audiologic rehabilitation (Chisolm et al., 2007; Hawkins, 2005).

Examples of tools commonly used include the Communication Profile for Hearing Impaired (CPHI; Demorest & Erdman, 1987), the Hearing Handicap Inventory for the Elderly (HHIE; Newman and Weinstein, 1982), and the International Outcome Inventory for Hearing Aids (IOI-HA; Cox & Alexander, 2002). Each tool has established psychometric properties, some have been revised for use in other languages (such as Dutch: Kramer, Goverts, Dreschler, Boymans, & Festen 2002; and Italian: Monzani, Genovese, Palma, Rovatti, Borgonzoni, & Martini, 2007), for use with younger populations (such as the Hearing Handicap Inventory for Adults; Newman, Weinstein, Jacobson, & Hug, 1990), for alternative interventions (such as the International Outcome Inventory for Alternative Interventions; Noble, 2002), and for proxy use by SOs (Erdman, Binzer, Demorest, Wark, & Lansing, 1995; Newman & Weinstein, 1986; Noble, 2002; Schow & Nerbonne, 1982). Overall, HI can impact an individual's perception of QOL, appropriate assessment through disease-specific (hearing-focussed) HRQOL assessments can help clinicians understand the wide-reaching and complex effect HI has on 'how good or bad' HIAs perceive their lives to be.

1.2.4.3. Hearing Impairment and Other Health Domains

In addition to the effect of HI on an individual's perception of HRQOL, several investigations discuss numerous other far-reaching consequences in various other health-related domains. The majority of the literature available; however, has explored these consequences on moderately sized samples of older adults, who are more than likely to be retired. The focus on this population is unsurprising, given the greater prevalence of HI in their age group (Kochkin, 2009). Overall, mild to moderately significant relations between self-reported or objectively founded HI and self-reported cognitive function, depression, loneliness (Kramer, Kapteyn, Kuik, & Deeg, 2002; Naramura et al., 1999; Strawbridge, Wallhagen, Shema, & Kaplan, 2000), social isolation, reduced social activity, feelings of exclusion (Arlinger, 2003), poorer social functioning (Caciatore et al., 1999), fatigue, anxiety, fear, and distrust (Smith & Kampfe, 1997) have been reported.

Hearing Impairment and Gender Differences

Few investigations have revealed gender differences with respect to the effects of HI. On the whole, however, it appears that female HIAs report significantly lower QOL and psychological wellbeing than male HIAs (Hallberg, Hallberg, & Kramer, 2008; Helvik, Jacobsen, & Hallberg, 2006; Hickson et al., 2008), suggesting that female HIAs may be more negatively affected by HI. Additionally, compared to male HIAs, female HIAs have greater problem awareness and are more likely to report communication problems (Garstecki & Erler, 1999) and assign greater importance to effective communication in social situations (Erdman & Demorest, 1998b; Garstecki & Erler, 1999), and with partners (Scarinci, Worrall, & Hickson, 2008). Female HIAs have also been found to be more likely to report the use of non-verbal strategies (Erdman & Demorest, 1998b; Garstecki & Erler, 1999; Hyde, Malizia, Storms, & Nemetz, 1996 as cited in Erdman & Demorest, 1998b) and verbal strategies (Hallberg, 1999) compared to male HIAs. Female HIAs are also lower in many areas of

personal adjustment to HI (Erdman & Demorest, 1998b), and are less likely to deny emotional reactions to hearing problems such as greater anger, stress, annoyance, irritation (Garstecki & Erler, 1999), and impatience (Garstecki & Erler, 1998). Following hearing-related intervention, compared to male HIAs, female HIAs report significantly less aversiveness to sound and difficulty in background noise (Cox, Alexander, & Gray, 1999), and are also again more likely to use more effective communication strategies, report more anger and impatience, to admit to experiencing negative feelings during communication, to use nonverbal strategies, and to place greater importance on communicating effectively in social situations (Garstecki & Erler, 1998).

Hearing Impairment and Middle-Aged Adults

The sparse research available that has focussed on middle-aged adults has provided an insight into those who belong in the age ranges where HI also appears to be growing (i.e., 55-64 years and 45-54 years, Kochkin, 2009), and thus those who might be at a working age. Generally, similar consequences have been found through either self-report or quantitative means: HI may be negatively associated with self-reported higher distress, anxiety, hostility, interpersonal sensitivity, depression, somatization, and loneliness in young and middle-aged adults compared to individuals of a similar age with no hearing problems (Monzani, Galeazzi, Genovese, Marrara, & Martini, 2008; Nachtegaal et al., 2009). So far, the investigation by Tambs (2004) has been the largest scale study to investigate the effects of HI for young, middle-aged and older adults aged between 29-101 years (mean = 50.2 years; SD = 17.0). Interestingly, for the large cohort of > 50,000 participants with audiometrically established HI, those who were younger (20-44 years) and middle-aged (44-65 years) reported higher levels of anxiety and depression, and lower levels of self-esteem, and wellbeing compared to (1) normally-hearing peers, and (2) older adults with HI. This is supported by Gordon-Salant, Lantz, and Fitzgibbons (1994) who found that younger HIAs reported greater disability than

did elderly HIAs with comparable HI. It is speculated that by comparison, older adults may appear to accept their HI because it may be considered a 'normal' process of aging. Individuals of younger ages, on the other hand, may suffer from being 'different' in terms of not being fully able to function as expected for their age; for example, at work (Tambs, 2004).

1.2.4.4. Consequences of Hearing Impairment on the Working Adult

The ICF recognises work as a 'major life area' (WHO, 2001, p.165). For many people, a significant determinant of their perceived status and position in society is their occupation (Scherich & Mowry, 1997). A prerequisite for performance in most professions is the ability to communicate successfully; an action typically complicated by HI (Ternevall Kjerulf, Backenroth-Ohsako, & Rosenhall, 2008). Previous research related to HI in the workplace has typically centred on HIAs with noise-induced occupational HI (Getty & Héту, 1991). Now with the aging of the baby boom generation, HI that is not just work-induced is becoming more prevalent in working adults that are not confined to noisy work environments (Tye-Murray, Spry, & Mauzé 2009). This has spawned some interesting investigations exploring the difficulties experienced by HIAs in the workforce.

Generally, it appears that there is a lack of recognition concerning the impact of HI in the workplace; with the lack of services and support being prevalent consequences of this (Geyer & Schroedel, 1999; Jennings & Shaw, 2008; Laroche, Garcia & Barrette, 2000). HIAs of a working age are less likely to be employed and more likely to be retired or to be employed part-time (Kochkin, 2009). It is consequently estimated that the impact of untreated HI in the workforce costs \$122 billion in lost wages annually in the U.S. (Kochkin, 2005b). Kramer (2008) speculates that perhaps what contributes to HIAs taking early retirement is the burden of work-related communication difficulties and other associated consequences resulting from HI. In terms of their experiences, compared to normal-hearing

employees, HIAs report: significantly higher degrees of fatigue, muscular tension, anxiety (Backenroth-Ohsako, Wennberg, & Klinteberg, 2003), loss of worker-identity (Jennings & Shaw, 2008), less 'control' at work, and higher instances of sick leave (77% compared to 55%) (Kramer, 2008).

To understand how HI may affect self-perceived job performance and psycho-emotional status, Tye-Murray, Spry, & Mauzé (2009) conducted focus group interviews with 48 hearing-impaired professionals aged 29-79 years (mean age = 61 years). Occupations included librarian, executive director, business owner, financial service representative, teacher, branch office administrator, appraiser, customer service representative, vice-president of a business, car salesman, laboratory analyst, and attorney. Analysed transcripts revealed that most HIAs believed their HI negatively affected their job performance, while some believed that they had lost their "competitive edge" and/or had been denied promotions as a consequence of their HI. However, unlike earlier studies of working HIAs that reported high incidences of negative self-image and stigmatisation (Hétu, Getty, & Waridel, 1994), Tye-Murray et al (2009) found that while difficulties were evident, most workers were determined to remain active in the workforce, and as such, had overcome hearing-related difficulties through various means (such as using assistive listening devices or informing co-workers of their HI).

The authors took the opportunity to hypothesise on an appropriate audiologic rehabilitation treatment plan for this population of HIAs based on their findings. They arrived at a problem-solving themed plan, and further suggested that such a plan might include: educational materials or workshops about HI in the individual's workplace, encourage optimal use of hearing assistive technology, provide education about coping and communication strategies that are relevant to the workplace, and finally, address specific communication difficulties and problematic situations. These suggestions pose encouraging

ideas for clinicians who wish to go over and above fitting hearing aids, and wish to provide additional specific treatment for this specific type of client.

On the whole, it appears that HIAs experience communication difficulties in different work-related situations, and if successful communication at work is seen to be important for job performance and competency, then it is useful to understand what specific situations are most problematic. This information may then provide further clinical guidance towards the remediation of these difficulties, and could also potentially increase awareness of HI in the workforce from the perspectives of employers and co-workers. Unfortunately, empirical data that would help guide clinicians in this process is lacking.

Listening difficulties and difficult work-specific situations reported by working HIAs have been sparsely documented. A series of online and telephone interviews were conducted by Prince Market Research (2006) with adults ($N = 458$) aged between 41-60 years who self-reported mild, moderate, or severe HI. Twenty-five per cent of respondents reported that their HI affects their work; of those, twenty-five per cent stated that their HI had an impact on their earning potential. Respondents who claimed HI affected their work also revealed the following difficulties in the workplace, in the order of prevalence: phone calls (64%), conversations with co-workers (61%), meetings (19%), and other situations (not specified) (6%). It is important to note that some respondents reported that they were self-employed, part-time employed, or unemployed at the time of interviewing, and it is unclear exactly what proportion of respondents reported this. Evidently, research with more stringent methodologies, statistical data, and clearer results is required to fully understand the type of hearing-related difficulties encountered by individuals in the workforce. This information could provide clinicians with an overview of the typical difficult communication situations that this specific client-base is likely to encounter. Furthermore, an idea of how common these issues are, and what measures individuals take to attempt to remediate

them, could also help to understand the complex problems facing working adults with HI and to suggest ways in which others may be assisted.

Overall, it appears that the far-reaching effects of HI may impose consequences on an individual's functioning, not just in their general day-to-day lives, but also at work. Research such as Tye-Murray and colleagues' (2009) has uncovered potential methods in which this may be remediated; future investigations could explore this as a viable treatment option. Additionally, the introduction of the ICF has allowed for an individual to be viewed in a holistic manner, while considering each of the influencing ICF components independently. This has encouraged assessment and treatment of HI to include functional-based as well as impairment-based principles and has thus allowed for the relationship between HI and the HIAs to be viewed on an individual basis.

1.2.5. Treatment of Hearing Impairment

Given that HI in the middle-age range (i.e., 45-64 years) is a growing phenomenon, and the negative effects of HI on an individual in varied situations is apparent, assessment methods that outline these effects, alongside treatment methods that aim to lessen them is imperative. Many intervention options for HI have surfaced over the years; these include hearing aids, cochlear implants, hearing assistance technology, and communication program-based audiologic rehabilitation (AR). The most common intervention for HI has traditionally been hearing aids; their effectiveness in improving HRQOL has been widely recognised. For example, a systematic review with meta-analyses conducted by Chisolm et al. (2007) determined that hearing aids are able to improve an individual's HRQOL by reducing the psychological, social, and emotional effects of HI, with greater effects measured via the HHIE (Ventry & Weinstein, 1982) rather than the SF-36 (Ware & Sherbourne, 1992). Recall that disease-specific HRQOL assessments have a greater focus on

communication and hearing than generic HRQOL assessments, which may account for their greater sensitivity in examining treatment effects. An important concluding comment by the authors was the clear need for randomised controlled trials (RCTs) in this field to further support these positive findings that at best, provide medium-to-large effects on an adult's HRQOL. Despite these positive effects being documented, it appears that most adults who acknowledge HI may in fact not own hearing aids, and those that do own hearing aids, may not necessarily use them regularly.

1.2.5.1. Irregular Use of Hearing Aids

Figures are varied with regards to the proportion of HIAs who reportedly use hearing aids on a regular basis. Much of the existing research is based on subjective measures of HI (mainly self-reported estimations) and includes results from clinically based samples of older adults, thus making findings less representative of the general population. Additionally, there is a lack of standardisation and consistency in the way that hearing aids usage is assessed and categorised (Perez & Edmonds, 2012). It generally stands that a significant number of older adults with reported HI who possess hearing aids, do not use them as often as intended. A cohort study by Smeeth et al. (2002) of close to 15,000 older adults (≥ 75 years) found that up to 40% of dispensed hearing aids are not used regularly. When including younger participants (49-80 years; mean age = 67.4 years), the proportion of non-regular hearing aid use rises to about 74.5% (Chia et al., 2007). In a follow-up study of the same pool of younger participants, Gopinath et al. (2011) found that the proportion of those who continued to use a hearing aid during the 5-year follow-up period was only 6.9%.

Despite well-founded evidence suggesting hearing aids to be a beneficial treatment approach for individuals with HI, it appears that once possessed, they are used less often than anticipated, with continuing use decreasing as a function of time. Finally, it is also likely that unsuccessful hearing aid users may continue to experience communication difficulties

in their everyday lives (Hickson & Worrall, 2003). This suggests a need for additional or alternative treatment methods that are able to reduce continuing communication difficulties despite previous and on-going remediation efforts.

1.2.5.2. Low Hearing Aid Adoption Rates

Despite the obvious known consequences of HI, HIAs do not readily and automatically adopt (i.e., ownership of hearing aids by a person who acknowledges hearing problems) hearing aids. Kochkin (2009) reported a very low rate of hearing aid adoption amongst HIAs. In the U.S., only approximately 25% of HIAs adopt hearing aids. This rate is seen to further decline as a function of decreased age; for example, while 16.7% of HIAs aged 55-64 years adopted hearing aids, only 11.2% of 45-54 year olds did.

While age may be a significant variable that influences hearing aid adoption, (Gopinath et al., 2011; Kochkin, 2009), other factors may include degree of HI (Kochkin, 2009; Meyer & Hickson, 2012), bilateral versus unilateral HI (Kochkin, 2007), prevalent communication problems that occur more than half the time (Kochkin, 2007), and increased perceptions of activity limitations and participation restrictions (Helvik et al., 2006). Individuals with HI also report that the negative views they themselves hold (Kochkin, 2007) as well as negative experiences as reported by peers (Gopinath et al., 2011; Fischer et al., 2011), financial cost, inconvenience (Fischer et al., 2011; Gopinath et al., 2011; Kochkin, 2007), and belief that their HI is not severe enough (Gopinath et al., 2011; Kochkin, 2007) also influence the adoption of hearing aids. In more recent times, it has been found that some of these variables may link to the ICF and in fact influence the decision to seek treatment in the first place, discussed under section *1.2.6. Decision to Seek Treatment*.

Overall, a question arises as to what can be done for those who report HI, but do not adopt hearing aids. At present, it is likely that approximately 21-23 million HIAs in the U.S.

do nothing about their HI (Chien & Lin, 2012; Tye-Murray, 2009). Extensive research has arisen in an attempt to determine why that may be the case and to determine what factors may influence treatment decisions to begin with, be it hearing aids, or alternative treatments (Knudsen et al., 2010; Meyer & Hickson, 2012).

1.2.6. Decision to Seek Treatment

Although there is an increase in the prevalence of adult HI, and evidence exists to support the efficacy of treatment (Chisolm et al., 2007; Kochkin, 2011), there are a number of factors that influence an individual's decision of whether or not to seek audiological services. A study by Laplante-Lévesque, Hickson and Worrall (2010a) yielded interesting results from a qualitative perspective that focussed on factors that influenced hearing-related treatment decisions in general, not just restricted to hearing aids. Options included hearing aids, a group communication program, an individual communication program, or no intervention for adults aged 50-82 years with acquired HI. Their findings on a subsample of participants ($N = 22$) suggested that: (1) convenience, (2) expected adherence and outcomes of treatment, (3) financial costs, (4) hearing disability, (5) nature of interventions, (6) peer experience, support and recommendations, and lastly (7) preventative and interim solutions, all played a part in decision-making. Although the majority of those participants were between the older ages of 65-82 years, the findings suggest that a number of issues need to be taken into account within the clinical management of individuals with HI.

Meyer and Hickson's (2012) review applied the ICF framework to outline factors that influence help-seeking and hearing aid adoption in older adults. They found that HIAs are more likely to seek help for HI and/or adopt hearing aids if they: (1) have a moderate to severe HI and self-report hearing-related activity limitations or participation restrictions; (2) are older; (3) have poor hearing perception; (4) consider more benefits than barriers to hearing aids; and (5) perceive their significant others as being supportive of hearing

rehabilitation. It appears that the older the HIA is, the worse their HI and speech perception is, and the more supportive their SOs are, if the benefits of adopting hearing aids outweigh the barriers, then the more likely the HIA is to adopt hearing aids. Even then, however, it is not known whether hearing aids will be used regularly.

It is clear that the prevalence of HI is growing in the middle-aged population. The most common treatment approach is the provision of hearing aids. Yet, hearing aids are not widely adopted by this age group, nor are they used as regularly as hoped. There are various factors that are considered in the adoption of hearing aids and/or any hearing-related treatment. It seems that alternative treatment options need to be made available for different possible decisions and to also take into account a younger, middle-aged adult population with HI who may appear reluctant to seek traditional services such as hearing aids.

1.2.7. Audiologic Rehabilitation

While the traditional hearing-related service has involved the provision of hearing aids, many studies have investigated the effects of a different service: audiologic rehabilitation (AR). In a recent critical review of treatment options for HI including hearing aids, hearing assistance technology, and communication programs (otherwise known as audiologic rehabilitation), Laplante-Lévesque, Hickson and Worrall (2010b) concluded that the QOL, activity limitations and participation restrictions of older adults can be improved with any of those options. Research is now required to confirm this finding with a younger population.

Audiologic rehabilitation, with its many definitions and theoretical frameworks, has its roots in military settings, where intensive services were provided to veterans with acquired HI. Following that era, a major AR focus has been on the technical aspects of

hearing aid fitting. However, it is becoming well-known that hearing aids alone are insufficient to overcome speech perception difficulties often faced by hearing-impaired adults, and renewed attention has been placed on the concept of AR beyond hearing aid fitting (Gagné & Jennings, 2008; Hickson & Worrall, 2003; Kramer, Allesie, Dondorp, Zekveld, & Kapteyn, 2005). Many AR programs used today have been modelled on the programs delivered to veterans and are easily modified to suit the needs of individuals with greater or lesser severities of HI (Gagné & Jennings, 2008). For example, AR programs vary in content and can consist of many features, but can include: education regarding hearing and HI, counselling, stress management, sensory management, speech-perception training, communication strategies training, telephone training, personal adjustment, and assertiveness training (Boothroyd 2007; Gagné & Jennings, 2008).

Generally, the goals of AR are to (1) reduce and alleviate the communication difficulties associated with HI and (2) minimise its consequences (Tye-Murray, 2009). Participation in AR can be a way to provide a sense of belonging, while reducing the stigma and loss of social identity associated with HI (Preminger, 2007). AR is typically provided on a group basis and has clear benefits over one-on-one treatment including delivery of psychosocial support, discussion of coping skills, problems and solutions of hearing-related difficulties, generalisation of strategies learnt, and cost-effectiveness (Hawkins, 2005; Hickson & Worrall, 2003). At least in the veteran population, it is more cost effective to provide AR in addition to hearing aid fitting compared to hearing aids alone (Abrams, Chisolm & McArdle, 2002). Furthermore, a RCT by Kramer et al. (2005) found that compared to hearing aid fitting alone, older adults who received a home AR education program in addition to hearing aid fitting reported significantly improved QOL, satisfaction, interaction with their SOs, as well as greater awareness of the benefits of speech reading.

Audiologic rehabilitation, or communication programs, are varied in their theoretical

frameworks as well as their delivery mode, focus, participant demographics, number of sessions, session duration, and outcome measures (Hawkins, 2005; Laplante-Lévesque et al., 2010b; Preminger, 2007; Preminger & Yoo, 2010), consequently making it difficult to make direct comparisons from study to study. There are also unfortunately no detailed guidelines or protocols for administering AR programs as there are for providing hearing aids (Preminger, 2007). A systematic review conducted by Hawkins (2005) examined the efficacy of counselling and communication strategies-oriented group AR. At least in the short-term, there is a small amount of evidence that supports participation in group AR. Positive outcomes were viewed in terms of reduction in the self-perception of hearing disability, improvements in perceived HRQOL (both disease-specific and generic measures), and improved use of communication strategies. Of importance however, is the conclusion that there is a need for more research including RCTs, to determine long-term AR effects, whether there is an advantage over hearing aids alone that continues over time, and whether there is a potential influence of SO participation in treatment.

Additionally, the results of the majority of studies within the review are difficult to generalise for various reasons: (1) they included mostly veterans, (2) participants were over the age of 60 years, and (3) participants used hearing aids. For example, Preminger and Yoo (2010) partly answered Hawkins' (2005) requests through conducting their recent RCT; however, they enlisted 52 older adults (mean age = 69.2 years) who were also experienced hearing aid users. Their study found long-term significant effects measured with the HHIE (Newman et al., 1990; Ventry & Weinstein, 1982) following group AR that was maintained a 6-month follow-up. Further research is now required to confirm these findings and to explore the other suggestions made by Hawkins (2005). Alongside the conclusions of the systematic review, AR studies need to now encompass the growing population of middle-aged working adults with HI and those who do not use hearing aids.

Overall, working adults who recognise that they have difficulty hearing may choose not to adopt hearing aids for various reasons, and may choose to pursue alternative or additional rehabilitation options for HI such as AR. The current focus on hearing aids as the HI panacea and the sole form of rehabilitation is believed to be an incorrect one (Hickson & Worrall, 2003). While some AR programs provide rehabilitation in addition to providing hearing aids, they have mostly been for the older adult population and have been technology-based, with a focus on providing education about hearing and hearing aids (Hickson & Worrall, 2003; Kramer et al., 2005). Recently, studies have turned their focus away from these impairment-based methods, and have moved towards alleviating the activity limitation and participation restriction effects of HI; most of the time in conjunction with hearing aids, and some of the time instead of hearing aids. Table 2 outlines AR studies that have mentioned the inclusion of non-hearing aid wearers. Most studies have unfortunately failed to explicitly investigate any differences in treatment effect for hearing aid users versus non-hearing aid users apart from a brief examination by Hickson, Worrall and Scarinci (2007), discussed in the following section.

Table 1: Audiologic rehabilitation studies that have included non-hearing aid wearers in their participant samples.

Reference	Participants	Intervention	Outcomes	Results
Getty & Héту (1991)	<i>N</i> = 48 Mean age = 54 SD = 8.65 Hearing aid use = 8/48	AR program	1. HHQ (pre- and post-treatment), 2. Follow-up meeting, 3. Telephone Interview	1. Significant improvements in two items and significant worsening in two items 2. Increased awareness and confidence in dealing with communication problems 3. Most reported further rehabilitative steps taken
Hickson et al. (2006)	<i>N</i> = 96 Mean age = 77 SD = 8 Hearing aid use = 49/96	ACE	IOI-AI (post-treatment)	Favourable results obtained on all items, particularly for program satisfaction
Hickson et al. (2007)	<i>N</i> = 178 Mean age = 73.8 SD = 8.29 Hearing aid use = 54 % (or ~ 96/178)	ACE (<i>N</i> = 100) Versus Placebo (<i>N</i> = 78)	5 x QOL scales; 3 of which were HI related (pre-, post- and 6-month follow up)	Significant improvements in 4/5 QOL scales for ACE maintained at 6-months No significant differences in post-treatment improvements between ACE and placebo
Worrall et al. (1998)	<i>N</i> = 250 Mean age = 70.5 SD = 7.49 Hearing aid use = Unclear; Speculation is that none wore hearing aids	KET (<i>N</i> = 120) Versus Control (<i>N</i> = 130)	1. Author-created knowledge-based and attitudinal questionnaire (pre- and post-treatment), 2. Qualitative written feedback post program, 3. 1-year follow-up interview	1. Significant improvements in many knowledge-based items 2. Positive overall, up to 52% were 'very satisfied' 3. 45% in KET compared to 10% in control reported further rehabilitative steps taken at follow-up

Note: AR = audiologic rehabilitation; HHQ = Hearing Handicap Questionnaire; KET = Keep on Talking program; ACE = Active Communication Education program; IOI-AI = International Outcome Inventory – Alternative Interventions; QOL = quality of life; HI = hearing impairment.

1.2.7.1. Audiologic Rehabilitation In Lieu of Hearing Aids

There is a small but growing evidence-base that may inform clinical practice for adults with HI who seek an alternative treatment to hearing aids, and those who are in the working adult population. The first of its kind, Hickson et al. (2007) conducted a double-blinded AR RCT that compared pre-treatment, post-treatment, and follow-up measures for two groups of older adults. Only half of the participants had been previously fitted with hearing aid(s), while the remaining had not. The treatment groups consisted of either: (1) the Active Communication Education Program (ACE) ($N = 100$), which consisted of a series of modules regarding day to day communication activities found to be problematic for older people with HI; or (2) a social placebo program, consisting of general education about hearing and HI, which was then followed by ACE five weeks after ($N = 78$). Significant within-subject improvements with ACE were found in self-reported measures of communication activity limitations, participation restrictions and wellbeing; the most robust finding was with the IOI-AI (Noble, 2002). Improvements were also generally maintained at a 6-month follow-up, where no significant differences were found between IOI-AI (Noble, 2002) measures. Interestingly, hearing aid use, age and participation of significant others were not among the variables significantly associated with improved ACE effects.

In short, although the effect sizes of the ACE group were not significantly large enough to reveal between-group differences, as the social group also exhibited improvements, this study indicates that participation in AR programs can be of benefit irrespective of hearing aid use. This supports the idea that AR programs can be considered an alternative to traditional methods that focus on the provision of hearing aids. Further research is now required to investigate the effects of AR programs for participants other than older adults who do not use hearing aids; in other words, adults in the workforce who do not use hearing aids and require an alternative form of treatment. There is sparse yet

interesting research available regarding AR programs for working adults; however, results from these investigations may only be applicable to working males with noise induced HI.

In the early 1990s Héту and colleagues (1991; Getty & Héту, 1991) developed and described their group AR paradigm for working male adults with occupational HI. The majority of their participants did not own hearing aids. The aim of their AR groups was to encourage 'problem-solving and active searches for solutions to communication problems' among the workers. Following group AR participation, although only four items of the Handicap Questionnaire (Lalande, Lambert, & Riverin, 1988) showed significant changes pre-versus post-treatment, findings generally suggested that HIA workers judged their hearing problems as less severe; an outcome maintained at 3-months follow-up. Despite the gender bias evident in this study as well as the similarities in their noisy industrial fields resulting in a high likelihood of a specific type of HI (i.e., noise-induced), this study provided an important addition to the sparse literature regarding AR specifically for adults of working age. Their findings encouraged problem solving of communication difficulties in general, including the workplace; a thought-process encouraged by the conclusions of the study by Tye-Murray and colleagues (2009).

More recently, Kelly-Campbell (in review) developed and examined a three-session group AR program (*See It! Hear It! Say It!*) specifically for middle-aged (mean age = 56.42 years), working adults with HI that had not received any form of hearing-related treatment including hearing aids. Participants were divided into non-waitlist groups ($N = 38$) for whom treatment started within 2 weeks of group assignment, and waitlist groups ($N = 37$) for whom treatment started between 12 and 14 weeks after random assignment. Assessment points occurred pre-treatment, post-waitlist (where relevant), post-treatment and at 12-weeks follow-up. Work settings included offices, classrooms, outdoors, retail settings, and on construction sites. The focus of *See It! Hear It! Say It!* encouraged participants to identify

specific and routine problematic workplace situations followed by discussion and enactments of specific solutions. Each session concentrated on developing communication strategies in the workplace with both didactic presentations of information and problem-solving practical exercises. In addition, Kelly-Campbell (in review) provided participants with information regarding the Americans with Disabilities Act (ADA) relating to services available to them, as did Tye-Murray and colleagues (2009) in their focus groups. Outcomes of two pilot studies showed no significant improvements while on the waitlist, but significant improvements in various measures of HRQOL including the IOI-AI (Noble, 2002) and the HHIA (Newman et al., 1990) following program participation. Further research is warranted to confirm this finding.

The first aim of the current study is to meet this need by replicating and expanding on Kelly-Campbell's (in review) group AR findings for working adults with HI and no previous hearing-related treatment, by use of the CPHI (Demorest & Erdman, 1987) as a more in-depth outcome measure. In addition, research is now required to examine outcomes in a similar treatment that includes SOs. Some investigations have arisen in an attempt to identify the effects of SO participation in AR that is aimed at the HIA, with the SO providing proxy-measures to describe problems experienced by the HIA from the SO's perspective. Less is known about the effects of AR that is specifically aimed at the SO in an attempt to minimise the impact of their partner's HI on them. This theme falls under the second section of this literature review, which will lead onto the second main aim of the current study. Briefly, the second aim is to include the normal-hearing SOs of the hearing-impaired workers in group AR classes, and to consequently: explore their proxy-estimations of treatment effect for their hearing-impaired partner, as well as their own estimations of treatment effect for themselves. The literature involved in arriving at this aim is discussed below.

