Sensory and demographic characteristics of deafblindness rehabilitation clients in Montreal, Canada

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Abstract

Purpose: Demographic changes are increasing the number of older adults with combined age-related vision and hearing loss, while medical advances increase the survival probability of children with congenital dual (or multiple) impairments due to pre-maturity or rare hereditary diseases. Rehabilitation services for these populations are highly in demand since traditional uni-sensory rehabilitation approaches using the other sense to compensate are not always utilizable. Very little is currently known about the client population characteristics with dual sensory impairment. The present study provides information about demographic

and sensory variables of persons in the Montreal region that were receiving rehabilitation for dual impairment in December 2010. This information can inform researchers, clinicians, educators, as well as administrators about potential research and service delivery priorities.

Method: A chart review of all client files across the three rehabilitation agencies that offer integrated dual sensory rehabilitation services in Montreal provided data on visual acuity, visual field, hearing detection thresholds, and demo- graphic variables.

Results: The 209 males and 355 females ranged in age from 4 months to 105 years (M = 71.9, S.D. = 24.6), indicating a prevalence estimate for dual sensory impairment at 15/100 000. Only 5.7% were under 18 years of age, while 69.1% were over the age of 65 years, with 43.1% over the age of 85 years. The diagnostic combination that accounted for 31% of the entire sample was age-related macular degeneration with presbycusis. Their visual and auditory measures indicated that older adults were likely to fall into moderate to severe levels of impairment on both measures. Individuals with Usher Syndrome com- prised 20.9% (n = 118) of the sample.

Conclusion: The age distribution in this sample of persons with dual sensory impairment indicates that service delivery planning will need to strongly con- sider the growing presence of older adults as the baby-boomers approach retirement age. The distribution of their visual and auditory limits indicates that the large majority of this client group has residual vision and hearing that can be maximized in the rehabilitation process in order to restore functional abilities and social participation. Future research in this area should identify the specific priorities in both rehabilitation and research in individuals affected with combined vision and hearing loss.

Introduction

Dual sensory impairment (DSI) generally refers to a functional restriction in both vision and hearing. It can be categorized into combinations of congenital or acquired impairment and can range from mild to total sensory loss within either sense.[1,2] In recent years, the topic of DSI and its rehabilitation has gained momentum, in large part due to the increasing number of older adults with either/ both hearing and vision impairment.[3–6] In Canada, for example, among those persons with DSI, the estimated proportion of persons over the age of 65 with dual impairment has increased from 21.6% in 1998 to 45.4% in 2005.[7,8] At the same time, improved neonatal screening and medical advances increase the number of children with DSI that survive despite pre-mature birth, low birth weight or rare hereditary diseases.[9] These trends require that rehabilitation agencies prepare for appropriate service provision, specifically in programs serving clients with dual impairments. It has previously been pointed out that loss of visual and auditory capacity is not simply additive but has a multiplicatory effect since the affected individuals cannot compensate for the loss of one sense with the other.[1] Therefore, uni-sensory rehabilitation approaches may not be sufficient when dealing with dual clients; however, the characteristics of this clientele and their service delivery needs are not well described, often due to the low incidence rate or because research with this population is plagued with methodological challenges. The present study provides information about demographic and sensory characteristics of persons in the Montreal region that were registered with any one of the rehabilitation agencies in a dual impairment program in December 2010.

The rehabilitation system available in Montreal through the Quebec Ministry of Health has the advantage that dual impairment rehabilitation services are provided through combined

multi-disciplinary programs offered at agencies that also provide uni-sensory rehabilitation. The professions involved include optometry, audiology, social work, occupational therapy, psychology, low vision rehabilitation, speech and language pathology, orientation and mobility, hearing-assistive technology, special care counseling, computer accessibility, braille, and sign language instruction. At present, there are no widely accepted standards for training rehabilitation professionals to provide services to individuals who cover the complex spectrum of DSI. They either come from a background in vision loss or hearing loss with no specific training on the other impairment, or from other rehabilitation professions with no specific training on any sensory loss. Given the traditional professional training and the mission of rehabilitation centers who provide services to individuals with DSI it is fair to surmise that clinicians are more familiar (and more competent) when they provide services to deaf- blind children and adults with Usher Syndrome. They are likely to have less training and experience providing rehabilitation services for older adults with age-related sensory restrictions. They are often agency-trained for the purpose of meeting the specific mandate (real or perceived) of the rehabilitation facility. Moreover, they are not likely to hold the equivalent of full-time employment, given the low prevalence of the traditional DSI clientele. This situation, however, is likely to change rapidly over the coming decades and requires additional attention from administrators, educators as well as rehabilitation specialists from all domains.

