Psychosocial Adaptations to Dual Sensory Loss in Middle and Late Adulthood

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Concurrent losses of hearing and vision function, or dual sensory loss, affect a large number of individuals of all ages and particularly older adults. Dual sensory loss may present at any age as a result of genetic defect, accident, injury, disease, or environmental insult; however, most persons develop this condition as a result of age-related disease processes that rarely result in total deafness or blindness. This condition has wide-ranging implications for physical and psychological functioning and quality of life. In this article, we review the prevalence and causes of dual impairment and its effects on functioning for both individuals affected and their

families. We examine psychosocial coping and adaptation to this condition using biopsychosocial-spiritual and ecological models and discuss various strategies for coping and adaptation. The impact of larger societal forces on psychosocial adaptation is presented, followed by recommendations for how rehabilitation and other professionals can meet the challenge of dual sensory loss that awaits us with the aging of the population.

Keywords: dual sensory loss; psychosocial adaptation; biopsychosocial-spiritual model; ecological perspective

Concurrent losses of hearing and vision function, or dual sensory loss, are receiving growing attention in the clinical and research literature. Dual sensory loss is defined as any combination of significant functional impairment in either hearing or vision and thus may include persons who are either deaf or hard-of-hearing as well as being blind or visually impaired. The prevalence of dual sensory loss among Americans of all ages is not known. However, 31.5 million persons in this country have some degree of hearing loss that affects life functioning,¹ while 8.3 million Americans have a similar degree of impairment because of vision loss.² Individuals with dual sensory impairment are not a homogenous population and can be classified into three categories.^{3,4} The first group consists of those with congenital or early postnatal

vision and hearing impairments. The second group consists of those individuals with a congenital or early postnatal impairment in one sense and acquired dual impairment through late-onset changes and/or age-related disease (eg, Usher syndrome). The third and largest group consists of individuals who became dual impaired in adulthood through the onset of age-related changes and/or age-related disease to sensory organs (eg, presbycusis and macular degeneration) and were able to hear or see for most their lives. Because the psychosocial needs among these groups are heterogeneous because of variation in the age-of-onset of the sensory impairment, we will focus on the last group of individuals who acquire dual sensory impairment. In this latter group, the highest prevalence is among adults 70 years of age and older, with anywhere from 5% to 20% classified as having dual sensory loss depending on the particular cohort studied, the method used to assess sensory impairment (ie, audiological or visual testing vs self-report) and the definition of sensory impairment.^{5,6} The projected incidence of dual impairment in this age group is 2 million new cases over 5 years.⁷ Given the influx of the "baby boomers" into the older population with 70.3 million older adults expected by 2030, somewhere between 3.5 million to 14 million can be expected to

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develop dual sensory loss.⁸ Thus, understanding psychosocial coping with and adaptation to dual sensory impairment will be of growing importance in the coming decades for rehabilitation service providers and others who work in the fields of sensory loss and aging, as well as for those affected by this condition.

The aging population, among whom vision and hearing loss is the most prevalent, is also at greater risk for other chronic conditions including arthritis, balance disorders, hypertension, heart disease, and orthopedic problems.^{9,10} Each of these conditions alone can limit daily life functions, and their effects are compounded with concurrent vision or hearing loss. The likelihood of having more than one of these conditions in addition to sensory loss is significant for older adults in rehabilitation settings.¹¹ One must also consider the particular challenges experienced by older adults in the process of adapting to dual sensory loss. For example, sensory loss is but one of many possible losses that an older person is likely to experience in the later stages of life. Thus the older person may be in the situation of coping with multiple losses, such as the loss of one's work role and often income following retirement, the loss of a spouse or other important members of the social network, or the loss of functional ability because of illnesses.¹²

State of the Research on Dual Sensory Loss

There is limited research on the impact of dual sensory loss on individuals.⁴ One of the major impediments to our understanding of the consequences of dual sensory loss and psychosocial adaptations to this condition is the lack of a research infrastructure to support investigations on this topic. An informal survey of graduate training programs in social work, audiology, speech-language pathology, counseling, and psychology in the United States revealed no courses for which the primary focus is dual sensory loss. Some programs such as the audiology, social work, deaf studies, and psychology programs at Gallaudet University and the University of California at Northridge report some course content in this area, although it is minimal. The University of Birmingham in the United Kingdom has an 18-month, full-time, 5-tier training program (from professionals to caretakers) for individuals who work with persons with dual sensory loss.¹³ Thus, the research community addressing psychosocial aspects of dual sensory loss lacks the cohesion of groups of

researchers that focus on other topics, such as child development or psychopathology, which may in turn limit the exchange of information and inhibit collaborations that could strengthen the field.

Another obstacle to the study of psychosocial issues in dual sensory loss stems from a general lack of integrated rehabilitation service models that address both vision and hearing impairments. For example, in vision rehabilitation settings, clients who present with hearing loss in addition to their visual impairments may (or may not) receive a referral for an audiological examination. Consequently, the hearing impairment is not explicitly addressed in the course of vision assessment and rehabilitation. In turn, research methodologies may also fail to consider the comorbid loss of hearing in study designs, for example, including hearing loss as a "control" variable in multivariate analysis while failing to fully consider how this additional sensory loss may compound the impact of the visual impairment. The situation is much the same with regard to aural rehabilitation service models and concomitant psychosocial research on hearing loss. A notable exception to this is the rehabilitation program offered by Helen Keller National Center for Deaf-Blind Youths and Adults.¹⁴

Thus, psychosocial research emerging from non-integrated sensory rehabilitation models has limited impact on policy and practice because of the constraints on the knowledge gained from such endeavors and diminishes the practical benefits of research findings for those affected by dual sensory loss. The lack of integrated dual sensory treatment and rehabilitation models also hinders research on more basic levels, for example, participant recruitment. Most of the in-depth research on single sensory loss relies on convenience samples from rehabilitation agencies, clinical settings, and related community-based groups that tend to focus on either vision or hearing. Attempting to recruit participants for a study on dual loss is hindered in such situations because information on a potential second sensory impairment may not be collected or recorded or may be sufficiently vague that recruiting for specific inclusion criteria (eg, high-frequency hearing loss, hearing loss above a certain decibel threshold) may not be possible.

Given these limitations, it is not surprising that most of the research to date on the functional and psychosocial consequences of dual sensory impairment have relied on large-scale panel surveys (ie, longitudinal studies in which the same set of variables are assessed on the same sample units over time).

