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The Impact of Hearing Aid Usage on Psychosocial Functioning in Both Hearing Impaired People and Their Communication Partners

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**Publication Date**

2020

Peer reviewed|Thesis/dissertation

The Impact of Hearing Aid Usage on Psychosocial Functioning in Both Hearing Impaired People and Their Communication Partners

by  
Lisa Kritikos

THESIS  
Submitted in partial satisfaction of the requirements for degree of  
MASTER OF SCIENCE

in

Nursing

in the

GRADUATE DIVISION  
of the  
UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

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## **The Impact of Hearing Aid Usage on Psychosocial Functioning in Both Hearing Impaired People and Their Communication Partners, Lisa Viia Kritikos, Abstract**

**Background:** Hearing loss is highly prevalent, especially among older adults. Left untreated, hearing loss is linked to negative outcomes, that affect both the person with hearing loss and the communication partner. Previous research has shown that hearing loss can negatively affect their physical and mental health, as well as their psychosocial functioning but the use of hearing aids can reduce these negative effects. The current longitudinal study aimed to investigate the potential effect of hearing aid use on psychosocial functioning in both people with hearing impairment and their communication partners in a community sample across one year.

**Methods:** Data were from 84 hearing impaired persons and 81 communication partners recruited as part of a longitudinal qualitative and quantitative study designed to examine the experiences of hearing impaired older adults and their communication partners over the course of one year. Participants completed the Short Form of the Hearing Handicap Inventory for the Elderly (HHIE-S), the emotional subscale of the Personal Assessment of Intimacy in Relationships (PAIR), and the 20-Item Short Form Survey (SF-20) at baseline and then again after intervals of three and 12 months.

**Results:** Hearing aid use was negatively associated with hearing handicap index scores for both participants with hearing loss ( $p < 0.0001$ ) and communication partners ( $p < 0.0001$ ) indicating hearing aid use reduced hearing handicap for both hearing impaired participants and communication partners. Hearing aid use was not associated with scores on the PAIR or SF-20 for either the participants with hearing loss or their communication partners.

**Discussion:** Hearing aid use reduced hearing handicap for both hearing impaired persons and their communication partners. Nurses can increase awareness and provide education about the

negative consequences of untreated hearing loss for the hearing impaired person and their communication partner with the goal of facilitating earlier access to hearing aids.

## Table of Contents

Introduction .....	1
Methods .....	5
Results .....	8
Discussion .....	10
References .....	18

List of Tables

**Table 1.** Demographics at 12 months..... 16

**Table 2.** Hearing aid associations with multiple phenotypes ..... 17

## **Introduction**

Hearing loss is highly prevalent, especially among older adults. Worldwide, approximately one-third of individuals 65 years of age and older are affected by disabling hearing loss (WHO, 2018). In the United States, two thirds of individuals aged 70 years or older have bilateral hearing loss, and almost three quarters have hearing loss in at least one ear (Goman & Lin, 2016). While often discounted or considered a normal age-related change, hearing loss is increasingly recognized as a serious health issue, as highlighted in an extensive report accomplished by the National Academy of Science (National Academies of Sciences, Engineering, and Medicine, 2016).

Left untreated, hearing loss is linked to negative outcomes, including depression, isolation, and risk of falls (Lin & Ferrucci, 2012; Morikawa et al., 2013). Importantly, these negative outcomes affect both persons with hearing loss and their communication partners (e.g., spouses, family members, caregivers). One important factor to consider as it relates to these outcomes is the negative impact of hearing loss on an older adult's ability to engage and be socially active. A review of psychosocial functioning in persons with hearing loss showed that they tend to experience reduced social activity, increased feelings of exclusion, and increased isolation (Arlinger, 2003). Another study of 996 older adults in Amsterdam found that higher levels of self-reported hearing impairment predicted worse social support over time (Pronk et al., 2011). Finally, a study of 860 older adults found that 20.6% of adults between 60-69 years of age and 19.8% of adults between 70-84 years of age reported both hearing loss and feelings of social isolation (Mick, Kawachi, & Lin, 2014). Reduced engagement may, in turn, contribute to feelings of anxiety and depression.