1.3. Hearing Impairment and the Significant Other

1.3.1. Consequences of Hearing Impairment on the Significant Other

A HI can deter successful communication, and in turn, can negatively impact a HIA in numerous ways often affecting perceptions of activity limitations, participation restrictions, and QOL (Dalton et al., 2003; Helvik, Jacobsen, & Hallberg, 2006; Laplante-Lévesque, Hickson & Worrall, 2010b). Communication is a two-way street; a message needs to be sent effectively and needs to be received effectively. If a HI is impeding a HIA from communicating successfully, it holds that communication partners are also impeded from communicating successfully. The most frequent communication partners of HIAs are often their SOs. While the numerous ways in which HI affects HIAs has been cited frequently in the literature, comparatively less is known about how it affects their normal-hearing SOs.

Investigations on the effect of the HIA's HI on SOs have been somewhat fragmentary. Seminal studies involving a middle-aged population appear to have begun and ended in the 1990s, while a small amount of research involving the older adult population has blossomed since the early 2000s. Widespread generalisations of the research that has focussed on middle-aged SOs are restricted due to the specific characteristics of the studied population; they have mostly revolved around SOs of men with noise-induced HI. The same can be posited for investigations of the SOs of retirees, which appear to be the focus of contemporary investigations. Nevertheless, various interesting findings have been uncovered regarding the insidious nature of HI, and its wide-reaching consequences.

Interviews of SOs conducted by Hétu, Riverin, Lalande, Getty, and St-Cyr (1988) revealed common misunderstandings, feelings of dissatisfaction, and burden as typical direct consequences of their partner's HI. Other studies discovered that a HI can lead the normal hearing SO to experience a multitude of emotional reactions, including feelings of anger, resentment, confusion, sadness, and frustration (Brooks, Hallam, & Mellor, 2001;

Hallberg & Barrenäs, 1993; Héту, Lalonde, & Getty, 1987; Smith & Kampfe, 1997). A HI can also negatively affect intimate relations by promoting feelings of blame, stigma, effort, irritation, stress, anxiety, negative self-image, and less marriage satisfaction (Héту, Jones, & Getty, 1993; Piercy & Piercy, 2002).

In addition, SOs can experience constraints in their social lives and social activities as a result of their partner's HI; situations such as parties and gatherings mitigate feelings of stress and vigilance on the part of the SO. Significant others also experience frustration due to difficulties in communicating with their hearing-impaired partners in background noise, having to repeat messages, speak louder, and having to talk on behalf of the HIA (Armero, 2001; Hallberg & Barrenäs, 1993; Stephens, France, & Lormore, 1995). Ultimately, SOs may share in the disability that their hearing-impaired partners experience due to the varied social and emotional consequences reported in the paragraphs above. These consequences affect the SO's functioning in everyday situations and may ultimately affect their QOL, discussed under section 1.3.1.2. *Significant Other and Quality of Life*. Prior to this discussion, it is important to note that the negative consequences of a partner's HI may be experienced differently by SOs; for example, as a function of gender.

1.3.1.1. Significant Other Gender Effects

Research on gender differences with regard to the impact of a HIA's HI on a SO is unfortunately limited but unsurprising given the sparse literature available to generally understand the impact of HIA HI on SOs as a whole. It has been proposed that communication is more important for women than for men (Garstecki & Erler, 1999; Wallhagen, Strawbridge, Shema, & Kaplan, 2004). Consequently, it is likely that in comparison, women report more psychosocial effects as a result of having a hearing-impaired partner than men. Female SOs of male HIAs have been found to make more negative attributions to HI than male SOs of female HIAs, they also may monitor their

partner's communicative behaviour more closely, and display a greater responsibility for adjusting to their male partners' hearing difficulties and for maintaining the couples' communication (Anderson & Noble 2005). Additionally, female SOs of male HIAs may express more feelings of frustration and distress over their partners' HI than male SOs of female HIAs (Scarinci et al., 2008). Finally, the negative impact of a husband's HI on the female SO's wellbeing can be stronger than that on a male SO (Wallhagen et al, 2004).

1.3.1.2. Significant Other and Quality of Life

A more recent investigation by Scarinci, Worrall, and Hickson (2008) sought to further examine the effect of partner HI on the SO's QOL through a series of in-depth interviews. An interpretive analysis revealed four main categories with subthemes describing the experiences of the SOs of older HIAs, outlined in table 2. Despite the slanted distribution of participant age range (60-83 years) used in this study, findings indicated that SOs experience wide-ranging difficulties as a result of their partners' HI. Further investigation would allow for an understanding of the extent of the disabling effects a partner's HI has on the normal-hearing SO.

Table 2: Categories and subthemes describing the effect of hearing impairment on the significant other. Adapted from Scarinci et al. (2008).

Category	Subthemes
1. Broad ranging effects of HI on SO everyday life	<ol style="list-style-type: none"> 1. The effect of HI on communication 2. The effect of HI on every activities 3. The effect of HI on emotions 4. The effect of HI on the relationship 5. The effect of HI on social factors
2. SO need to constantly adapt to HI	<ol style="list-style-type: none"> 1. Using communication strategies 2. Having to think about the HI all the time 3. Protecting the hearing-impaired partner 4. Imbalance of adjustment 5. Accepting the situation as it is
3. The effect of acceptance of the HI on the SO	<ol style="list-style-type: none"> 1. Denial on the part of the hearing-impaired partner 2. Denial on the part of the SO 3. The effect of acceptance on the SO 4. The centrality of hearing aids
4. The impact of ageing and retirement	<ol style="list-style-type: none"> 1. HI as a consequence of ageing 2. The effect of age on ability to adapt to HI 3. The effect of retirement 4. Comparing difficulties with others

1.3.2. Third Party Disability

The succeeding hallmark study by Scarinci, Worrall, and Hickson (2009a) successfully related the categories and subthemes uncovered in their previous study to ICF terminology. This allowed for an exploration of the relationship between HI and the relatively new concept, 'third party disability', as previous studies had done with other communication

disorders such as aphasia (Threats, 2010). The ICF describes third party disability as “*the disability and functioning of family members due to the health condition of their significant others.*” (World Health Organization, 2001, p. 251). Considering HI with regard to the ICF, while normal-hearing SOs do not have a health condition; they may nevertheless experience disability (namely activity limitations and participation restrictions) due to their partner’s HI (Scarinci et al. 2012). By relating the qualitatively obtained categories and subthemes to ICF terminology, the authors established that SOs reported activity limitations and participation restrictions in the ICF domains of communication, domestic life, interpersonal interactions and relationships, community, social, and civic life. Further research is required to understand the relationship between third party disability and the ICF domain of body functions and structures (Scarinci et al., 2009a).

The experience of a disability as a result of someone else’s disability is similar to concepts of ‘primary’ and ‘secondary’ handicap as proposed by Stephens and Héту (1991). They suggested an extension to the original WHO framework (World Health Organization, 1980), and to the definition of *handicap* to describe the secondary handicap experienced by SOs. In the current WHO framework (World Health Organization, 2001), the ICF has been established as a useful means by which the effects of HI on the SO can be portrayed. A flowchart depicting the relationship between various ICF components within the concept of functioning and disability, as existing for HIAs, can also be conceptualised for SOs. This flowchart, as developed by Scarinci et al. (2009a), is displayed in figure 2.

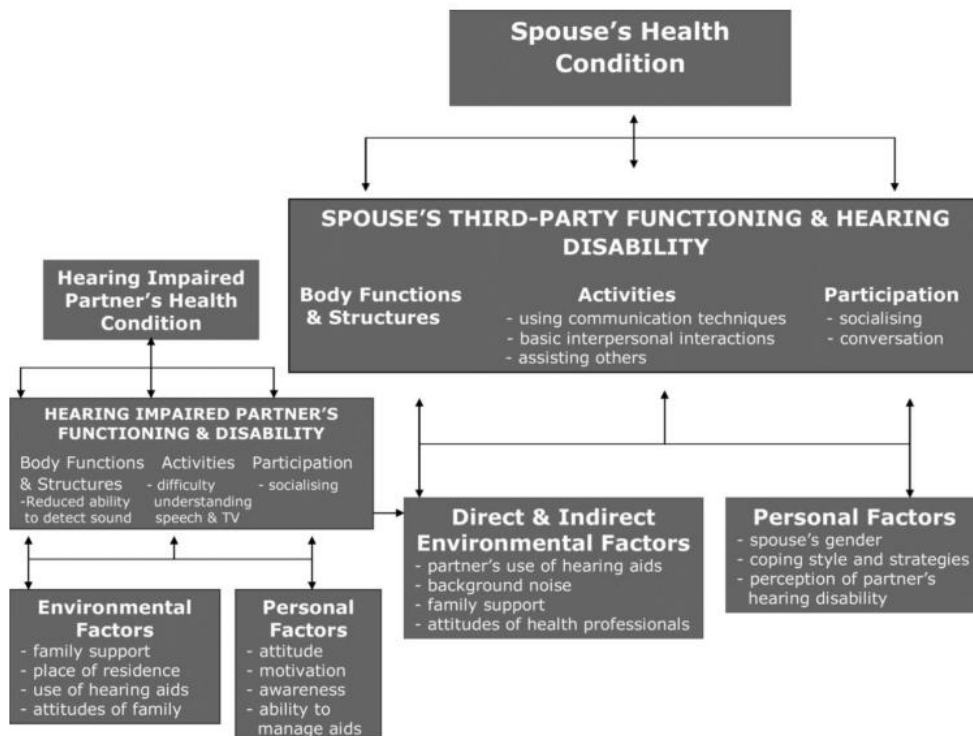


Figure 2: Example of how third party disability, on the right side, can arise from the hearing impaired adult's disability, on the left side, as a result of hearing impairment (Scarinci, Worrall & Hickson, 2009a).

The interrelation between the SO's third party disability, and the HIA's HI and disability, is understood by viewing the HIA's HI as an indirect *environmental factor* from which the SOs third party hearing disability stems. Recall the definition of environmental factors as being the external elements in which individuals live and conduct their lives (i.e., physical, social, and attitudinal elements). As the HIA's functioning and disability can be influenced by their own personal and environmental factors, the SO's functioning and third party disability can also be influenced by their own personal and (direct) environmental factors. This may lead the SOs to experience different degrees of third party disability. Scarinci, Worrall and Hickson (2009b) sought to quantify the extent of third party disability through the development of their self-report assessment tool, the Significant Other Scale for Hearing Disability (SOS-HEAR; Scarinci et al., 2009b). This concept of third party disability

and quantification of it contributes to the awareness of providing and potentially evaluating intervention for SOs; since they also experience the effects of HL, it stands to reason that they could benefit from intervention.

1.3.2.1. Significant Other Scale for Hearing Disability

The SOS-HEAR was up until recently, the only available tool capable of measuring third party hearing disability in SOs of individuals with HI. Shortly after the data collection for this thesis had finished, Preminger and Meeks (2012) published their own tool for quantifying the effect of SO third party disability, called the Hearing Impairment Impact-Significant Other Profile (HII-SOP). Further discussion and explanation of the SOS-HEAR, which has been psychometrically evaluated (Scarinci et al., 2009b), can found in *Chapter two: Methodology*. Briefly, based on a much larger sample ($N = 100$) than the original ten in the previous study (Scarinci et al., 2008), preliminary findings suggest that the SOS-HEAR was capable of measuring some degree of third party hearing disability for the majority of participants, although the effects of gender on scores could not be determined due to gender disparities in participant samples (Scarinci et al., 2009b; 2012). The ability to measure hearing-related disability on the part of the SO is an interesting notion for the involvement of SOs in AR, because so far, the extent of SO involvement in hearing-related treatment has been to provide a different perspective on treatment outcomes for HIAs. This different perspective has been based on proxy estimations from disease-specific HRQOL assessments. The perceptions of the SOs of HIAs have been the topic of a few investigations, which have found interesting results.

1.3.3. Perceptions of Significant Others

As mentioned previously, the majority of information provided by SOs regarding the effects of HI has been based on proxy estimations. Several HRQOL questionnaires have been adapted for SO proxy use. These have included the Hearing Handicap Inventory for

Spouses (HHI-SP; Newman & Weinstein, 1986), the Significant Other Assessment of Communication (SOAC; Schow & Nerbonne 1982), the International Outcome Inventory for Hearing Aids for the Significant Other (IOI-HA-SO; Noble, 2002), and the Communication Profile for Hearing Impaired Adults (CPHI-W (for wife, thus female pronouns) and CPHI-H (for husband, thus male pronouns); Erdman et al., 1995 as cited in Erdman, 2006). Through these self-reports, SOs can provide their perceptions of the difficulties faced by their hearing-impaired partner as a result of HI. As an example of this adaptation, the CPHI item *“Because of my hearing impairment I keep to myself,”* was modified to *“Because of her hearing impairment she keeps to herself,”* in the female-pronoun SO version, and *“Because of his hearing impairment he keeps to himself,”* in the male-pronoun SO version. Overall, obtaining hearing-related measurements of HRQOL from HIAs in addition to establishing treatment outcomes, obtaining proxy estimations of HRQOL in HIAs from SOs provides an opportunity to explore congruence among members of a couple (Preminger & Meeks, 2010a). That is, whether they are in agreement in their perceptions, or not.

1.3.3.1. Differences in the Perceptions of Hearing Impaired Adults and their Significant Others

Studies of the congruence of couples' perceptions in mean HRQOL scores (particularly the HHIE versus HHIE-SP) have yielded varied results, suggesting that this is a somewhat complex topic. Couples are either in agreement or disagreement regarding the extent of disability the HIA experiences as a result of HI (Chmiel & Jerger, 1993, 1996 as cited in Preminger, 2002; Newman & Weinstein, 1986; Preminger, 2002; Preminger & Meeks, 2010a). Some studies have found no significant difference between couples' perceptions (Hickson, Worrall, & Scarinci, 2006; Kramer et al., 2005; Preminger and Meeks, 2010a; Scarinci, Worrall & Hickson, 2012), two studies have found that most SOs perceive greater handicap on behalf of their hearing-impaired partners than the partners do themselves

(Chmiel & Jerger, 1993, 1996, as cited by Preminger, 2002), while some studies appear to find the opposite (Newman & Weinstein, 1986; Preminger, 2002; Preminger, 2003). That is, most HIAs reported significantly higher hearing-related QOL problems than most of their SOs.

Hétu and Getty (1991) suggest that SOs may not understand the daily frustrations of dealing with a HI. They may not necessarily interpret communication difficulties as being directly resulting from a HI and instead may interpret the behaviour of HIAs as being inconsistent and that HIAs “*only hear when they want.*” A possible explanation of differences in perceptions points to the concept of ‘stigma’, and how HIAs may attempt to minimise their hearing difficulties so as to avoid the stigma associated with HI (Hétu et al., 1993). This phenomenon has been called the “*adults with hearing impairment minimization effect.*” While HIAs minimise the negative communication effects of HI, SOs may become frustrated with the negative communication effects that occur due to a HI (Preminger, 2002). This theory can also be viewed in terms of the SO to account for the other findings; that is, SOs may minimise the difficulties experienced by their HIA partners and as such, perceive greater handicap than their HIA partners (Preminger, 2002). Investigations have also revealed that mood and emotional affect may influence HRQOL scores and subsequent degrees of congruence (Preminger & Meeks 2010a; 2010b), as does HRQOL score severity as perceived by the HIA (Preminger, 2002). HIA and SO score discrepancies are, however, not significantly linked to HI severity or slope of the audiogram (Preminger, 2002).

Overall, differences in participant characteristics and other variables make it difficult to make definitive conclusions from the above studies as to what is the likely perception of SOs and how this may or may not align with the perception of their hearing-impaired partners. While age appears to have been consistent across studies (all including older adults), differences in studies include using veterans versus non-veterans, HI participants of

single gender versus both, differences in HI definition, in SO definition, and different levels of hearing aid use. Research is required to determine whether similar findings are discovered with a younger, middle-aged population through the use of more streamlined methodologies. Additionally, studies have generally failed to investigate the effects of gender and perception of HI likely due to gender imbalance in population samples (Preminger, 2003; Preminger & Meeks, 2012) or too small a sample size (Preminger & Meeks, 2010a; 2010b). However, given the available knowledge on gender differences for HIAs (Garstecki & Erler, 1998; 1999) and SOs (Anderson & Noble, 2005; Scarinci et al., 2008; Wallhagen et al, 2004), it is possible that gender differences do exist.

Ultimately, while within each study of couple congruence there is a subpopulation of couples that rated hearing-related disability similarly, the majority of findings suggest that most SOs tend to overestimate the disability experienced by their HIA partners, whether significantly, or not (Preminger, 2003). Whether any of these perceptions are amenable through intervention, as they are for HIAs, is an interesting area of exploration. If intervention can influence the HIA's perceptions of HRQOL, then it is possible that it can also influence the SO-proxy perceptions HRQOL. This is discussed in detail in section 1.3.4.1.

Audiologic Rehabilitation and the Significant Other.

1.3.4. Significant Other Involvement in Hearing-Related Treatment

Despite the fact that SOs may accompany their hearing-impaired partners to audiology appointments, the communication needs of the normal-hearing SO are rarely acknowledged (Donaldson, Worrall, & Hickson, 2004). Audiologists have a responsibility to provide a service to not only HIAs but also their SOs, be it through support, information, and/or direction (Tye-Murray & Schum, 1994). This seems reasonable given the known consequences they experience as a result of their partner's HI (Getty & Héту, 1991; Scarinci et al., 2008). Despite these known consequences and despite the generally positive impacts

of rehabilitation, there is limited research on the effects of HI on the SO and how that might be alleviated. Most of the time, SOs have been used as proxies in studies, to describe their perception of the difficulties faced by their partners as a result of HI at pre-treatment and post-treatment timeframes. Investigations of couple congruence with regards to HRQOL measures are also commonplace.

Improvements in HRQOL perceptions in both qualitative and quantitative terms have been reported for HIAs and proxy-SOs post hearing aid fitting (Brooks, Hallam & Mellor, 2001; Stark & Hickson, 2004) suggesting evidence of widespread benefits obtained from hearing aids, consistent with findings from Chisolm et al. (2007). While hearing aids can produce positive effects on communication and self-reported estimations of QOL, as uncovered previously, many HIAs do not continue to use hearing aids after fitting, and many of those who do use hearing aids continue to report communication difficulties (Chia et al., 2007; Gopinath et al., 2011; Hickson & Worrall, 2003; Smeeth et al., 2002). As a result, alternative treatments such as AR have seen their small share of studies exploring the effect of treatment on HRQOL measures for not only the HIA, but also proxy estimations from the SO.

1.3.4.1. Audiologic Rehabilitation and the Significant Other

There is a plethora of information and resources available for the creation of communication programs specifically for communication partners of HIAs (Tye-Murray & Schum, 1994; Tye-Murray, 2009). Currently, only a small amount of research exists that investigates the outcomes of AR programs that also include SOs. To date, all of the studies exploring the effects of AR on SOs involve treatments that include the use hearing aids and/or cochlear implants in addition to participation in AR. Given the belief of providing services to not only the HIA, but also the SO, this is a small feat.

The inclusion of SOs in the AR treatment of HIAs has generally been found to positively affect the HRQOL outcomes for the HIAs. Additionally, as the measured HRQOL for HIA decreases, the proxy reports of HRQOL by SOs also tend to decrease (Preminger, 2002; Preminger and Meeks, 2010a). Preminger (2003) compared the benefit of group AR classes for HIAs who attended class with their SOs ($N = 13$) to those who attended class without their SOs ($N = 12$). Outcomes based on HHIA and HHIE scores revealed that despite a small sample size, and although both groups of HIAs received benefit post-treatment as measured through self-and proxy reports, and there was a tendency for increased benefit for subjects who participated with their SOs. This finding is in contrast to the RCT by Hickson et al. (2007), which found that attendance of SOs was not significantly related to outcomes. However, it is important to note that only approximately 34% of their participants had SOs who attended the program, and despite this, the majority of SOs did not attend all of the five sessions.

Interestingly, in terms of whether SO perceptions were amenable to AR treatment, Preminger's (2003) quasi-experimental cohort study uncovered that SOs significantly underestimated the degree of HIA disability pre-treatment and underestimated the degree of benefit post-treatment. In other words, although some SOs perceived benefit for their HI partners, they did not perceive as much benefit for their partners from the AR classes as the HIAs did. Potential reasons for this may relate to a lack of SO-specific program element in the study design. It was hypothesised that SOs may have underestimated their partner's progress following increased understanding of the impact of HI (Preminger, 2003). Further research is necessary to confirm or refute the rationale for incongruent findings post-treatment by use of a SO-specific focus in an AR program, and to also determine if there is any additional SO-specific benefit as a result of this. The sparse research within the literature revolving SO-specific hearing-related treatment has provided encouraging

findings.

In a problem-solving group AR study involving males with noise-induced HI and their SOs, Getty and Hétu (1991) reported positive outcomes not only for the HIAs, but also for their SOs. SOs reported a positive change in communication adjustments, a better understanding of the difficulties associated with hearing impairment, and an improvement in communicating with their hearing-impaired partners. This early study has provided support for the inclusion of SOs during rehabilitation, and has prompted further research to include a more diverse population base.

More recently, Preminger and Meeks' (2010a) RCT addressed the discrepancies in proxy measurements outlined in her previous study and determined whether specialised separate SO training alongside AR for HIAs improved congruence for HHIA versus HHI-SP scores. Thirty-six couples were randomised either into a control group ($N = 18$), where the SO did not receive training, or into an experimental group ($N = 18$), where the SO received additional instruction. Results indicated that the majority of couples in both groups were significantly congruent pre-treatment. They also indicated that when the HIA completed a group AR program where the SO received no attention (control group); there was little effect on the couples' measured congruence at post-treatment or at follow-up. In contrast, for the experimental group, where SOs completed a special rehabilitation program, a significant improvement in congruence was seen, but only at follow-up. The measurements of congruence at post-treatment were not explicitly reported.

It seems that congruence following SO involvement in AR programs requires more research. When SOs participate alongside HIAs in HIA-specific treatment, incongruent findings in hearing-related HRQOL scores remain post-treatment (Preminger, 2003). When SOs participate in AR programs separately to HIAs, congruence in findings seem to be

influenced in the long-term (i.e., at 6-months) rather than immediately post-treatment (Preminger & Meeks, 2010a). It appears then that either congruence remains the same regardless of treatment, or the focus and delivery of treatment has an influence on findings. It may be useful to investigate whether AR that both encourages SO participation alongside HIAs and provides separate SO specific portions has an effect on congruence.

All SOs in Preminger and Meeks' (2010a) study received their own therapeutic benefits much like the SOs in the study by Getty and Héту (1991). They exhibited a trend of moderate effect size for measures of decreased stress and decreased negative affect after program participation. It would be interesting to explore similar therapeutic findings for SOs for more hearing-specific HRQOL measures such as the SOS-HEAR (Scarinci et al., 2009b).

1.4. Rationale

This study seeks to provide much-needed investigation into the area of AR as it relates to HIAs and their normal-hearing SOs. Firstly, there is clearly a gap in knowledge regarding AR treatment outcomes for middle-aged HIAs, for HIAs in the workforce, and for HIAs who do not use hearing aids. Findings from this study may provide further understanding as to whether this form of AR is a viable alternative treatment for this population, and will also support current research detailing the beneficial effect of AR as a whole. Treatment information may thus provide relevant evidence-base with which to inform clinical decisions regarding patients who have a HI that which impacts their QOL, are still working, and do not wish to purchase or use hearing aids.

Secondly, there is a lack of research regarding SO involvement in AR. For the most part, their involvement has been to provide a different perspective on treatment outcomes for HIAs, based on their proxy estimations. There are currently conflicting results pertaining to couple congruence in HRQOL measures. This study seeks to describe the effects of an AR

program that provides HIA-specific and SO-specific instruction on couple congruence. That is, whether the perceptions of couples change post-treatment.

Lastly, this study seeks to add to the budding body of literature relating to HI and third party disability. Although the SOS-HEAR (Scarinci, et al., 2009b) was developed for older couples, investigations into the difficulties younger couples experience could allow for further exploration of any differences in third party disability experienced by middle-aged SOs. Additionally, obtaining hearing-related information from the SO's own perspective may provide support for further opportunities of considering normal-hearing SOs as treatment candidates and addressing the negative consequences HI may have on their functioning. Treatment that also focuses on the SOs of HIAs could help deter the associated negative effects of HI (Hétu, Riverin, Lalande, Getty, & St-Cyr, 1988; Scarinci, Worrall, & Hickson, 2008). Given the potential benefits of including SOs in this treatment option, it will provide the clinician with an option for a holistic and inclusive approach for the management of HI and frequent communication partners such as SOs.

1.5. Aims and Hypotheses

This thesis aims to build on Kelly-Campbell's (in review) working adult group AR study by developing an SO-specific portion to the existing AR program. Hearing-impaired adults along with their SOs attended three group audiologic rehabilitation sessions and were randomised to receive treatment in either non-waitlist groups or waitlist groups. For the HIAs, group AR treatment outcomes based on self-reported HRQOL and SO-proxy HRQOL measures are described, while the resulting effect of treatment on the congruence between these measures are also reported. For the SOs, in addition to the proxy measures used, direct HRQOL outcomes of AR group treatment are explored. Ultimately, this thesis seeks to answer the following research questions: **(1)** *Is there any treatment effect for HIAs as measured through the CPHI (Demorest & Erdman, 1986; 1987)?* **(2)** *Is there any treatment*

effect for HIAs as measured through the SO-proxy version of the CPHI (Erdman, Binzer, Demorest, Wark, & Lansing, 1995 as cited in Erdman, 2006)? (3) Are there any differences in the level of congruence between couples' CPHI assessments prior to and after the AR program? (4) Is there any treatment effect for SOs as measured through the SOS-HEAR (Scarinci et al., 2009b)?

General findings within the literature relating to AR treatment suggest that treatment benefit for HIAs is likely (Hawkins, 2005). Specifically, hearing-related HRQOL measurements display a decrease in disability post-treatment compared to pre-treatment. This finding is yet to be made with disease-specific HRQOL measures for SOs. However, given the fact that HIAs are capable of experiencing a decrease in their perception of HI-related disability after specific treatment, it is reasonable to expect that SOs too are capable of experiencing a decrease in their perception of HI-related disability (i.e., third party disability) if they are also provided with specific treatment. With regards to the congruence of HRQOL measures between couples, previous results have been mixed (Preminger, 2002; 2003; Preminger & Meeks, 2010a). Investigation of this relationship in this study may shed more light on this area.

Based on the literature available, the following research hypotheses were proposed:

- (i) There will be no significant differences between pre-treatment assessment scores and post-waitlist assessment scores for:
 - (a) HIAs
 - (b) SO-proxies
 - (c) Couple congruence, or
 - (d) SOs
- (ii) HIA treatment outcomes will measure a significant improvement over time (i.e.,

from pre-treatment, to post-treatment, to follow-up)

(a) There will be a significant effect of gender on treatment outcomes

(iii) HIA treatment outcomes as obtained by proxy estimations of the SO will measure a significant improvement over time (i.e., from pre-treatment, to post-treatment, to follow-up)

(a) There will be a significant effect of gender on proxy estimations

(iv) HIA and SO-proxy scores will be significantly different at pre-treatment assessment

(v) There will be a significant effect on the congruence, i.e., CPHI difference scores, in couple treatment outcome measures over time (i.e., from pre-treatment, to post-treatment, to follow-up)

(a) There will be a significant effect of gender on couple outcome measures

(vi) SO treatment outcomes will measure a significant improvement over time (i.e., from pre-treatment, to post-treatment, to follow-up)

(a) There will be a significant effect of gender on treatment outcomes

CHAPTER TWO: METHODOLOGY

2.1. Introduction

The purpose of this thesis is to describe the effects of group aural rehabilitation (AR) treatment for: (1) hearing-impaired adults (HIAs) in the workforce, and (2) their significant others (SOs) with normal hearing. Participant couples were divided into two treatment groups: (1) waitlist and (2) non-waitlist. The evaluation tools used to measure the effects of treatment were self-report health-related quality of life (HRQOL) assessments; namely, the Communication Profile for the Hearing Impaired (CPHI) and the Significant Other Scale for Hearing Disability (SOS-HEAR). These assessments were completed pre-treatment, post-treatment, and at 12-weeks follow-up. This chapter will discuss participant recruitment, group allocation, the study's design, AR program development, implementation, measurement, and analysis. For the benefit of the reader, there will also be an in-depth review of the disease-specific HRQOL questionnaires used in this study.

This study received ethical clearance from the University of Canterbury Human Ethics Committee, New Zealand. The procedures conducted in this study were in accordance with the Committee's approval. All participants provided written informed consent prior to their involvement.

2.2. Participants

2.2.1. Recruitment

A combination of convenience and purposive sampling strategies (Portney & Watkins, 2009) were used to recruit HIAs and their normal hearing SOs in Phoenix, Arizona. Sampling strategies included clinical database searches from a private audiology clinic and community advertising that took place between July and September 2012. Clinical database recruitment acquired a sample of clients that had presented for hearing evaluation but did not elect to pursue hearing aids or other assistive technology. Advertisement flyers (see Appendix A) outlining the details of the communication program and basic inclusionary criteria sought out the remaining participants in this study, and were posted in community newspapers, centres, doctors' offices, post offices, grocery stores, and churches. It was hoped that a form of snowball sampling (Portney & Watkins, 2009) would occur with the above recruitment strategies. That is, either HIAs would decide to participate and volunteer their normal-hearing SOs, or the SOs would respond to the advertisements and volunteer themselves and their hearing-impaired partners.