Although such methodologies are desirable for determining the incidence and prevalence of dual loss, they are clearly at a disadvantage in providing in-depth information on psychosocial adaptation to this condition. With few exceptions outside of the realm of communication difficulties, these studies have been largely descriptive and limited in terms of measurement of both sensory loss and psychosocial indicators. To illustrate, in the Health and Retirement Survey (HRS) and related Assets and Health Dynamics among the Oldest Old (AHEAD) studies, measurement of visual impairment and hearing loss consist of single-item, self-report measures whereas psychosocial outcomes are limited to truncated versions of depression and anxiety scales.^{15,16} Therefore, because of the factors enumerated above, psychosocial research on dual sensory loss is much more restricted than even the limited research on single losses of hearing and vision. Because of the limitations and dearth of psychosocial research on dual sensory loss, one is left with extrapolating findings from single sensory impairment to dual impairment in order to have a better understanding of its psychosocial challenges and adaptations.

The Impact of Hearing and Vision Loss on Functioning

Dual sensory loss compromises the two primary receptive sensory communication modes; listening and speechreading. This combined loss also limits the information received about the environment. Negotiating the environment and addressing daily life functions becomes a significant challenge if both sensory channels are impaired. It is reasonable to conclude that when dual sensory loss is further compounded by physical or psychological conditions such as those faced by many older adults (eg, arthritis, depression), communication and life functioning will become significantly more compromised.

There are several aspects of hearing loss that may affect the communication process. These include the type of loss, the degree of loss, and the measured speech discrimination ability.¹⁷ Communication can also be measured by the participation restrictions and activity limitations associated with hearing loss and the residual participation restrictions after hearing aid fitting. As pure tone thresholds increase and/or as speech recognition abilities decline, hearing aids may provide less benefit. In addition to the impact on communication, adults who sustain hearing loss may

also have increased difficulty accessing important environmental sounds they have come to rely on, affecting safety and security as well as daily life functioning. These include sounds such as alarms, smoke detectors, computer beeps, timers, sirens, fast moving vehicles and other traffic noise, tornado and civil defense sirens, as well as warning sounds from natural sources (eg, cracking ice or tree limbs, growling dogs).

Similar to hearing loss, visual impairment may also significantly interfere with receptive communication in ways that parallel hearing loss. However, in comparison to hearing loss, the onset of visual impairment in adulthood has a greater impact on the ability to complete many daily life functions. The onset of visual impairment in adulthood has the potential to disrupt previously established behaviors related to physical, psychological, and social functioning.¹² For example, visual impairment in the older population has been related to greater health comorbidity, activities of daily living (ADL) task difficulty, and increased risk for falls and related fractures.^{5,18-20}

Psychosocial Issues in Coping and Adaptation to Dual Sensory Loss

While research on single sensory losses in adulthood has been based on a variety of conceptual models (eg, stress and coping model),²¹ for the present discussion, we find that the biopsychosocial-spiritual model of well-being provides an excellent framework for examining the widespread consequences of dual sensory loss and psychosocial adaptations to this condition. The biopsychosocial-spiritual model is an expansion of a model originally proposed by Engel²² as a reaction to the biomedical model that dominated medical practice. Engel asserted that the biomedical model did not account for the psychological and social dimensions of illness. Engel's proposed model expanded the concerns of medical care from the biological basis of disease to concerns about how such disease interacted with psychological dimensions (ie, behavior, affect, cognition), interpersonal relationships, and social interactions. This biopsychosocial model considers not only how biological factors (ie, disease) affect psychological and social functioning but also how these two latter domains affect the disease process, as well as the interplay between psychological and social dimensions.

More recently, there has been a call to expand the biopsychosocial model to one that includes spiritual issues in patient care, or the so-called biopsychosocial-spiritual

model.²³⁻²⁶ The biopsychosocial–spiritual model reflects the growing recognition of the importance of spirituality in health and well-being, and how spirituality interacts with biological, psychological, and social domains. Thus, using the biopsychosocial–spiritual model as a conceptual framework permits a greater understanding of issues affecting psychosocial adaptation to dual sensory impairment among middle age and older adults.

Dual Sensory Loss at the Biological Level

Much of what we know concerning the consequences of dual sensory loss is closely tied to the biological domain of physical functioning and overlaps into the psychosocial and spiritual domains when we consider behaviors and activities that rely on such function. At a basic level of function, dual sensory loss reduces one's biological resources and capacities for adaptation because it interferes with one's ability to compensate for one primary sensory modality with the other.⁴ For example, one of the ways many older adults with visual impairment compensate is to use hearing to substitute for loss of visual information such as using audio books when reading is compromised.^{27,28} In the same vein, vision is used to compensate for hearing loss as when using closed captioning for video or when speechreading to supplement a diminished auditory signal.

A good illustration of the compounding effects of dual sensory loss at the biological level is provided by orientation and mobility tasks that are necessary for safe and independent travel. For the adult with dual sensory loss, problems with hearing interfere with the ability to compensate for loss of visual information through auditory signals (eg, car horns, sound of traffic), while problems with vision interfere with the ability to compensate for loss of hearing (eg, visual scanning of the environment for dangerous conditions, nearness of traffic). The situation is exacerbated for adults with comorbid health conditions that are increasingly common with older age, such as arthritis or cardiovascular disease, resulting in even greater constraints on mobility and independent travel.

Technological compensation for dual sensory loss. Technology addressing single losses of vision and hearing at the physiological level ranges from the simple to the complex. In most instances, such technology

works by increasing the signal to noise ratio of the sensory input to the point where it can be used by the compromised sensory modality, or by exploiting alternative sensory modalities that retain functionality. For example, technological approaches to visual impairment may include lenses or other magnifiers to make use of residual vision, or may involve using hearing or touch to provide the information in an alternative sensory pathway (eg, talking books, Braille). Technological devices to address hearing loss include hearing aids and cochlear implants, or may involve presenting audible information in a tactile or visual format (eg, television closed-captioning, flashing or vibrating alarm clock). Unfortunately, dual sensory impairment may limit the usefulness of devices that rely on hearing ability in the case of visual impairment or visual function in the case of hearing loss. For example, a person with hearing loss who is comfortable with closed-captioning and develops a moderate to severe visual impairment in later life may lose his or her ability to watch television. This presents the challenge of developing new adaptive technologies that will be accessible to persons for whom the use of both visual and auditory information is problematic.

The use of adaptive technologies that allow continuity in performing valued activities has been found to decrease disability and depression among older adult applicants for vision rehabilitation services.²⁸ However, many individuals with vision or hearing loss may reject the use of technological solutions. Madell et al²⁹ provide evidence that the primary reason for not using hearing technology is that it does not meet the consumer's expectations. This supports the tenets of expectations-performance theory as described by Kotler and Clark,³⁰ which posits that consumer satisfaction is a function of consumer's product expectations and the products perceived performance. Another variable affecting hearing aid use for adaptation is the concern that noticeable aids and devices will result in stigmatizing reactions from those around them.³¹ Furthermore, these devices may identify them as a person who is aging, which is itself stigmatized in our youth-oriented culture. In these cases, the ability to "pass" as a nonimpaired or younger individual may outweigh the decrease in functional ability that results from eschewing these aids.

