Gender Issues in Audiologic Rehabilitation

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Certain aspects of the aging process affect men and women differently. Moreover, differences exist in communication style between the sexes. Yet many of us rarely consider client gender in our rehabilitation decisions. The purpose of this paper is to present information on gender differences and their potential impact on audiologic rehabilitation, particularly with older adults. Overall, results of past research suggest that the focus of audiologic rehabilitation may need to be different for men versus women.

In 1992 John Gray published a book entitled *Men Are From Mars, Women Are From Venus* (Gray, 1992). This book became the first in a series dealing with communication differences between men and women and the impact these differences have on relationships. Although much of the content of these books has little relevance to audiologic rehabilitation, the idea that we might need to treat men and women differently is one that should be considered. After all, the goal of audiologic rehabilitation is to improve communication ability; it is therefore reasonable to question whether differences in communication style, as well as in physiological functioning, between the sexes influences the rehabilitation process. This discussion will include a brief overview of gender differences that could influence hearing rehabilitation and specific information regarding when, and how, gender might need to be considered in the rehabilitation process. A more detailed account of gender issues specific to auditory processing in older adults can be found in Helfer (2001).

A note of caution: meta-analysis of existing data is problematic because researchers who find no differences between genders often do not report this fact.

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Research studies that are intentionally planned to examine gender and hearing are a rarity. Even in such planned investigations, studies that find no gender difference are less likely to be published than are studies that do find such differences. This publication bias phenomenon has been coined the "file drawer problem" (Rosenthal, 1979) in reference to where these studies reside.

GENDER DIFFERENCES

Auditory Thresholds

The most well-documented gender difference in hearing is for pure-tone thresholds. Men have significantly more high-frequency hearing loss than women (e.g., Eisdorfer & Wilkie, 1972; Gates, Cooper, Kannel, & Miller, 1990; Glorig & Nixon, 1960; Milne, 1977; Royster, Royster, & Thomas, 1980), a fact that is attributed primarily to greater cumulative noise exposure. High-frequency threshold differences between men and women may diminish in very old age (Biering-Sorensen, Christensen, Sorensen, & Parving, 1997; Jonsson & Rosenhall, 1998). Less well-known is the finding of slightly more low-frequency hearing loss in older women, as compared to similar-aged men (e.g., Corso, 1963; Erdman & Demorest, 1998; Gates et al., 1990; Hayes & Jerger, 1979; Megighian, Savastano, Salvador, Frigo, & Bolzan, 2000; Pearson et al., 1995). The origins of this "gender reversal" phenomenon have not yet been determined.

The underlying causes of presbycusis might differ by gender. Recent research has shown that certain medications are associated with hearing loss in older women but such connections are not significant in older men. Specifically, Lee, Matthews, Mills, Dubno, and Adkins (1998a) found that the use of beta-adrenergic medications (used to treat asthma, bronchospasms, and glaucoma) and antihistamines/cold medications are connected with poorer hearing in women, while calcium-channel blocker usage (used for the treatment of angina and hypertension) is correlated with better hearing in women. None of the large list of medications they examined was linked with hearing in men, even when comparing a subsample of men matched for amount of hearing loss with the women. Hence, it is not the case that a greater degree of hearing loss in men masked any potential connections.

Another source of difference in the nature of presbycusis is its link with cardiovascular health. Cardiovascular disease appears to be more strongly related to hearing in older women than in older men. For example, Gates, Cobb, D'Agostino, and Wolf (1993) showed a stronger correlation between cardiovascular disease and low-frequency thresholds in females than in males. Moreover, an elevated LDL/HDL ratio is related to higher pure-tone thresholds in women, but not in men (Lee, Matthews, Mills, Dubno, & Adkins, 1998b).

The genetic basis of presbycusis may be more important in women than in men. In a recent report on the Framingham Heart Study cohort, Gates, Courom-

piree, and Myers (1999) noted a stronger inheritance pattern of presbycusis among women. Specifically, low-frequency hearing had the strongest genetic links, especially among sister-sister and mother-daughter dyads. These connections were not significant for pairs containing males.

Finally, hormones might play a role in hearing differences between the genders. In young women certain auditory abilities and measures vary with phase of the menstrual cycle, including pure-tone thresholds, the perception of binaural beats and interaural time differences, otoacoustic emissions, and the auditory brainstem response (see McFadden, 1998, for a thorough summary of this information). Post-menopausal women who use estrogen replacement therapy (ERT) gain certain benefits that might help to maintain good communication skills. These advantages include increased blood supply to the cochlea (Laugel, Dengerink, & Wright, 1987; Laugel, Wright, & Dengerink, 1988) and enhanced verbal fluency/verbal learning (Grodstein et al., 2000; Kimura, 1995; Sherwin, 1996).