A possible link between social engagement and psychosocial functioning was identified in a classic study of 194 elderly veterans in the US. The authors found that 85% of those with hearing impairment reported moderate communication difficulties with a large proportion reporting social and emotional handicap (Mulrow et al., 1990). In a more recent review of hearing loss literature, Arlinger states that persons with hearing loss who had impaired social functioning were more likely to report depressive symptoms (Arlinger, 2003). Additionally, hearing impairment has been associated with worse scores in social functioning and emotional problems subscales on the Short Form-25 scale (Chia et al., 2007). Anxiety also has been found to be more prevalent among individuals with mild and moderate hearing impairment (Contrera et al., 2017). Several studies report an association between hearing loss and depression among older adults (Huang et al., 2010; Morikawa et al., 2013), further supporting a possible connection between hearing loss and psychosocial function that may be mediated by a reduction in social functioning.

While the consequences of hearing loss on the individuals themselves are well documented, it is often underappreciated that communication partners are also affected. In a longitudinal study of health and well-being, spouses of people with self-reported hearing loss reported increased depression, worse self-rated mental health, increased negative affect, decreased happiness, decreased energy levels, and poorer marital quality than spouses of people without hearing loss (Wallhagen, Strawbridge, Shema, & Kaplan, 2004). A more recent study found that spouses of older persons with hearing impairment experience disability such as communication challenges, impeded daily and social activities, and relationship strain (Scarinci, Worrall, & Hickson, 2012). Finally, a systematic review of consequences of hearing loss on the communication partner found that communication partners of the people with hearing

impairment report a restricted social life, increased communication burden, poorer quality of life, and decreased relationship satisfaction (Kamil & Lin, 2015).

Treatment of hearing loss, most commonly in the form of hearing aids, has been shown to be helpful in offsetting some of the negative consequences of hearing loss for older adults (Brooks, Hallam, & Mellor, 2001; Kennedy, Stephens, & Fitzmaurice, 2008; Kramer et al., 2005; Mo, Lindbaek, & Harris, 2005; National Council on Aging, 1998). However, hearing aid use by people with hearing loss is far from universal. According to the National Institute on Deafness and Other Communication Disorders, fewer than 30% of adults age 70 and older who would benefit from hearing aid use have ever tried them (National Institute on Deafness and Other Communication Disorders, 2020). Barriers to use among older adults is well studied and proves to be a multifaceted issue related to factors including the stigma of hearing aid use (Wallhagen, 2010), cost of hearing aids (Mamo, Neiman, & Lin, 2016), and inadequate screening of hearing loss in primary care settings (Wallhagen & Reed, 2018).

When barriers to hearing aid use are addressed, hearing aids have been shown in some studies to be an effective treatment for hearing loss. Hearing aid use is associated with positive outcomes for both the person and their communication partner. Chia and colleagues found that individuals who wore hearing aids reported slightly improved “physical functioning” and reduced “role limitation due to physical problems” on the SF-36 compared to participants with untreated hearing loss, but these differences did not reach statistical significance (Chia et al., 2007). In terms of social function, a recent study found that treatment with hearing aids was associated with significant improvement in self-reported hearing handicap as measured by the Short Form of the Hearing Handicap Inventory for the Elderly (Dawes et al., 2015). Hearing aid use has also been associated with improved communication function, reduced depressive

symptoms, and a significant decline in perceptions of loneliness after just one month of hearing aid use (Weinstein, Sirow, & Moser, 2016). Thus, there is support for the idea that treatment of hearing loss with the use of hearing aids can help offset some of the negative psychological and social consequences of hearing loss for the hearing impaired person.