One could speculate that the stigma of many of these devices may be waning with the infusion of technology in our daily experience. From i-Pod

music players to Bluetooth headsets, many of today's innovations are similar in appearance to the stigmatizing technology of only a few years past. In addition, because of the aging of the population and the push for accessibility in design and architecture, there has been an infusion of new products that increase functionality for everyone, including persons with sensory loss, such as more ergonomic designs, large print markings and instructions, and combining audio and visual output. However, the destigmatization of these devices has not yet been documented, and this would be an important issue for future research.

Finally, there is evidence that aural rehabilitation as a supplement to hearing aid use is a key factor in increasing the likelihood of successful adaptation, postfitting. Primeau³² and Abrams et al³³ provide evidence that aural rehabilitation that uses a psychosocial focus results in emotional and social adaptation supportive of continued hearing aid use.

Dual Sensory Loss and Psychological Function

Psychologically, both hearing and vision loss have been shown to significantly influence an individual's behavioral, affective, and cognitive systems in numerous, significant, and interacting ways.^{34,35}

Behavioral responses to sensory loss. Dual sensory loss interferes with one's behavioral repertoire. For example, older adults with self-reported dual impairment have been found to be impaired in their ability to perform personal and instrumental ADLs and decline in their ability to perform these tasks over time.^{5,6,36} Task difficulty in these areas is directly related to self-reported impairment severity, with higher levels of severity associated with greater disability. As noted previously, because many middle age and older adults with dual sensory loss suffer from a variety of comorbid health conditions, behavioral difficulties may be further exacerbated following the onset of this condition.

Hearing and vision loss may trigger the use of coping strategies, some of which are effective in adapting and others that are not. The modification of behavior is a normal reaction through which individuals respond and cope with sensory loss.²¹ Behavioral modifications may be adaptive or maladaptive. Some may have short-term results but may not prove successful on a long-term basis. Examples include adjusting the distance or position at which one holds a

menu for diminished vision, or moving closer to a sound source or turning up the volume to compensate for a diminished auditory signal. When left on their own, older individuals with vision or hearing loss may use coping strategies which have been helpful in other situations or that they have seen modeled by others. For example, saying "Huh?" may be useful on the occasions when one is not paying attention to another individual who is making a comment or inquiry, and people are usually agreeable to repeat what they have said. However, when this strategy is used repetitively to compensate for hearing loss, communication partners may soon lose tolerance for this situation. Research has found that among older vision rehabilitation clients, there is a tendency to use preexisting coping strategies at the onset of sensory loss. When these existing strategies prove ineffective in coping with sensory loss, adults will develop novel strategies to cope with the situation to address the challenges presented by their impairments.³⁷

Affective responses to dual sensory loss. There are strong parallels between the affective and cognitive reactions sustained from hearing loss with those from vision loss. The loss of either hearing or vision in adulthood may precipitate a state of crisis. This state may result from either sudden or progressive onset of sensory loss or as a response to its subsequent limitations. Crisis may also occur because of cumulative stressors. Because the number of stressors associated with dual loss is greater than for single sensory impairments, it is reasonable to assume that dual sensory loss may place the individuals who sustain it at greater risk for crisis compared with those with single sensory impairments.^{35,38}

Significant loss of any kind may result in grieving, the extent to which depends on the meaning of the particular loss to a specific individual. Dual sensory loss, it may be reasoned, may create greater barriers to communication and life functioning thereby intensifying grief-related reactions such as denial, anger, bargaining, guilt, depression, and acceptance. Further, there is evidence that older adults may be more accepting of sensory loss compared with their younger peers. Wiley and colleagues³⁹ reported that Hearing Handicap Inventory for the Elderly-Screening scores increased as a function of age among adults aged 48 to 92 years. However, the probability of reporting a hearing disability decreased with age after controlling for the degree of hearing loss. Another national survey found that only 43% of

middle age and older adults do not consider vision loss to be a normal part of aging.⁴⁰ Pray³⁵ posits that because acceptance is a more passive reaction to sensory loss, professionals should strive toward helping their clients to adapt rather than to accept sensory losses when compensatory strategies are viable options.

Other affective reactions that have been reported to occur in both vision loss and hearing loss independently may include anxiety, anger, dependence, depression, fear, frustration, guilt, helplessness, insecurity, irritability, loss of confidence, insecurity, marginalized or diminished self-identity, reduced self-esteem, depression, withdrawal, dependence, and a diminished sense of well-being.^{34,41-55} Of particular concern for rehabilitation providers are studies that find depression is more prevalent among persons with dual loss than those with single impairments in vision or hearing. For example, among community-dwelling older individuals with objective assessments of sensory function (ie, Snellen acuity and free-field voice testing), visual and hearing impairments increased the odds of depression by 2.3 and 1.8, respectively.⁵⁶ One study of older adults that also used objective criteria to assess sensory function found the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, major depressive disorder in 18% of persons with dual sensory loss, as compared with 12% in the single sensory loss groups.⁵⁷ These rates of major depressive disorder are much higher than the 1% to 4% reported among community-dwelling elderly in general.⁵⁸

Thus, depression and other affective sequelae of both single and dual sensory loss may have a negative impact on a middle age or older adult's readiness for change and ability to effectively use rehabilitation options that address their functional problems.^{59,60} From a life-span perspective, such emotional challenges may also impact psychosocial growth and development in middle age and older adults with sensory loss.⁶¹⁻⁶⁵ One study of middle age and older adult vision rehabilitation clients found evidence that the onset of impairment initiated a process of developmental recapitulation, in which psychosocial developmental stages are revisited and renegotiated in response to the challenges of the vision loss.⁶⁶

Cognitive responses to dual loss. Cognition also plays an important role in coping and adaptation to dual sensory impairment. Factors that influence the cognitive effects of sensory loss on adults may include their knowledge base, level of cognitive functioning, and perceptions related to the loss. The brain is able

to integrate visual, auditory, and even tactile modes of information with cognitive resources such as knowledge of situational contexts and basic linguistics. As noted by Glass,⁴ vision and hearing represent interdependent, information-gathering domains; impairment of these senses interferes with both communication and the acquisition and sharing of knowledge necessary for coping and adaptation, and the combined loss of function in both senses may have damaging consequences. Without such knowledge, problem-solving ability may be compromised to varying degrees.