A total of 34 couples (i.e., HIAs and their SOs) responded to the recruitment strategies and attended a *pre-assessment screening* appointment, which determined eligibility for further participation in the study. Of those, 30 couples met the inclusionary criteria outlined in table 4 for HIAs and table 5 for SOs, and consequently progressed to the *pre-treatment* assessment stage. Four couples did not wish to undergo random assignment to groups, and were therefore excluded from the study. Additionally, two couples were not available during the study period to attend all sessions and were consequently also excluded from the study. The remaining 24 couples, that is, 48 individual participants, were quasi-randomly allocated into two AR group types: (1) *waitlist groups*, which collectively consisted of 12 HIAs (male = 6; female = 6) and 12 SOs (male = 7; female = 5), and (2) *non-waitlist*

groups, which collectively consisted of 12 HIAs (male = 6; female = 6) and 12 SOs (male = 6; female = 6). A flowchart illustrating the sequence of assessments and ensuing group allocation is outlined in figure 3. During the administration of the AR program, the waitlist and non-waitlist groups, each consisting of 24 participant couples in total were further divided into four groups (i.e., two waitlist and two non-waitlist groups) that consisted of six participant couples each.

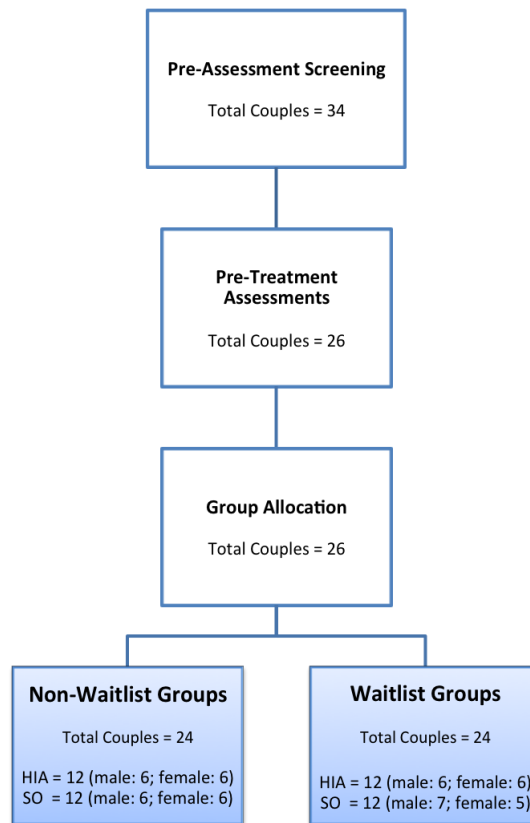


Figure 3: Flowchart illustrating sequence of assessments and group allocation for all participants.

2.2.2. Inclusionary and Exclusionary Criteria

Firstly, with regard to the HIAs, it was decided that a constraint of no less than 20 hours worked a week would be required to participate in the AR program. The rationale behind this was the supposition that eligible HIAs worked for enough time outside the home so that work-related communication problems would be apparent. Additionally, the upper age limit (i.e., 64 years) was used to eliminate candidates most likely to be retired and to also ensure a homogenous grouping of working adults. The lower age limit (i.e., 45 years) was decided on based on the findings of the rapid growth of hearing impairment (HI) down to this age (Kochkin, 2009). Adult onset HI was preferred based on the assumption that HI from birth may have mitigated remedial procedures and well-established communication strategies during an individual's lifetime. Moreover, the lower limit of the pure-tone average (PTA) thresholds was based on Goodman (1965)'s definition of HI, while the upper limit represented a 'moderate' HI; a HI greater than moderate may be too great for the effects to be lessened by just AR. In other words, a HI greater than moderate would likely result in continued speech perception difficulty, even in quiet. Lastly, the HIA's willingness to travel and participate with their normal-hearing SOs would be essential for successful enrolment into the group AR program and allow for unimpeded data collection.

Conversely, with regard to the SOs, the only difference in eligibility requirements was normal hearing. This was decided for a number of reasons: (1) to maintain group homogeneity and to control SO HI as a potential confounding variable during data analysis, (2) to avoid potentially difficult to control interactive effects that HI from both members of the couple might have, and (3) to establish the effects of the AR programme on the concept of third party disability.

Table 3: Hearing-Impaired Adult Inclusionary and Exclusionary Criteria.

Inclusionary Criteria	Exclusionary Criteria
Working adults (≥ 20 hours worked per week) employed outside their homes	Current or previous treatment for hearing impairment including aural rehabilitation, hearing aids, and/or assistive listening devices
Aged between 45-64 years	
Adult onset hearing impairment	
Better ear pure-tone air-conduction average between 26-55 dB HL	
Willingness to participate in three group sessions with their significant others	
Willingness to travel to the treatment venue	

Table 4: Significant Other Inclusionary and Exclusionary Criteria.

Inclusionary Criteria	Exclusionary Criteria
Aged between 45-64 years	Hearing Impairment
Better ear pure-tone air-conduction average below 26 dB HL	
Willingness to participate in three group sessions with their hearing-impaired partner	
Willingness to travel to the treatment venue	

2.3. Procedure

2.3.1. Group Allocation

Couples who met the eligibility criteria during the *pre-assessment* screening went on to complete the *pre-treatment* HRQOL assessments (discussed under section 2.3.3. *Participants' Tasks*), and were then quasi-randomly assigned to their AR treatment groups: (1) waitlist, or (2) non-waitlist. The random assignment had the constraint that there needed to be equal numbers of participants in each group. Group assignment was achieved by placing 24 marked pieces of paper in a single container: 12 pieces of paper displayed the word "waitlist", while 12 pieces of paper displayed the word "non-waitlist." Soon after the *pre-treatment* assessment, one member of the couple blindly drew a piece of paper from the container, and was subsequently assigned to the group displayed on it with their partner. The order of group assignment for each couple was as follows:

1. waitlist	9. non-waitlist	17. non-waitlist
2. waitlist	10. non-waitlist	18. waitlist
3. non-waitlist	11. non-waitlist	19. non-waitlist
4. waitlist	12. waitlist	20. non-waitlist
5. non-waitlist	13. non-waitlist	21. waitlist
6. waitlist	14. non-waitlist	22. waitlist
7. non-waitlist	15. waitlist	23. non-waitlist
8. waitlist	16. non-waitlist	24. waitlist

Participants in the waitlist group began their first session within 12 weeks of group allocation, while participants in the non-waitlist group began their first session within 1 week of group allocation. Following the AR program, all couples progressed to the *post-treatment* assessment and *follow-up* assessment stages.

2.3.2. Study Design

The purpose of the waitlist design of this study was to simulate a randomised control trial (RCT). In a RCT, participants are randomly assigned to either a treatment group or a control group (Portney & Watkins, 2009). However, in this circumstance, since it is believed to be beneficial to participate in this program, it was decided that would be unethical to withhold treatment. Therefore, a waitlist group scenario was used in lieu of a control (no-treatment) group. An additional benefit of this design is that if the pre-treatment assessments were found not to be reactive, the outcome data of all participants, that is, data from the waitlist and non-waitlist participants, could be combined, thus increasing the statistical power of the study.

Effect sizes that determine whether meaningful change has occurred as a result of treatment can be small (0.20), medium (0.50) or large (0.80), based on Cohen's *d* (Portney & Watkins, 2009). It was decided that an effect size of 0.65 and above could constitute a "clinically significant" treatment effect (or change in HRQOL scores) resulting from group AR participation. *A priori power analysis* (Portney & Watkins, 2009) was also conducted for this study; by referring to sample size tables, it was determined that in order to be able to detect clinically significant effects, a minimum of ten participants in each group would be necessary. In this study, the number of individuals receiving treatment in a particular group, be it waitlist or non-waitlist was 12. This is in agreement with Fehr's (2003) argument that an appropriate or minimum number of participants in a group situation is eight.

2.3.3. Participant's Tasks

(1) AR Program Participation: In their respective groups, the participant couples (i.e., HIAs and their SOs) took part in all three weekly sessions of the group AR program. Within the sessions, the HIAs and their SOs each participated in specifically designed experiential

activities, at times together, at times separately. Further details are found under section 2.4. *Instrumentation*.

(2) Self-Report Assessments: Within this repeated-measures study design, participants also completed self-report HRQOL questionnaires at repeated timeframes. Further details of the questionnaires are found under section 2.5. *Measurement*. For the non-waitlist group, information was obtained at three data collection stages: (1) pre-treatment (PrT), (2) post-treatment (PT), and (3) follow-up (FU). In contrast, for the waitlist group, information was obtained at four data collection stages: (1) pre-treatment (PrT), (2) post-waitlist (PW), (3) post-treatment (PT), and (4) follow-up (FU). This is illustrated in figure 4.

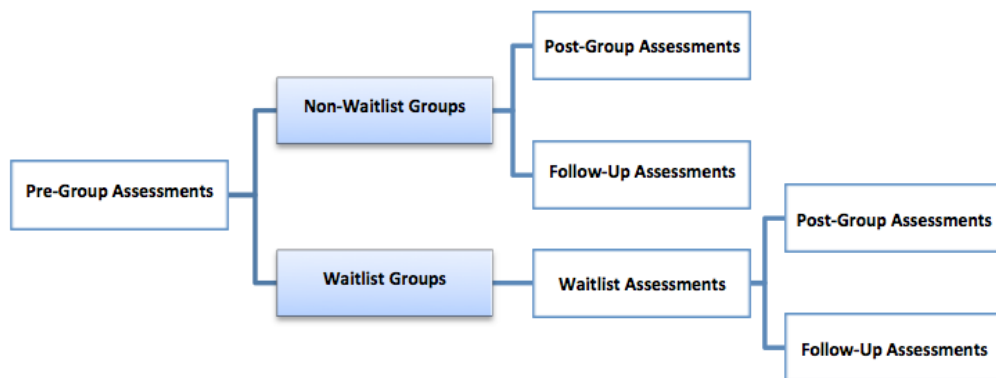


Figure 4: Different assessment points for the waitlist and non-waitlist groups.

Timeframes in which each group attended the program and completed the assessments once group allocation was completed are displayed on table 5. For both groups, pre-treatment assessments occurred prior to group allocation and follow-up assessments occurred twelve weeks after session 3. For the non-waitlist group, post-treatment assessments occurred shortly after session 3. For the waitlist group, pre-waitlist assessments occurred shortly prior to session 1, while post-treatment assessments occurred shortly after session 3.

Table 5: Group assessment and treatment timeframe.

Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
NWL	PrT	S1	S2	S3 & PT											FU											
WL	& GA												PW & S1	S2	S3 & PT											FU

Note: NWL = non-waitlist; WL = waitlist; GA = group allocation; PrT = pre-treatment; S1 = session 1; S2 = session 2; S3 = session 3; PT = post-treatment; PW = post-waitlist; FU = follow-up.

2.4. Instrumentation

2.4.1. See It! Hear It! Say It!

2.4.1.1. Previous Program

The group AR program used in this study was based on the previous program used by Kelly-Campbell (in review) called “*See It! Hear It! Say It!*” This previous program was aimed at working adults with unaided HI. The current program builds on its predecessor with an additional focus on significant others, discussed shortly. The name of the program separates the content into three individual themes that in turn, represent three separate sessions. For example, session one, termed *See It!* emphasizes the visual aspects of communication; next, session two, termed *Hear It!* emphasizes the auditory aspects of communication; lastly, session three, termed *Say It!* emphasizes assertiveness training and conversational repair strategies. By presenting a mixture of both didactic information and practical activities in each session, the themes of the program are supported and learning is facilitated.

See It!

The first session prompts discussion on the visual aspects of communication; a didactic portion focuses on understanding the importance of obtaining visual cues during communication and encourages discussion of preparing the optimal environmental setting in which to obtain as much visual information as possible. Practical activities include dividing up into pairs and discriminating minimal pair words. Additionally, hearing-impaired participants are encouraged to critically evaluate their own workspaces for obtaining optimal visual information and make any needed changes for the following week. They are asked to share their experiences with the group in the following session.

Hear It!

The second session focuses on the auditory aspects of communication. The didactic portion discusses hearing and HI, and also focuses on an awareness of the redundancies in language, using contextual clues to fill in missed auditory information, and preparing the optimal environmental setting in which to obtain as much auditory information as possible. This session also introduces the topic of assistive technology within the workplace with a discussion on ways in which technologies could be used in the participants' work environments. Practical activities include dividing up into pairs and using context clues in a phrase to determine the correct word spoken. Additionally, hearing-impaired participants are encouraged to use these communication strategies at work or home and investigate procedures for obtaining assistive technology at work. Again, they are asked to share their experiences with the group in the following session.

Say It!

The final session focuses on assertiveness training and conversational repair strategies. The didactic portion concerns expressing how to improve communication in the work place or in other social situations to others (i.e., colleagues). Practical activities include dividing into pairs and role-playing different conversational styles. Additionally, hearing-impaired participants are presented with information about their rights as workers based on the Americans with Disabilities Act (ADA). They are also encouraged to speak with their employers assertively regarding their communication needs and worker rights, and to also practice effective repair strategies at work.

2.4.1.2. Current Program: Significant Others

For the current study, *See It! Hear It! Say It!* was tailored to include SOs for frequent communication partner training. Similar to the previous program, SOs divided up into pairs and completed practical activities. Modifications were kept within the themes of each session; an example of how the elements are incorporated into the sessions is outlined in table 6. The overarching rationale for the development of the current program was to not only encourage successful communication on the part of the HIA specifically in the workplace as per Kelly-Campbell's (in review) aims, but to also encourage successful communication on the part of the SO specifically in the home environment. The specific practical activities and hand outs for the SOs were adapted in part from activities of the previous program, and also from resources illustrated in Preminger (2011), and resources provided by Nancy Tye-Murray as part of an undergraduate course taught in 2010 in New Zealand. The practical activities and PowerPoint presentations of each session can be viewed in Appendix E and F, respectively.

Table 6: Significant other incorporation into *See It! Hear It! Say It!*

Session Theme	Significant Other Incorporation into the Program
See It!	Significant others are taught the importance of visual cues for successful communication and are encouraged to critically evaluate their home environments to facilitate visual cues for the HIA
Hear It!	Significant others are taught the importance of auditory cues for successful communication and are encouraged to critically evaluate their home environments to facilitate auditory cues for the HIA
Say It!	Significant others are taught conversational repair strategies and are encouraged to practice using them with the HIAs

2.4.2. Program Delivery and Materials

Three weekly group sessions took place in a quiet library room in Phoenix, Arizona on consecutive Tuesday evenings from 6:30 pm to 8:30 pm. The 2-hour sessions had a 15-minute coffee break at 45-minutes. The sessions were facilitated by two audiologists. One audiologist had facilitated the program outlined in Kelly-Campbell's study (in review), while the other audiologist had previous experience with group facilitation in an audiologic context. Didactic program information and related activities were delivered through the use of PowerPoint presentations, displayed on a MacBook Pro laptop connected to an Epson EB 1761W LCD data projector. Activities were also supported by hand outs and white boards, where relevant.

2.5. Measurement

2.5.1. Pre-Group Screening

Couples that responded to the recruitment activities attended a 30-minute screening appointment that determined whether they were eligible to join the group based on hearing status (i.e., confirmed HI for the HIA and confirmed normal hearing for the SO) and ear-related history. If participant pairs met the study criteria, they were provided with the study information hand out (Appendix B), the informed consent hand outs (Appendix C), and then the *pre-treatment* assessment data were obtained. The screening appointment took place in a quiet clinical room in an audiology clinic in Phoenix, Arizona. Demographic information and diagnostic audiological assessments were gathered and completed by an audiologist who held a license to practice audiology in Arizona.

2.5.1.1. Audiological Assessments

Testing took place in a double-walled sound-attenuating booth that met ANSI S3.1-1999 maximal permissible ambient noise level standards for audiometric threshold measurement. A GSI 61 audiometer that was calibrated within 6-months of the assessment was used for air and bone conduction pure-tone audiometry, and also for speech audiometry.

(1) Pure-tone Audiometry:

Air-conduction audiometric thresholds were obtained for 250, 500, 1000, 2000, 3000, 4000, 6000, and 8000 Hz via ER-3A insert earphones. When adjacent octave thresholds differed by 20 dB HL or more, thresholds at 750 and 1500 Hz were also established. Bone-conducted audiometric thresholds were obtained at 250, 500, 1000, 2000, 4000 Hz via a Radioear BC-71 bone vibrator.

(2) Speech Audiometry:

Speech recognition thresholds for monitored live voice using the *CID W-1 spondaic word list* (Hirsh, Davis, Sliverman, Reynolds, Eldbert, & Benson, 1952) with a 5-dB step-size following the American Speech-Language-Hearing Association guidelines (1988) were obtained via ER-3A insert earphones. Word recognition via ER-3A insert earphones was assessed using the Auditec recording of NU-6 monosyllabic word list (Tillman & Carhart, 1966) at 40 dB SL re: SRT. Speech in noise was assessed via ER-3A insert earphones using the QuickSIN (Etymotic Research, 2001; Killion et al., 2004). Stimuli were presented binaurally following standardised instructions and practice sentences. The level of the QuickSIN was determined based on reviewing the instruction manual. For example, for participants whose PTA is less than or equal to 45 dB HL, presentation level was 70 dB HL. For participants whose PTA was greater than 45 dB HL, presentation level was “loud, but OK” (Valente & Van Vliet, 1997). Two practice lists were given, followed by two test lists. The average SNR impairment of each test list was subsequently used to derive SNR impairment for each participant. For further information regarding the QuickSIN, the reader is referred to Killon et al. (2004).

2.5.2. Health-Related Quality of Life Questionnaires

The HRQOL questionnaires used to evaluate the outcome of this AR program for the HIA, were self and proxy versions of the Communication Profile for the Hearing Impaired (CPHI; Demorest & Erdman, 1987; Erdman & Demorest, 1998a, 1998b). These were to be completed by the HIAs and their SOs, respectively. The questionnaire used to evaluate the outcome of this AR program for the SO was the SOS-HEAR (Scarinci, Worrall & Hickson, 2009b).

2.5.2.1. Communication Profile for the Hearing Impaired (CPHI)

Overview

It is well known that the disability and impaired functioning experienced by an individual with HI is insufficiently predicted by audiometric data alone (Erdman & Demorest, 1998a). Self-report measures are a means by which individuals can conceptualise the difficulties they may experience as a result of their HI over and above what an audiogram can do. The Communication Profile for the Hearing Impaired (CPHI; Demorest & Erdman, 1986; 1987) is a comprehensive paper-and-pencil 145-item self-report measure that is commonly used to establish an inventory and quantify the effects of HI. It is a true composite scale with factors that allow for an investigation of the environmental, behavioural, and psychological variables that contribute to adjustment to hearing impairment (Erdman & Demorest, 1998a). A recommended clinical application of the CPHI is post-treatment evaluation (Demorest & Erdman, 1988) and as such, the CPHI can be used to detect a change in functioning over time, with inferences made based on treatment effects. Due to the fact that the CPHI is copyrighted, it cannot be presented in the appendix of this thesis.

Development

The CPHI was initially developed to identify the rehabilitative needs of military personnel with noise-induced hearing impairment (age range = 20-70 years) in the mid-1980s. It has since undergone refinements, psychometric assessment, cross-validation assessments, and is now more generalisable after being established with a more heterogeneous clinical population of HIAs ($N = 1,004$; age range = 16-90 years; mean age = 64.5 years) (Erdman & Demorest, 1998a). Psychometric properties of the 145 items have been described (Demorest & Erdman, 1986), while the coefficient alpha values related to the scales have also been established. The internal consistency related to the CPHI's scales range from 0.67 to 0.89, with a median value of 0.79 (Demorest & Erdman, 1987). Overall,

CPHI-related studies have determined that in the absence of intervention, the retest scores are more likely to decrease than increase. Additionally, although findings were somewhat weak, the trend in results seems to suggest that spontaneous improvement in CPHI scores is not the norm (Demorest & Erdman, 1986).

Administration

The CPHI, which can be administered on site or mailed to the individual, is sensitive enough to detect group and individual changes induced by treatment, be it hearing aids and or AR (Demorest & Erdman, 1988). As such, it is ideally administered before and after the provision of treatment. Individuals are asked to respond to the CPHI items as they currently perceive their communication situations. Results are then entered into a computerised scoring program for subsequent analysis.

Items, Scales and Factors

Responses to items are obtained on a 5 point scale of frequency, agreement, or importance. For example, “1” signifies rarely/almost never, strongly disagree, or not important, and “5” signifies usually/almost always, strongly agree, or essential. High scores on a profile suggest effective communication, good adjustment, or a lack of involvement in the individual’s communication difficulties. In contrast, low scores, which warrant clinical attention, and suggest communication and/or adjustment difficulties. In terms of interpretation, the CPHI provides scores for 25 scales as well as three importance ratings for communication environments across the following four sections: Communication Performance, Communication Environment, Communication Strategies, and Personal Adjustment. Scores can be transferred to software developed at the Audiological Rehabilitation Laboratory at the University of Memphis (University of Memphis, 2000), which generates a profile for each individual. This profile characterises the degree and pattern of problems experienced by a given individual at a particular point in time and can

display an individual's scale scores relative to normative ranges (Erdman & Demorest, 1998a).

The CPHI also has a 5-factor structure that is compatible with the results of canonical analyses presented by Demorest and Erdman (1989). They are: (1) Adjustment, (2) Reaction, (3) Interaction, (4) Communication Performance, and (5) Communication Importance, explained further in table 7. Factor scores are able to summarise information across scales in a way that reflects important correlations among the areas as well as within them (Demorest & Erdman, 1989). Scores for these factors are reported on a standard z-score scale and can also be added to the profile. These factor scores, with a mean of zero and a standard deviation of one, referenced to group data obtained by the Walter Reed army Medical Centre, will comprise the main points of CPHI interpretation in this study.

Table 7: Five factors of the Communication Profile of the Hearing Impaired (CPHI; Demorest & Erdman, 1986; 1987).

Factor	Explanation
Adjustment	<ul style="list-style-type: none"> • Reflects perception of negative feelings (anger, discouragement, stress, denial, withdrawal), acceptance of impairment (displacement/exaggeration of responsibility, self-acceptance, acceptance of impairment), and attitudes and behaviours of others • High scores indicate good personal adjustment to hearing impairment
Reaction	<ul style="list-style-type: none"> • Reflects perception of need for communication, physical characteristics of environment, and problem awareness • High scores indicate strong need to communicate in daily life and high communication importance at work as well as frequent use of verbal and nonverbal communication strategies
Interaction	<ul style="list-style-type: none"> • Reflects perception of rejection by others, communication behaviour of others, and own use of maladaptive strategies

	<ul style="list-style-type: none"> • High scores indicate little perceived negative attitudes of others and infrequent use of poor communication habits by the respondent as well as others
Communication Performance	<ul style="list-style-type: none"> • Reflects the frequency with which the person is able to engage in conversation at home, work and social situations without great effort • High scores indicate frequent effective communication
Communication Importance	<ul style="list-style-type: none"> • Reflects perception of the degree of importance that the person places on effective communication at home, work and social situations • High scores indicate high importance placed on effective communication

The significant other version of the CPHI (CPHI-H or CPHI-W) used as a proxy measurement, has not received the in depth statistical analysis as its predecessor, but it still permits SOs to document their perceptions of the HIA's Communication Performance, Communication Environment, Communication Strategies and Personal Adjustment (Erdman et al., 1995 as cited in Erdman, 2006), and thus will be used in this study.

2.5.2.2. Significant Other Scale for Hearing Disability (SOS-HEAR)

Overview

The Significant Other Scale for Hearing Disability (SOS-HEAR) is a paper-and-pencil self-report measure that, compared to the CPHI, is still in its infancy. That being said, the basis of its creation centres on a topic that has received on-going attention in recent times. The SOS-HEAR (available in Appendix D) consists of 36 items and has been developed through exploration of the concept of third party disability as it relates to HI. It allows for the investigation and measurement of the level of third party disability experienced by partners of those with HI.

Development

Nerina Scarinci headed a series of studies that meticulously explain the development of this tool, which has its roots in qualitative data. In their first study, Scarinci, Worrall, and Hickson (2008) carried out semi-structured in-depth interviews with ten (five women and five men) SOs of individuals with HI. Ages of the participants ranged from 60 to 83 years, with a mean of 70.2 years (SD = 7.12). The transcribed responses underwent interpretive analysis, which revealed four categories describing the experiences of the SOs of those with HI: (1) the broad ranging effects of the HI on the SO's everyday lives; (2) the SO's need to constantly adapt to their partners' HI; (3) the effect of acceptance of the HI on the SO; and (4) the impact of ageing and retirement. The study also revealed 18 themes and 50 sub-themes. For an in-depth review, the reader is directed to Scarinci et al.'s (2008) findings. Scarinci, Worrall, and Hickson (2009)'s follow-up study linked the themes of the interview to the International Classification of Functioning, Disability and Health (ICF; World Health Organization, 2001), with most themes linking to ICF codes in the activities and participation component. Within the creation of the SOS-HEAR, to ensure face and content validity, findings were modified into simple statements and were consistent with the language used by the interviewees (Scarinci et al., 2009a). The SOS-HEAR also aimed to reflect the 18 themes recognised in the qualitative study.

This self-report tool has been subjected to psychometric testing with a larger sample of 100 SOs (78 females and 22 males) aged from 49 to 87 years (mean = 69.65 years; SD = 7.68) using item analysis, Cronbach's alpha, factor analysis, and test-retest reliability (Scarinci et al., 2009b). Cronbach's alpha indicating internal consistency for the scale was 0.94, with weighted kappa values ranging from fair to very good. Cronbach's alphas for the SOS-HEAR's six factors were 0.88, 0.89, 0.91, 0.77, 0.85, and 0.71, respectively, demonstrating good internal consistency, and indicating that the items in each factor reflect

the same attribute. The test-retest reliability (temporal stability) of the revised SOS-HEAR was acceptable (Scarinci et al., 2009b). The majority of items received weighted kappa values greater than 0.41 (i.e., moderate or better).

Administration

Use of the SOS-HEAR is proposed as a means of identifying significant others of older people with hearing impairment in need of intervention. It can be used to document any treatment effects and as such can be completed before and after treatment, and also in the long-term. Participants are asked to read each statement on the test form carefully and to circle how much of a problem the content statement is for them. Findings can be tallied by hand.

Items and Factors

This self-assessment tool employs a 5-point response scale based on ICF-related qualifiers. The direction of the SOS-HEAR scores are opposite to the CPHI. For example, 0 indicates 'no problem'; 1 indicates 'a mild problem'; 2 indicates 'a moderate problem'; 3 indicates 'a severe problem'; 4 indicates 'a complete problem.' Scores range from 0-144. Higher SOS-HEAR scores thus indicate greater difficulties experienced by the significant other, consistent with third party disability. In terms of interpretation, the SOS-HEAR provides a total score, and scores for 27 items across six factors of third party disability and functioning: (1) Communication Changes; (2) Communicative Burden; (3) Relationship Changes; (4) Going Out and Socialising; (5) Emotional Reactions to Adaptations; and (6) Concern for the Partner. The total score will comprise the main points of SOS-HEAR interpretation in this study. Due to the small number of items, findings can be easily interpreted manually. As a result, a software program that creates a profile of results, much like the CPHI, is not necessary.

2.6. Data Analyses

The participants' age, gender, pure-tone average, speech understanding in quiet, and signal to noise ratio loss were tabulated to reveal demographic and audiometric information for both the HIAs and their SOs. In addition to these data, assessment results from the CPHI and the SOS-HEAR were also tabulated. CPHI results were coded and entered into the software program (University of Memphis, 2000) in accordance with procedures described by Erdman and Demorest (1998a). In short, all identifying information was removed, raw data were entered into a clinical database established for the purposes of this research, and were subsequently re-entered by a second data entry person to rule out errors. Factor scores for the CPHI were obtained from the CPHI software (University of Memphis, 2000) and transferred to Excel spread sheets, while total scores for the SOS-HEAR items were manually entered into Excel spread sheets.

2.7. Statistical Analyses

The statistical analyses performed in this study were achieved by using The Statistical Package for the Social Sciences (SPSS version 19). The range of statistical tests were chosen based on the characteristics of the data and subsequent analyses required to test the study's hypotheses. The significance level was set at $\alpha = 0.05$, while a clinically significant effect size was set at $d = 0.65$.

A series of t-tests and Chi-squared tests were conducted to compare audiometric and demographic variables between both group types (i.e., waitlist and non-waitlist) and to subsequently determine whether group data could be combined for interpretation.

For self-report HRQOL outcome analysis, a series of analyses of variance (ANOVA) and repeated-measures t-tests were performed on the 5 CPHI factor scores both for the

HIAs and the proxy-SOs, and also on the total SOS-HEAR scores for the SOs. Time (that is, pre-treatment, post-treatment, and follow-up assessments) was used as the within-subjects variable and gender was used as the between-subjects variable. When a significant interaction between gender and time was found, simple main effects were examined. For each simple main effect analysis, a repeated measures ANOVA was performed to test for the effects of time on each gender independently. Finally, all significant effects were followed-up with repeated measures t-test to ascertain which time interval(s) were significantly different.

CHAPTER THREE: RESULTS

3.1. Introduction

This thesis documents and discusses the effects of group AR treatment for: (1) unaided hearing-impaired adults (HIAs), and (2) their normal-hearing significant others (SOs). This chapter presents findings from demographic and audiological assessments, and also compares health-related quality of life (HRQOL) self-report assessments completed at the following timeframes: pre-treatment, post-waitlist (where relevant), post-treatment, and 12-weeks follow-up. The study's hypotheses will be revisited and scrutinised while reporting the findings of this study. Treatment outcomes for the HIA will be evaluated from self and SO-proxy assessment reports of the Communication Profile for the Hearing Impaired (CPHI; Demorest & Erdman, 1986; 1987; Erdman & Demorest, 1998a, 1998b). Investigations for couple report congruency will likewise be obtained through CPHI results. Treatment outcomes for the SO will be evaluated from self-assessment reports of the Significant Other Scale for Hearing Disability (SOS-HEAR; Scarinci et al., 2009b).