Likewise, there is support that hearing aid use by the individual can offset negative consequences of hearing impairment for the communication partner. In fact, a survey conducted by the National Council on Aging found that significant others of hearing aid users reported greater resulting benefits from the aid than the users themselves in all areas measured including relationships, mental health, and quality of life (National Council on Aging, 1998). Studies exploring the impact of cochlear implants from the perspective of the communication partner found slight benefits for the communication partner such as decreased burden of communication, increased participation in life activities, and improved psychological functioning (Kennedy, Stephens, & Fitzmaurice, 2008; Mo, Lindbaek, & Harris, 2005). Studies regarding hearing aid use, specifically, have found that spouses of people with hearing loss generally report improvements in quality of life following hearing aid fitting and use (Brooks, Hallam, & Mellor, 2001; Kramer et al., 2005). One study assessed 93 communication partners before and after hearing aid fitting and found that the majority of communication partners reported less frustration and less effortful communication with their spouses (Stark & Hickson, 2004). Therefore, there is support that communication partners benefit from their spouse's hearing aid use. However, these studies have limitations such as the use of homegrown questionnaires or small samples of communication partners. A prospective study using validated measures of psychosocial functioning to explore the potential benefits of hearing aid use on the communication partner is needed.

In summary, untreated hearing loss is a prevalent and burdensome problem for both the person with hearing loss and their communication partner. It can negatively affect their physical and mental health, as well as their psychosocial functioning. Barriers exist to hearing aid use but previous studies have shown benefits for people with hearing loss and their communication partners when hearing aids are used. The current longitudinal study aimed to investigate the potential effect of hearing aid use on psychosocial functioning in both people with hearing impairment and their communication partners in a community sample across one year.

## **Methods**

### **Participants and Procedure**

Participants were dyads consisting of a hearing impaired person and their communication partner. Data was collected as part of a longitudinal qualitative and quantitative study designed to examine the experiences of hearing impaired older adults and their communication partners over the course of one year. Participants were recruited as they sought information about hearing loss testing or treatment from clinics or centers that performed hearing evaluations or provided informational seminars on hearing loss. Individuals who were interested responded to flyers that were posted in reception areas or information packets that were distributed by hearing professionals or office personnel.

Eligibility was determined via telephone screening. To be eligible, the persons with hearing loss had to meet the following inclusion criteria: age 60 or older, cognitively capable of providing informed consent, ability to read and understand English, presence of a willing communication partner, residence within 1.5 hours travel distance of the study center, untreated hearing loss, and no prior experience with hearing aids or had not worn them within the past

year. A total of 91 dyads were recruited, consented, and interviewed at baseline, three months, and 12 months. However, four hearing impaired persons and six communication partners were lost to follow-up at the three month and an additional three hearing impaired persons and four communication partners were lost to follow-up at the 12 months follow-up time. For a more complete description, please see Wallhagen & Pettengill (2008).

## **Data Collection**

At each timepoint, the hearing impaired individual and their communication partner were interviewed at the same time but separately. In addition to an in-depth interview, participants completed several questionnaires, including the Short Form of the Hearing Handicap Inventory for the Elderly (HHIE-S), the emotional subscale of the Personal Assessment of Intimacy in Relationships (PAIR), and the 20-Item Short Form Survey (SF-20). The current study focuses on the impact of hearing aids on the responses from both the person with hearing loss and their partner to these questionnaires.

## **Instruments**

### ***Hearing Handicap Inventory for the Elderly***

The 10-item Short Form version of the Hearing Handicap Inventory for the Elderly (HHIE-S) was used to measure the emotional and social impact of hearing loss (Ventry & Weinstein, 1982; Weinstein, 1994; Weinstein, Spitzer, & Ventry, 1986). On this questionnaire, participants rate the emotional and social impact of hearing loss in different situations. There are three response options with points associated with them (Yes = 4 points, Sometimes = 2 points, No = 0 points) which are summed. The total scores range from 0 to 40, with a higher score

indicating more impairment. In order to measure the experience of the communication partner, questions on the HHIE-S were modified to reflect how the communication partner is affected by their partners' hearing impairment. For example, "Do you feel that any difficulty with your partner's hearing limits or hampers your personal or social life?" and "Does your partner's hearing problem make it difficult to speak without raising your voice?".