The few studies that have explored the possible impact of ERT on hearing have been limited to examining its effect on pure-tone thresholds. These investigations have found slightly, but statistically non-significant, lower pure-tone thresholds in ERT users, as compared to non-users of ERT (Kim, Kang, Chae, & Kim, 2002; Lee et al., 1998a; Weston, 1964) or no difference in pure-tone thresholds between such groups of women (Clark, Sowers, Wallace, Jannausch, & Anderson, 1995; Nozza et al., 1997).

Speech Recognition Ability

It is understandable that older men have poorer speech recognition ability than older women given the fact that, as a group, they have higher high-frequency thresholds. Large-scale studies have shown that this gender difference remains even after controlling for differences in pure-tone hearing loss between men and women (Dubno, Lee, Matthews, & Mills, 1997; Wiley et al., 1998). Hence, there appears to be a *pure* effect of gender on speech recognition ability, above and beyond that which can be explained by variations in audibility. This gender difference is even greater when the speech is presented with competition (Lutman, 1991; Wiley et al., 1998).

With old age comes an increasing asymmetry in performance on dichotic listening tasks. Specifically, material presented to the left ear in these paradigms is increasingly more difficult to perceive than information presented to the right ear (Bellis & Wilber, 2001; Clark & Knowles, 1973; Jerger & Jordan, 1992; Johnson et al., 1979). This asymmetry appears to be more marked in older men than in older women (Jerger, Chmiel, Allen, & Wilson, 1994).

As discussed above, several studies have shown small differences in hearing sensitivity between women who do and do not use ERT. In order to identify connections between ERT use and auditory processing we measured the performance

of two groups of older women (60 - 74 years, $n = 23$ per group) on several tests of speech understanding (Helfer, in press). One group consisted of women who had never used ERT; the other group had current ERT users.

Because the ERT non-users were significantly older than the ERT users, Analyses of Covariance were used to control for this age difference. Results showed that, even after adjusting for age, the ERT users were better able to perceive reverberated speech, as compared to the non-ERT subjects. Analyses also suggested that this difference was, at least in part, due to the fact that high-frequency thresholds were significantly poorer in the ERT non-user group, even after controlling for age differences. After adjusting for age, no significant group differences were found on tests of auditory and auditory-visual speech understanding in noise or on a dichotic sentence identification test. The data from this pilot project suggest that ERT may play a role in mitigating age-related decline in speech understanding, although its effect is not universal.

Visual Abilities

Visual problems are more prevalent in older women than in older men (Klein, Klein, Linton, & De Mets, 1991; Taylor, Fraco, Stanislavsky, & McCarty, 1997). Moreover, men have a life-long advantage on tasks of visuospatial perception and perceptual disembedding (Kimura, 1987; Wiederholt et al., 1993) presumably because of gender differences in prenatal hormonal exposure (LeVay, 1993).

The impact of gender differences in vision on hearing rehabilitation has received little attention. It might be expected that men would have the advantage on visuospatial tasks such as inserting or removing a hearing aid battery. Indeed, as will be mentioned below, it appears that older women have more difficulty than older men in learning how to manipulate hearing aids. It has not yet been determined whether older females' relative deficit is attributed to greater age-related decline in visual processing, poorer motor/tactile abilities, or a combination of the two.

Another facet of hearing rehabilitation that requires visual abilities is speechreading. The above-cited information might lead us to expect that men would be better speechreaders, compared to women. However, women have a lifelong advantage in certain verbal abilities that might influence speechreading; for example, older females are faster at processing verbal information, as compared with older males (e.g., Elias, Wright, & Winn, 1977; Kimura, 1987). Moreover, women maintain visual contact with the speaker more extensively than do men (Burgoon, 1994) although this research has not been extended to participants with hearing loss. The few published studies that have examined gender differences in speechreading have reported superior performance by females (Dancer, Krain, Thompson, Davis, & Glenn, 1994; Johnson, Hicks, Goldberg, & Myslobodosky, 1988; Watson, Qui, Chamberlain, & Li, 1996). It should be noted that none of these investigations evaluated the performance of older participants.