The continuing increase in the number of clients with dual impairment makes any prevalence estimate very difficult to perform; it is like attempting to hit a moving target. Therefore, prevalence data are not available in great abundance. Population prevalence has been estimated to be anywhere between 0.01% and 1.3%,[7,8,10] whereas these estimates rise

dramatically to values around 6% to over 20% when only older adults are considered,[2,11–15] and can be as high as 8% to 30.1% in special populations such as older adults with hip fractures.[16,17] The variation in these numbers may, in part, be due to how hearing impairment and visual impairment were operationally defined across studies or whether they were based on self-assessment or behavioral measures, such as acuity or pure-tone averages. Prevalence data regarding dual sensory impairment in children are even scarcer than those for adults. Usher Syndrome affects approximately 3%–6% of all deaf and hard-of-hearing children,[9] and Boughman *et al.*[18] estimated the prevalence of this condition in the United States at 0.0044%. The aetiology of dual sensory impairment in deaf-blind children can be attributed to over 70 different conditions related to hereditary/chromosomal syndromes and disorders, pre- natal/congenital complications, post-natal/non-congenital complications, and complications related to pre-maturity.[19]

Very little information is currently available about whether hearing and vision losses generally affect clients with equal severity. Rönnberg *et al.*[20] presented data on visual acuity, visual field and pure-tone average dB hearing loss in 13 intellectually intact participants (age 17–80) with dual impairment; however, these individuals were all profoundly hearing impaired and may not be representative of the general client profile. Dalby *et al.*[21] described 182 participants with congenital or acquired deaf-blind- ness whereby 30.2% self-reported being severely impaired in both senses and 48.3% described themselves as severely impaired in one sensory modality and mildly or moderately impaired in the other, as measured by the Deafblind

Severity Index.[22] This measure provides valuable information about the subjective level of perceived functioning; however, since no behavioral measures of visual or hearing status

were provided, it is not possible at this time to compare the perceived level of impairment with the objective eligibility criteria for rehabilitation services, or evaluate to which level one is a good indicator of the other.

As far as descriptive data for the DSI population are concerned, internal rehabilitation agency audits can be consulted via the web; however, their presentation format is often driven by the needs of the agency, is not peer- reviewed and usually written in the language in which services are provided (for example, in Montreal, the Institut Raymond-Dewar or the Institut Nazareth et Louis- Braille mainly provide reports in French on their web sites). Therefore, this information is not necessarily easily accessed by international researchers through literature review or available in a scientific format. The presented chart review provides a description of the clientele who receives services for both hearing and vision loss in the Greater Montreal Area across the three independent rehabilitation agencies and offers a demographic profile and visual display of clients within dual-sensory-impairment space. By plotting vision loss as a function of hearing loss, it is easy to show their distribution according to demo- graphic or diagnostic variables. Such a display facilitates visualization of potential priorities in program planning for the coming decades, based on emerging clusters of clients and their characteristics.

Method

The protocol was approved by the *Centre de recherche interdisciplinaire en réadaptation de Montréal métropolitaine* (CRIR), the ethics review board for rehabilitation agencies within the Greater Montreal Area. At the time of the review (September–December 2010), the Quebec agencies utilized one common software program *Info- Réadapt* that tracked all

clinical data on all registered clients. This program was used to identify all files at the only three local rehabilitation agencies of persons currently on record within one of the programs that serve individuals with dual sensory impairment (English: Dual Sensory Impairment Program – Adults & Seniors, Multiple Impairment Program – Children, French: *programme surdicecité – Lifespan*). The data from both the electronic and paper files were accumulated for tabulation, graphical display, and descriptive statistical analysis using SPSS 17.0 for Windows. Basic demographic variables, such as age and gender, as well as information on time of impairment onset (e.g., pre-linguistic hearing loss, adult-onset vision loss), diagnosis, communication form (e.g., sign language) and type of loss (e.g. sensorineural, conductive, etc.) were tabulated.