### ***Personal Assessment of Intimacy in Relationships***

The 6-item Emotional Subscale of the Personal Assessment of Intimacy in Relationships (PAIR) was used to measure the potential impact of hearing loss on intimacy in the relationship. On this questionnaire, participants indicate their level of agreement with statements about their relationship. Items include statements such as, "I often feel distant from my partner" and "I can state my feelings without him/her getting defensive". Participants rate the degree to which they agree with each item on the 5-point Likert scale. Scores are calculated so that higher scores indicate higher levels of intimacy in the relationship (Schaefer & Olson, 1981). This tool is commonly used to measure relational intimacy between spouses and it has been used in a variety of populations (Lafontaine, Hum, Gabbay, & Dandurand, 2018; Manne, Siegel, Kashy, & Heckman, 2014; Moreira & Canavarro, 2013).

### ***20-Item Short Form Survey***

The 20-Item Short Form Survey (SF-20) was used to measure the effect of hearing aid use on six categories of health status. The SF-20 evolved from a tool developed for use with the Medical Outcomes Study and assesses how much the individual's health limits them in a range of domains. These domains include physical functioning (six questions), role functioning (two questions), social functioning (one question), and mental health (five questions). Exemplar items include, "Does your health keep you from working at a job, doing work around the house, or

going to school” (role function) and “How much of the time during the past month has your health limited your social activities (like visiting with friends or close relatives)” (social function). The scores are coded and calibrated so that each of the categories is weighted equally. Each item score is correlated with a scale from 0 to 100, with higher values indicating better status overall (Stewart, Hays, & Ware, 1988).

### **Data Analysis**

All analyses for the current study were done using R v3.6.0 (R Core Team, 2019). Counts and percentages were calculated for dichotomous variables, and medians and interquartile ranges were calculated for continuous variables.

We were interested in investigating the effect of hearing aid use on study outcomes, such as psychosocial handicap as measured by the Short Form of the Hearing Handicap Index for the Elderly (HHIE-S). We fit a robust linear mixed model to account for repeated measures at baseline, three months, and 12 months, as well as to account for departures from normality. The outcome was adjusted for hearing aid usage (the covariate of interest, which varied by time), time, age, and gender. We employed a Bonferonni correction for the six models included and considered  $p < 0.0083$  to be significant, and also report suggestive nominal associations ( $p < 0.05$ ).

## **Results**

### ***Study Population***

Participant demographics are summarized in Table 1. Participants ranged in age from 60 to 93 years old (mean age = 72.9 years,  $SD = 7.5$ ). A total of 52 (57%) were men, 66 (73%) were married or partnered, 61 (67%) were graduates of post-high school education, 61 (67%) were retired, and 82 (90%) were White. A total of 57 dyads (63%) were spouse couples, 12 dyads

(13%) were parent-child pairs, and 22 dyads (24%) were other relationship types. The length of dyad relationship ranged from approximately seven months to 61 years (mean = 33.5 years,  $SD = 17.2$ ). On the basis of the high frequency pure tone average (HFPTA) categories, 27 (30.3%) of the participants had mild hearing loss, 52 (58.4%) had moderate hearing loss, and seven (7.9%) had severe or profound hearing loss. Only three (3.4%) individuals had HFPTA scores that were within normal limits, but all three scored high on the HHIE-S (scores of 22, 22, and 32), suggesting that they viewed their hearing loss as having a considerable negative impact.