3.2. Demographic and Audiological Assessments

3.2.1. Hearing-Impaired Adults versus Significant Others

Table 8 illustrates demographic and audiologic characteristics for all participants in both group types (i.e., waitlist and non-waitlist groups). Of the total 48 participants, 24 were HIAs, and 24 were SOs. For the HIAs, the average age was 59.33 years ($SD = 2.76$), the mean pure-tone average (PTA) was 31.97 dB HL ($SD = 5.14$), the mean speech in quiet score was 93.50% ($SD = 2.37$), the mean signal to noise ratio (SNR) loss was 2.33 dB SNR ($SD = 0.99$), and there were 12 males and 12 females. For the SOs, the average age was 56.88 years ($SD = 3.72$), the mean PTA was 20.98 dB HL ($SD = 2.99$), the mean speech in quiet score was

98.67% (SD = 1.52), the mean SNR loss was 0.53 dB SNR (SD = 0.53), and there were 13 males and 11 females.

Table 8: Audiometric and demographic variables of hearing-impaired adults and significant others.

Variable	Role	N	Mean	SD
Age (years)	HIA	24	59.33	2.76
	SO	24	56.88	3.71
PTA (dB HL)	HIA	24	31.97	5.14
	SO	24	20.98	2.99
Speech in quiet (%)	HIA	24	93.50	2.37
	SO	24	98.67	1.52
SNR loss (dB SNR)	HIA	24	2.33	0.99
	SO	24	0.54	0.53
Gender				
Male	HIA	12		
Female	HIA	12		
Male	SO	13		
Female	SO	11		

3.2.2. Waitlist versus Non-waitlist Groups

Based on random assignment to groups, it was expected that there would be no difference between participants in the waitlist and non-waitlist groups in any of the independent variables; that is, audiometric and demographic variables would be similar between groups. To investigate this, t-tests and Chi-squared tests were run between the groups for the above variables. The data are shown in table 9. Statistical analyses revealed no significant differences in any of the variables between the groups, including age ($p =$

1.00), PTA ($p = 0.499$), speech in quiet ($p = 0.313$), SNR loss ($p = 0.221$), or gender (Chi-square = 0.686; $p = 0.408$), thus suggesting a homogenous participant sample.

Table 9: Audiometric and demographic variables for participants in the waitlist and non-waitlist groups.

Variable	Group	N	Mean	SD	t	p
Age (years)	NWL	12	59.33	3.17	0.000	>0.999
	WL	12	59.33	2.43		
PTA (dB HL)	NWL	12	32.71	5.74	0.688	0.499
	WL	12	31.25	4.59		
Speech in quiet (%)	NWL	12	93.00	2.34	-1.032	0.313
	WL	12	94.00	2.41		
SNR loss (dB SNR)	NWL	12	2.58	0.70	1.259	0.221
	WL	12	2.08	1.18		
Gender	$\chi^2 = 0.686$					0.408
Males	NWL	6				
	WL	4				
Females	NWL	6				
	WL	8				

3.3. Difficult Communication Situations

From the group discussions that took place during the sessions, the following difficult communication situations were identified by the HIAs ($N = 24$):

- Telephone conversations at work (100%)
- Telephone conversations at home (100%)
- Conversations with co-workers in large groups (95.8%)

- Conversations with co-workers in small groups (58.3%)
- Seminars/presentations (41.7%)

From the group discussions that took place during the sessions, the following difficult communication situations were identified by the SOs ($N = 24$):

- Telephone conversations at home (100%)
- Conversations at the dinner table (100%)
- Conversations with children (75%)
- Conversations from a distance (i.e., different room, large room) (66.7%)
- Movies/theatre (41.7%)

3.4. Self-Report Questionnaires

3.4.1. Communication Profile for the Hearing Impaired

3.4.1.1. Hearing-Impaired Adult Self-Report Measures

Waitlist Effect

- (i) **Research Hypothesis:** There will be no significant differences between pre-treatment assessment scores and post-waitlist assessment scores for: **(a)** HIAs. This hypothesis was upheld by the findings of this study for all five CPHI factor scores.

As only half of the participant couples were placed on the waitlist based on quasi-randomised assignment, the sample size of the pre-treatment assessment versus post-waitlist assessment is 12. Post group data combining, the sample size for the pre-treatment assessment versus post-treatment assessment, and the post-treatment assessment versus follow-up assessment is 24. Related samples t-tests were used to determine whether there were any significant differences in HIA CPHI factor scores between the two timeframes.

Statistical analyses revealed no significant differences between the pre-treatment assessment and the post-waitlist assessment for Adjustment ($p = 0.288$), Reaction ($p = 0.198$), Interaction ($p = 0.534$), Communication Performance, ($p = 0.475$), and Communication Importance ($p = 0.649$). This finding suggested that completion of the CPHI between pre-treatment and post-waitlist was not reactive. With this in mind, and also taking into account that there were no significant differences in demographic and audiometric variables between the waitlist and non-waitlist groups, HIAs in the both groups were combined for collective analysis. This was done for pre-treatment versus post-treatment comparison and for post-assessment versus follow-up assessment comparisons, obtained below.

CPHI Factor Scores

- (ii) **Research Hypothesis:** HIA treatment outcomes will measure a significant improvement over time (i.e., from pre-treatment, to post-treatment, to follow-up) and there will be a significant effect of HIA gender on treatment outcomes. The first part of this hypothesis was upheld by the findings of this study for all five CPHI factor scores. Gender analysis revealed a significant effect for gender for only the Adjustment factor and the Communication Importance factor.

Adjustment Factor

Repeated measures analysis of variance (ANOVA) of the Adjustment factor revealed a significant interaction between gender and factor score; therefore, the simple main effects were examined: $F(1,22) = 10.681$, $p = 0.004$, $\eta^2 = 0.327$, $1-\beta = 0.878$. The interaction plot with mean Adjustment factor scores and standard errors across three time intervals: pre-treatment (1), post-treatment (2), and follow-up (3) is shown in Figure 5. Scores below zero indicate below average Adjustment scores, while scores above zero indicate above average Adjustment scores. For each simple main effect analysis, a repeated measures ANOVA was

performed to test for the effects of time. Significant effects were followed up with repeated measures t-tests.

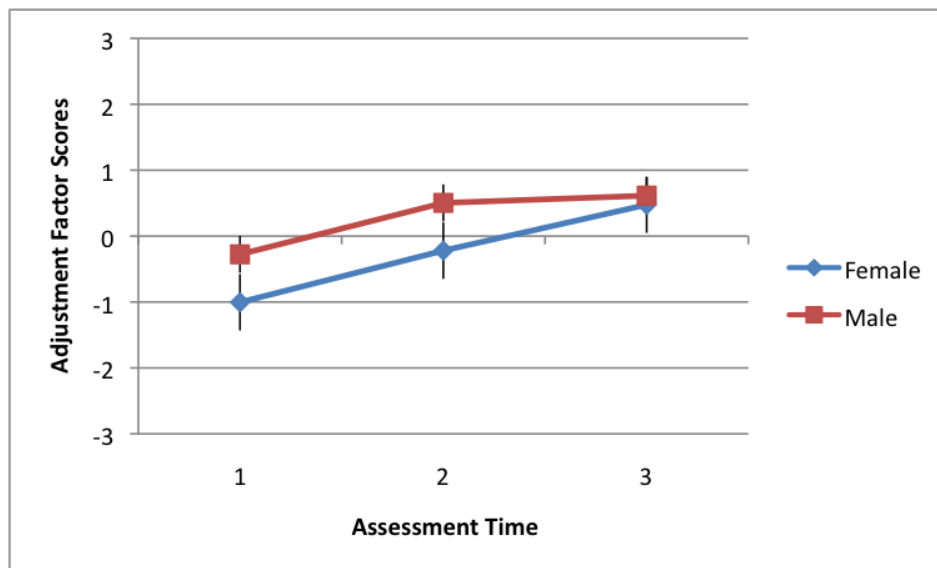


Figure 5: Interaction plot showing the mean Adjustment factor scores and standard errors for male and female hearing-impaired adults across the three assessment time intervals.

The means and standard deviations of the Adjustment factor scores for male and female HIAs at the three time intervals are shown in Table 10. For female HIAs, the repeated measures ANOVA revealed a significant effect of assessment time: $F(1,13) = 35.510$, $p < 0.001$, $\eta^2 = 0.732$, $1-\beta = 1.00$. Repeated measures t-tests revealed a significant difference in female HIA Adjustment factor scores at each assessment time interval (pre-treatment, post-treatment, and follow-up). Pre-treatment assessment versus post-treatment assessment: $t(13) = -3.05$, $p = 0.009$, $d = 0.85$. Post-treatment assessment versus follow-up assessment: $t(13) = -2.55$, $p = 0.024$, $d = 1.03$. Pre-treatment assessment versus follow-up assessment: $t(13) = -5.96$, $p < 0.001$, $d = 2.34$.

For male HIAs, the repeated measures ANOVA revealed a significant effect of assessment time: $F(1,9) = 10.496$, $p = 0.010$, $\eta^2 = 0.538$, $1-\beta = 0.821$. Repeated measures t-tests revealed a significant difference in male HIA Adjustment factor scores at each assessment time interval. Pre-treatment assessment versus post-treatment assessment: $t(9) = -2.554$, $p = 0.031$, $d = 1.03$. Post-treatment assessment versus follow-up assessment: $t(9) = -3.11$, $p = 0.013$, $d = 0.42$. Pre-treatment assessment versus follow-up assessment: $t(9) = -2.87$, $p = 0.018$, $d = 1.20$.

Table 10: Means and standard deviations on the Adjustment factor scores for male and female hearing-impaired adults.

Gender	N	Assessment time	Mean	SD
Female	14	Pre-treatment	-1.00	0.87
	14	Post-treatment	-0.22	0.95
	14	Follow-up	0.48	0.12
Male	10	Pre-treatment	-0.09	0.81
	10	Post-treatment	0.52	0.24
	10	Follow-up	0.61	0.19

Reaction Factor

A repeated measures ANOVA of the Reaction factor revealed no significant interaction between gender and factor score; therefore, female and male HIAs were analysed together: $F(1,22) = 0.571$, $p = 0.458$, $\eta^2 = 0.025$, $1-\beta = 0.112$. Repeated measures t-tests revealed a significant difference in HIA Reaction factor scores at each assessment time interval. Pre-treatment assessment versus post-treatment assessment: $t(23) = 8.43$, $p < 0.001$, $d = 1.69$. Post-treatment assessment versus follow-up assessment: $t(23) = -1.71$, $p = 0.100$, $d = 0.42$. Pre-treatment assessment versus follow-up assessment: $t(23) = -6.67$, $p <$

0.001, $d = 2.01$. Mean Reaction factor scores and standard errors for all HIAs at all three time intervals: pre-treatment assessment (1), post-treatment assessment (2), and follow-up assessment (3) are displayed in figure 6. Scores below zero indicate below average Reaction scores, while scores above zero indicate above average Reaction scores.

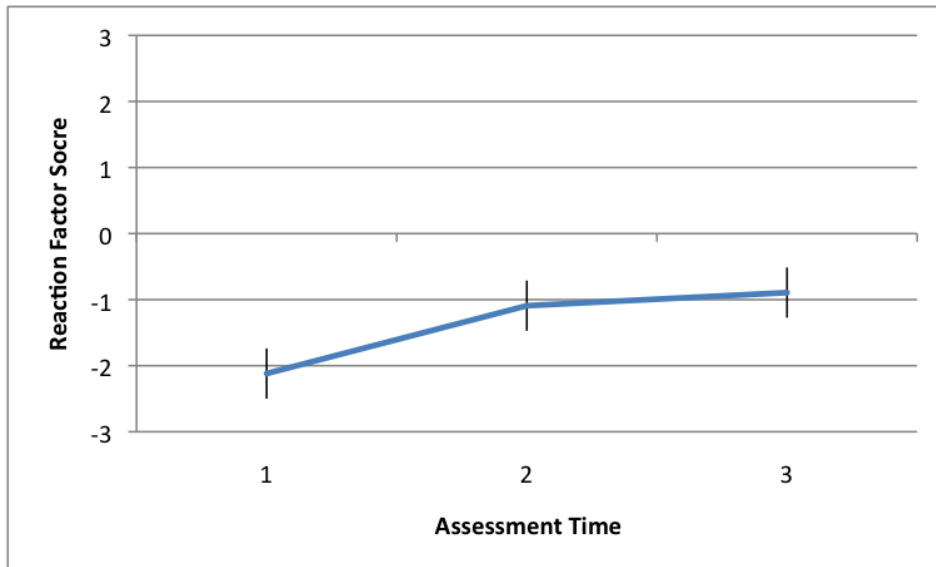


Figure 6: Mean Reaction factor scores and standard errors for hearing-impaired adults across the three assessment time intervals.

Interaction Factor

A repeated measures ANOVA of the Interaction factor revealed no significant interaction between gender and factor score; therefore, female and male HIAs were analysed together: $F(1,22) = 0.157$, $p = 0.696$, $\eta^2 = 0.007$, $1-\beta = 0.067$. Repeated measures t-tests revealed a significant difference in HIA Interaction factor scores at each assessment time interval. Pre-treatment up assessment versus post-treatment assessment: $t(23) = 7.57$, $p < 0.001$, $d = 0.62$. Post-treatment assessment versus follow-up assessment: $t(23) = 1.09$, $p = 0.284$, $d = 0.16$. Pre-treatment assessment versus follow-up assessment: $t(23) = -3.13$, $p = 0.005$, $d = 0.55$. Mean Interaction factor scores and standard errors for all HIAs at all three time intervals: pre-treatment assessment (1), post-treatment assessment (2), and follow-up assessment (3) are displayed in figure 7. Scores below zero indicate below average Interaction scores, while scores above zero indicate above average Interaction scores.

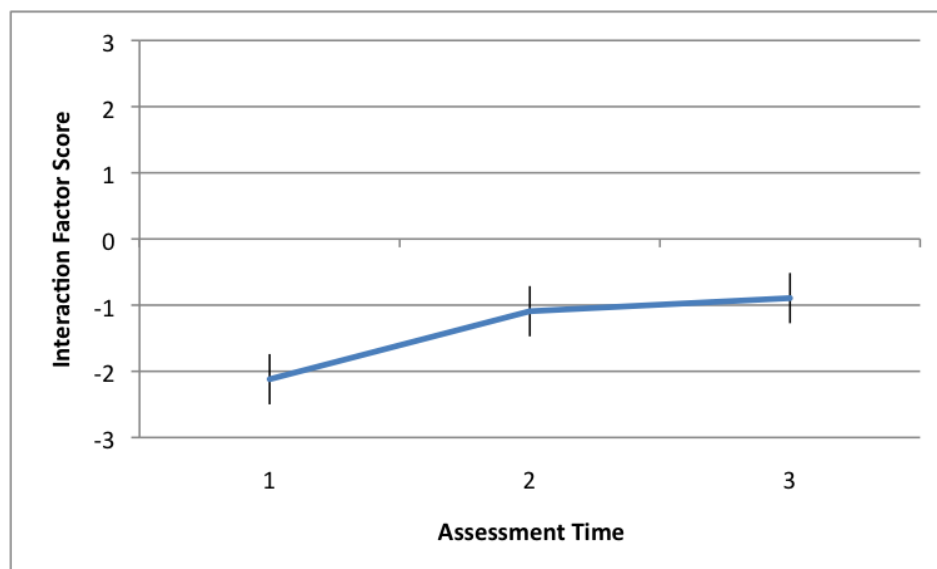


Figure 7: Mean Interaction factor scores and standard errors for hearing-impaired adults across the three assessment time intervals.

Communication Performance Factor

A repeated measures ANOVA of the Communication Performance factor revealed no significant interaction between gender and factor score; therefore, female and male HIAs were analysed together: $F(1,22) = 1.977$, $p = 0.174$, $\eta^2 = 0.082$, $1-\beta = 0.270$. Repeated measures t-tests revealed a significant difference in HIA Communication Performance factor scores at each assessment time interval. Pre-treatment assessment versus post-treatment assessment: $t(23) = 7.20$, $p < 0.001$, $d = 1.05$. Post-treatment assessment versus follow-up assessment: $t(23) = 2.53$, $p = 0.019$, $d = 0.72$. Pre-treatment assessment versus follow-up assessment: $t(23) = -2.33$, $p = 0.029$, $d = 0.67$. Mean Communication Performance factor scores and standard errors for all HIAs at all three time intervals: pre-treatment assessment (1), post-treatment assessment (2), and follow-up assessment (3) are displayed in figure 8. Scores below zero indicate below average Communication Performance scores, while scores above zero indicate above average Communication Performance scores.

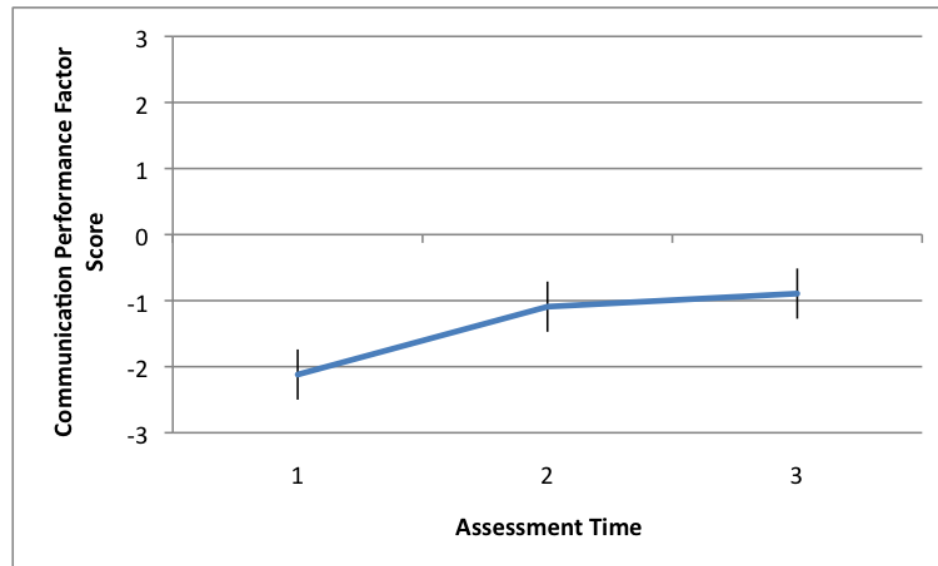


Figure 8: Mean Communication Performance factor scores and standard errors for hearing-impaired adults across the three assessment time intervals.

Communication Importance Factor

A repeated measures ANOVA of the Communication Importance factor revealed a significant interaction between gender and factor score; therefore, the simple main effects were examined, $F(1,22) = 12.953$, $p = 0.002$, $\eta^2 = 0.371$, $1-\beta = 0.930$. The interaction plot with mean Communication Importance factor scores and standard errors across three time intervals: pre-treatment assessment (1), post-treatment assessment (2), and follow-up assessment (3) is shown in Figure 9. Scores below zero indicate below average Communication Importance scores, while scores above zero indicate above average Communication Importance scores. For each simple main effect analysis, a repeated measures ANOVA was performed to test for the effects of time. Significant effects were followed up with repeated measures t-tests.

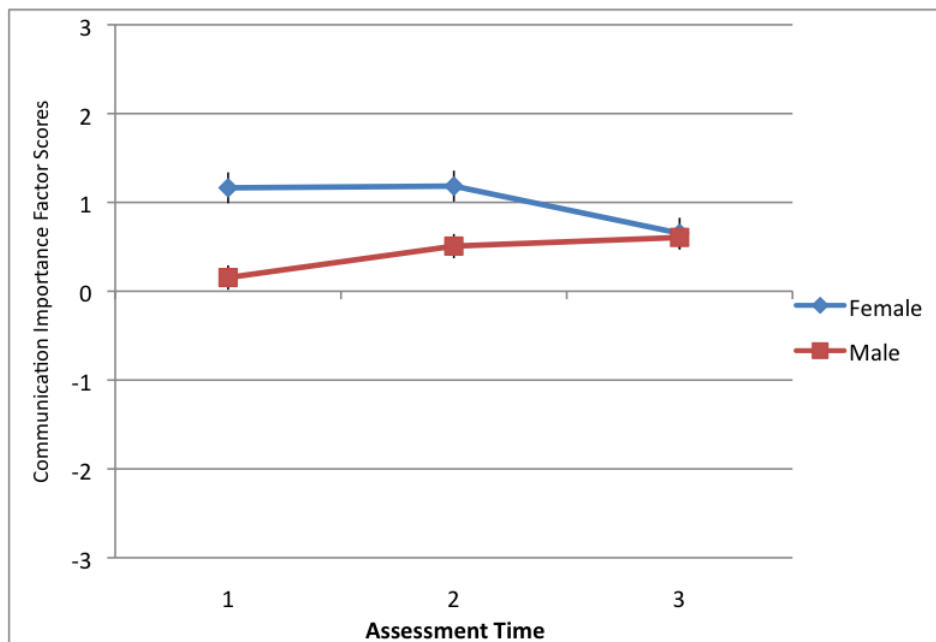


Figure 9: Interaction plot showing the mean Communication Importance factor scores and standard error for male and female hearing-impaired adults across the three assessment time intervals.

The means and standard deviations of the Communication Importance factor scores for the three time intervals are shown in Table 11. For female HIAs, the repeated measures ANOVA revealed a significant effect of assessment time: $F(1,13) = 7.514$, $p = 0.017$, $\eta^2 = 0.366$, $1-\beta = 0.717$. A repeated measures t-test revealed there was no significant difference in female HIA Communication Importance factor scores between the pre-treatment assessment and the post-treatment assessment: $t(13) = -0.099$, $p = 0.923$, $d = 0.03$. However, repeated measures t-tests revealed significant differences in HIA Communication Importance factor scores between the post-treatment assessment and follow-up assessment: $t(13) = 2.61$, $p = 0.022$, $d = 0.73$, and between the pre-treatment assessment and follow-up assessment: $t(13) = 2.74$, $p = 0.017$, $d = 1.04$.

For male HIAs, the repeated measures ANOVA revealed a significant effect of assessment time: $F(1,9) = 15.181$, $p = 0.004$, $\eta^2 = 0.628$, $1-\beta = 0.933$. Repeated measures t-tests revealed no significant difference in male HIA Communication Importance factor scores between the pre-treatment assessment and the post-treatment assessment: $t(9) = -2.07$, $p = 0.069$, $d = 0.85$, nor between the post-treatment assessment and follow-up assessment: $t(9) = -1.31$, $p = 0.224$, $d = 0.24$. However, a repeated measures t-test revealed a significant difference between the pre-treatment assessment and follow-up assessment for male HIAs: $t(9) = -2.81$, $p = 0.020$, $d = 0.95$.

Table 11: Means and standard deviations on the Communication Importance factor scores for male and female hearing-impaired adults.

Gender	N	Assessment time	Mean	SD
Female	14	Pre-treatment	1.16	0.11
	14	Post-treatment	1.18	0.76
	14	Follow-up	0.65	0.68
Male	10	Pre-treatment	0.15	0.48
	10	Post-treatment	0.51	0.34
	10	Follow-up	0.61	0.46

In summary, there was a significant effect of time on HIA outcomes for all CPHI factor scores. In addition, there was a significant effect of gender for the Adjustment and Communication Importance factor scores. For Adjustment factor scores, female HIAs consistently displayed significantly lower scores versus male HIAs. For Communication Importance factor scores, female HIAs consistently displayed significantly higher scores than male HIAs. In all instances of a significant effect (of time) in scores, the direction of the difference represented an increase in scores, except for female HIA Communication Importance factor scores, which displayed a significant decrease in scores between post-treatment and follow-up. Significant differences were found for all pre-treatment assessment versus post-treatment assessment difference scores except for Communication Importance factor for both male and female HIAs. Significant differences were also found for all post-treatment assessment versus follow-up assessment difference scores except for male HIA Communication Importance factor scores. Finally, significant differences were found for all pre-treatment assessment versus follow-up assessment difference scores.

3.4.1.2. Significant Other Proxy Measures

Waitlist Effect

- (i) **Research Hypothesis:** There will be no significant differences between pre-treatment assessment scores and post-waitlist assessment scores for: **(b)** SO-proxies. This hypothesis was upheld by the findings of this study for all five CPHI factor scores.

As per the description of the waitlist effect for HIAs under section 3.4.1.1. *Hearing-Impaired Adult Self-Report Measures*, the sample size for the pre-treatment assessment versus post-waitlist assessment is 12. However, following the combination of group data, the sample size for the pre-treatment assessment versus post-treatment assessment, and the post-treatment assessment versus follow-up assessment is 24. It was expected that proxy CPHI factor scores from SOs in the waitlist group would not change significantly between the pre-treatment assessment and the waitlist assessment. Related samples t-tests revealed that there were no significant differences between the pre-treatment assessment and the post-waitlist assessment for Adjustment ($p = 0.068$), Reaction ($p = 0.377$), Interaction ($p = 0.175$), Communication Performance, ($p = 0.426$) or Communication Importance ($p = 0.839$). This finding suggested that completion of the proxy CPHI between pre-group and post-waitlist was not reactive. As a result, SOs completing proxy measures in the two group types; that is, waitlist and non-waitlist, were combined for collective analysis for pre-treatment versus post-treatment assessment comparisons, and for post-treatment assessment versus follow-up assessment comparisons.

Significant Other Proxy CPHI Factor Scores

- (iii) **Research Hypothesis:** HIA treatment outcomes obtained by proxy estimations of the SO will measure a significant improvement over time (i.e., from pre-treatment, to post-treatment, to follow-up) and there will be a significant effect of gender. The first part of this hypothesis was upheld by the findings of this study for all five CPHI factor scores. Statistical analysis revealed a significant effect for gender on the Interaction and Communication Importance factors.

When operationalising the gender variable for couple data, a decision needs to be made regarding whether to classify according to the gender of the HIA or the SO. When the participants comprise a homogeneous sample of either different-sex or same-sex couples, the decision can be arbitrary. However, participants in the current study comprised both different-sex and same-sex couples. Therefore, there is not a one-to-one relationship between the gender of the HIA and the gender of the SO and as a result, the decision of how to classify gender is no longer arbitrary. In this study, it was decided to operationalise the gender variable in terms of the HIA for the couple data because the SO measurements were proxy measures of treatment effects on the HIA.

Adjustment Factor

Repeated measures analysis of variance (ANOVA) of the Adjustment factor revealed no significant interaction between gender and factor score; therefore, the data for the SOs of male and female HIAs were analysed together: $F(1,22) = 0.145$, $p = 0.707$, $\eta^2 = 0.007$, $1-\beta = 0.065$. Repeated measures t-tests revealed a significant difference in proxy SO Adjustment factor scores at each assessment time interval. Pre-treatment assessment versus post-treatment assessment: $t(23) = 4.02$, $p = 0.001$, $d = 0.80$. Post-treatment assessment versus follow-up assessment: $t(23) = -2.63$, $p = 0.015$, $d = 0.75$. Pre-treatment assessment versus follow-up assessment: $t(23) = -9.10$, $p < 0.001$, $d = 2.51$. Mean Adjustment factor scores and

standard errors for SO's of HIAs at all three time intervals: pre-treatment assessment (1), post-treatment assessment (2), and follow-up assessment (3) are displayed in figure 10. Scores below zero indicate below average Adjustment scores, while scores above zero indicate above average Adjustment scores.

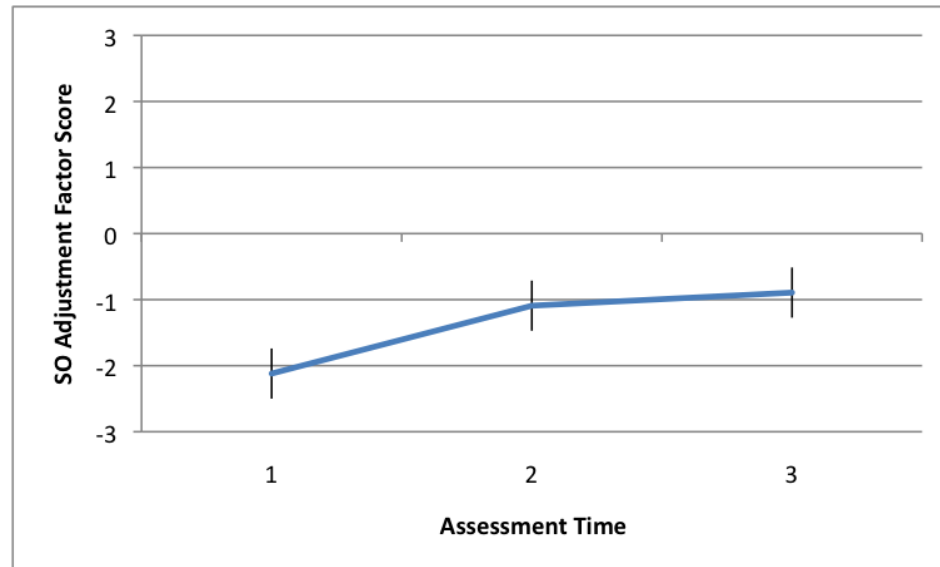


Figure 10: Proxy Adjustment Factor scores and standard errors for the significant others of hearing-impaired adults across the three assessment time intervals.