Compounding the problems with knowledge acquisition, individuals who sustain hearing and vision loss, as well as the general population, may not have a strong knowledge base about sensory disability, its causes, and available interventions. For example, in a national study of community-dwelling adults aged 55 years and older, respondents demonstrated poor to moderate knowledge of vision loss associated with aging, underscoring the need for continued education and outreach efforts with this population.⁴⁰ Among a probability sample of adults 40 years and older in Australia, a fairly high proportion of the sample was knowledgeable about cataract (74%), however, only 19% demonstrated correct knowledge of glaucoma, and only 2% demonstrated correct knowledge concerning age-related macular degeneration. In this sample, adults with correct knowledge of these eye conditions were more likely to be receiving eye care (ie, eye exams, prescription lenses).⁶⁷

The lack of basic information related to sensory disabilities may hinder problem-solving ability among middle age and older adults, and specifically, their ability to generate appropriate strategies for overcoming the challenges of sensory loss. Few Americans know how the eye and ear function or the myriad etiologies that can cause sensory loss, other than that they may be "fixed" by glasses and hearing aids, respectively. They rarely understand the differences between audiologists and hearing aid dealers or between optometrists and opticians. Unless referred by a general practitioner, many do not know where to turn for help for sensory impairment problems. They are mostly unaware of the variety of assistive technology and rehabilitation services that is available. In addition, average citizens are only vaguely familiar with the tenets of the Americans With Disabilities Act that may protect them from discrimination, the means by which they may assert these rights, or to whom they might turn for recourse if their

rights are violated.⁶⁸ Misinformation (eg, there is nothing that can be done about nerve deafness, or that vision loss is a normal and irreversible part of aging) may further exacerbate an individual's ability to find viable solutions.¹²

With regard to cognitive function, studies have shown a reduction in cognitive capacity among older adults in selected domains such as memory and processing speed.⁶⁹⁻⁷¹ Hearing loss may have a negative impact on cognitive ability, especially the ability to interpret auditory signals,⁷² whereas vision loss limits the acquisition and processing of visual material. One study found that community-dwelling Italian older adults with self-reported hearing loss had significantly lower Mini-Mental State Examination scores compared with their peers.⁷³ Among older US adults with self-reported vision and hearing impairment, those with dual impairment were the most likely to report problems with memory and frequent confusion, followed by those with single sensory impairments, in comparison with their peers without sensory loss.^{74,75} Another examination of community-dwelling older adults in Germany found that objectively assessed sensory loss (ie, visual and auditory acuity) was negatively related to cognitive domains of perceptual speed, reasoning, memory, knowledge, and fluency.⁷⁶ Likewise, comorbid cognitive processing difficulties, such as dyslexia, may have negative effects on sensory function. Compounding problems with cognition for older adults with dual sensory loss are other age-related conditions that further compromise cognitive function, such as Parkinson's disease, mild cognitive impairment or Alzheimer's disease.

Personal resources and dual sensory loss. Lee and Brennan⁷⁷ found that many older adult vision rehabilitation clients report greater reliance on personal resources (ie, maintaining an independent lifestyle) as compared with social resources (ie, receiving help from the social network and use of rehabilitation services), and this may be true for persons with dual sensory loss as well. Furthermore, an individual's degree of assertiveness and ability to self-advocate will have a significant influence on his or her ability to have needs met. Those taking an overly passive or aggressive approach are unlikely to motivate others to meet their needs. This ability to identify needs and approach the appropriate sources through which these needs may be fulfilled is a valuable one for coping with sensory loss.³⁵

Dual Sensory Loss and Social Interaction

Dual sensory loss also impacts social domains of work and retirement, interactions with family and friends, and participation in the community. Horowitz and colleagues⁷⁸ found that older adults with self-reported dual sensory loss are more likely than their peers to receive help with instrumental ADL tasks, such as shopping or using the telephone, and are also more likely to report living with others, or retiring because of health reasons. In this study, greater impairment severity increased the likelihood of receiving instrumental help. In terms of social participation, dual sensory loss also presents many potential impediments. For example, among nursing home residents, both self-reported hearing loss and visual impairment were positively related to decreased social engagement and less time spent with social activities, with these effects more pronounced at higher levels of impairment.⁷⁹ With regard to community-dwelling populations, the evidence on dual impairment and social participation is mixed. Campbell and colleagues¹⁸ found that self-reported dual sensory loss was associated with decreased participation among older adults in activities such as socializing with friends or going out to eat. However, Horowitz and colleagues⁷⁸ found few differences in levels of informal network participation and other social activities based on dual impairment status in this population.

Adaptation to dual sensory loss in social situations may include a wide repertoire of communication and functional strategies, such as anticipatory, maintenance and repair strategies. Anticipatory strategies are those actions that increase the likelihood of success for forthcoming communication or situations. These may include modifications of the environment, interpersonal strategies (eg, explaining communication or mobility needs), and linguistic strategies (eg, asking a carefully crafted closed set of questions and confirming information).^{80,81} Strategies are considered maladaptive when they are ineffective in achieving communication or functional goals. Examples of maladaptive strategies include self-isolation, bluffing, and avoidance of difficult situations. Finally, there is considerable social stigma around both hearing loss and visual impairment which likely plays a role in the impediments to social participation among those with dual sensory loss.^{82,83}

However, there are considerable resources for promoting the psychosocial adaptation of persons with vision and/or hearing loss at the social level in the form of vision and aural rehabilitation providers, respectively. These formal, community-based service providers may be low vision specialists, audiologists, and other professionals (eg, rehabilitation teachers) who address the functional and psychosocial issues of sensory loss. Available research suggests that sensory rehabilitation programs addressing either vision or hearing loss have a positive impact on their adult clients. In one study of adult aural rehabilitation clients in Nigeria, Olusanya⁸⁴ found positive change in hearing aid use and benefit, activity participation, and quality of life following rehabilitation program participation. Stark and Hickson⁸⁵ reported positive change in hearing handicap and health-related quality of life for adults with hearing loss and their spouses following hearing aid fitting and aural rehabilitation. Research on vision rehabilitation clients also has documented benefit in visual function and psychosocial indicators (ie, depression) following use of vision rehabilitation services.⁸⁶⁻⁸⁸

Dual Sensory Loss and Spirituality

With regard to spirituality, dual sensory loss also presents numerous challenges. Blindness has long been stigmatized with religious connotations; characterized in the Judeo-Christian religious tradition as punishment for sin, often of a sexual nature.¹² In some cultures, disabilities are assumed to have a great spiritual meaning, with those affected having greater connections to the spirit world (ie, the Hmong).⁸⁹ In various parts of Nepal, that country's subcultures may view hearing loss as a curse, a being in need of brotherly and mutual support or a punishment to the family or being for past sins, and these perspectives are guided in part by spiritual beliefs.⁹⁰ In addition to these negative conceptualizations, many may question their religious and spiritual beliefs in terms of why they are affected by sensory loss, despite being faithful to their religious traditions. Thus, dual sensory loss presents the potential for a "metaphysical" crisis. Reactions may range from "bad things always happen to me" or "I am being punished by God/Allah for deeds I have done or left undone" to "these are the challenges that life/Allah/God puts before me."