The two central variables of interest for vision and hearing loss, acuity/visual field and degree of hearing loss measured in dB HL,[23] were chosen based on the requirements for service and device eligibility within the Quebec Minis- try of Health guidelines. In Quebec, individuals who fulfill any of these criteria are automatically eligible for services and devices that are entirely covered by provincial health- care programs. For vision, eligibility is determined in the better eye with standard optical correction of less than four dioptres, based on a visual acuity on a letter chart (ETDRS or Feinbloom, Lighthouse International, New York, NY, USA) of less than 20/70 (6/21), or a visual acuity equal to or less than 20/60 (6/18) for individuals with a degenerative visual problem, or a continuous remaining visual field of less than 60° including fixation measured in degrees on Goldmann or Octopus monocular static threshold perimetry (target size III/4e or equivalent) either horizontally or vertically, or complete hemianopia/loss of half the visual field. In addition, persons with a progressive degenerative eye disease, such as age-related macular degeneration, are eligible

for services (not assistive technology) if they experience problems in their activities of daily living.[24,25] For hearing, impairment is generally determined on the basis of the average hearing detection thresholds dB HL measured at four audiometric frequencies (i.e., 500, 1000, 2000, and 4000 Hz) in the better ear, without assistive technology.[23] However, for children under the age of 12 years, notwithstanding the degree of hearing loss, services are provided whenever the impairment is deemed sufficient to be a potential threat to language development. In youth between 12–18 years of age services are provided if the average hearing loss, in the better ear, is 25 dB HL or poorer. Similarly, in working- age adults services may be provided if the average hearing loss, in the better ear is at least 25 dB HL and if the impairment is deemed sufficient to have an effect on ability to study or work. Also, individuals who have an average hearing loss of 35 dB or greater in the better ear are eligible for services. Finally, any individual, irrespective of age and degree of hearing loss, may benefit from services if they report experiencing functional limitations due to hearing loss at school, at work, or in society in general.[26] Within the client file, these variables are usually tracked because eligibility for services and assignment to rehabilitation programs is largely determined by the level of impairment. The Quebec Ministry of Health does not presently provide separate eligibility criteria for dual sensory rehabilitation; therefore, the *Institut de re´adaptation en déficience physique du Québec* (IRDPQ) developed eligibility guidelines for their dual impairment program, using the World Health Organization categories for vision- and hearing loss (see *Table 1*).[27,28] These categories are used to guide admission but remain flexible, in light of the additional criteria based on functional impairment.

Results

Across the agencies, a total of 614 files of individuals with DSI were identified. Of those, 50 were excluded from the analysis because the individuals lived more that 75 km from Montreal, placing them outside the Greater Montreal Area. This choice was made because many of these persons may also receive rehabilitation services at other agencies in rural regions; therefore, their file information was rarely complete at the Montreal agencies. The remaining 209 males (37.1%) and 355 females (62.9%) ranged in age from 4 months to 105 years (M = 71.9,

S.D. = 24.6). Using the Montreal population census information from 2010, the resulting prevalence estimate for DSI is 0.015%. The frequency distribution is displayed in *Figure 1*, showing a larger number of female older adults, while male children and younger adults generally out- number their female counterparts. Overall, only 5.7% (n = 32) were under 18 years of age, while 69.1% (n = 390) were over the age of 65 years, with 43.1% (n = 243) of the sample being over the age of 85 years.

Please note that for the graphical display of visual acuity, the logMAR scale was used, because this measure is commonly used to linearize the data[29,30] and is familiar to vision scientists. A value of 0 indicates normal acuity (20/20 or 6/6) whereas a value of 1 indicates legal blindness (20/200 or 6/60), making this an elegant scale of visual impairment. For the purpose of including acuity measures such as no light perception or hand motion in the graphs, the conversion proposed by Schulze-Bonsel and colleagues[31] was applied, whereby a logMAR value of

2.3 indicates the perception of hand motion, 3 represents light perception and 3.1 indicates the absence of light perception/total blindness.

There were no clinically meaningful differences among demographic variables between

the English and French- speaking rehabilitation agencies; therefore, the presented statistics are collapsed across institutions. Visual acuity data were available for 551 persons (97.7%), visual field data were measured in 498 cases (88.3%), hearing detection threshold data were available in 520 (92.2%), and all three measurements were complete in 460 files (81.6%). For some incomplete files, the client was currently on a waiting list for the intake exam, while for others this information was simply missing. When categorizing the 551 complete files by vision eligibility criteria, 25 (4.5%) fell within the normal range, indicating that these persons received services based on one of the functional vision impairment criteria. Only three of these were under the age of 18. The remaining individuals were eligible for vision rehabilitation based on reduced acuity only (n = 273, 49.5%), field reduction only (n = 57, 10.4%), or impairments in both acuity and field (n = 196, 35.6%). When categorizing the participant pool on the basis of their hearing disability, 13 (2.4%) had a mean hearing detection threshold better than 26 dB HL, indicating that these persons received services based on one of the functional hearing impairment criteria. Only four of these were under the age of 18.