Reaction Factor

A repeated measures ANOVA of the Reaction factor revealed no significant interaction between gender and factor score; therefore, the SO's of female and male HIAs were analysed together: $F(1,22) = 2.105$, $p = 0.161$, $\eta^2 = 0.087$, $1-\beta = 0.284$. Repeated measures t-tests revealed a significant difference in proxy SO Reaction factor scores at each assessment time interval. Pre-treatment assessment versus post-treatment assessment: $t(23) = 8.43$, $p < 0.001$, $d = 0.62$. Post-treatment assessment versus follow-up assessment: $t(23) = -1.71$, $p = 0.100$, $d = 0.42$. Pre-treatment assessment versus follow-up assessment: $t(23) = -3.84$, $p = 0.001$, $d = 0.92$. Mean Reaction factor scores and standard errors for SO's of HIAs at all three time intervals: pre-treatment assessment (1), post-treatment

assessment (2), and follow-up assessment (3) are displayed in figure 11. Scores below zero indicate below average Reaction scores, while scores above zero indicate above average Reaction scores.

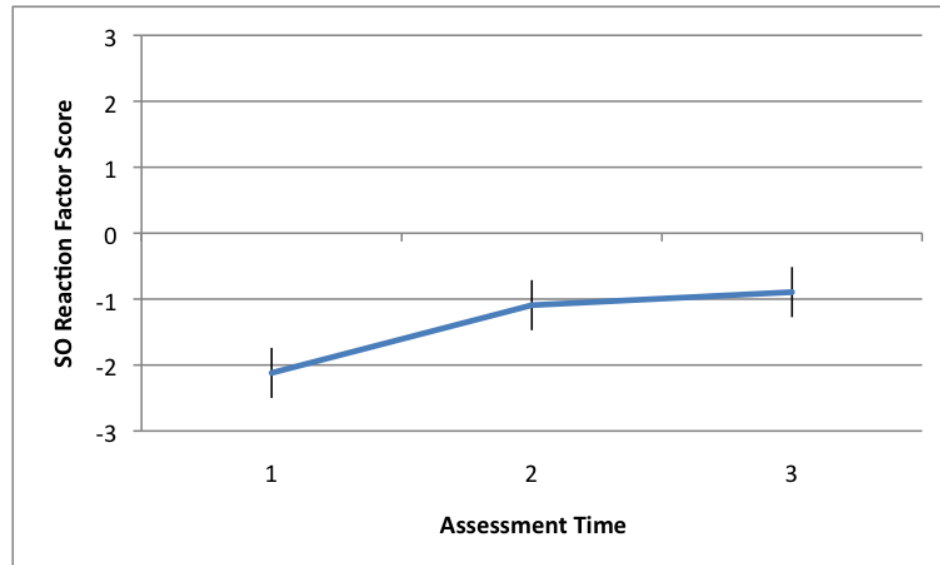


Figure 11: Proxy Reaction factor scores and standard errors for the significant others of hearing-impaired adults across three assessment time intervals.

Interaction Factor

A repeated measures ANOVA of the Interaction factor revealed a significant interaction between gender and factor score; therefore, the simple main effects were examined: $F(1,22) = 8.383$, $p = 0.008$, $\eta^2 = 0.276$, $1-\beta = 0.790$. The interaction plot with mean Interaction factor scores and standard errors at three time intervals: pre-treatment assessment (1), post-treatment assessment (2), and follow-up assessment (3) is shown in Figure 12. Scores below zero indicate below average Interaction scores, while scores above zero indicate above average Interaction scores. For each simple main effect analysis, a repeated measures ANOVA was performed to test for the effects of time. Significant effects were followed up with repeated measures t-tests.

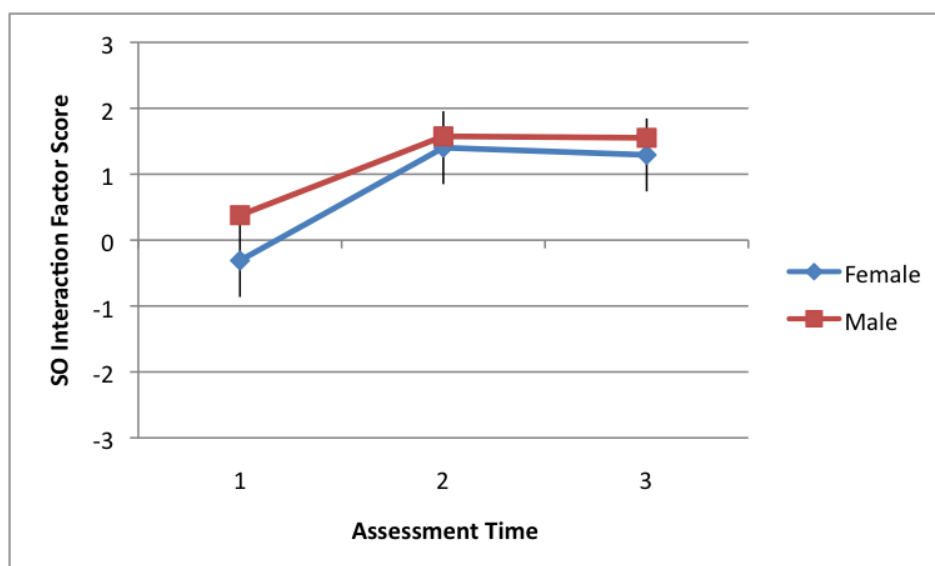


Figure 12: Interaction plot, showing the mean Interaction factor scores and standard error for significant others of male and female hearing-impaired adults across three assessment time intervals.

The means and standard deviations of the Interaction factor scores of the Interaction factor scores for the three assessment time intervals are shown in Table 12. For female HIAs, the repeated measures ANOVA revealed a significant effect of assessment time: $F(1,13) = 21.921$, $p < 0.001$, $\eta^2 = 0.618$, $1-\beta = 0.991$. A repeated measures t-test revealed a significant difference in female HIA's SO Interaction factor score between the pre-treatment assessment and the post-treatment assessment: $t(13) = -4.89$, $p < 0.001$, $d = 2.02$. A repeated measures t-test revealed no significant difference in the SOs of female HIAs between the post-treatment assessment and the follow-up: $t(13) = 1.53$, $p = 0.151$, $d = 0.46$. However, there was a significant difference between female HIA's SO Interaction factor scores between the pre-treatment assessment and the follow-up: $t(13) = 4.68$, $p < 0.001$, $d = 1.92$.

For male HIAs, the repeated measures ANOVA revealed a significant effect of assessment time: $F(1,9) = 199.096$, $p < 0.001$, $\eta^2 = 0.957$, $1-\beta = 1.00$. A repeated measures

t-test revealed a significant difference in male HIA's SO Interaction factor score between the pre-treatment assessment and the post-treatment assessment: $t(9) = -7.70, p < 0.001, d = 3.14$. A repeated measures t-test revealed no significant difference in the SOs of male HIAs between the post-treatment assessment and the follow-up: $t(9) = 0.27, p = 0.792, d = 0.09$. However, there was a significant difference between male HIA's SO Interaction factor scores between the pre-treatment assessment and the follow-up assessment: $t(9) = 14.11, p < 0.001, d = 2.85$.

Table 12: Means and standard deviations on the Interaction factor scores for significant others of male and female hearing-impaired adults.

Gender of HIA	N	Assessment time	Mean	SD
Female	14	Pre-treatment	-0.31	1.16
	14	Post-treatment	1.40	0.28
	14	Follow-up	1.29	0.19
Male	10	Pre-treatment	0.38	0.50
	10	Post-treatment	1.58	0.20
	10	Follow-up	1.55	0.30

Communication Performance Factor

A repeated measures ANOVA of the Communication Performance factor revealed no significant interaction between gender and factor score; therefore, female and male significant others were analysed together: $F(1,22) = 0.017$, $p = 0.898$, $\eta^2 = 0.001$, $1-\beta = 0.052$. Repeated measures t-tests revealed a significant difference in proxy SO Communication Performance factor scores at each assessment time interval. Pre-treatment assessment versus post-treatment assessment: $t(23) = 7.200$, $p < 0.001$, $d = 1.05$. Post-treatment assessment versus follow-up assessment: $t(23) = 2.53$, $p = 0.019$, $d = 0.72$. Pre-treatment assessment versus follow-up assessment: $t(23) = -8.429$, $p = < 0.001$, $d = 1.81$. Mean Communication Performance factor scores and standard errors for SO's of HIAs at all three time intervals: pre-treatment assessment (1), post- treatment assessment (2), and follow-up assessment (3) are displayed in figure 13. Scores below zero indicate below average Communication Performance scores, while scores above zero indicate above average Communication Performance scores.

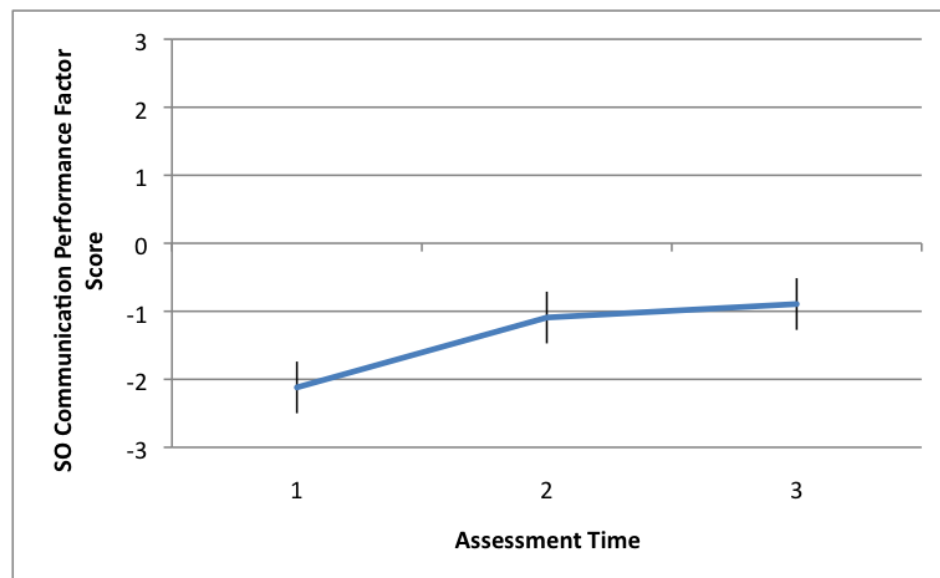


Figure 13: Proxy Communication Performance factor scores and standard errors for the significant others of hearing-impaired adults across the three assessment time intervals.

Communication Importance Factor

A repeated measures ANOVA of the Communication Importance factor revealed a significant interaction between gender and factor score; therefore, the simple main effects were examined: $F(1,22) = 5.611$, $p = 0.027$, $\eta^2 = 0.203$, $1-\beta = 0.620$. The interaction plot for mean Communication Importance factor scores and standard errors across three time intervals: pre-treatment assessment (1), post-treatment assessment (2), and follow-up assessment (3) is shown in Figure 14. Scores below zero indicate below average Communication Importance scores, while scores above zero indicate above average Communication Importance scores. For each simple main effect analysis, a repeated measures ANOVA was performed to test for the effects of time. Significant effects were followed up with repeated measures t-tests.

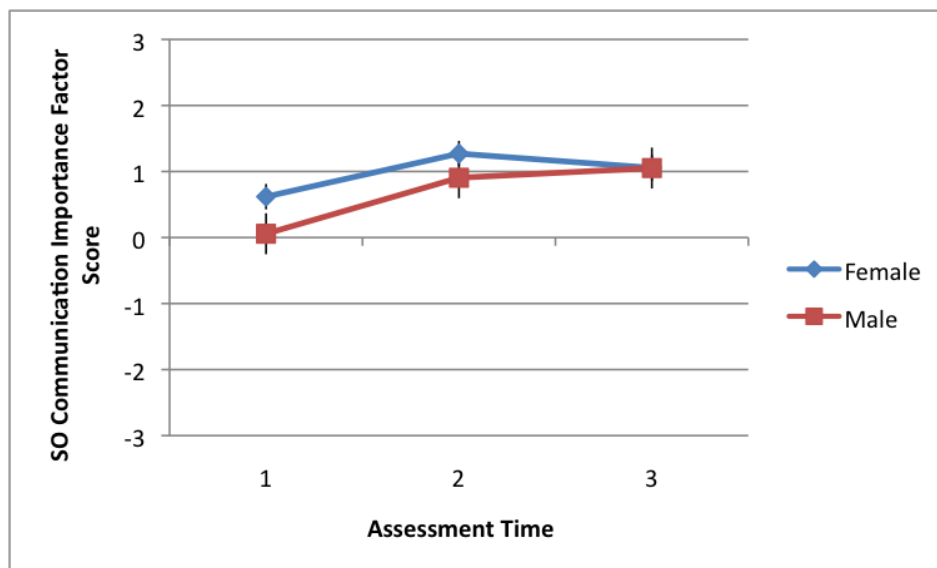


Figure 14: Interaction plot, showing the mean Communication Importance factor scores for significant others of male and female HIAs across the three assessment time intervals.

The means and standard deviations of the Communication Importance factor scores for the three assessment time intervals are shown in Table 13. For female participants, the

repeated measures ANOVA revealed a significant effect of assessment time: $F(1,13) = 141.701$, $p < 0.001$, $\eta^2 = 0.916$, $1-\beta = 1.00$. A repeated measures t-test revealed a significant difference in female HIA's SO Communication Importance factor scores between the pre-treatment assessment and the post-treatment assessment: $t(13) = -2.92$, $p = 0.012$, $d = 1.03$, but not between the post-treatment assessment and the follow-up: $t(13) = 1.90$, $p = 0.080$, $d = 0.72$. There was a significant difference between female HIA's SO Communication Importance factor scores between pre-treatment assessment and follow-up: $t(13) = 2.04$, $p = 0.011$, $d = 1.09$.

For male participants, the repeated measures ANOVA revealed a significant effect of assessment time: $F(1,9) = 39.285$, $p < 0.001$, $\eta^2 = 0.814$, $1-\beta = 1.00$. Repeated measures t-tests revealed a significant difference in male HIA's SO Interaction factor scores at all three assessment time intervals. Pre-treatment assessment versus post-treatment assessment: $t(9) = -3.29$, $p = 0.009$, $d = 1.31$. Post-treatment assessment versus follow-up assessment: $t(9) = -3.01$, $p = 0.015$, $d = 1.03$. Pre-treatment assessment versus follow-up assessment: $t(9) = 3.55$, $p = 0.006$, $d = 1.56$.

Table 13: Means and standard deviations on the Communication Importance factor for significant others of male and female hearing-impaired adults.

Gender of HIA	N	Assessment time	Mean	SD
Female	14	Pre-treatment	0.62	0.86
	14	Post-treatment	1.27	0.24
	14	Follow-up	1.07	0.08
Male	10	Pre-treatment	0.57	0.89
	10	Post-treatment	0.90	0.17
	10	Follow-up	1.05	0.10

In summary, there was a significant effect of time on SO-proxy outcomes for all CPHI factor scores. In addition, there was a significant effect of gender for the Interaction and Communication Importance factor scores. For Interaction factor scores, SO proxies of female HIAs consistently displayed significantly lower scores versus SO proxies of male HIAs. For Communication Importance factor scores, SO proxies of female HIAs consistently displayed significantly higher scores than SO proxies of male HIAs. In all instances of a significant effect (of time) in scores, the direction of the difference represented an increase in scores. Significant differences were found for all pre-treatment assessment versus post-treatment assessment difference scores. Significant differences were also found for all post-treatment assessment versus follow-up assessment difference scores except for Interaction factor scores for SO proxies of both male and female HIAs, and SO proxies of female HIA's Communication Importance factor scores. Finally, significant differences were found for all pre-treatment assessment versus follow-up assessment difference scores.

3.4.1.3. Couple Congruence on CPHI Scores

Waitlist Effect

(i) **Research Hypothesis:** There will be no significant differences between pre-treatment assessment scores and post-waitlist assessment scores for: (c) couple congruence. This hypothesis was upheld by the findings of this study for all five CPHI factor scores.

As with the descriptions of sections 3.4.1.1. and 3.4.1.2., because only half of the participant couples were placed on the waitlist based on quasi-randomised assignment, the sample size of the pre-treatment assessment versus post-waitlist assessment is 12. Post combining of group data, the sample size for the pre-group assessment versus post-treatment assessment, and the post-group assessment versus follow-up assessment is 24. It was expected that HIA CPHI factor scores and proxy CPHI factor scores from SOs in the

waitlist group would not change significantly between the pre-assessment and the waitlist assessment.

Related samples t-tests revealed no significant differences between couples between the pre-treatment assessment versus the post-waitlist assessment for Adjustment ($p = 0.068$), Reaction ($p = 0.377$), Interaction ($p = 0.175$), Communication Performance, ($p = 0.426$) or Communication Importance ($p = 0.839$). This finding suggested that HIA completion of the CPHI and SO completion of the proxy CPHI between pre-treatment and post-waitlist was not reactive. As a result, SO and HIA CPHI data in the two group types; that is, waitlist and non-waitlist, were combined for collective analysis for pre-treatment versus post-treatment comparison and for post-treatment versus follow-up assessment comparisons.

Pre-Treatment Assessment Scores

(iv) Research Hypothesis: HIA and SO-proxy scores will be significantly different at pre-treatment assessment and there will be an effect of gender. The first part of this hypothesis was upheld by the findings of this study for only two factors: Interaction and Adjustment. Statistical analysis revealed a significant effect of gender for the Adjustment factor.

To investigate congruence, mean CPHI factor scores were analysed in relation to the difference between the couples' factor scores, (i.e., HIA - SO proxy). The closer the mean difference is to zero, the greater the couple congruence. That is, when the difference score is 0, there was no difference in mean perceptions between the HIA and SO. The further away the points are from zero, the less the couple congruence. Positive mean difference scores indicate the mean HIA factor scores were higher than the mean SO proxy factor

scores. Negative mean difference scores indicate the mean SO proxy factor scores were higher than the mean HIA factor scores.

Adjustment Factor

Repeated measures analysis of variance (ANOVA) of the Adjustment factor revealed a significant interaction between gender and factor score. Mean Adjustment factor couple difference scores and standard errors for male and female HIAs, and their SOs are shown in table 14. The interaction plot for the Adjustment factor is shown in figure 15.

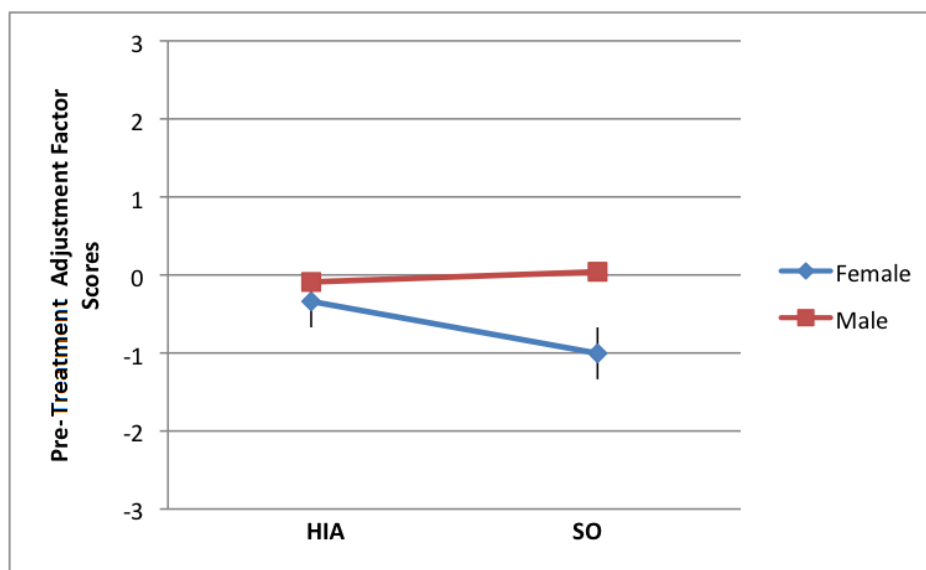


Figure 15: Mean Adjustment factor couple difference scores and standard errors for hearing-impaired adults and significant others at pre-treatment assessment.

For female HIAs, there was a significant difference between HIA Adjustment factor score and SO-proxy Adjustment factor score: $t(13) = -2.42$, $p = 0.032$, $d = 1.16$. For male HIAs, there was no significant difference between HIA Adjustment factor score and SO-proxy Adjustment factor score: $t(9) = 0.51$, $p = 0.622$, $d = 0.31$.

Table 14: Means and standard deviations on the Adjustment factor for female and male hearing-impaired adults and their significant others at pre-treatment assessment.

Gender of HIA	Role	N	Mean	SD
Female	HIA	14	-0.10	0.87
	SO	14	0.04	0.91
Male	HIA	10	-0.09	0.81
	SO	10	-0.34	0.80

As there was no significant effect of gender for the other CPHI factors, male and female participants were combined for analysis. There was no significant difference between HIA Reaction factor score and SO-proxy Reaction factor score: $t(23) = -0.379$, $p = 0.709$, $d = 0.10$. There was, however, a significant difference between HIA Interaction factor score and SO-proxy Interaction factor score: $t(23) = 2.41$, $p = 0.024$, $d = 0.74$, but not between HIA Communication Performance factor score and SO-proxy Communication Performance factor score: $t(23) = 0.86$, $p = 0.401$, $d = 0.12$, or between HIA Communication Importance factor score and SO-proxy Communication Importance factor score: $t(23) = 1.69$, $p = 0.109$, $d = 0.46$.

Couple Difference CPHI Factor Scores

- (v) **Research Hypothesis:** There will be a significant effect on the congruence of couple treatment outcome measures over time (i.e., from pre-treatment, to post-treatment, to follow-up) and there will be a significant effect of gender on couple outcome measures. The first part of this hypothesis was upheld by the findings of this study for all five CPHI factor scores. Statistical analysis revealed a significant effect of gender for the Adjustment factor.

To investigate congruence over time, mean CPHI factor scores were analysed by deriving the difference between the couples' factor scores, (i.e., HIA - SO proxy). Mean difference scores closer to zero indicate no difference (i.e., congruence) in couple mean scores. Scores below zero indicate higher mean SO factor scores than HIAs, while scores above zero indicate the opposite. That is, mean HIA factor scores were higher than SO mean factor scores.

Adjustment Factor

Repeated measures analysis of variance (ANOVA) of the Adjustment factor revealed a significant interaction between gender and factor score; therefore, the simple main effects were examined: $F(1,22) = 4.612$, $p = 0.043$, $\eta^2 = 0.173$, $1-\beta = 0.537$. The interaction plot for mean Adjustment factor difference scores and standard errors across three time intervals: pre-treatment assessment (1), post-treatment assessment (2), and follow-up assessment (3) is shown in Figure 15. The abscissa represents the three assessment times (pre-, post- and follow-up), and the ordinate represents the difference in the couples' factor scores.

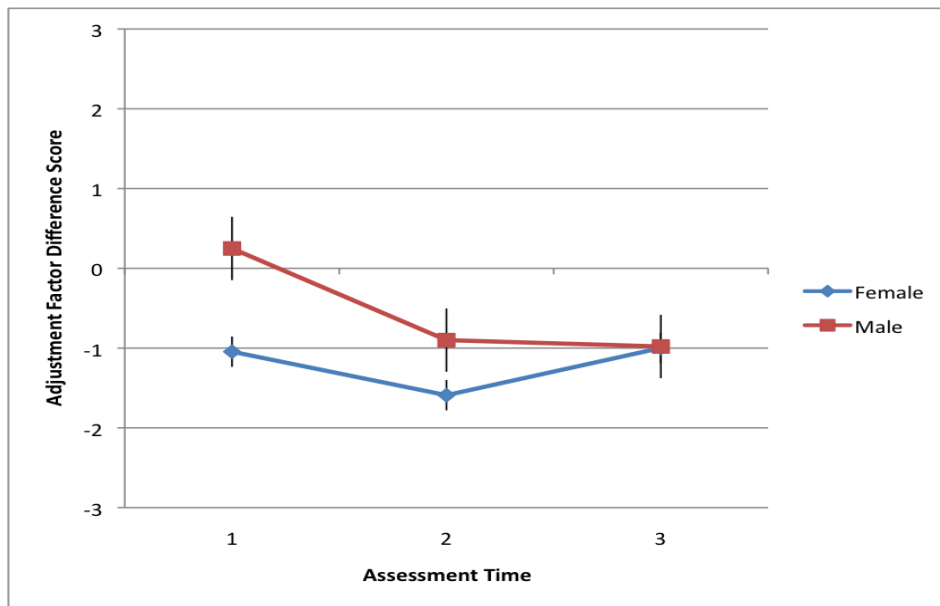


Figure 16: Interaction plot, showing the mean difference Adjustment factor scores and standard errors for couples across the three assessment time intervals as a function of gender.

For each simple main effect analysis, a repeated measures ANOVA was performed to test for the effects of time. Significant effects were followed up with repeated measures t-tests. The means and standard deviations of the Adjustment factor difference scores at the three time intervals are shown in Table 15. For female HIAs, there was no significant difference in HIA - SO-proxy Adjustment factor scores (i.e., difference scores) for any of the assessment time intervals. Pre-assessment versus post-assessment: $t(13) = 1.64$, $p = 0.125$, $d = 0.41$. Post-assessment versus follow-up: $t(13) = 2.02$, $p = 0.064$, $d = 0.81$. Pre-assessment versus follow-up: $t(13) = -0.09$, $p = 0.926$, $d = 0.04$.

For male HIAs, there was a significant difference in HIA - SO-proxy Adjustment factor scores (i.e., difference scores) for the pre-assessment versus post-assessment: $(t) = 2.82$, $p = 0.020$, $d = 0.96$. There was no significant difference in difference scores for the post-assessment versus follow-up: $(t) = 0.40$, $p = 0.698$, $d = 0.14$. However, there was a significant

difference in difference scores for the pre-assessment versus follow-up: (t) 13 = 2.734, p = 0.023, d = 1.09.

Table 15: Mean difference Adjustment factor scores and standard deviations for couples.

Gender of HIA	N	Assessment time	Mean	SD
Female	14	Pre-treatment	-1.05	1.63
	14	Post-treatment	-1.59	0.98
	14	Follow-up	-0.10	0.35
Male	10	Pre-treatment	0.25	1.54
	10	Post-treatment	-0.90	0.72
	10	Follow-up	-0.98	0.40

Reaction Factor

A repeated measures ANOVA of the Reaction factor revealed no significant interaction between gender and HIA versus SO-proxy factor difference scores; therefore, female and male participants were analysed together: $F(1,22) = 1.150$, $p = 0.295$, $\eta^2 = 0.050$, $1-\beta = 0.177$. Repeated measures t-tests revealed a significant difference in HIA - SO-proxy factor difference scores for the pre-assessment versus post-assessment: $t(23) = 3.57$, $p = 0.002$, $d = 1.693$. There were no significant differences for the post-treatment assessment versus follow-up assessment: $t(23) = -1.05$, $p = 0.304$, $d = 0.42$ or the pre-treatment assessment versus follow-up assessment: $t(23) = 0.47$, $p = 0.647$, $d = 2.00$. Mean Reaction factor difference scores and standard errors for proxy SOs and HIAs at all three time intervals: pre-treatment assessment (1), post-treatment assessment (2), and follow-up assessment (3) are displayed in figure 16.

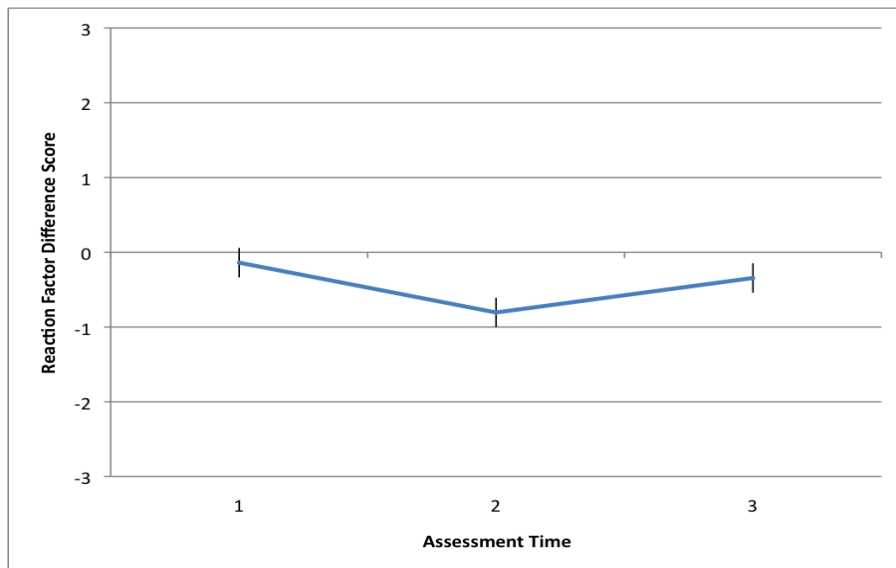


Figure 17: Mean difference Reaction factor scores and standard error for couples across the three assessment time intervals

Interaction Factor

A repeated measures ANOVA of the Interaction factor revealed no significant interaction between gender and HIA - SO-proxy factor difference scores; therefore, female and male participants were analysed together: $F(1,22) = 1.811$, $p = 0.129$, $\eta^2 = 0.076$, $1-\beta = 0.251$. Repeated measures t-tests revealed a significant difference in HIA versus SO-proxy factor difference score for the pre-assessment versus post-assessment time interval: $t(23) = 4.75$, $p < 0.001$, $d = 0.62$. There was no significant difference for the post-treatment assessment versus follow-up assessment: $t(23) = -0.03$, $p = 0.976$, $d = 0.16$. There was a significant difference between the pre-treatment assessment versus follow-up assessment: $t(23) = 4.14$, $p < 0.001$, $d = 0.55$. Mean Interaction factor difference scores and standard errors for proxy SOs and HIAs at all three time intervals: pre-treatment assessment (1), post-treatment assessment (2), and follow-up assessment (3) are displayed in figure 17.