Many individuals turn to their spiritual beliefs for solace or inspiration when faced with adversity. Spirituality, including religion, has consistently been shown to have a pivotal role in people's lives and

how they cope with stress.⁹¹ Koenig⁹² and Forbes⁹³ provide evidence that spirituality gives meaning in life beyond coping with chronic health problems. As noted by Pargament,⁹⁴ religious and spiritual coping does not invariably lead to more positive adjustment, and indeed, may sometimes be linked to negative outcomes. However, for many, spirituality is an important positive factor in adapting to single-sensory loss (eg, vision) and has been found to help middle age and older adults with sensory loss cope with this condition as well as other negative life events.^{41,95} In sensory rehabilitation settings, spirituality has been associated with greater rehabilitation goal success among middle age and older adults with visual impairment.⁹⁶ Those who ascribe to organized religion may seek spiritual help, guidance, or support.^{45,46,97} In addition, some congregations provide accommodations such as Braille religious texts, sign language interpreters, or group amplification systems for members with sensory losses, as well as considerable amounts of emotional support and instrumental help (eg, providing transportation, meals, shopping, and running errands).⁹⁸

Ecological Perspectives on Coping and Adaptation to Dual Loss

As discussed above, the impact of a dual sensory impairment may present significant challenges from the perspective of the individual so affected. However, the individual with dual sensory loss must face these challenges in the ecological context of his or her life experience. At about the same time that the biopsychosocial model of medical care was introduced, many were also advocating that an ecological perspective be taken both in terms of disease and human development.^{99,100} This ecological emphasis was aimed at examining persons in the variety of contexts that were relevant to the phenomenon in question, that is, not only as individuals but also as individuals in family, community, and societal contexts. The theory of ecological systems, given by Bronfenbrenner,⁹⁹ delineates different contexts that describe the interaction between a person and the environment. At the closest level is the *microsystem* that contains the interactions with those in the immediate environment (eg, family members, friends, or rehabilitation providers). The *mesosystem* is the next level and involves interactions between the various components of the microsystem (eg, families with rehabilitation providers). The *exosystem* is the larger

social system in which the individual does not interact with directly but has an impact on other interactions within the system (eg, insurance coverage for visual or audiological assessment). Finally, the *macrosystem* represents the larger society and is comprised of cultural factors such as values, mores, customs, and laws. Thus, because an individual affected by dual sensory impairment is situated in an environmental milieu, the effects of dual impairment extend beyond the individual to these other levels of the ecological context.

Microsystem and Mesosystem Responses to Sensory Loss

The impact of hearing and vision loss on an individual's family, friends, and coworkers has been widely studied.^{35,53,101} However, the effects of dual sensory loss on the mesosystem, that is, the level at which these entities interact, has received far less attention. The parallel reactions of others are based on the meaning of the sensory loss from the perspective of those individuals and the groups within which they function, and are also reflective of societal values at the macrosystem level. Such meaning is largely based on knowledge of the sensory disability, the extent and type of impact that the disability has on the family, and more specifically, the family member. Often these persons provide significant levels of instrumental assistance from help with shopping or communication activities to meal preparation and mobility assistance. Perhaps even more important is the emotional support that these persons give to the individual with dual loss, as well as advice in how to cope and adapt, some of which may be ill conceived and unfounded.

Although not always simultaneously, Pray³⁵ suggests that family members experience similar reactions to communication breakdown because of hearing loss, including crisis, grieving, frustration, anxiety, impatience, anger, self-pity, guilt, withdrawal, and feelings of incompetence. In particular, husbands and wives appear to be especially vulnerable to experiencing the negative emotional impact of sensory loss on the part of their spouses. Generally speaking, marriage has been found to have a positive impact on physical and mental health and the marital relationship seems to mediate the impact of mutually experienced life events, such as the onset of visual impairment in later life.^{102,103} Spouses are the most likely to serve as informal caregivers when one member of the couple experiences chronic

illness or disability.¹⁰⁴ However, one must consider that family and significant others may also be affected by the dual loss on the part of one member. Communication at family gatherings may be impeded or some may be annoyed with technological aids such as closed-captioning on TV. In addition, there is often strain on caregivers who look after someone with a chronic condition and the simple fatigue from providing care for another person.

A study by Pray⁵³ found that spouses and significant others experience grieving for the loss of their family member's hearing. Héту and colleagues¹⁰⁵ reported that in an assessment of noise-exposed working-age adults, difficulties with communication and listening resulted in anxiety, stress, change in social activities, isolation in groups, and a negative self-image, which affected both the individual, spouse and significant others. In the same vein, Brooks and colleagues¹⁰⁶ found that individuals with hearing loss and their partners were both affected by communication difficulties resulting from the sensory loss. Other research has documented that among community-dwelling older married couples, hearing loss on the part of a partner increases a spouse's likelihood of poorer physical, psychological, and social well-being.¹⁰⁷

Although affected by a partner's sensory loss, the evidence is equivocal regarding the accuracy of a significant other's perception of the difficulties arising from the loss of vision or hearing. For example, Newman and Weinstein¹⁰⁸ reported that spouses of hearing-impaired men aged 65 to 90 years tended to underrate their husbands' degree of hearing handicap in comparison to the men's self-report of handicap. In contrast, Chmiel and Jerger¹⁰⁹ found the opposite; elderly spouses' ratings of hearing handicap were significantly greater than those reported by the patient with hearing loss. These findings suggest that the accuracy in perceptions of the degree of sensory handicap on the part of significant others may play a role in the degree to which these persons may be affected by the sensory impairment of a family member. Future research should examine the relationship between a significant others' perceptions of sensory impairment and psychosocial outcomes for both the adult with sensory loss and their partners.