### ***Hearing Handicap Inventory for the Elderly***

The effect of hearing aid use on outcome measures is described below and summarized in Table 2. Hearing aid use was negatively associated with HHIE-S scores for both participants with hearing loss (estimate = -4.7, 95% CI = -7.1 to -2.4,  $p = 0.000071$ ) and communication partners (estimate = -3.0, 95% CI = -4.7 to -1.4,  $p = 0.00037$ ). Hearing aid use reduced hearing handicap for both hearing impaired participants and communication partners.

### ***Personal Assessment of Intimacy in Relationships***

Hearing aid use was not significantly associated with PAIR scores for both participants with hearing loss (estimate = -0.08, 95% CI = -0.93 to 0.77,  $p = 0.85$ ) and communication partners (estimate = 0.35, 95% CI = -0.58 to 1.29,  $p = 0.46$ ). There was no effect of hearing aid use on relationship intimacy as measured by the PAIR.

### ***20-Item Short Form Survey***

There was also no effect of hearing aid use on any of the four SF-20 scores. For participants with hearing loss there was no association between hearing aid use and the physical functioning subscale (estimate = 1.59, 95% CI = -3.11 to 6.29,  $p = 0.51$ ), role functioning subscale (estimate = 3.38, 95% CI = -6.52 to 13.28,  $p = 0.5$ ), social functioning subscale



(estimate = 1.06, 95% CI = -4.78 to 6.9,  $p = 0.72$ ), or mental health subscale (estimate = -0.72, 95% CI = -3.78 to 2.34,  $p = 0.65$ ). Likewise for communication partners there was no association between hearing aid use and the physical functioning subscale (estimate = 2.88, 95% CI = -0.84 to 6.59,  $p = 0.13$ ), role functioning subscale (estimate = 0.82, 95% CI = -6.67 to 8.31,  $p = 0.83$ ), social functioning subscale (estimate = 0.10, 95% CI = -4.86 to 5.05,  $p = 0.97$ ), or mental health subscale (estimate = 0.55, 95% CI = -2.31 to 3.40,  $p = 0.71$ ).

There were no associations between hearing aid use and other demographic variables included in the models, such as sex and age, and hearing aid use did not significantly covary with time.

### **Discussion**

Our study sought to investigate the impact of hearing aid usage on psychosocial functioning in both hearing impaired people and their communication partners. We analyzed data from 84 hearing impaired persons and 81 communication partners. Participants completed the HHIE-S, PAIR, and SF-20 questionnaires at baseline, three months, and 1 year. Hearing aid use reduced hearing handicap for both hearing impaired persons and their communication partners but had no significant association with PAIR scores or the SF-20 subscales for either the hearing impaired participant or their communication partner. Additionally, there were no significant associations between hearing aid use and gender or age.

The fact that the use of hearing aids led to decreased scores on the HHIE for both the hearing impaired and communication partner indicates that hearing aids can alleviate some of the psychosocial handicap caused by hearing loss. Importantly, the communication partners also endorsed that they felt less psychosocial handicap in their interaction with their hearing impaired loved one. These results might be expected because hearing loss is negatively associated with the

ability to engage with others and be socially active and can lead to social isolation and depression. Through the use of hearing aids, people with hearing loss may feel more comfortable engaging in the activities described on the HHIE, such as meeting new people. These results support the view that hearing aids may help people feel better about their ability to communicate with others and align with work done by Chisolm and colleagues (2004). In their work, they found that hearing aid use improved both short and long term self-perception of communication performance. Furthermore, it has been demonstrated in the literature that communication partners are also negatively affected by a loved one's hearing impairment. Our study found that when the person with hearing loss used hearing aids, their communication partner also reported less psychosocial handicap due to their partner's hearing loss.