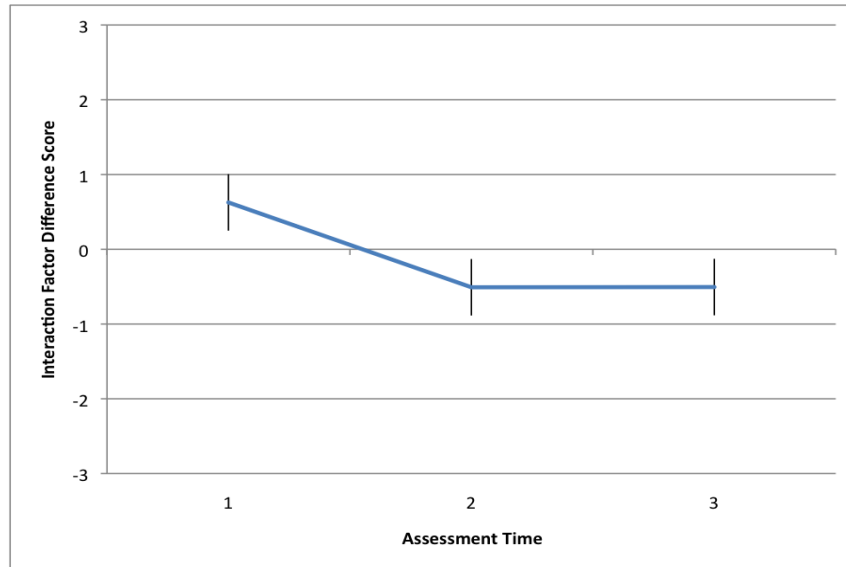


Figure 18: Mean difference Interaction factor scores and standard error for couples across the three assessment time intervals.

Communication Performance Factor

A repeated measures ANOVA of the Communication Performance factor revealed no significant interaction between gender and HIA - SO-proxy factor difference scores; therefore, female and male participants were analysed together: $F(1,22) = 0.963$, $p = 0.337$, $\eta^2 = 0.042$, $1-\beta = 0.156$. Repeated measures t-tests revealed a significant difference in HIA - SO-proxy factor difference score for each of the assessment times. Pre-assessment versus post-assessment: $t(23) = 7.28$, $p < 0.001$, $d = 1.04$. Post-treatment assessment versus follow-up assessment: $t(23) = 3.41$, $p = 0.002$, $d = 0.47$. Pre-treatment assessment versus follow-up assessment: $t(23) = 10.41$, $p < 0.001$, $d = 0.50$. Mean Communication Performance factor difference scores and standard errors for proxy SOs and HIAs at all three time intervals: pre-treatment assessment (1), post-treatment assessment (2), and follow-up assessment (3) are displayed in figure 18.

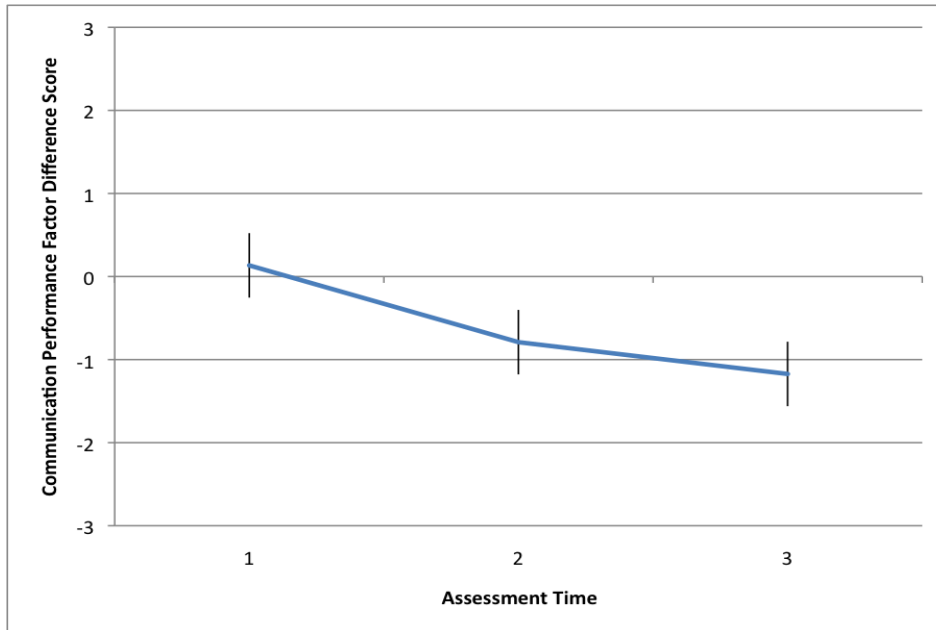


Figure 19: Mean difference Communication Performance factor scores and standard error for couples across the three assessment time intervals.

Communication Importance Factor

A repeated measures ANOVA of the Communication Importance factor revealed no significant interaction between gender and HIA - SO-proxy factor difference score; therefore, female and male participants were analysed together: $F(1,22) = 1.210$, $p = 0.283$, $\eta^2 = 0.052$, $1-\beta = 0.183$. Repeated measures t-tests revealed a significant difference in HIA -SO-proxy factor difference score for the pre-assessment versus post-assessment: $t(23) = 2.71$, $p = 0.013$, $d = 0.24$. There was no significant difference for the post-treatment assessment versus follow-up assessment: $t(23) = 1.70$, $p = 0.102$, $d = 0.42$. There was a significant difference between the pre-treatment assessment versus follow-up assessment: $t(23) = 3.64$, $p = 0.001$, $d = 0.18$. Mean Communication Importance factor difference scores and standard errors for proxy SOs and HIAs at all three time intervals: pre-treatment assessment (1), post-treatment assessment (2), and follow-up assessment (3) are displayed in figure 19.

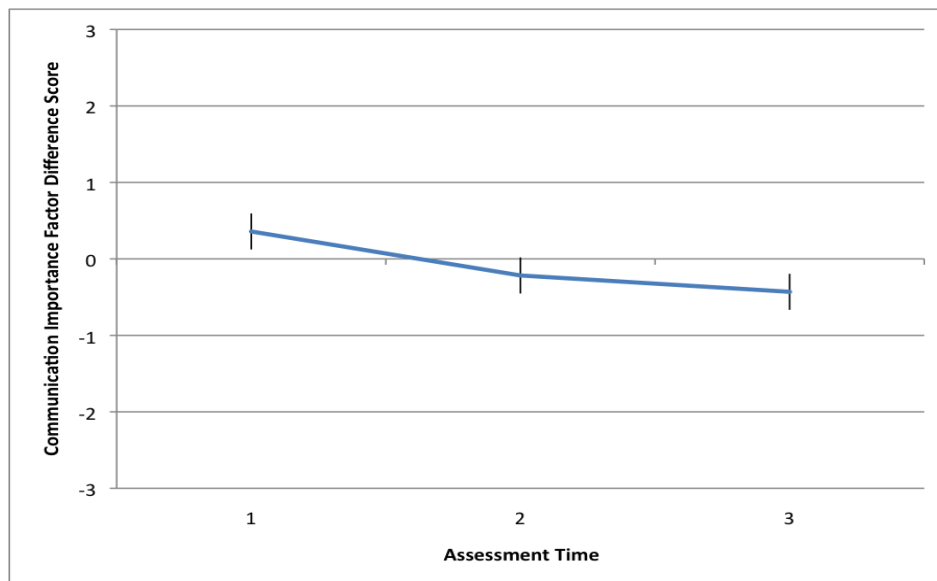


Figure 20: Mean difference Communication Importance factor scores and standard error for couples across the three assessment time intervals.

In summary, there was a significant effect of time on couple congruence for all CPHI factor scores. In addition, there was a significant effect of gender for the Adjustment factor score. In all instances of a significant difference between couples' difference scores, the

direction of the difference represented a decrease in couple congruency. Significant differences (i.e., decrease in congruency) were found for all pre-treatment assessment versus post-treatment assessment difference scores except for the Adjustment factor. For female HIAs, there was no significant difference in HIA - SO-proxy difference scores for the Adjustment factor at any timeframe. Differences in congruence as a result of treatment were maintained at the follow-up for all CPHI factors except the Reaction factor, where difference scores at the follow-up assessment were not significantly different from difference scores at the pre-treatment assessment.

3.4.2. Significant Other Scale for Hearing Disability

3.4.2.1. Significant Other Self-Report Measures

Waitlist Effect

(i) Research Hypothesis: There will be no significant differences between pre-treatment assessment scores and post-waitlist assessment scores for: **(d)** SOs. This hypothesis was upheld by the findings of this study for the total scores of the SOS-HEAR.

In accordance with the waitlist effect for HIAs, as only half of the participant couples were placed on the waitlist based on quasi-randomised assignment, the sample size of the pre-treatment assessment versus post-waitlist assessment is 12. Post combining of group data, the sample size for the pre-treatment assessment versus post-treatment assessment, and the post-treatment assessment versus follow-up assessment is 24. It was expected that SOS-HEAR total scores from SO participants in the waitlist group would not change significantly between the pre-treatment assessment and the waitlist assessment. Related samples t-tests revealed no significant differences between the pre-treatment assessment and the post-waitlist assessment ($p = 0.433$). This finding suggested that completion of the SOS-HEAR between pre-treatment and post-waitlist was not reactive. As a result, SOs in the

two group types; that is, waitlist and non-waitlist, were combined for collective analysis for pre-treatment versus post-treatment assessment comparison and for post-treatment assessment versus follow-up assessment comparisons.

SOS-HEAR Total Scores

(vi) **Research Hypothesis:** SO treatment outcomes will measure a significant improvement over time (i.e., from pre-treatment, to post-treatment, to follow-up) and there will be a significant effect of gender on treatment outcomes. The first part of this hypothesis was upheld by the findings of this study. Statistical analysis revealed no significant effects of gender.

Repeated measures analysis of variance (ANOVA) of the SOS-HEAR total score revealed no significant interaction between gender and total score; therefore, female and male SOs were analysed together: $F(1,22) = 0.030$, $p = 0.864$, $\eta^2 = 0.001$, $1-\beta = 0.053$. The mean SOS-HEAR total scores and standard deviations for all SOs at the different assessment timeframes are outlined in table 16.

Table 16: Mean total SOS-HEAR scores and standard deviations for all significant others ($N = 24$) at the assessment timeframes.

Assessment time	Mean	SD
Pre-treatment	62.58	5.63
Post-treatment	43.88	5.46
Follow-up	35.25	4.75

Repeated measures t-tests revealed a significant difference in SO SOS-HEAR scores at each time interval. Pre-treatment assessment versus post-treatment assessment: $t(23) = 14.33$, $p < 0.001$, $d = 3.27$ Post-treatment assessment versus follow-up assessment: $t(23) =$

1.19, $p < 0.001$, $d = 1.67$ Pre-treatment assessment versus follow-up assessment: $t(23) = 33.88$, $p < 0.001$, $d = 5.07$. The mean SOS-HEAR scores and standard errors for all three time intervals: pre-treatment assessment (1), post-treatment assessment (2), and follow-up assessment (3) are seen on figure 20.

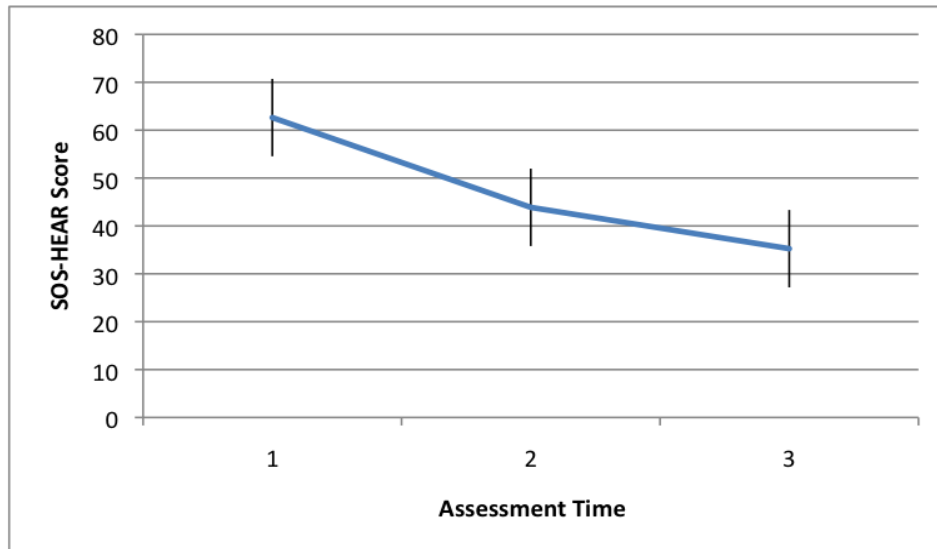


Figure 21: Mean SOS-HEAR scores and standard error for all significant others of participants with hearing impairment for the three time intervals.

In summary, there was a significant effect of time on SO outcomes for the SOS-HEAR total scores. There was not a significant effect of gender. In all instances of a significant effect (of time) in scores, the direction of the difference represented a decrease in scores. Significant differences were found for all pre-treatment assessment versus post-treatment assessment; post-treatment assessment versus follow-up assessment; and pre-treatment assessment versus follow-up assessment scores.

3.5. Summary of Results

The main outcomes of this study can be summarised as follows:

- (a) There were no significant differences in audiometric or demographic variables between participant couples in the waitlist versus non-waitlist groups.
- (b) There were no significant differences in HRQOL outcomes (CPHI, proxy-CPHI, couple congruence, and SOS-HEAR) for HIAs or SOs in the waitlist groups at the pre-treatment versus post-waitlist assessment stages.
- (c) For HIAs, there were significant differences found for CPHI factor scores at pre-treatment versus post-treatment, and at pre-treatment versus follow-up. There was a significant effect of gender on the Adjustment and Communication Importance factors.
- (d) For proxy-SO measures, there were significant differences found for CPHI factor scores at pre-treatment versus post-treatment, and at pre-treatment versus follow-up. There was a significant effect of gender for the Interaction and Communication Importance factors.
- (e) For HIA versus proxy-SO measures, there were significant differences found for CPHI factor scores at pre-treatment versus post-treatment, and at pre-treatment versus follow-up. There was a significant effect of gender on the Adjustment factor.
- (f) For SOs, there were significant differences found for total SOS-HEAR scores at pre-treatment versus post-treatment, and at pre-treatment versus follow-up. There was no significant effect of gender.

CHAPTER FOUR: DISCUSSION

4.1. Introduction

The main focus of this thesis was to develop and evaluate the treatment outcomes of a group audiologic rehabilitation (AR) program for unaided hearing-impaired adults (HIAs) and their significant others (SOs). Findings from this study indicate that both types of participants experienced significant improvements in self-reported health-related quality of life (HRQOL) assessments. Comparisons of the Communication Profile for the Hearing Impaired (CPHI; Demorest & Erdman, 1986; 1987) and the Significant Other Scale for Hearing Disability (SOS-HEAR; Scarinci et al., 2009b) at pre-treatment, post-treatment and at 12-weeks follow-up revealed significant treatment effects for HIAs (based on self and proxy-estimations), for couple congruence scores, and for SOs. These findings provide evidence suggesting that the developed program may be a viable method of treatment for HIAs *and* normal hearing SOs that improves both of their perceptions of HRQOL and reduces the disabilities associated with hearing impairment (HI). This chapter will discuss these findings in relation to the literature and will also discuss clinical implications, limitations, and future directions for this topic.

4.2. Difficult Communication Situations

Based on the literature review, it was apparent that knowledge of common difficult communication situations for working adults with HI was somewhat scarce. The information obtained from group AR discussions provides an overview of the circumstances that can cause unsuccessful communication in the workforce, and can also play a part in the eventual negative consequences of HI on the working adult (Backenroth-Ohsako et al., 2003; Kochkin, 2009; Kramer, 2008). Generally, there seems to be a trend for the majority of difficulties to

stem from telephone communication, followed by conversations with co-workers in large, then small groups. This is in line with the large-scale findings of Prince Market Research (2006). Further research may determine whether there is a decrease in the incidence of these situations following treatment. Overall, the information obtained from the HIA participants in this study may provide clinicians with an understanding of the particular work environments that can jeopardise successful communication so that they may be more adept at discussing potential remediation procedures with their clients, such as an amplified telephone, and specific communication strategies.

The group AR discussions also prompted SOs to provide common difficult situations encountered by HIAs. Similarly to their hearing-impaired partners, telephone communication was the principal complaint mentioned by SOs. The SOs also outlined problems in the home and social context, shedding further light on the dynamic situations that are challenging for HIAs. This information, the first to be sought in the literature, shows that at the very least, SOs are aware of where and how the HIAs are finding it difficult to communicate successfully. The list outlined in this study, in section 3.3. *Difficult Communication Situations*, may also be useful for clinicians to be aware of, especially when identifying ways in which they can provide services for SOs during the AR process. This could occur through counselling or communication strategies training. Again, further research may uncover whether a decrease in the incidence of these situations following treatment is likely.

4.3. Treatment Outcomes for the Hearing Impaired Adult

4.3.1. Hearing-Impaired Adult Self-Reported Outcomes

4.3.1.1. Hypotheses, Relation to the Literature, and Clinical Implications

Firstly, while acting as this study's semi-'control' group in the waitlist scenario, it was anticipated that waitlist group HIA CPHI scores would not change prior to treatment. As expected, this did not occur. Hearing impaired adults exhibited no significant changes in CPHI factor scores while on the waitlist (i.e., from the pre-treatment assessment to the post-waitlist assessment). This is in agreement with the findings of both pilot studies from Kelly-Campbell (in review). In this current study, for HIAs in the waitlist group, completing a HRQOL assessment at pre-treatment and then waiting 6-weeks for another HRQOL assessment was not reactive or influential. Thus, without receiving treatment, improvement in HRQOL did not occur. Consequently, a placebo effect, similar to what occurred for the placebo social group in Hickson et al.'s (2007) randomised controlled trial (RCT), did not take place with this study. One possible reason for this observed difference is that in the Hickson et al.'s study, participants interacted with other HIAs, and thus may have received some benefit from that interaction.

Next, it was expected that HIA treatment outcomes would measure a significant improvement over time (i.e., from pre-treatment, to post-treatment, to follow-up). This was supported by the majority of findings, where in all but one instance, CPHI factor scores significantly increased, indicating an improvement. For scores that at pre-treatment were negative or below average, at post-treatment they moved towards positive or towards the normative values. This trend was maintained, or continued 12-weeks later. Recall that a clinically significant effect of treatment was defined as $d = 0.65$. The effect sizes for HIA statistically and clinically significant outcomes were medium to large (ranging from $d = 0.67$ to $d = 2.34$). In two instances, a statistically significant difference failed to meet the criterion

of clinically significant. The effect size for the male HIA pre-treatment versus post-treatment Adjustment factor differences was $d = 0.42$, and the effect size for all HIA pre-treatment versus post-treatment Reaction factor differences was $d = 0.62$. In general, the positive effects of HIA treatment were found to be both statistically and clinically significant. These findings of a positive effect of treatment over time on HRQOL measures are in agreement with the literature that has documented group AR outcomes (Hawkins, 2005; Hickson et al., 2006; 2007; Kelly-Campbell, in review). As a result of group AR participation, it appears that the HIAs perceived an improvement in their communication abilities and a decrease in their hearing-related disabilities.

Finally, it was expected that there would be a significant effect of gender on the HIA outcomes for this group AR program. This was found for two CPHI factors: Adjustment and Communication Importance. Recall that a description of what the factors signify and entail is available on table 7. Despite a significant improvement in scores following treatment, female HIAs consistently displayed significantly lower scores than male HIAs for the Adjustment factor. This is in line with previous studies regarding gender differences that have found generally low perceptions of female HIA personal adjustment; there is a greater likelihood for females to report feelings of anger, stress, annoyance, irritation before and even after treatment (Garstecki & Eler, 1998; 1999). As a result of treatment, Communication Importance scores generally saw a significant decrease in scores for female HIAs, and a significant increase for male HIAs. Female HIAs consistently displayed significantly higher scores for this factor than male HIAs. This is again in line with the literature on gender differences, which report that female HIAs place a greater importance on communication before and after treatment (Erdman & Demorest, 1998b; Garstecki & Eler, 1998; 1999). The fact that female HIA Communication Importance scores significantly decreased as a result of treatment, may suggest that prior to the program, their views on

the importance of communication were above average, and following treatment, their expectations and preconceptions moved closer to the normative values.

Overall, this thesis has presented clinical implications for the future treatment of the growing population of unaided HIAs, who are also in the workforce. The outcomes of this study confirms previous investigations that *See It! Hear It! Say It!* is an effective AR program (Kelly-Campbell, in review). Not only that, this study is also providing evidence supporting the literature that AR as a whole may be a justified alternative treatment approach to hearing aids. Clinicians may be able to consider this program as a potential treatment approach for this particular client-base. Lastly, more research is required to confirm these beneficial treatment findings, which will undoubtedly help minimise the well-known diverse and disabling consequences of HI (World Health Organization, 2001).

4.3.2. Significant Other Proxy Reported Outcomes

4.3.2.1. Hypotheses, Relation to the Literature, and Clinical Implications

Firstly, just as had been predicted for waitlist HIA scores, it was expected that SO-proxy CPHI waitlist group scores would not change prior to treatment. Results show that these participants exhibited no significant changes in CPHI factor scores while on the waitlist. This is generally supported by previous findings that have not found a reactive effect on HRQOL outcomes from being on a waitlist (Kelly-Campbell, in review). These findings are not in agreement, when comparing specifically to SO-proxy reports; for example, with Preminger and Meek's (2010a) randomised controlled trial (RCT). Proxy reports of SOs in their control group (where no treatment was provided), displayed an increase in HRQOL scores. However, at the same time that SOs in Preminger and Meek's (2010a) study were serving as 'controls', their HIA partners were receiving treatment. While SOs were serving as 'controls' in this thesis by being on the waitlist, neither they nor their HIA partners were experiencing treatment. It is likely that the effects of treatment

experienced by the HIAs in the study by Preminger and Meeks (2010a) were having an influence on the SO's perceptions of the HIA's HRQOL.

Next, it was expected that HIA treatment outcomes as obtained by proxy estimations of the SO would measure a significant improvement over time (i.e., from pre-treatment, to post-treatment, to follow-up). This was supported by the findings of this study, where most CPHI scores improved over time. Scores that decreased, did not display significance. Similar to HIA self-scores, for SO-proxy scores that at pre-treatment were negative or below average, at post-treatment they moved towards positive or towards the normative values. This trend was also maintained, or continued at 12-weeks. The effect sizes for SO-proxy measurements that were statistically and clinically significant ranged from medium to large (i.e., $d = 0.72$ to $d = 3.14$). In one instance, a statistically significant difference barely failed to meet the criterion of clinically significant: the effect size for the pre-treatment versus post-treatment Reaction factor was $d = 0.62$. In general, the positive effects of treatment as perceived by the SO were found to be both statistically and clinically significant. These findings of a positive effect of treatment for HIAs over time based on SO-proxy measures of HRQOL are in agreement with the literature (Hickson et al., 2006; Preminger, 2003; Preminger and Meeks, 2010a; Stark & Hickson, 2004).

Finally, it was expected that there would be a significant effect of gender on proxy estimations for this group AR program. This was found for the Interaction and Communication Importance CPHI factors. These factors also revealed a decrease in SO-proxy scores, which were not significant. Recall that a description of what the factors signify and entail is available on table 7. Also recall that due to the fact that there was a same-sex couple in the study, gender effects were not based on the gender of the SO, but on the gender of the HIA. Despite a general significant increase after treatment, the SOs of male HIAs consistently displayed significantly higher scores versus SOs of female HIAs for the

Interaction factor. Additionally, again, despite a general increase after treatment after beginning above average, the SOs of male HIAs displayed significantly lower scores versus SOs of female for the Communication Importance factor. As previously mentioned, comparisons of a gender effect on proxy estimations cannot be made due to gender imbalance and small participant samples in previous studies (Preminger, 2003; Preminger & Meeks, 2010a; 2010b; 2012). Nevertheless, it was speculated that given the known literature regarding gender differences for the effect of HI on HIAs and SOs, a gender effect might be evident. Overall, this is the first study to report gender effects for SO-proxy measures following treatment. As such, it adds an importance piece of information to the literature base. One that needs to be further explored in the future.

Overall, the clinical implications of these findings suggest that an improvement in HIA HRQOL can be perceived and evidenced by SOs when SOs are included in treatment. This study consequently provides further evidence towards the efficacy of this particular group AR program for the HIA, which can produce benefits not only felt by the HIA, but also seen by the SO. It also provides support for the notion that SOs should be involved in the treatment process. More research is required to confirm these beneficial treatment findings and to importantly uncover any gender differences in proxy estimations.

4.4. Treatment Outcomes and Couple Congruence

4.4.1. Hypotheses, Relation to the Literature, and Clinical Implications

Firstly, it was expected that while on the waitlist, waitlist group couple congruence (or difference) scores would not change prior to treatment. Results show that couples exhibited no significant changes in their congruence scores for all CPHI factors while on the waitlist. Again, this is generally supported by previous findings that have not found a reactive effect on HRQOL outcomes from being on a waitlist (Kelly-Campbell, in review). This is also in agreement with the RCT conducted by Preminger and Meeks (2010a), which

found that congruence level for their control couples (treatment was provided to the HIA and not the SO) was maintained, or unchanged.

Next, it was expected that HIA and SO-proxy scores would be significantly different from each other at the pre-treatment assessment, with a significant effect of gender also to be found. This was confirmed by the findings of this study for only two factors of the CPHI: Adjustment and Interaction. For female HIAs, couples had statistically and clinically significantly different perceptions on the Adjustment factor (with female HIAs exhibiting lower scores than their SOs). With relation to the literature, it appears that either SOs may have underestimated the HIA's overall Adjustment of their HI (Newman & Weinstein, 1986; Preminger, 2002; 2003), or the female HIAs responded with lower views of their personal Adjustment to HI (Erdman & Demorest, 1998b). Similarly, for all HIAs, couples had statistically and clinically significantly different perceptions on the Interaction factor, with SOs exhibiting a lower score than HIAs, consistent again with some of the literature (Newman & Weinstein, 1986; Preminger, 2002; 2003). However, the overall lack of significant differences between the majority of SO-proxy and HIA scores suggest that couples held mostly congruent perceptions regarding the impact of HI on the HRQOL of the HIA before entering the program. This is in agreement with Hickson et al. (2006), Kramer et al. (2005), Preminger and Meeks (2010a), and Scarinci, Worrall and Hickson (2012,) who all also failed to uncover a significant difference between HRQOL self and proxy-SO scores.

Further, it was expected there would be a significant effect on the congruence of couple treatment outcome measures over time (i.e., from pre-treatment, to post-treatment, to follow-up). This was supported by the findings of this study, where a significant decrease in couple congruence was seen based on their mean difference in factor scores. The effect sizes for congruence statistically and clinically significant outcomes ranged from $d = 0.81$ to $d = 1.69$. Unlike the individual HIA-outcomes and the SO-proxy outcomes, the statistically

significant findings for couple congruence generally failed to meet the criterion for clinical significance. Small effect sizes were found for statistically significant differences for the Interaction factor, the Communication Performance factor, and the Communication Importance factor. That is, while there was a trend towards a decrease in couple congruence, these results should be interpreted with caution, as many of the effect sizes were considered not clinically significant (ranging from $d = 0.18$ to $d = 0.62$). Scores that were not significant also displayed a decrease in congruence, except for post-treatment versus follow-up treatment results for the reaction factor (for both genders), which showed a non-significant increase. Following treatment, it appears that SOs may have overestimated the degree of benefit the HIAs received in comparison the HIAs themselves, which resulted in a decrease in congruence.

This result is similar to what Preminger (2003) found, who expected that following treatment, SOs and HIAs would be on similar grounding. While her study found incongruent findings because the SOs who did not receive treatment underestimated benefit for their HIAs, the current study found incongruent findings potentially because the SOs overestimated treatment benefit. By adjusting the focus of their study to create an additional AR program specifically for SOs, congruent couples studied by Preminger and Meeks (2010a) appeared to reach further congruence. This is in contrast with the current study's findings. This present study fell somewhere in the middle of Preminger's studies, by adjusting the focus of *See It! Hear It! Say It!* to include a SO-portion where didactic information was delivered to both HIAs and SO, but practical activities were completed by HIAs and SOs individually. The results of this modification suggest that the focus of an AR program can have an effect of the resulting congruence, which is different to what has been reported previously. It is possible that as the SOs were experiencing their own form of treatment, they were projecting their success and the benefit they themselves were

receiving onto their perceptions of treatment benefit for their hearing-impaired partners. Perhaps following AR, communication between SOs and HIAs had improved in the home environment and in other environments where they communicate. There are further possibilities: (1) the HIA underreported the benefits, and/or (2) HIA experienced fewer benefits than the SO was aware because they experience a wider range of communication environments than the SO is exposed to (e.g., at work). Nevertheless, HIAs did display significant improvements following treatment as a result of participation in this AR program.