With regard to vision loss, Goodman and colleagues^{102,103} examined affect similarity in older couples where one spouse was experiencing significant age-related visual impairment resulting in an application for vision rehabilitation services. Both the

level of family conflict and the depressive symptoms of the spouse with sensory impairment were independent predictors of depression among the spouses of persons with visual impairment. However, further complicating this picture is the reported "overprotection" of persons with sensory loss by their family. Among older adult vision rehabilitation clients, such overprotection can have a negative impact on the well-being of the person with sensory loss, as well as reduce functional ability through the unnecessary restriction of activities.^{110,111}

In addition, there has been growing recognition of the importance of family members and significant others during the process of sensory rehabilitation.¹¹²⁻¹¹⁶ The implications of these findings at the level of the mesosystem are that spouses and significant others should be included in interventions to reduce the impact of sensory impairment, such as rehabilitation, education, and counseling, to maximize positive outcomes for both the individual with sensory loss and the nonimpaired spouse. Rehabilitation programs which include spouses and significant others have been developed to address problems because of visual impairment and hearing loss.^{117,118}

Horowitz and colleagues¹¹³ initiated a project that provided an opportunity for family members to be involved in all aspects of vision rehabilitation services for older adults to gauge the impact of such an approach on the outcomes for persons with vision loss and their family members. An examination of prerehabilitation and postrehabilitation data found that family involvement served to decrease the level of functional disability and increase family members' understanding of how to best assist the older person and feelings of family-life satisfaction. However, family involvement was related to an increase in depressive symptoms on the part of the older person with vision loss and did not decrease overprotectiveness. These latter findings deserve more study but may suggest that families are more likely to be involved in cases of greater sensory impairment severity and/or greater physical and psychological adjustment problems on the part of the person with sensory loss. In fact, other analyses of these data suggested that caregiver burden and level of overprotectiveness did promote greater involvement in family rehabilitation services.¹¹⁵

In addition to the involvement of family members in sensory rehabilitation programs, an alternative approach to addressing the concerns of these

significant others is through targeted services to family members. In the arena of vision rehabilitation, one example of this approach was a support group specifically tailored to meet the needs of spouses and significant others in middle and late adulthood (mean age = 69 years) who had a partner undergoing vision rehabilitation.¹¹⁹ A curriculum developed for this intervention, titled "Program for Partners," included topics such as: understanding your partner's vision loss; exploring emotional issues; communication between partners; organizing the home for accessibility, safety, and comfort; getting around safely; and managing change and dealing with stress. Although global measures of psychosocial well-being (eg, life satisfaction) did not seem to be affected by program participation, spouses and significant others did have a significantly better understanding of the issues faced by their partners because of impaired vision and how to help them more effectively. Also, participants felt significantly less "role captivity" (ie, being trapped in a caregiving role) at the end of the program. Among the ways participants felt they benefited from this program was in learning from others how to cope and adapt to their partners' sensory impairment and understanding that many others shared the situation they faced.

Changing demographics affecting the microsystems of middle age and older adults are likely to affect the availability of informal support in the next decades.¹⁰⁴ Families are less likely to live together or nearby each other than they were 50 years ago, resulting in diminished potential sources of social support in the event of the onset of sensory loss. Furthermore, as age increases there is the inevitable loss of spouse, family members, and friends. Although there is a trend toward working longer, retirement is still a significant component of the aging process. Some retirees move to more hospitable climates and away from support systems they have developed over a lifetime. A small percentage of the population may be institutionalized and isolated from the community. These changing contexts will likely result in fewer informal social support resources for coping with sensory disability for emerging cohorts of middle age and older adults. However, changes in formal caregiving service modeled to older adults, such as the expansion of assisted-living facilities,¹²⁰ could serve to ameliorate the potential truncation of informal support resources.

Macrosystem Influences on Individuals With Sensory Loss

When considering macrosystem influences on psychosocial adaptation to dual sensory loss, important factors are the general level of knowledge about and attitudes toward sensory impairment in our society. These factors influence how an individual with sensory impairment is treated in day-to-day life, as well as how governmental, medical, and other institutions respond to the needs of adults with dual sensory loss. Unfortunately, the evidence suggests that attitudes and knowledge about sensory loss leave much to be desired. As noted previously, research using a national sample of adults aged 55 years found a relatively low level of accurate knowledge about visual impairment.⁴⁰ Furthermore, respondents who had more accurate knowledge about visual impairment were more likely to endorse positive attitudes toward vision loss and aging. But despite moderately positive attitudes toward vision loss in this sample, fear of blindness remained quite high and respondents ranked emotional/mental illness as the only medical condition feared more than blindness. These types of negative attitudes, with regard to both vision and hearing loss, have the potential to create considerable stigma and barriers to persons affected by these conditions.

The social stigma of disability is a considerable factor in how persons with vision and/or hearing loss adapt to their disabilities. Societal bias incorporates those with sensory loss as well as those with whom they must interact on a daily basis. Stereotypes of the “deaf and dumb” and those who are “blind as a bat” have persisted in the popular culture. Wax^{121(p.3)} describes those who are aging and have a hearing loss as being in “double jeopardy”; they are devalued and subject to increased discrimination.

The impact of culture. The variety of ways in which culture colors the experience of vision and/or hearing loss for individuals and their families is as varied as the many cultures and subcultures that exist in the tapestry of American society. Deeply embedded in the attitudes, thinking, and behaviors of each culture are the ways in which it perceives and responds to persons with disabilities in general and to hearing or vision loss in particular. The degree to which individuals and their family support systems have assimilated into American culture is also a factor in how cultural norms may affect adaptation to sensory loss.

For example, many Asian cultures are very private about disability, keeping such differences within the knowledge of immediate family only. Whereas more assimilated families may note and follow American trends toward being more outright about disability and seeking help for it.¹²² This is often true for other traditional cultures as well.

Economics. Large segments of the deaf and visually impaired populations are documented as being underemployed.¹²³⁻¹²⁶ The onset of sensory loss also affects the continued employment of adults in middle and late adulthood; adults with dual sensory loss are more likely to retire at an earlier age than their counterparts without sensory loss.³⁴ Because the incidence of both hearing and vision loss increases with age, the majority of adults with dual sensory loss have retired and likely face economic constraints because of fixed incomes. Economic responsibilities for these older adults include increasing housing, health care, and insurance costs, resulting in difficult choices in allotting expenditures. These economic constraints may present barriers to older adults seeking sensory rehabilitation services and assistive technologies, leading them to defer necessary treatment. To illustrate, one study found that adult Hispanics with hearing loss with incomes above the poverty line were nine times more likely to be using hearing aids compared to peers below the poverty threshold.¹²⁷

Physical environment. What are considered to be “normal” environmental conditions may present significant challenges for individuals with both auditory and visual sensory loss. Four factors may affect communication function for the person with sensory loss. These include audition (eg, background noise, sound that is too loud or too quiet), visual factors (eg, poor lighting, glare, visual noise), spatial relationships (eg, distance, barriers that affect sound and light, seating arrangements), and comfort (eg, too hot, cold, uncomfortable seating). These factors may compound communication difficulties for individuals with dual sensory loss. In addition, environmental factors may increase the difficulty to complete daily functions for the individual with vision loss (ie, poor lighting for changing a hearing aid battery). There are numerous modifications one can make to physical environments in order to accommodate visual impairment or hearing loss. With regard to hearing, the use of carpeting or other

fabrics in interior spaces may help reduce ambient noise and improve a person's ability to discriminate sounds in situations such as having a conversation in a restaurant or other public place. Seating arrangements that improve face-to-face positioning of speakers (eg, round tables vs long rectangular tables) can facilitate speechreading and communication function. With regard to visual impairment, the use of high-contrast materials or materials of different textures (eg, carpeting vs linoleum floors) in indoor environments can promote orientation and mobility skills. For example, in office buildings, linoleum can be used in public areas, such as elevator lobbies or hallways, whereas carpeting can be used to denote private office areas. Signage can be made in large-print, high-contrast materials, and/or use raised lettering or Braille for the same purposes. In addition, systems have been developed that provide auditory information for people with visual impairments to facilitate indoor and outdoor travel.¹²⁸

Unfortunately, many of the strategies or environmental modifications made for vision loss may not be helpful to those with hearing loss and vice versa. For example, dependency on written material for persons unable to hear critical information may not be a viable alternative for persons with dual sensory loss with moderate to severe impairment of vision. The Americans With Disabilities Act of 1990¹²⁹ supports modifications of work and public environments, for example, amplified or hearing aid-compatible telephones for persons with hearing loss, or computer screen readers for persons with visual impairment. However, individuals with sensory loss are usually left to their own devices to advocate for change.