Due to the fact that hearing aids improve psychosocial functioning in both the hearing impaired person and communication partner, it is interesting that the use of hearing aids did not affect scores on the PAIR. It is reasonable to think that improved psychosocial functioning would allow for increased intimacy between a hearing impaired person and their communication partner. However, according to a recent review (Lehane, Dammeyer, & Elsass, 2017), the literature regarding hearing loss and couples' relationship quality has yielded conflicting findings. Some data suggest that hearing loss has a negative effect on marriage satisfaction (Anderson & Noble, 2005; Govender, Maistry, Soomar, & Paken, 2014; Wallhagen, Strawbridge, Shema, & Kaplan, 2004), while other studies found that couples were able to utilize coping strategies to offset the difficulties caused by one partner's hearing loss (Knutson, Johnson, & Murray, 2006; LaPierre, Ferguson, & Jiregna, 2012;). It is possible that while, on average, our sample shows no change in relationship intimacy as measured by the PAIR, significant individual variation exists and, mirroring the literature, some couples experience

negative relationship consequences due to hearing loss while others are more able to cope. One potential explanation for our findings is that the majority of these dyads had been married for many years and have established relationships and communication patterns. Perhaps a different assessment tool, one that measures more short-term communication patterns or that is more specific to the impact of hearing loss, may be more appropriate for measuring this effect.

It is also interesting that hearing aids did not impact the scores on the SF-20, despite our finding that hearing aids decreased hearing handicap for hearing impaired persons and their communication partners. This may be a measurement issue as the SF-20 only includes one item measuring social functioning and two items measuring role functioning and thus not able to capture most aspects of the participants' experiences in these areas. In addition, the limited number of items on these measurements may be constraining the variability in our sample. A future study should utilize measurements of social and role functioning that allow for more variability. Concerns about the item-response distributions have been expressed regarding the use of the SF-20 in several clinical populations including people who are HIV seropositive (Holmes, Bix, & Shea, 1996) and older adults in the community (McHorney, 1996). In these studies, the physical, role, and social functioning subscales were found to suffer from ceiling effects in their distributions. When scores are subject to ceiling effects, any potential improvement due to intervention cannot be captured due to the limited range of results. Further, the items specifically ask for the impact of the individual's "health" and, thus, the referent used to respond is unrelated to the hearing loss. In addition, hearing impairment is just one component of someone's life and a majority of our sample had other comorbidities. Improvement in one area, such as improving hearing with hearing aids, may not be captured on a questionnaire that addresses many medical conditions. Finally, it is important to acknowledge that hearing aids are

not a cure for hearing loss. Even with hearing aids, persons with hearing loss are not able to hear normally. Hearing aids make communication easier but do not fully solve the problem. This might also help to explain why we did not find a significant effect of hearing aid use on health status as measured by the SF-20.

Our findings are similar to those of other studies that have examined the relationship between hearing aid use and various quality of life variables. A systematic review by Chisholm and colleagues (2007) found that hearing aid use may be specifically related to hearing related quality of life as measured by disease specific instruments such as the HHIE. Based on their meta-analysis the authors concluded that while the beneficial effect of hearing aid use on hearing specific quality of life was in the small to medium effect size range, studies that used more global or generic measures of quality of life (eg. SF-36) typically showed effects that were small or non-significant. Similarly, Mulrow and colleagues (1990) found that hearing aid use was associated with a reduction in scores on the HHIE for the hearing impaired persons while Stark and Hickson (2009) found the same effect in hearing impaired persons in addition to their significant others. Given these previous findings and the findings of the current study, we can conclude that one benefit of hearing aid use is a reduction in self-reported psychosocial handicap, as it relates specifically to hearing loss for both hearing impaired persons and their communication partners, while there is less support for improvement in global quality of life scores.

Our study is limited in that it was conducted as part of a larger qualitative study so the tools that were selected may not be perfectly aligned with the aims of the current study. Despite efforts made by the larger study to recruit a diverse population, our sample was predominantly White. Ideally, a future study would take special care to recruit a more diverse population.

Finally, the majority of the dyads consisted of spouses. While not necessarily a limitation, it might be interesting to investigate the effect of hearing aid use on non-spousal communication partners such as hired caregivers. It would also be interesting to explore how hearing aid use affects communication with primary care providers and a hearing impaired person's involvement in their health care.