Finally, it was expected that there would be a significant effect of gender on couple outcome measures throughout the rehabilitative process. This occurred only with the Adjustment factor. For this factor, there were no significant changes in female HIA - SO-proxy difference scores at any timeframe. That is, the couples' difference scores for this factor did not change significantly for female HIAs throughout the rehabilitative process, thus both members of the couple remained unchanged on their perception of the HIA's Adjustment. For male HIAs, the significant change in their difference scores meant that congruence decreased. Specifically, they went from positive to negative. While their SOs might have perceived benefit for them on this factor, the HIAs may not have. As mentioned previously, studies of couple congruence have been unable to explore the effects of gender and HI perceptions because of the disparity and small participant samples used (Preminger, 2003; Preminger & Meeks, 2010a; 2010b; 2012). Future studies could attempt to uncover this.

Overall, findings of this study present clinical implications towards the idea of congruence between HIAs and their SOs. This thesis has also contributed to the literature investigating couple congruence and may provide evidence towards an answer as to what may occur before and after treatment. It appears that following group AR treatment, an effect on the congruence between HIA and SO perceptions occurs. Nonetheless, these

findings need to be interpreted with caution; although there were statistically significant findings, many of those were accompanied by small effect sizes. Yet, the use of congruence data may pose some clinical utility. For example, perhaps couple congruence data could be used as a counselling tool so that couples may become informed of their congruence (or lack thereof). As mentioned earlier, it may be that SOs are unaware of many of the communication situations the HIA struggles in, and that can be explored by examining their congruence. Conversely, the normal-hearing SO may be more aware of the communication environments only when they are together (as the SO can hear what the HIA is missing). Again, those situations could be explored with couple congruence information, which could stimulate further discussion of hearing-related difficulties and how this may be remediated between the HIA and SO.

4.5. Treatment Outcomes for the Significant Other

4.5.1. Hypotheses, Relation to the Literature, and Clinical Implications

Firstly, while acting as this study's semi-'control' group in the waitlist scenario, it was anticipated that waitlist group SO SOS-HEAR scores would not change prior to treatment. As expected, this did not occur. Results show that these participants exhibited no significant changes in SOS-HEAR scores while on the waitlist. This finding is not in agreement with the reports of Preminger and Meeks (2010a), which is the only study thus far to include a specific form of AR for SOs of HIAs. Significant others in their control group (who received no treatment) experienced significant improvements in stress and negative affect as did SOs in the experimental group. However, it is important to note that Preminger and Meeks (2010a) did not use explicit measures of third party disability such as the SOS-HEAR or the HII-SOP, and as a result, it is difficult to compare findings. Additionally, similar to the proxy-SO comparison, while SOs were serving as 'controls' in this thesis by being on the waitlist, neither they nor their HIA partners were experiencing treatment. In contrast, at the same

time that SO's in Preminger and Meeks' (2010a) study were serving as 'controls', their HIA partners were receiving treatment. It is possible that the effects of treatment experienced by the HIAs were having a positive influence on the stress and negative affect of these SOs.

Next, it was expected that treatment outcomes for SOs would measure a significant improvement over time (i.e., from pre-treatment, to post-treatment, to follow-up). As for the HIAs' outcomes, this was supported by the findings of this study. After participating in the program, the total scores of the SOS-HEAR decreased significantly immediately after treatment, and continued to decrease 12-weeks afterwards. The effect sizes for SO statistically and clinically significant outcomes were consistently large (ranging from $d = 1.67$ to $d = 3.27$). Therefore, the positive effects of treatment were found to be both statistically and clinically significant. This indicates that the SOs experienced a significant reduction in third party disability while participating in a group AR program with their hearing-impaired partners. While this is the first study to document hearing-related treatment effects as recorded by the SOS-HEAR, the effects of treatment are consistent with previous studies that have provided intervention for SOs (Getty & Héту, 1991; Preminger & Meeks, 2010a).

Lastly, the discovery that there was no significant effect of gender was surprising, given that female SOs of male HIAs may report more frustration and distress compared to male SOs of female HIAs (Scarinci et al., 2008) and that female SOs report having to adjust to their male partners' hearing difficulties and maintain communication (Anderson & Noble 2005). Scarinci, Worrall and Hickson (2009b; 2012) were unable investigate SOS-HEAR score differences by gender most likely due to the disparity in their population samples leading gender to be excluded from their statistical models. Preminger and Meeks' (2012) study for the HII-SOP appears to exhibit the same issue. However, for this study, the gender distribution in the groups was closer to equal, and while an effect of gender could be investigated, no gender differences in third party disability were found for this study. It

appears that perhaps both male and female SOs experienced equally large benefits. Alternatively, there is a possibility that there were gender differences, but they were not detected by the SOS-HEAR. This may be supported by the fact that the SOS-HEAR has not been shown to be sensitive to gender differences in previous studies. Further research needs to confirm the discoveries of this thesis in terms of the potential benefit of group AR, and the possible effect of gender on perceptions of third party disability.

Overall, this thesis has presented clinical implications not only for the future treatment of unaided adults with HI, but also for the inclusion of their SOs in the AR process. It is clear that SOs experience the disabling effects of HI (Armero, 2001; Brooks, Hallam, & Mellor, 2001; Hallberg & Barrenäs, 1993; Héту et al., 1987; 1988; 1993; Scarinci et al., 2008; Smith & Kampfe, 1997), and as such require assessment and remediation efforts such as the one outlined in this study. Advancements have also been made with the relatively new concept in audiology; third party disability, which has been successfully measured in a clinical and rehabilitative context. This may allow for the term to experience more widespread acknowledgement and use in audiological practice.

The findings of this study may also encourage clinicians to revisit their concepts of the AR process of not just focusing on the HIA but also importantly focusing on their SOs; a shift in the balance of perceptions regarding who treatment can be delivered to is warranted. Clinicians may become aware that the far-reaching effects of HI means that their services also need to be far-reaching by extending services to those who do not necessarily experience the impairment cause by HI, but do experience its consequences. Clinicians could perhaps add tools such as the SOS-HEAR to their hearing-related assessment batteries in order to adequately assess the SO's level of third party disability, identify areas of possible remediation, and provide treatment. This encourages the notion of a holistic approach to audiologic services. While *See It! Hear It! Say It!* has received further support of its efficacy

for HIAs, the modification it has undergone has enhanced its focus, so that clinicians may now be able to provide treatment to another client-base: normal-hearing SOs who may be experiencing third party disability. In cases where AR of this style may not be an option that clinicians are able to provide, the data from this study still supports the underlying idea of including SOs in audiologic practice and addressing third party disability. This could perhaps be easily achieved in clinics via the normal counselling (either formal or informal) procedures that occur during audiologic appointments, which are very often attended by SOs as well as HIAs.

4.6. Limitations and Future Directions

Despite the encouraging findings of this study, there are some limitations that warrant discussion. Firstly, the group sessions were conducted in the U.S., while the ensuing data was analysed in New Zealand. Whether findings would be different if the opposite occurred, or whether the author had both facilitated the groups and analysed the data remains unknown. However, one of the clinicians that facilitated the groups of the current study also facilitated those in Kelly-Campbell's (in review) study. This may have effectively maintained consistency between the two programs and allowed for more precise comparisons. Further, this study was completed with participants from the U.S. and as such, generalisations may only be made to the U.S. population. Nevertheless, while this study was being completed, a parallel version of the original *See It! Hear It! Say It!* program for HIAs in the workforce was run in New Zealand. Findings may provide evidence towards the generalisability of the program. Another limitation may be the lack of qualitative information obtained from the participants. It would have been useful and interesting to have included an end-of-treatment questionnaire or survey that sought to uncover any specific learning outcomes. It would have also been interesting to explore the feedback and preferences the participants felt towards the program, and whether any elements could be

improved. Future studies may include a means through which rehabilitative clients, who are also consumers, are able to provide their own evaluations and suggestions towards treatments available to them.

Additionally, while AR in this sense aimed to reduce and alleviate communication difficulties for the HIA in the workplace, the impact the AR program had on communication with co-workers or employers was not investigated. Given that there is a lack of recognition of HI in the workplace, future programs could extend education towards employers and co-workers in terms of communication strategies, and also in terms of services they are able to make use of and make accessible for their hearing impaired employees or co-workers. A further limitation is the duration of time between the post-treatment assessment and the follow-up assessment. Findings from this study suggest an improvement in outcomes in the medium term (3-months); however, future studies could determine whether these effects are measurable in the long-term as Hawkins (2005) suggested (i.e., 6-months and above), to determine the duration of effects, and further confirm AR as a viable treatment for HI.

A further limitation revolves around the HRQOL assessments used. As with all self-report assessments, findings relate to 'perceived' difficulties and thus may lack objectivity. External factors such as how the individual is feeling at the time or the effect of having someone watching while the assessment was being completed may have influenced self and proxy responses, potentially creating a Hawthorne effect. Additionally, the CPHI was chosen as it provides rich information about perceptions across a range of dimensions. However, the CPHI is time-consuming to complete and score, and as such, has less clinical relevance than other self-assessment tools. Also, while the CPHI provided a wealth of information regarding the communicative abilities of the HIAs, it is important to note that the internal consistency and factor analyses of this measure were established for a predominantly male military population (Demorest & Erdman, 1986; 1989). Consequently, any generalisations to

a wider population based on findings must be done with caution. The CPHI is a comprehensive tool, but tends to only be used in research settings. Perhaps a future study could use a more clinically suitable outcome measure more appropriate for the population to be investigated, such as the Hearing Handicap Inventory for Adults (HHIA; Newman et al., 1990).

The same restrictions to generalisations apply to the SOS-HEAR. This measure is based on a small sample of mostly female older adults, who may have been experiencing age-related cognitive decline and language changes (Worrall & Hickson, 2003) in comparison to the younger participants in the current study. The small sample size on which the tool is based is recognised by Scarinci, Worrall, and Hickson (2009b) as being inadequate with which to develop scales. In addition, the SOS-HEAR in and of itself may be flawed due to potential participant bias. Significant others had self-selected to participate in a research project examining the negative impact of HI on the spouse (Scarinci et al., 2009b). Future studies could provide more support for the clinical utility of the SOS-HEAR by expanding the population sample on which psychometric results are based to younger couples.

Interestingly, this was a similar thought-process held by Preminger and Meeks (2012), who recently developed their own version of the SOS-HEAR, called the Hearing Impairment Impact–Significant Other Profile (HII-SOP) based on themes reported in the literature. Preminger and Meeks (2012) had not published their findings when this study was conceptualised and human ethics approvals were met. Future studies may look into investigating the clinical utility of the HII-SOP based on younger participants. Nevertheless, it appears that the clinical utility of the SOS-HEAR is satisfactory; this tool was able to document third party disability and its reduction following treatment for the purpose of this thesis. In short, future studies may now have a choice in assessments in order to investigate third party disability, decisions of which may be influenced by participant characteristics.

This may allow for this concept to be further validated and for more research in this area to be conducted.

Unlike the original CPHI, the SO version has not received psychometric evaluation and as such, results are to be interpreted with caution. Future studies that wish to examine couple congruence may choose to use proxy tools with established psychometric properties such as the Significant Other Assessment of Communication (Schow & Nerbonne, 1982; Hodes, Schow & Brockett, 2009). Additionally, there are no established ways in which congruence following AR should be measured, each study has done so differently to the current one (Preminger, 2003; Preminger & Meeks, 2010a). As a result, this study's findings relating to congruence may have been affected by the delivery of the sessions. Perhaps more couple-directed activities may have produced an alternative effect on couple congruence. Future studies, whose goal it is to improve couple congruence, may assess this.

Finally, the idea of evaluating couple congruence and using SO-proxy measures to determine HIA treatment benefit is complex one. With regards to SO-proxy evidence that the AR program in this current study was of benefit for the HIAs, it may be difficult to distinguish 'true' perceptions. Perhaps either proxy-SO estimations improved because the SOs developed a recognition of the benefits experienced by the HIAs, or their perceptions were influenced, as they themselves were experiencing treatment. It serves to remember that first of all, self-reports are based on self-'perceptions'. Furthermore, proxy reports are based on 'perceptions of perceptions'. They are similar yet vastly different concepts; thus, comparing the two is a difficult task. Resultantly, attempting to evaluate treatment benefit as a function of congruence as previous studies have done may be an erroneous undertaking. Measurements of congruence in and of themselves may not be adequate measures of treatment benefit. The perceptions of both the HIA and the SO are being solicited and both the HIA and SO were subjected to treatment. In addition, treatment

outcomes should be directly related to treatment goals, which were to obtain benefit for HIAs and their SOs. Using couple congruence as an outcome measure may only be justified if one of the treatment goals was in fact couple congruence. Further studies may be encouraged to further investigate this complex area with this in mind.

4.7. Conclusion

The aims of this thesis were firstly to replicate Kelly-Campbell's (in review) working adult group AR study, secondly to adapt the program to contain a SO-specific portion, and thirdly to evaluate the treatment outcomes. It can be concluded that for HIAs and their normal hearing SOs, participating in the study's group AR program, significant and robust treatment effects can be seen throughout the rehabilitative process based on improvements in their HRQOL. In short, the group AR program *See It! Hear It! Say It!* has received further confirmation from this study for being a strong alternative treatment for a particular client-base that clinicians may face: individuals with HI in the workforce who do not wish to adopt hearing aids. This study has also provided strong evidence towards the adaptability of the program for a type of treatment for another client-base: normal hearing SOs of HIAs. Additionally, this study has furthered the knowledge of third party disability and has demonstrated its measurement in a clinical context. In conclusion, the findings of this thesis may be able to guide clinicians towards a holistic approach for the evaluation and remediation of disabilities experienced secondary to HI. This may ultimately decrease the likelihood of continued and prolonged negative consequences of HI both on the part of HIAs and their frequent communication partners, likely to be their SOs.

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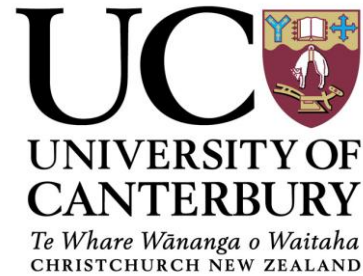
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APPENDIX B – INFORMATION SHEET

Researchers: Lucía Habanec & Dr. Rebecca Kelly-Campbell

University of Canterbury
Department of Communication Disorders
Private Bag 4800
Christchurch 8140
New Zealand



Information for participants

You are invited to take part as a participant in the research project:

“Outcomes of a group audiologic rehabilitation program for adults with unaided hearing-impairment and their significant others.”

Project Aim:

To develop a new hearing-related service for working adults who feel they have hearing problems but do not want to use hearing aids. The project will examine the usefulness of a communication program called *“Hear it! See it! Say it!”* that has been adapted for the inclusion of significant others. Participants may be divided randomly to two group classes. One group may start their communication training immediately; the other, so called “waitlist group” may commence after 6 weeks.

Classes:

Classes will provide information about hearing, hearing loss it’s impact on every day life. The classes will also give people practical exercises, demonstrations and tips to communicate effectively and overcome any hearing issues they have at work or at home. For the significant others, classes will also provide information on how to help make the home social environments more ‘listener-friendly’ for the person with hearing impairment.

Your Involvement:

1. **Attending an individual recruitment appointment** for you and your significant other (approx. 45 mins) consisting of:
 - a. A comprehensive **hearing test** for you; screening test for your significant other

- b. **Filling out 2-3 questionnaires** about your experience with hearing loss or living with someone with hearing loss
2. **Only if you are in the 'waitlist' group:** filling out the questionnaires **again** after the waitlist period, before commencing the programme
3. **Attending the communication training programme** in three evenings at 2 hours each
4. **After completing the programme: filling out the same questionnaires** (total time approx. 20-30 mins)
5. **Attending a follow-up appointment** for you and your significant other **12 weeks after** finishing the program to evaluate the programme (total time approx. 20-30 mins)
 - a. **Filling out 2-3 questionnaires** about your experience with hearing loss or living with someone with hearing loss

As this programme is still in the research stage, no enhanced communication can be promised as a result of participating.

Potential Risk:

In the questionnaires, you will be asked to answer questions about your experience living with hearing impairment or living with someone who has a hearing impairment; there is a risk you may experience feelings of distress as you think about your experiences.

Your Rights:

You have the right to refuse to participate or withdraw from the project at any time, including withdrawal of any information you have provided. This is done without penalty and will not affect any ongoing or future relationships with either the University of Canterbury or the Premiere Hearing Center.

Confidentiality:

Confidentiality for group work cannot be assured. The results of the project may be published, the Masters thesis will be a public document that may be available via the University of Canterbury library database. However, you are assured of the complete confidentiality of data gathered: the identity of participants will not be made public without their consent. To ensure anonymity and confidentiality, your name will not be used on your data files; instead you will be given a participant number. In addition, the consent form will be kept in a locked cabinet in a locked room in the Department of Communication Disorders on the University of Canterbury campus in Christchurch, New Zealand. Electronic data (without your identifying information) will be kept on password-protected computers that are stored in a locked room in the Department of Communication Disorders on the

University of Canterbury campus in Christchurch, New Zealand. Raw data will be destroyed after 5 years.

Researchers:

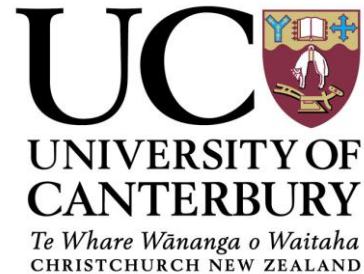
This project is being carried out as a requirement of the Master of Audiology degree at the University of Canterbury by Lucía Habanec under the supervision of **Dr. Rebecca Kelly-Campbell**, who can be contacted at **rebecca.kelly@canterbury.ac.nz** or phone **(+64 3) 364-2987 ext.8327**. She is pleased to discuss any concerns you may have about participation in the project.

The project and been reviewed and approved by the University of Canterbury Human Ethics Committee.

APPENDIX C – CONSENT FORMS

Researchers: Lucía Habanec, Rebecca Kelly-Campbell

Contact address: University of Canterbury
Department of Communication Disorders
Private Bag 4800
Christchurch 8140
New Zealand



Consent Form – Working Adult with Hearing Impairment

“Outcomes of a group audiologic rehabilitation program for adults with unaided hearing-impairment and their significant others.”

I have read and understood the description of the above-named project.

On this basis, I agree to participate as a subject in the project, and I consent to publication of the results of the project with the understanding that anonymity will be preserved.

I understand also that I may at any time withdraw from the project, including withdrawal of any information I have provided.

I note that the project has been reviewed **and approved** by the University of Canterbury Human Ethics Committee.

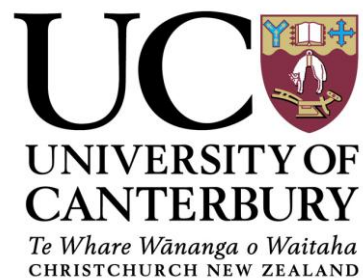
Name: (please print): _____

Signature: _____

Date: _____

Researchers: Lucía Habanec, Rebecca Kelly-Campbell

Contact address: University of Canterbury
Department of Communication Disorders
Private Bag 4800
Christchurch 8140
New Zealand



Consent Form – Significant Other

“Outcomes of a group audiologic rehabilitation program for adults with unaided hearing-impairment and their significant others.”

I have read and understood the description of the above-named project.

On this basis, I agree to participate as a subject in the project, and I consent to publication of the results of the project with the understanding that anonymity will be preserved.

I understand also that I may at any time withdraw from the project, including withdrawal of any information I have provided.

I note that the project has been reviewed **and approved** by the University of Canterbury Human Ethics Committee.

Name: (please print): _____

Signature: _____

Date: _____

APPENDIX D – SIGNIFICANT OTHER SCALE FOR HEARING DISABILITY (SOS-HEAR)

Participant Number: _____

Instructions: We are interested in finding out what it is like having a spouse of a partner with a hearing impairment. Here are some experiences that other participants have shared with us.
Read each statement carefully and circle how much of a problem it is for you. It may or may not be a problem for you.

Changes to communication

- 1. Because of my partner's hearing difficulties I have to repeat myself often.**

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

- 2. Because of my partner's hearing difficulties I have to raise the volume of my voice when talking to him/her.**

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

- 3. Because of my partner's hearing difficulties we do not communicate spontaneously or have as many conversations about trivial things as often as I would like.**

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

- 4. Because of my partner's hearing difficulties I cannot whisper secrets to him/her.**

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

5. Because of my partner's hearing difficulties I have to make sure I am face-to-face when talking to him/her.

For me this is:

0	1	2	3	4
no problem	a mild problem	a moderate problem	a severe problem	a complete problem

6. Because of my partner's hearing difficulties we do not communicate as often as I would like.

For me this is:

0	1	2	3	4
no problem	a mild problem	a moderate problem	a severe problem	a complete problem

Communication burden

7. Because of my partner's hearing difficulties I have to answer the phone for him/her.

For me this is:

0	1	2	3	4
no problem	a mild problem	a moderate problem	a severe problem	a complete problem

8. Because of my partner's hearing difficulties I have to answer for him/her during group conversations.

For me this is:

0	1	2	3	4
no problem	a mild problem	a moderate problem	a severe problem	a complete problem

9. Because of my partner's hearing difficulties I have to make phone calls for him/her.

For me this is:

0	1	2	3	4
no problem	a mild problem	a moderate problem	a severe problem	a complete problem

10. Because of my partner's hearing difficulties I have to 'coach' or 'cue' him/her during group conversations by telling him/her when someone is speaking to him/her.

For me this is:

0	1	2	3	4
no problem	a mild problem	a moderate problem	a severe problem	a complete problem

11. Because of my partner's hearing difficulties I have to act as an interpreter during group conversations by repeating others' comments/questions to my partner.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

12. Because of my partner's hearing difficulties when we are both in conversation with others I have to listen into his/her conversations as well as my own to make sure he/she responds appropriately that is being said.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

Relationship changes

13. Because of my partner's hearing difficulties have an effect on our intimate/physical relationship.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

14. Because of my partner's hearing difficulties I withdraw from my partner and do things alone.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

15. Because of my partner's hearing difficulties I am less satisfied with the relationship I have with my partner.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

Going out and socializing

16. Because of my partner's hearing difficulties I worry that he/she doesn't hearing warnings such as shouts or alarms.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

17. Because of my partner's hearing difficulties I do not go to as many social gatherings as I would like.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

18. Because of my partner's hearing difficulties I do not go to the movies and/or theatre as often as I would like.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

19. Because of my partner's hearing difficulties I do not go to noisy environments (e.g., restaurants) with my partner as often as I would like.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

Emotional reactions to adaptations

20. It makes me upset that I have to adapt to my partner's hearing difficulties

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

21. I am constantly thinking about my partner's hearing difficulties.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

22. Because of my partner's hearing difficulties I have had to accept the situation as it is and learn to 'live with it'.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

23. It makes me angry when I have to tolerate the loud volume of the television.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

24. My partner's hearing difficulties cause me to feel frustrated.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

Concern for partner

25. Because of my partner's hearing difficulties I worry about what other people think about him/her when he/she doesn't respond to questions or conversations.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

26. During social activities I have to explain my partner's hearing difficulties to friends and family to protect him/her from embarrassing situations.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

27. I feel sorry for my partner because of his/her hearing difficulties.

For me this is:

0 **1** **2** **3** **4**
no problem a mild problem a moderate problem a severe problem a complete problem

APPENDIX E – SEE IT! HEAR IT! SAY IT! PRACTICAL ACTIVITY

HANDOUTS

E.1. *See It!* Minimal Pairs Activity

- Take turns in being the speaker and listener – *the SO should now insert the foam ear plugs*
- Sit about a metre from each other

Condition 1: Auditory

- The speaker* reads the words aloud at a normal speaking level **covering their mouth with the piece of paper**
- The listener* decides whether the words are the same or different
- The speaker* ticks whether the listener was correct or incorrect



Condition 2: Auditory and Visual

- The speaker* reads the words at a normal speaking level without covering their mouths
- The listener* decides whether the words are the same or different
- The speaker* ticks whether the listener was correct or incorrect

E.2. See It! Minimal Pairs List

SPEAKER 1		SPEAKER 2	
Auditory Only		Auditory Only	
Pairs	Correct/ Incorrect	Pairs	Correct/ Incorrect
1. me/me		1. bean/mean	
2. bite/might		2. man/man	
3. bark/bark		3. bug/mug	
4. more/more		4. bake/make	
5. bet/met		5. may/may	
6. beat/meat		6. boo/moo	
7. bored/bored		7. crab/cram	
8. mooded/mooded		8. meet/beet	
9. bass/mass		9. rib/rib	
10. batch/match		10. cub/cub	
TOTAL CORRECT	/10	TOTAL CORRECT	/10
Auditory and Visual		Auditory and Visual	
Pairs	Correct/ Incorrect	Pairs	Correct/ Incorrect
1. pat/mat		1. gleam/gleam	
2. bill/bill		2. him/jim	
3. rim/rim		3. hub/hum	
4. jab/jam		4. lamb/lamb	
5. dab/dab		5. bored/bored	
6. bob/bomb		6. bake/make	
7. pay/bay		7. bass/mass	
8. bit/mitt		8. pay/may	
9. boat/boat		9. bang/bang	
10. bug/mug		10. rob/rob	
TOTAL CORRECT	/10	TOTAL CORRECT	/10

E.3. See It! Concentration Sabotage Exercises

Story 1

1. Significant Others, please wear the foam ear plugs
2. While the facilitator reads aloud story 1, please complete as many **math problems** as you can

Math Problems

1. $16 + 83 = \underline{\quad}$
2. $52 + 28 = \underline{\quad}$
3. $61 + 10 - 19 = \underline{\quad}$
4. $15 + 15 + 4 = \underline{\quad}$
5. $100 - 14 = \underline{\quad}$
6. $83 - 41 = \underline{\quad}$
7. $26 + 48 = \underline{\quad}$
8. $18 + 17 = \underline{\quad}$
9. $20 + 53 = \underline{\quad}$
10. $99 - 61 = \underline{\quad}$

Now, please answer the following questions about the story:

Questions:

- What was the name of the dog?
- Where did I take the dog for a walk?
- What did my dog do when she stopped walking?
- What did my dog take out of the hole?
- What did my dog want to do with the mole?

Story 2

1. Please pay attention to the facilitator this time and do anything that helps you to understand the story
2. Please answer questions when the story is done

Questions:

- Where did my family go last weekend?
- What happened to our original flight?
- Where did we go on Saturday morning?
- Where did we go on Saturday afternoon?
- What kind of restaurant did we go to for dinner?

⇒ ***What was easier?***

⇒ ***What else could have been done to make things easier?***

For the Facilitator to Read

Story #1: Last week I took my dog Lilith for a walk. We walked in a wooded area near the river. Suddenly Lilith stopped walking and started to dig furiously. After just 30 seconds she made a hole in the ground and took out a mole. She was just about to eat the mole when I realized what she was doing and made her stop. Now I know why we no longer have any moles in our back yard!

Questions:

1. What was the name of the dog? (Lilith)
2. Where did I take the dog for a walk? (by the river)
3. What did my dog do when she stopped walking? (she started to dig)
4. What did my dog take out of the hole? (a mole)
5. What did my dog want to do with the mole? (eat it)

Story #2: Last summer my family took a trip to London. We were supposed to fly up on Friday afternoon but the flight was canceled because there was an ice storm in London. So, we woke up real early on Saturday and took a 6:00 a.m. flight. When we got to London we went to the natural history museum in the morning and an art museum in the afternoon. For dinner we went to a French restaurant. It was difficult staying awake at dinner because we had all woken up at 4:30 in the morning.

Questions:

1. Where did my family go last weekend? (London)
2. What happened to our original flight? (it was canceled because of an ice storm)
3. Where did we go on Saturday morning? (a natural history museum)
4. Where did we go on Saturday afternoon? (an art museum)
5. What kind of restaurant did we go to for dinner? (French)

E.4. *Hear It!* Context Clues Activity

- Take turns in being the speaker and listener – *the SO's should use the foam ear plugs*
- **The speaker** reads five phrases aloud at a normal level and **MOUTH OUT** the word in bold. They do not need to cover their face.
- **The listener** decides which word out of the pair best fits in the phrase.

How did you do?

Why were some easier than others?

(2) Words and Phrases - Context Clues Activity (speaker)

Speaker 1 – mouth out only the bolded word

1. Shut the **gate**
2. **Soccer**
3. Can you wait a **minute**?
4. **Pay**
5. It's raining **cats** and dogs

-- Swap Speaker! --

Speaker 2– mouth out only the bolded word

1. Which way is **up**?
2. Like two peas in a **pod**
3. **Sunny**
4. **Call** an ambulance
5. **Time**?

(2) Words - Context Clues Activity (Listener)

Listener 1

1. kate/gate
2. pay/bay
3. soccer/talker
4. cats/gas
5. might/bite

-- Swap Speaker! --

Listener 2

1. up/cup
2. pod/pot
3. warm/ worn
4. cod/call
5. time/dime

E.5. *Hear It!* Context Clues Activity - Picture

- Take turns in being the speaker and listener – *the SO's should use the foam ear plugs*
- **The speaker** reads four phrases aloud at a normal level and **MOUTH OUT** the word in bold. They do not need to cover their face.
- **The listener** looks at the picture and guesses the correct missing word

How did you do?