The future of technology. The rapidly expanding array of communication and other assistive technology provides some solutions for individuals with sensory loss but also may present further complications as well. Lubinski and Higginbotham¹⁰ provide a survey of technology options for sensory loss. Micro-technology provides more options and better fitting capabilities for individuals with hearing loss and minimizes the visibility of hearing aids, meeting the needs of those who are concerned about the stigma of hearing loss. However, the smaller size of such technologies creates difficulties for individuals with vision loss who may not be able to see or manipulate the controls easily. At the same time individuals with visual impairment may turn to audition to help

negotiate tasks and environments, but when they also have hearing loss, environmental clues such as timers or bells may not be available and communication may be compromised.

With regard to the psychosocial benefit of using assistive technology to address dual sensory loss, the evidence is positive but with a few caveats. Hearing aid technology enables an increase in amplitude by adjusting sounds for a more uniform loudness across frequencies. This provides the listener access to sounds that were not loud enough by providing more auditory receptive information. Despite successful hearing aid fittings, many individuals experience residual participation restrictions and activity limitations. One study of older adults with mild to moderate hearing loss who were first time hearing aid users found that whereas aid use had positive effects on self-perceived hearing handicap (i.e., communication function), there were no significant effects of aid use on social activity participation, satisfaction with social relations, well-being, or cognitive functioning.¹³⁰ However, a meta-analysis of the benefits of hearing aid use by Chisolm and colleagues¹³¹ found that use of these devices had medium to large positive effects on disease-specific health-related quality of life (ie, sensorineural hearing loss) through reduction of the emotional, psychological, and social effects of this condition.

There are also limits to assistive technology in addressing the psychosocial well-being of adults with visual impairment. Horowitz and colleagues²⁸ examined the short-term benefits of optical device (eg, magnifiers, telescopes, special lenses) and adaptive aids (eg, large print materials, talking items, handwriting guides) among older adult vision rehabilitation clients with regard to levels of depression and inability to perform ADLs. At the 6-month follow-up, after controlling for vision impairment severity and other sociodemographic covariates, the use of optical devices was associated with lower levels of depression and disability. However, no such effect was observed for adaptive aids. Horowitz and colleagues proposed that the differential effects of optical device and adaptive aid use occurred because optical devices make use of residual vision and allow a greater continuity with one's behavioral repertoire. In contrast, the use of adaptive aids requires learning new methods to perform old tasks and is less desirable from both a functional and psychological perspective. Thus, technological approaches to sensory impairment do have their value, but in some

instances, they may be limited in their ability to broadly improve quality of life.

Health care and healthcare services. Visual impairment and hearing loss may receive little attention in traditional health care settings. For example, Cohen and colleagues¹³² reported that whereas nearly all primary care physicians surveyed felt that hearing loss posed significant quality of life issues, only 60% assessed patients for this condition. Furthermore, traditional audiological services focus on assessment and fitting of amplification. Audiological programs that offer holistic approaches are usually found in tandem with university training programs and their related clinical services. The paucity of available holistic programs is, in part, because aural rehabilitation is generally not covered by insurance.¹³³ In addition, the average consumer with hearing loss may not be aware of such services or what they can provide to help with adaptation. A similar situation with respect to a lack of comprehensive care exists among vision rehabilitation clients who have hearing difficulties. Among a sample of vision rehabilitation clients from 18 to 98 years (mean age = 70 years), 39% reported a hearing problem. Of those with a hearing problem, 33% had not had their hearing checked within the past 5 years and less than half had consulted with their primary care provider about their hearing loss.^{134,135}

Of particular concern is the ability of individuals with dual sensory loss to access and negotiate the medical system because of both communication and mobility limitations. The challenges of creating an effective medical assessment protocol when communication is impaired are significant. Furthermore, individuals with dual loss who are hospitalized for surgery or other medical procedures face communication challenges that few professionally based institutions are equipped to address. With regard to long-term care, it is estimated that 90% of older adults in residential care will have one or more conditions that will impair communication in some way and to some degree.¹³⁶ These institutions will also need to address the sensory impairment status of their residents to ensure adequate quality of care.

Policy and law. The most significant and comprehensive law that is supportive to the rights of persons with hearing loss, vision loss, and dual sensory loss is the Americans With Disabilities Act of 1990.¹²⁹ This sweeping reform in disability rights

protects individuals in both public and private sectors and requires that *reasonable accommodations* be made for persons with a disability. For individuals with vision and/or hearing loss this may include such modifications as job restructuring, interpreters, and the provision of assistive technology that provides alternative sensory input. Work settings with fewer than 15 employees and religious groups are waived from these requirements, and various parts of the law are regulated by different government entities.

Although individuals with Americans With Disabilities Act grievances should exhaust efforts to rectify problem situations through the offending agencies' chains of command, formal complaints may be lodged through the Equal Employment Opportunity EOC for job-related issues and the US Department of Justice for access or accommodations to other public realms.¹³⁷⁻¹⁴⁰ Often, these agencies will refer for mediation prior to sending complaints to the appropriate courts. Other legislations that protect the rights of access for persons with dual sensory loss include The Telecommunications Act,¹⁴¹ Fair Housing Act,¹⁴² Air Carrier Access Act,¹⁴³ Voting Accessibility for the Elderly and Handicapped Act,¹⁴⁴ National Voter Registration Act,¹⁴⁵ Civil Rights of Institutionalized Persons Act,¹⁴⁶ and the Architectural Barriers Act and the Rehabilitation Act.¹⁴⁴

Implications and Directions for the Future

Although detailed information on psychosocial adaptations to dual sensory loss is lacking due to the current state of the science, what we are able to glean from the literature on single loss of hearing and vision suggests a number of action steps that could address the growing numbers of middle age and older adults with this condition. Interdisciplinary approaches to dual sensory impairment need to be examined given the complex nature of this condition, as well as its multifaceted impact on functioning and well-being. What is required is enhanced training for those already in the fields of visual impairment and hearing loss (ie, audiologists, ophthalmologists, rehabilitation specialists, educators, researchers, counselors), as well as outreach to other professions whose expertise is also needed, such as in the medical and legal fields. Such training should involve basic information on hearing and visual function, causes of sensory

impairment, rehabilitation options, and technological applications for improving function and life quality.