Tactile Abilities

Older women have the advantage for skills requiring good dexterity. Experimental studies have shown better performance by older women (as compared to older men) in tasks of fine motor manipulation (Derosiers, Hebert, Bravo, & Dutil, 1995a, 1995b). However, arthritis is more prevalent in older women than in older men (Verbrugge, 1985).

The few studies that have examined hearing aid manipulation skills between the genders have found that women have more difficulty with a variety of hearing-aid related tasks (Meredith & Stephens, 1993; Upfold, May, & Battaglia, 1990; Ward, Gowers, & Morgan, 1979). This perhaps is an unexpected finding, given the above-stated advantage females experience in manipulating small objects. However, the successful use of a hearing aid requires both fine and gross motor skills, along with some visuospatial ability. The combination of motor and spatial abilities needed for hearing aid use could be particularly taxing for older women.

Impact of and Adjustment to Hearing Loss

A small number of investigators have looked at gender differences in the impact of and the adjustment to hearing loss. The most comprehensive work in this area has been done by Garstecki and Erler (1995, 1998, 1999). They have found that women are more likely to admit to communication difficulties; assign greater importance to effective communication in social settings; report more stress and anger associated with hearing loss; and have greater loneliness, depression, and lowered self-esteem related to hearing loss. These findings have been supported by several other researchers (Chen, 1994; Erdman & Demorest, 1998; Ives, Bonino, Traven, & Kuller, 1995).

Factors affecting hearing handicap also may vary between men and women. Personality characteristics are more strongly related to hearing handicap in women, while age, IQ (Gatehouse, 1990), and amount of pure-tone hearing loss (Pedersen & Rosenhall, 1991) are more highly related to hearing handicap in males.

Hearing Aid Use and Benefit

Several recent studies have been focused on gender differences in various aspects of hearing aid use. Cox and her co-workers have shown that the more severe high-frequency hearing loss noted in men leads to greater self-perceived problems understanding aided speech in noise and greater aversiveness of amplified sound, as compared to women (Cox, Alexander, & Gray, 1999). However, overall results suggest there are no significant gender differences in the amount of help from or degree of satisfaction from hearing aids (Gatehouse, 1994; Hosford-Dunn & Halpern, 2001).

Men and women may arrive at the decision to try amplification for different

reasons. For example, locus of control may more strongly influence this decision in women than in men (Garstecki & Erler, 1998). Moreover, women may be more highly motivated to wear hearing aids than men and may have higher expectations for hearing aids (Jacobson, Newman, Fabry, & Sandridge, 2001).

Communication Style/Partners

The genders also seem to differ on types of strategies used to resolve communication breakdowns. Women, at least those with noise-induced hearing loss, are more likely to use a wide variety of strategies depending on the "emotional temperature" of the communication situation (Hallberg & Jansson, 1996). They are more willing to use conversational repair strategies when the emotional atmosphere is perceived to be warm and friendly, and more likely to bluff or guess when the atmosphere is thought to be unfriendly. Men are more apt to bluff in general, pretending to understand when they really do not, and prefer to use invisible strategies like watching the speaker's face (Hallberg, 1999). Garstecki and Erler (1999) found that women are more likely than men to use nonverbal "stage management" strategies like moving their seat within a listening environment. In addition, women may be more adept at reading nonverbal information than are men (Hall, 1985).

Men and women also differ in who they talk to as well as in the content of their conversations. Because of the gender difference in life expectancy, women are more likely to be widowed, and thus are more likely to have non-spouse communication partners (Garstecki & Erler, 1999). Women are more open to discussing intimate topics and disclosing personal information (Antonucci, 1994) and they may be more sensitive to the negative reactions of their communication partners (Garstecki & Erler, 1999).

IMPLICATIONS FOR HEARING REHABILITATION

Does client gender matter in the audiologic rehabilitation of older adults? In attempting to answer this question at least two considerations are salient. First, are noted differences between the genders large enough to overcome individual variability within each gender? Gender is just one attribute on which people differ. One reason why gender differences are not noted more often is because the variability within gender often is larger than the variability between genders. Second, are noted differences large enough to be clinically significant? A statistically significant finding on a research study does not necessarily imply that we should change the way we conduct hearing rehabilitation.

It is clear that additional research needs to be completed to determine whether the hearing rehabilitation process should be influenced by client gender. Based on the growing body of research evidence, the following discussion summarizes areas in which client gender might indeed matter for hearing rehabilitation. Ob-

viously, the needs of each patient must be considered on an individual basis. However, knowledge of potential gender differences may be particularly important when planning group rehabilitation programs, where individual assessment of communication ability or hearing handicap often is not conducted.