(2) Words and Phrases - Context Clues Exercise

Speaker 1 – mouth out only the bolded word

1. Chris is cleaning the **porch**
2. Kevin is standing on a **ladder**
3. The sun **shines** through the glass
4. He is **paining** the room green

-- Swap Speaker! --

Speaker 2– mouth out only the bolded word

1. A cute **dog** watches Chris
2. Gary carefully **shaves** his face
3. The boy carries a teddy **bear**
4. Dad wants to play a **baseball** game

E.6. Say It! Scenarios – Working Adults

Have a think and discussion about the following scenarios, keeping in mind what we've learnt in the past 3 weeks...

Hint: It may be helpful to organise your thoughts in terms of the environment, message, speaker and listener – it's fine if they overlap.

(1) John is anxious about the upcoming group meeting/presentation at work. What sort of things should he think about to prepare for effective communication?

a. Enviro

- i. Find out room layout: round table? Lecture style? (if so, sit at front/ close and facing man speaker)
- ii. If presenting audiovisually: HATs – captions, PA; turning lights on again after presentation
- iii. Eliminate background noise: close door/window
- iv. Increase lighting in room

b. Message

- i. Prepare, learn about the topic beforehand. Learn potential key words or concepts

c. Listener

- i. Stay calm and assertive
- ii. Situate yourself in an optimal position
- iii. Use communication breakdown strategies when needed
 1. Ask for clarification, repetition, rephrasing
- iv. Record the lecture to listen to later on
- v. Take notes or hire someone to take notes

d. Speaker

- i. Make sure you let the speaker know when you haven't understood
- ii. Be prepared to suggest strategies for repairing communication breakdowns

(2) Anne hates talking on the phone, especially when she needs to call the office supplier who is just impossible to understand. He mumbles and talks way too quickly. What sort of things can Anne say and do to make talking on the telephone easier?

1. Enviro

- a. Eliminate background noise: close door/window
- b. HAT: Amplified phone

2. Message

- a. You already know what the conversation will be about, but be prepared to know where the conversation will go if it takes a turn

3. Listener

- a. Don't stress out!
- b. Use conversation repair strategies
 - i. Tell him the quality of the call is poor
 - ii. Ask him to rephrase
 - iii. Ask if email is better
 - iv. Clarify and review at the end of the conversation

4. Speaker

- a. Make sure you let the speaker know when you haven't understood
- b. Be prepared to suggest strategies for repairing communication breakdowns

(3) James is frustrated because his colleague always chooses to speak with him in the hallway where there's background noise and distractions. He's already bluffed twice this week. What sort of things can James say or do to make communicating with his colleague?

a. Enviro

- i. Find out if there's another room you can go to?
- ii. Ask if he can go to your office or somewhere else instead

b. Message

- i. Be prepared to react if the conversation takes an unknown turn

c. Listener

- i. Stay calm and assertive
- ii. Avoid further bluffing
- iii. Situate yourself in an optimal position
- iv. Keep standing in front of the colleague and speechread/use context clues
- v. Use communication breakdown strategies when needed
 - 1. Be honest, say that the hallway has too many distractions
 - 2. Ask for clarification, repetition, rephrasing

d. Speaker

- i. Make sure you let the speaker know when you haven't understood
- ii. Be prepared to suggest strategies for repairing communication breakdowns

E.7. Say It! Scenarios – Significant Others

Have a think and discussion about the following scenarios, keeping in mind what we've learnt in the past 3 weeks...

Hint: It may be helpful to organise your thoughts in terms of the environment, message, speaker and listener – it's fine if they overlap.

(1) Your significant other hates parties and is usually quiet and on his/her own because of trouble communicating. You are at a neighbour's BBQ, what can you say or do to make things easier to communicate in?

-
- i. **Enviro**
 - 1. Gravitate towards a quiet space
 - 2. Have the listener's back towards the noise
 - 3. Make sure to converse in a space with lots of light
 - ii. **Message**
 - 4. Be clear and to the point if there's any doubt that your SO is likely to misunderstand
 - iii. **Listener**
 - 5. Make sure that your SO is understanding
 - 6. Ask if there's anything they want you to do to make communication easier
 - iv. **Speaker**
 - 7. Stand in front of your SO or on their better side
 - 8. Don't mumble or obscure your face
 - 9. Gesture with your words to aid if there's a lot of background noise
 - 10. Be prepared to repair breakdowns when needed
 - a. Rephrase, simplify, etc

(2) You have plans to go to a popular restaurant next week. What sort of things should he think about to prepare for effective communication?

- i. Enviro**
 - 1. When making reservations, ask for a table away from the kitchen, server stations or large parties
 - 2. Have the listener's back towards the noise
 - 3. Make sure that your face is as well illuminated as possible
- ii. Message**
 - 4. Be clear and to the point if there's any doubt that your SO is likely to misunderstand
- iii. Listener**
 - 5. Make sure that your SO is understanding
 - 6. Ask if there's anything they want you to do to make communication easier
- iv. Speaker**
 - 7. Sit in front of the listener or side to side (on their good side)
 - 8. Don't mumble or obscure your face
 - 9. Gesture with your words to aid if there's a lot of background noise
 - 10. Be prepared to repair breakdowns when needed
 - b. Rephrase, simplify, etc

(3) The TV is just too loud for you to enjoy being in the living room or even talking to your SO. What can you say or do to make things easier to communicate in?

i. Enviro

- a. Turn the tv vol down
- b. Mute commercials
- c. Invest in a HAT
- d. Turn the lights on in the living room/make sure they are on

ii. Message

1. Be clear and to the point if there's any doubt that your SO is likely to misunderstand

iii. Listener

2. Make sure that your SO is understanding
3. Ask if there's anything they want you to do to make communication easier

iv. Speaker

4. Before speaking get the listener's attention first
5. Sit or stand in front of the listener or on their good side
6. Don't mumble or obscure your face
7. Gesture with your words to aid
8. Be prepared to repair breakdowns when needed
 - c. Rephrase, simplify, etc

E.8. Say It! Repair Strategies – Significant Others Only

1. Please pair up and take turns in wearing earplugs – one person is the listener, the other person is the speaker who will use conversation repair strategies
2. **Speaker:** please read aloud the phrase on the separate sheet of paper
3. **Listener:** please pick a strategy card and hand it to the speaker
4. **Speaker:** please try the repair strategy printed on the card

Caution -- *Don't stress! some repair strategies may not be applicable*

5. When both of you have taken turns, please order the cards in terms of difficulty
6. Have fun!

(3) Repair Strategies Phrases – Significant Others

1. Do you want to go to the market on Monday?
2. I'm very tired, I just want to go to sleep.
3. Can you make me a cup of tea please?
4. I spoke to Mary on the phone, she has the flu.

REPEAT

Say the sentence again

-----Example-----

Original Sentence: *my mother called today*

Repair: *my mother called today*

REPHRASE

Use different words

-----Example-----

Original Sentence: *the television is not working*

Repair: *the TV's broken*

SIMPLIFY

Use fewer, more common words

-----Example-----

Original Sentence: *the black and white cardigan is hanging in the closet*

Repair: *the sweater's in the closet*

KEYWORD

Use one key word

-----Example-----

Original Sentence: *the boys are playing cricket*

Repair: *cricket*

ELABORATE

Repeat key words or provide more information

-----Example-----

Original Sentence: *I made some chicken*

Repair: *I made some chicken. We'll take it to the BBQ*

DELIMIT

Limit the possible answers when asking a question

-----Example-----

Original Sentence: *Where did you go?*

Repair: *Did you go home or to the party?*

BUILD FROM THE KNOWN

Gesture! Present the information easily

-----Example-----

Original Sentence: *Put the phone on the table*

Repair: *Here's the phone ... there's the table ... put this on it*

APPENDIX F – SEE IT! HEAR IT! SAY IT! POWERPOINT

PRESENTATIONS

F.1. *See It!* Presentation

**SEE IT!
HEAR IT!
SAY IT!**
SESSION 1

Communication Strategies Program
For Working Adults with Hearing
Problems and Their Significant Others

SEE IT! HEAR IT! SAY IT!

1. Overview of Program
2. Objectives / Goals for Each Class
3. Today's Outline: *SEE IT!*
4. Introductions

2

1. PROGRAM OVERVIEW

- Each session focuses on aspects of **improving** communication (work)
- Includes **SOs** because communication is a team effort (home)
 - Begins with presentation of information
 - Contains hands-on activities
 - Concludes with challenges for the week

3

2. OBJECTIVES: SEE IT!

- Participants will **prepare** for effective communication by learning the importance of **visual aspects** of communication
- Those with hearing problems will gain **speechreading** skills and learn to **optimize** their workplace
 - Significant Others: home environment
- Participants will **critically evaluate** their own workspaces (and homes) and make **needed** changes

4

2. OBJECTIVES: HEAR IT!

- Participants will **prepare** for effective communication by learning the importance of **auditory aspects** of communication
- Participants learn to **use language redundancies** and **context clues** to fill in information missed auditorily
- Participants will learn about **assistive listening devices** that can be used in the work setting or at home
- Participants will **critically evaluate** their communication habits at work or at home and **make needed changes**

5

2. OBJECTIVES: SAY IT!

- Participants will **prepare** for effective communication by **learning to be assertive**
- Adults with hearing problems will learn **how to tell others** in the workplace and home how to improve communication
- Participants will learn how to use conversation **repair** strategies
- Adults with hearing problems will learn about their **rights as workers** with hearing impairment

6

3. SEE IT! SESSION OUTLINE

- ✍ Introductions
- ✍ Discussion of problems encountered in the workplace
- ✍ Discussion of problems encountered at home
- ✍ Basics of speechreading
- ✍ Importance of visual cues
- ✍ **Coffee Break**
- ✍ Critical evaluation of your workspace
- ✍ Critical evaluation of your home environment
- ✍ Changes you would like to make

7

4. INTRODUCTIONS

- ✍ Group Facilitators
- ✍ Group Members with **hearing problems**
 - ✍ Name
 - ✍ Why you are here
 - ✍ How long you've had a hearing problem
 - ✍ What (if anything) you've tried before
 - ✍ Where you work and what you do
 - ✍ Who you live with
- ✍ Significant Others
 - ✍ Name
 - ✍ Why you are here
 - ✍ What (if anything) you've tried before to improve communication
 - ✍ What you notice about your SO's hearing problem

8

GROUND RULES

- ✍ Share your experiences
- ✍ Don't bluff
- ✍ Confidentiality
- ✍ Others?

9

BRAINSTORM

✍ BRAINSTORMING COMMUNICATION PROBLEMS

✍ At Work

✍ At Home

✍ Both can take part in this

10

PROBLEMS ENCOUNTERED IN THE WORKPLACE

- ✍ Share some examples of problems you face at work
 - ✍ Who was involved?
 - ✍ How was the room set up?
- ✍ What did you do?
- ✍ What did others do?
- ✍ What was the outcome?
- ✍ What was your desired outcome?

11

PROBLEMS ENCOUNTERED AT HOME

- ✍ Share some examples of problems you face at home
 - ✍ Who was involved?
 - ✍ How was the room set up?/Who was where?
- ✍ What did the person with hearing problems do?
- ✍ What did the significant other do?
- ✍ What did others do?
- ✍ What was the outcome?
- ✍ What was your desired outcome?

12

ADDING VISUAL AND AUDITORY INFORMATION

- ✓ We don't know how we do it – but we are able to add what we see and what we hear to help us understand
- ✓ What we see affects what we hear – and vice versa
- ✓ Clear Speech^{2,3} – speaking in a way that helps the listener understand what's being said
 - ✓ Speaking somewhat slower
 - ✓ Good enunciation – but not over exaggerated

19

SPEECHREADING EXERCISE

- ✓ Watch the speaker's face and listen to the words. Write down what you think is being said.
- ✓ How did you do with this exercise compared to the last one?
- ✓ What kind of mistakes did you make?
- ✓ What would have helped you perform better?

20

ACTIVITIES!

- ✓ Split up into pairs
- ✓ Read the activity sheet and complete the tasks
- ✓ Have fun!

21

ACTIVITY # 1: MINIMAL PAIRS

- ✓ SO's, please wear ear plugs
- ✓ Take turns in being speaker/listener in both conditions
 - ✓ Condition 1: Auditory only (cover your mouth)
 - ✓ Condition 2: Auditory and Visual
- ✓ Mark how much you got correct

22

ACTIVITY # 2: CONCENTRATION SABOTAGE

- ✓ SO's, please wear ear plugs again
- ✓ The facilitator will read aloud 2 stories
- ✓ Answer questions related to stories 1 and 2
- ✓ It might not be as easy as you would like!

23

BACK TOGETHER

- ✓ How did the activities go?
- ✓ How did you do and why?

24

EFFECTIVE COMMUNICATION

- ✓ Conversation – exchange of information and ideas between two or more people
- ✓ Effective communication – ease of exchange of information and ideas
- ✓ **Important elements!**
 1. Speaker
 2. Listener
 3. Message
 4. Environment
- ✓ Communication can break down at any of those elements

13

VISUAL ASPECTS OF EFFECTIVE COMMUNICATION

- ✓ **Visual** information can help increase the ease of the flow of information and ideas in a conversation

 1. Speaker – needs to be visible to listener
 2. Listener – needs to be able to make use of visual information
 3. Message – needs to be clear and concise
 4. Environment – needs to be conducive to getting the most out of the visual aspects of speech

14

BASICS OF SPEECHREADING¹

- ✓ Lipreading – recognizing speech using visual cues
- ✓ Speechreading – recognizing speech using **both** auditory and visual cues
- ✓ It is much easier to recognize speech when you both hear and see the speaker
- ✓ Everyone relies on speechreading to some degree
- ✓ **The greater the hearing impairment, the more we rely on speechreading**

15

WHO IS A GOOD LIPREADER?

- ✓ Younger adults
- ✓ Acquired hearing loss before learn language
- ✓ Good cognitive skills
- ✓ Willingness to guess
- ✓ Ability to use context clues
- ✓ Has an adequate vocabulary
- ✓ Has an adequate world knowledge

16

LIPREADING EXERCISE

- ✓ Watch the speaker's face and write down the words you think are being said
- ✓ How many did you guess correctly?
- ✓ What kinds of mistakes did you make?
- ✓ Why do you think you made those mistakes?

17

WHY IS LIPREADING DIFFICULT?

- ✓ Many sounds of English are not visible on the lips
- ✓ People speak quickly – faster than your eye can recognize the sound
- ✓ Sounds are affected by the other sounds in the same word
- ✓ Many sounds of English look alike on the face
- ✓ Many sounds of English look different when different people say them

18

WHAT HELPS SPEECHREADING?

- ✓ Being familiar with the speaker⁴
- ✓ Females are easier to speechread than males^{5,6}
- ✓ Reducing background noise¹
- ✓ Reducing fatigue and stress¹
- ✓ Being in a well-lit area

25

WHAT HELPS SPEECHREADING – LISTENER ATTRIBUTES

- ✓ Using context clues⁷
- ✓ Being in front of speaker, or at least within a 45° angle⁸
- ✓ Being closer to the speaker (about 1.8 meters)⁹
- ✓ Avoiding distractions
- ✓ Concentration

26

WHAT HELPS SPEECHREADING – SPEAKER ATTRIBUTES

- ✓ Shorter, simpler sentences¹
- ✓ Using common words¹
- ✓ Being in front of listener
- ✓ Being close to listener
- ✓ Having adequate lighting with no shadows on speaker's face⁹
- ✓ Allowing full view of face without obscuring it

27

COFFEE BREAK



28

SPLIT UP

- ✓ BRAINSTORMING SOLUTIONS
- ✓ Person with Hearing Problems
 - ✓ Work
- ✓ Significant Others
 - ✓ Home

29

CRITICAL EVALUATION OF YOUR WORKSPACE

- ✓ Think about the problems you have at work
- ✓ What do you think contributes to difficulties with **speechreading** in those situations?
- ✓ What can you do to improve your speechreading abilities in those situations?

30

**CRITICAL EVALUATION OF YOUR HOME –
SIGNIFICANT OTHERS**

- ✍ Think about any problems arising from home

- ✍ What do you think contributes to difficulties with **speechreading** in those situations?

- ✍ What can you do to **improve your significant other's** speechreading abilities in those situations?

31

CHANGES YOU WOULD LIKE TO MAKE

- ✍ What specific changes could you make at work / home to improve speechreading?
 1. Listener attributes (person with hearing problems)
 2. Speaker attributes (significant other)
 3. Environment attributes
 4. Message attributes

- ✍ Try making some of these changes and report back to the group next session

32

F.2. Hear It! Presentation

See It! Hear It! Say It!

Session 2

Communication Strategies Program
For Working Adults with Hearing Problems and Their Significant Others

SEE IT! HEAR IT! SAY IT!

1. Objectives / Class Goals
2. Ground Rules
3. Today's Outline: *HEAR IT!*

▶ 2

1. Objectives: Hear It!

- ▶ Participants will **prepare** for effective communication by learning the importance of **auditory aspects** of communication
- ▶ Participants learn to **use language redundancies and context clues** to fill in information missed auditorily
- ▶ Participants will learn about **assistive listening devices** that can be used in the work or home settings
- ▶ Participants will **critically evaluate** their own workplace and home environment **communication habits** and **make needed changes**

▶ 3

2. Ground Rules

- ▶ Share your experiences
- ▶ Don't bluff
- ▶ Confidentiality
- ▶ Others?

▶ 4

3. Hear It! Session Outline

- ▶ Discussion of changes made to workplace and home environment from previous session
- ▶ Review problems encountered in workplace or home
- ▶ Discussion of **auditory** aspects of communication
- ▶ Discussion of **language redundancies** and **context clues**
- ▶ Information about **assistive listening devices**
- ▶ **Coffee Break**
- ▶ Critical evaluation of your workspace / home
- ▶ Changes you would like to make

▶ 5

Changes Made From Last Session

- ▶ What changes did you want to make in your workspace and home from last session?
- ▶ What changes did you make?
- ▶ What was the outcome?

- ▶ What changes were you not able to make?
- ▶ What prevented you from making them?

- ▶ What else can you do?

▶ 6

Problems Encountered in the Workplace

- ▶ Share some examples of problems you encounter in the workplace (can be the same or different from last session)
 - ▶ Who was involved?
 - ▶ How were they speaking?
 - ▶ Were you familiar with the topic?
 - ▶ Was there background noise?
- ▶ What did you do?
- ▶ What did others do?
- ▶ What was the outcome?
- ▶ What was your desired outcome?

▶ 7

Problems Encountered in the Home Environment

- ▶ Share some examples of problems you encounter in the home environment (can be the same or different from last session)
 - ▶ Who was involved?
 - ▶ How were they speaking?
 - ▶ Were you familiar with the topic?
 - ▶ Was there background noise?
- ▶ What did the person with hearing problems do?
- ▶ What did the Significant Other do?
- ▶ What did others do?
- ▶ What was the outcome?
- ▶ What was your desired outcome?

▶ 8

Auditory Aspects of Effective Communication

- ▶ **Auditory** information can help increase the ease of the flow of information and ideas in a conversation
- 1. **Speaker** – needs to be audible to listener
- 2. **Listener** – needs to be able to make use of auditory information
- 3. **Message** – needs to be clear and concise
- 4. **Environment** – needs to be conducive to getting the most out of the auditory aspects of speech

▶ 9

Distance Affects Audibility

- ▶ The further away the speaker is from the listener, the softer the speech will be when it reaches the listener
 - ▶ Sound travels in a spherical shape away from the speaker
 - ▶ The energy in the sound is spread over a greater area
 - ▶ There is less energy available as the listener is farther away from the speaker
- ▶ You will be able to hear the speech at softer levels than you will need to understand it
- ▶ Everyone has difficulty hearing and understanding speech if it is very soft
- ▶ **The greater the hearing impairment, the closer we need to be to the speaker to hear and understand speech**

▶ 10

Types of Hearing Impairment

- ▶ Conductive
 - ▶ Problem is in the outer or middle ear
 - ▶ Is often medically treatable
- ▶ Sensorineural
 - ▶ Problem is in the organ of hearing or the nerve of hearing
 - ▶ Almost never medically treatable
- ▶ Mixed
 - ▶ More than one problem
 - ▶ One in the sensorineural portion and one in the conductive portion

▶ 11

Problems Resulting from Sensorineural Hearing Impairment

- ▶ Cannot hear what is being said
 - ▶ Soft sounds become inaudible
- ▶ Cannot understand what is being said
 - ▶ Speech is becomes unclear and distorted
- ▶ Background noise is a problem
 - ▶ Makes speech even more distorted
 - ▶ Makes listener tired and distracted
- ▶ Hearing aids are designed to address the first problem
 - ▶ Do not address problems with listener's ability to understand what is being said or difficulty understanding in background noise
 - ▶ Even with hearing aids, people need to use communication strategies

▶ 12

Shape of Hearing Impairment

- ▶ "I know you're talking, but I don't know what you're saying"
- ▶ When there is little hearing impairment in the lower pitches (or normal hearing), you can hear that people are talking
- ▶ When there is more hearing impairment in the higher frequencies, you have difficulty understanding what people are saying
- ▶ More common for people with sensorineural hearing impairment

▶ 13

Language Redundancies and Context Clues

- ▶ People with sensorineural hearing impairment **do not** need to hear every speech sound to understand speech
- ▶ Language markers (e.g., number marker -s)
 - ▶ Tend to be soft and higher in pitch
 - ▶ If the noun is singular (e.g., man), you do not need to hear the number marker on the verb (e.g., eats)
- ▶ Grammatical rules (e.g., sentence order)
 - ▶ If you hear book ... on ... table, you do not need to hear other words to understand sentence
- ▶ Context clues
 - ▶ If you know the context of the conversation, you can guess what some of the words will be

▶ 14

ACTIVITIES!

- ▶ Split up
- ▶ Read the handouts
- ▶ Have fun!

▶ 15

Activity # 1: Context Clues - Auditory

- ▶ 1. Take turns in being speaker/ listener
 - ▶ SO's please use foam ear plugs
- ▶ 2. **Speaker:** please read the words or phrases and only mouth the bolded word
- ▶ 3. **Listener:** guess the missing word

▶ 16

Activity # 2: Context Clues - Picture

- ▶ 1. Take turns in being speaker/ listener
 - ▶ SO's please use foam ear plugs
- ▶ 2. **Speaker:** please read the words or phrases and only mouth the bolded word
- ▶ 3. **Listener:** guess the missing word using the pictures

▶ 17

Assistive Listening Devices

- ▶ Hearing Assistance Technology Systems (**HATS**)
- ▶ Used to help people with hearing problems receive speech and non-speech information¹⁰
- ▶ Can be used for a large group or for an individual
 - ▶ Public address (PA) systems
 - ▶ Headphones
 - ▶ Amplified telephones
- ▶ Can be used with or without hearing aids
- ▶ Health and safety concerns if cannot hear alarms

▶ 18

Common Assistive Listening Devices (work)

- Telephone
 - Amplified phone, amplified ringer, visual voice mail, relay service
 - Texting and emailing when possible
- Groups
 - Conference microphone (less efficient as group size increases), pa system (less efficient as group size decreases), FM system
 - Note-taker, recording for later listening
- Background noise
 - FM system, PA system
- Audio-visual material
 - Infra-red system, closed captioning

▶ 19

Other ALDs - Home

- FM Systems
- Amplified telephones
- TV or radio headphones
- Alarm clocks
- Light sensors

▶ 20

Coffee Break



▶ 21

Split up

- BRAINSTORMING SOLUTIONS
- Person with Hearing Problems
 - Work
- Significant Others
 - Home

▶ 22

Critical Evaluation of Your Workspace

- Think about the problems you have at work
- What contributes to difficulties hearing and understanding in those situations?
- What can you do to improve your hearing and understanding in those situations?
- What HATs might be useful?


▶ 23

Critical Evaluation of Your Home Environment

- Think about the problems there might be at home
- What contributes to difficulties hearing and understanding in those situations?
- What can you do to improve hearing and understanding in those situations?
- What HATs might be useful?


▶ 24

F.3. Say It! Presentation



See It! Hear It! Say It!
Session 3


Communication Strategies Program
For Working Adults with Hearing Problems and Their
Significant Others



SEE IT! HEAR IT! SAY IT!

1. Objectives / Class Goals
2. Ground Rules
3. Today's Outline: SAY IT!


2



I. Objectives: Say It!

- Participants will prepare for effective communication by learning to be assertive
- Participants will learn how to tell others in the workplace how to improve communication
- Participants will learn how to use conversation repair strategies
- Those with hearing problems will learn about their rights as workers with hearing impairment


3



2. Ground Rules

- Share your experiences
- Don't bluff
- Confidentiality
- Others?


4



3. Say It! Session Outline

- Discussion of changes made to workplace/home from previous session
- Review problems encountered in workplace/home
- Discussion of **communication strategies**
- Discussion of **conversation repair strategies**
- Information about **worker rights**
- Coffee Break**
- Critical evaluation of your workspace/home
- Changes you would like to make


5



Changes Made From Last Session

- What changes did you want to make in your workspace (home) from last session?
- What changes did you make?
- What was the outcome?
- What changes were you not able to make?
- What prevented you from making them?
- What else can you do?


6



Problems Encountered in the Workplace

- ✍️ Share some examples of problems you encounter in the workplace (can be the same or different from last session)
 - ! Who was involved?
 - ! Describe the situation
- ✍️ What did you do?
- ✍️ What did others do?
- ✍️ What was the outcome?
- ✍️ What was your desired outcome?


7



Problems Encountered in the Home Environment

- ✍️ Share some examples of problems encountered in the home environment (can be the same or different from last session)
 - ! Who was involved?
 - ! How were they/you speaking?
 - ! Was the topic familiar?
 - ! Was there background noise?
- ✍️ What did the person with hearing problems do?
- ✍️ What did the significant other / others do?
- ✍️ What was the outcome?
- ✍️ What was your desired outcome?


8



Ineffective Communication Strategies

- ✍️ Talk more than you need to so you can hold the conversational floor
- ✍️ Interrupt to take control over the conversation
- ✍️ Pretend to be understanding when you are not
- ✍️ Withdraw from the conversation
- ✍️ Becoming angry or upset when conversations break down


9



Communication Strategies

- ✍️ Acknowledge emotional reactions
 - ! Relax, take deep breaths, allow extra time
- ✍️ **Prepare** for effective communication
 - ! Get the most from visual cues
 - ! Get the most from auditory information
 - ! Learn vocabulary to be used
 - ! Become knowledgeable about topic and people involved


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Conversation Repair Strategies

- ✍️ All conversations can break down – despite your preparation efforts
- ✍️ Learning how to **repair** a conversation breakdown is important in the workplace
 - ! You maintain good working relationships
 - ! You appear confident and competent
 - ! You model healthy conversation style for everyone

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Specific Repair Strategies¹

- ✍️ Repeat at least some of the message when asking for a repair
- ✍️ Ask the speaker to rephrase
- ✍️ Ask the speaker to make the message simpler
- ✍️ Ask the speaker to tell you the topic of conversation
- ✍️ Let the speaker know what part of the message you do understand
- ✍️ Give the speaker feedback about what's working
- ✍️ If all else fails, ask the speaker to write it down

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What is Your Style?!

- ✍ **Passive**
 - ! You want to avoid misunderstandings and conflicts
 - ! You may withdraw from a conversation or bluff when you can't follow it
 - ! You may avoid situations you think will be difficult
- ✍ **Aggressive**
 - ! You want to protect your rights, sometimes at the expense of others
 - ! You may feel frustrated or resentful when you can't follow the conversation
 - ! You may demonstrate a uncooperative attitude and dominate the conversational floor

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What is Your Style?!

- ✍ **Passive-Aggressive**
 - ! You may use a passive style at first, then move to an aggressive style as you become more frustrated
 - ! You may use sarcasm and procrastination
- ✍ **Assertive**
 - ! You take responsibility for effective communication in a collegial way
 - ! You openly discuss your communication problems and tell others how best to communicate with you
 - ! You model effective communication and acknowledge the efforts made by others

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Guess the Style!

- ✍ Role Play

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Role Play Exercise

Act out the scene on the script.

What communication style is being shown in each?

How could the person in the script have been more assertive?

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Activities!

- ✍ Split up
 - ! Person with hearing problems group
 - ✍ Worker Rights
 - ✍ Scenarios
- ! SO group
 - ✍ Repair Strategies
 - ✍ Scenarios
- ✍ Complete the activities
- ✍ Have fun

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Your Worker Rights

Refer to leaflets

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Adult with Hearing Problems

- Activity # 1: Scenarios

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Significant Other Activities

- Activity # 1: Repair Strategies
- Activity # 2: Scenarios (if there's time)

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Coffee Break



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Critical Evaluation of Your Workspace

- Think about the problems you have at work
- What contributes to communication breakdowns in those situations?
- What can you do to reduce communication breakdowns or repair them when they occur?
- What worker rights do you have that you are not taking advantage of?

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Split Up

- BRAINSTORMING SOLUTIONS
- Person with Hearing Problems
 - ! Work
- Significant Others
 - ! Home

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Critical Evaluation of Your Home Environment (SOs)

- Think about the problems there might be at home
- What contributes to communication breakdowns in those situations?
- What can be done to reduce communication breakdowns?

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Changes You Would Like to Make

✍️ What specific changes could you make to reduce communication breakdowns or improve outcomes of repairs?

✍️ Person with hearing difficulty - work

✍️ Significant other – home

1. Listener attributes
2. Speaker attributes
3. Environment attributes

✍️ What worker rights are available to you that you would like to implement at work?

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