Our findings have important implications for nurses. Nurses can make a difference by increasing awareness and providing education about the negative consequences of untreated hearing loss on the hearing impaired person and their communication partner. Informing both the person with hearing loss and the communication partner of the effects of hearing loss on the communication partner may motivate the hearing impaired person to pursue hearing aids. The knowledge of the negative impact of hearing loss and the benefit that hearing aids can provide, may help both persons with hearing loss and their communication partners weigh the benefit of treatment with any perceived stigma that may be felt about the treatment options. One study in particular found that perceived stigma from the hearing impaired person's spouse was an influencing factor in decision making processes at multiple points along the continuum of hearing loss from initial acceptance, to pursuing treatment and testing, and finally in determining when and where hearing aids are worn (Wallhagen, 2010). Furthermore, the discussion of hearing aids by a health professional may validate the experience of the communication partner and empower them to encourage their hearing impaired partner to get tested and treated. It can also validate hearing loss as an important health issue for the person with hearing loss as hearing loss is often attributed to normal aging processes. Education and awareness of the importance of hearing loss may encourage persons with hearing loss and their communication partners to advocate that their primary care provider screen for hearing loss and refer for further treatment as

appropriate. Thus, through screening and education, nurses could play an important role in facilitating earlier access to hearing aids and help both the person with hearing loss and their communication partner.

**Table 1.** Demographics at 12 months. Values given are median (interquartile range), or N (%).

	Hearing Impaired Person		Communication Partner	
	Yes	No	Yes	No
Hearing aid use				
N	58	26	57	24
Age	75 (70 – 78)	71 (63 – 76)	66 (59 – 74)	68 (59 – 73)
Male, N (%)	38 (65.5%)	10 (38.5%)	15 (26.3%)	10 (41.7%)
HHIE-S	10 (4 – 16)	13 (10 – 19)	6 (2 – 12)	8 (6 – 12)
SF-20 Physical Functioning	75 (58 – 92)	75 (58 – 83)	92 (75 – 92)	79 (69 – 92)
SF-20 Role Functioning	100 (50 – 100)	100 (50 – 100)	100 (75 – 100)	100 (100 – 100)
SF-20 Social Functioning	100 (80 – 100)	100 (80 – 100)	100 (100 – 100)	100 (100 – 100)
SF-20 Mental Health	84 (76 – 92)	86 (63 – 92)	86 (80 – 91)	86 (80 – 95)
PAIR	27 (24 – 30)	25 (22 – 28)	26 (23 – 29)	26 (22 – 29)

*Note.* HHIE-S = Short Form of the Hearing Handicap Inventory for the Elderly; SF-20 = 20-Item Short Form Health Survey; PAIR = Personal Assessment of Intimacy in Relationships

**Table 2.** Hearing aid associations with multiple phenotypes.

	Hearing Impaired Person		Communication Partner	
	Effect (95% CI)	<i>p</i> -value	Effect (95% CI)	<i>p</i> -value
HHIE-S	-4.7 (-7.1, -2.4)	0.000071	-3.0 (-4.7, -1.4)	0.00037
SF-20 Physical Functioning	1.6 (-3.1, 6.3)	0.51	2.9 (-0.8, 6.5)	0.13
SF-20 Role Functioning	3.4 (-6.5, 13.3)	0.50	0.8 (-6.7, 8.3)	0.83
SF-20 Social Functioning	1.1 (-4.8, 6.9)	0.72	0.1 (-4.9, 5.1)	0.97
SF-20 Mental Health	-0.7(-3.8, 2.3)	0.65	0.5 (-2.3, 3.4)	0.71
PAIR	-0.1 (-0.9, 0.8)	0.85	0.4 (-0.6, 1.3)	0.46

*Note.* HHIE-S = Short Form of the Hearing Handicap Inventory for the Elderly; SF-20 = 20-Item Short Form Health Survey; PAIR = Personal Assessment of Intimacy in Relationships



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