Considerations: Older Men

Men have greater high-frequency hearing loss and poorer speech recognition ability than women, especially in middle and older adulthood. The sloping configuration of hearing loss often noted in older men suggests that hearing aids incorporating multichannel processing might be especially useful. Greater problems understanding speech, especially in adverse listening situations, indicates that technology aimed at reducing adverse acoustical effects should be utilized (such as digital noise reduction or directional/multiple microphone technology).

There is evidence that men are less apt to watch a talker and might be poorer at speechreading, as compared to women. Men may use a smaller corpus of strategies to remedy communication breakdown and are poorer at reading nonverbal cues. Intervention might need to focus on problem solving techniques that address skill training, such as attending to nonverbal sources of information (watching the talker's face, reading body language, etc.), speechreading, and expanding the repertoire of communication repair strategies.

Finally, men might be less likely than women to admit their communication difficulties. This has a number of potential implications for hearing rehabilitation. First, a reluctance to admit problems is likely to affect the validity of self-report measures of hearing handicap. The use of a hearing handicap scale that has a *denial* category (such as the Communication Profile for the Hearing Impaired [CPHI]; Demorest & Erdman, 1986) may provide useful information. Another recommended strategy would be to use patient/spouse companion forms and compare problems perceived by the patient to those noted by a communication partner. Secondly, men who deny the effects of hearing loss may be less likely to seek help or follow through with recommendations. Several teams of researchers have noted that acceptance of hearing loss by men may be easier when family and friends have fewer negative reactions (Demorest & Erdman, 1989; Garstecki & Erler, 1999; Hétu, Lalonde, & Getty, 1987). This suggests that including a significant other in the therapeutic process may be an effective strategy in getting a reluctant (male) individual to try hearing aids.

Considerations: Older Women

As described earlier, women have stronger links of age-related hearing loss with medication usage, cardiovascular disease, and genetics. If future research verifies a connection between lifestyle factors and hearing, this information will be vital in informing the public about possible ways to minimize or prevent age-related hearing loss. This information also might have an impact on hearing rehabilitation: The knowledge that you may be able to somehow mediate a disorder

might influence one's feelings about and adjustment to that condition.

The finding that women may have higher expectations for hearing aids leads to the necessity for comprehensive pre-fitting discussion of realistic expectations. The Client-Oriented Scale of Improvement (COSI; Dillon, James, & Ginis, 1997) is an appropriate tool to use in this process. Because locus of control may be more important in following through with hearing aid recommendations in women, techniques that foster control in this situation (such as offering women choices in the fitting process) may be particularly fruitful.

Research has also shown that older women have more difficulty manipulating hearing aids (as compared to older men). Pre-fitting counseling should include formal or informal assessment of a patient's ability to manipulate small hearing aids and batteries. Clinical protocols might need to build in additional time or visits for older women in anticipation that they need more extensive practice and instruction. Modifications to hearing aids/earmolds such as raised controls and removal handles/notches might be particularly useful for older women, as would the use of hearing aid processing schemas that reduce the need for manual volume control adjustment.

Hearing loss appears to have a greater negative emotional impact on women than on men. This could be because women place more importance on effective communication, as compared to men. Moreover, personality characteristics are more strongly related to hearing loss in women. Hence, rehabilitation programs for older women may need to focus more on emotional reactions to hearing loss and coping skills. For example, women may benefit from stress management exercises and relaxation techniques to help reduce the negative impact of hearing loss (Garstecki & Erler, 1999). Research also supports the potential importance of inclusion of family or friends in rehabilitation programs aimed at older women.

SUMMARY

Gender differences have been noted in a number of variables associated with hearing and hearing loss. In general, men have greater objective hearing problems, but women seem to be more greatly affected by hearing difficulty. Although individual differences exist, these findings suggest that the focus of rehabilitation may need to differ in men versus women. Specifically, men may need more perceptual skill-based training while women might benefit from more attention to adjustment issues.

A great number of questions remain unanswered concerning gender differences in hearing and their impact on audiologic rehabilitation. For example:

- Do women need more training than men to satisfactorily manipulate hearing aids?
- Are certain training strategies more effective and/or more necessary for men versus women?

- Do gender differences in the underlying causes of presbycusis necessitate different hearing aid processing strategies?
- Will different "messages" be more effective in getting men versus women to comply with recommendations for amplification and/or rehabilitation? That is, should we be relaying different types of potential benefits to men versus women?

These and other questions must be addressed before we can definitively determine whether gender matters in the hearing rehabilitation process.

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