Evolving Models of Sensory Rehabilitation

To foster such collaborations and avoid turf issues, a more unifying model of sensory loss rehabilitation should be expanded that incorporates the various combinations of sensory conditions (eg, single vs dual impairments) and clarifies the primary and supporting roles of professionals in rehabilitation settings. To inform these endeavors, there must be a commitment from both governmental and private-sector funding sources to support rigorous and relevant research on the topic of psychosocial and functional adaptation to dual sensory loss. Ideally, such research would involve longitudinal studies on psychosocial and functional outcomes of persons with adult-onset dual sensory loss. Such research should also examine program outcomes for rehabilitation services targeted toward a specific impairment (ie, aural or vision rehabilitation), as well as emerging models of holistic approaches to dual sensory loss. Additional work is also needed in understanding public perceptions of single and dual sensory losses and attitudes toward rehabilitation and barriers to the use of these services.

Group approaches and peer mentoring in adjustment to sensory loss. In the past 5 years, several programs have been introduced that provide support for individuals who need help in coping with hearing loss. In part they have evolved from the self-help concept that has provided help for the past 30 years such as the Hearing Loss Association of America (HLAA) formerly known as SHHH, and the Association of Late Deafened Adults (ALDA), both national organizations with affiliated local chapters. A group approach to working with individuals with dual sensory loss may provide added benefits, although this has yet to be documented in the professional literature. An analysis of studies of group aural rehabilitation by Hawkins^{147(p.491)} reveals that, although group benefits are not well researched, some of the benefits include "a reduction in perception of hearing handicap, improvement in perceived quality of life and perhaps, better use of hearing aids and communication strategies." Furthermore, Lesner^{148(p.203)} gives us some insight when she states, "Programs that focus on self-help and education also provide attention to the

psychosocial changes that result from disabilities." Kemp¹⁴⁹ adds that these types of programs help people, "... in leading more satisfying lives." HLAA chapters and some of the programs they sponsor (eg, lipreading classes, community projects, etc) as well as similar programs offered by community hearing and speech centers may have great value in helping individuals meet the challenges of hearing loss.

Ross and Bally¹⁵⁰ provide convincing arguments for the need for peer mentoring, and Gallaudet University has initiated a mostly on-line two-year graduate level certificate program to train individuals to provide mentoring specifically for persons with hearing loss. That program, which included both academic and experiential learning, is only open to other individuals who have sustained and adjusted successfully to hearing loss as evidenced by their application materials describing their own functioning and efforts to help others to meet the challenges of hearing loss (eg, active in HLAA or ALDA chapters or national organizations, volunteer work, etc.). HLAA has initiated a Hearing Loss Support Specialist online program that is primarily academic in nature and is open to anyone who is interested in helping others with hearing loss. Given the lack of access to vision and aural rehabilitation services in the United States because of issues of cost and geographic barriers,¹⁵¹⁻¹⁵³ programs using this model have the potential to improve access to help for adults with dual sensory loss.

Outreach and Public Education

Changes in rehabilitation models, programs, and grant-funding priorities will not occur without widespread public support for such initiatives. Thus, increasing public awareness through outreach and education are sorely needed concerning the causes and consequences of dual sensory impairment, the extent to which dual impairment impacts our society, and rehabilitative and technological strategies for managing this condition. Increasing public awareness of dual sensory loss should also serve to increase understanding of those affected by dual loss and lessen the stigmatizing effects of this condition with regard to assessment, training, and the use of technology as previously discussed. It may also foster better accommodation of persons with dual sensory impairment as mandated by the Americans With Disabilities Act. We also need to provide outreach and education specifically to persons with

dual sensory loss, their families, and significant others who are directly affected by this condition to improve understanding and reduce feelings of isolation. This type of outreach could also facilitate coping and adaptation by providing information about rehabilitation programs and technology. It is imperative that this outreach makes a special effort to reach populations who may face even greater hurdles in accessing relevant information and obtaining needed services, such as non-English speaking minorities or persons with multiple disabling conditions.

Dual Sensory Loss and Medical Insurance

Lastly, addressing the problem of dual sensory loss will also require that we tackle the inequities in the provision of health care services in this country. Lack of health insurance coverage has been the focus of continuing debate in the United States. In fact, a number of studies have suggested that lack of health insurance coverage presents a barrier to regular eye examinations, even for persons with high-risk conditions such as diabetes.¹⁵⁴⁻¹⁵⁶ But even for persons with health insurance, assessment of hearing and vision functioning may not be covered. For example, with regard to audiological examinations, a survey of 975 major employers with private health insurance coverage found that only 23% provide a hearing care plan, while an additional 2% had this coverage as part of another insurance package.¹⁵⁷ Regular and standardized assessments of sensory function could go a long way in preventing needless sensory disability through earlier diagnosis and treatment.

When treatments to address sensory conditions are covered by insurance, there is often a lack of consistency in the insurers' approach. For example, insurance reimbursement rates often do not cover the cost of cochlear implants, whereas Medicare and Medicaid reimbursement rates may not cover the costs of aural rehabilitation following surgery.^{151,158} When coverage by private carriers is available, claims may be initially denied but are often paid on appeal.¹⁵⁹ Although Medicare is currently running a demonstration project for vision rehabilitation, it includes only 6 sites in the United States and does not include the cost of assistive technology such as optical devices or low-vision aids.²⁸ Better insurance and third party reimbursement for sensory rehabilitation services is required to ensure that those who need these services can afford them.

Although medical and psychiatric rehabilitation reimbursement is commonplace in our society, sensory rehabilitation is rarely covered. This is despite the fact that severe sensory loss, such as visual impairment, may have the same negative impact on quality of life as advanced cancer or other life-threatening conditions.^{160,161} Thus, much better coverage needs to be provided by Medicare and other insurers.

Conclusion. There is ample evidence that dual sensory impairment presents numerous challenges to psychosocial coping and adaptation for middle age and older adults affected by the onset of this condition and their families. The fact that dual sensory loss is especially prevalent among older people, who present with a variety of comorbid conditions in addition to sensory loss, makes the needs of this group even more difficult to address. However, with a concerted effort on the part of rehabilitation and human service providers, researchers, educators, policymakers, program planners, and persons who are impacted by dual loss and their family members, we will be able increase knowledge about this condition, and offer rehabilitation and other services that can better meet the needs of this population.

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