The distribution of the measurements for all available data points in dual impairment space of dB HL as a function of either acuity or visual field is displayed in *Figures 2 and 3*, respectively. For acuity, the clustered majority of individuals at the center of *Figure 2* show moderate to severe levels of both hearing and vision loss. For visual fields, the cluster at the top right corner of *Figure 3* contains mostly individuals with Usher Syn- drome with profound or total hearing loss and severely reduced visual fields. The cluster at the center of *Figure 3* contains mostly older adults with age-related central vision loss and presbycusis. This population is characterized by both moderate to severe loss of hearing and vision

display the distribution of participants' visual acuities, visual fields and pure-tone average detection thresholds as a function of age, respectively. For visual acuity, the distribution of data points demonstrates how, particularly, seniors over the age of 75 cluster in the moderate to severe acuity impairment level. Individuals under the age of 60 are more likely to show acuities better than the limit of legal blindness; these persons are likely receiving rehabilitative services because of functional impairments that interfere with education or work. *Figure 5* demonstrates the great variability of visual field sizes among persons over the age of 75 mentioned in the description of *Figure 3*. Both the restrictions in visual field and visual acuity go far beyond what would be expected during the regular aging process.[32,33] In terms of hearing impairment, older adults were less likely to be profoundly impaired as is seen in the cluster underneath the reference line in *Figure 6*. However, it is important to recall that the hearing loss data plotted here represent the mean hearing loss across four audiometric frequencies (i.e., 500, 1000, 2000, and 4000 Hz). Further, it must be considered that the audiometric configuration observed in older adults with presbycusis is typically characterized by normal or near normal hearing detection thresholds at low frequencies (i.e., below 2000 Hz) and a progressively greater hearing loss at higher audiometric test frequencies.[34,35] In addition, it is well documented that especially in older adults there is not a strong relationship between mean hearing detection threshold and the hearing disability (i.e., the ability to perform common hearing-related everyday activities). Relative to children and adults, older adults experience greater hearing disability than would be predicted by their audiometric hearing detection thresholds; thus, the activity limitations and participation restrictions experienced by older adults with moderately- severe to severe hearing loss may be greater than those experienced by younger individuals with a similar degree of

impairment.[36] Notwithstanding this caveat, the data illustrate the great variability across the age range for clients with dual sensory loss.

Based on the etiology criteria used for referral by the University of Oklahoma/OK Deaf-Blind Project,[19] an extended system for the present diagnostic categories was created (see Appendix S1). One hundred and fifty individuals were classified with a hereditary or chromosomal syndrome or disorder, of which 118 were affected with one of the three types of Usher Syndrome. Furthermore, 28 were classified with pre-natal or congenital complications, such as congenital rubella (n = 8) or Seckel Syndrome (n = 4). A further 34 showed post-natal or non-congenital complications, such as encephalitis (n = 4) or tumors (n = 6). Only four cases were related to complications of pre-maturity, and for 66 individuals at least one diagnosis (vision or hearing loss) were unknown (this was mostly the case with longstanding files). The remaining 282 individuals were affected with vision and hearing loss combinations that were adult-onset or age-related, such as age-related macular degeneration/presbycusis (n = 179) or glaucoma/presbycusis (n = 25), see *Figure 7*.

Discussion

The presented client profile across the DSI and deaf- blindness rehabilitation programs in the Greater Montreal Area demonstrated great variability in visual and auditory thresholds throughout this population. The age-distribution is of particular significance because the older participants represent the parents of the baby-boomer generation, since 2010 (the fall during which the sample was identified) was the last year before the baby-boomers reach retirement age. Interestingly, a previous population prevalence estimate in Canada by Watters *et al.*[8] reported a very similar age distribution in Quebec as found in the present

data, with persons over the age of 65 comprising 63% of the studied population (69% in the present data set). The authors had speculated that their estimate may not be accurate due to recruitment problems and difficulties with ethics approval requirements in the Montreal region. The present data indicate that their estimate may be more accurate than they had anticipated. When focusing on the prevalence estimates in the 6–21-year-old population, Watters *et al.* reported a discrepancy between the province of Quebec (3.8%) and other provinces, such as Southern Ontario (25.9%) or British Columbia (48.4%). Our proportion of 3.7% is again similar to their data from 2005. Watters *et al.* stated that older adults with dual impairment may be more likely to be known to the rehabilitation agencies, thereby more accurately approximating the reality of the age distribution. However, their definition of dual impairment was less stringent and more based on functionally perceived limitations; therefore, it is likely that both the study by Watters *et al.* and our sample still underestimate the actual prevalence of combined vision and hearing loss.

Almost half of the clients across the DSI programs were over 85 years of age, with more than 2/3 being over the age of 65 years. These individuals are the first wave of a continuously growing number of future clients who will likely require a different approach to sensory rehabilitation. This has partially to do with the fact that, at least according to the experience of our clinical staff with their clients, they consider themselves neither deaf nor blind and are not comfortable with receiving services labeled for the deaf-blind.[37] Moreover, the activity limitations and participation restrictions that older adults with DSI will seek to overcome by seeking rehabilitation services are likely to be unique and very different from the rehabilitation goals that are typically addressed for children- and younger- adults with congenital or acquired DSI. The present data support this perception because the distribution

of older adults within dual impairment space indicates clusters at moderate/severe levels of sensory loss, not at the profound/extreme levels. The most common cur- rent age-related cause of vision loss in developed countries is macular degeneration, characterized by a progressive loss of photoreceptors in the central retina.[38] Functionally, this disease translates into decline of visual acuity that does not affect the extent of the visual field diameter in the periphery. What is remarkable about the age-related impairment group is that, even though macular degeneration by definition affects central vision only, these individuals also show great variability in the integrity of their remaining visual fields. At the present time, the rehabilitation literature does not provide clear information on either the rehabilitation needs of older adults with DSI or the treatment approach that is best suited to efficaciously address those needs.

Not surprisingly, the second-largest diagnostic group, after age-related sensory impairment, was Usher Syn- drome. This group of clients has history and a more established identity within the DSI rehabilitation community and their needs have previously been discussed in more detail.[39,40] What emerged from the diagnostic review in Appendix S1 was the large number and variety of *other* diagnostic combinations that can cause dual impairment, many of which are rarely discussed in the research context. This is most likely the case because of low incidence; however, in the context of rehabilitation service delivery, this variety of diagnostic categories has potentially problematic consequences. Based on the cur- rent and emerging demographic profile of their clientele, clinicians who provide DSI rehabilitation services must possess a high-level of flexibility when planning intervention programs because one size is unlikely to fit all. In order to do so, continued research is needed so clinicians can be trained and be competent at providing the appropriate rehabilitation

services to the complete spectrum of their DSI clients. Another important and growing segment of the DSI spectrum are adults who adjusted to living with a single sensory impairment (hearing or vision) and who develop a second sensory impairment in later life. What are the rehabilitation needs of those individuals? Do the needs vary according to which impairment occurred first and which one developed in later life? Presently there is very little experimental data or expert-clinician knowledge to guide the rehabilitative services sought and needed.

In the present study, all efforts were made to identify the complete client population across the respective agencies. However, some clients may have received rehabilitation services within a government agency for one impairment while having received additional rehabilitation-related services outside the government system or via private health care providers for the other or both impairments. At present, there is no effective way to identify and include these individuals in such a review. How- ever, it is possible in the present context that the number of people within this chart review is not very far from the actual number of individuals with dual impairment at the present time in this region. First, the health care system in the province of Quebec provides rehabilitation at no charge for the client, which makes the services affordable for anyone. Second, the three rehabilitation agencies in the Montreal region and their satellite offices are spread out geographically in order to facilitate client-access and overcome basic transport difficulties. Third, the Montreal public transport system provides adapted transport once clients have been identified as eligible, which includes door-to-door service. Fourth, a quick review of the files of persons at one of the agencies that provides both hearing and vision rehabilitation showed that only 32 individuals (13.5% of all files at that agency of clients with both impairments) received services in the

two parallel pro- grams for adult vision and adult hearing impairment at the time of the chart review. Their respective levels of loss were not sufficiently severe to qualify them for the dual program. Fifth, individuals with dual impairment are likely to require ongoing rehabilitation, especially if they are affected with progressive age-related conditions and if they require the use of assistive devices to overcome basis activity limitations and participation restrictions; there- fore, by identifying individuals with combined vision and hearing loss through these rehabilitation agencies we believe that the large number has been detected. Still, we concede that the estimated prevalence of 15/100 000 is likely to underestimate the true population. Previous work has shown failures to detect dual impairment in subpopulations, such as in younger individuals with multiple impairment[41]; in addition, awareness and utilization of rehabilitation services for low vision, for example, has been shown to be less than ideal, with up to 54% referred clients choosing not to utilize them.[42]

Conclusions

The present dual sensory impairment rehabilitation pro- file outlines the demographic and sensory characteristics of this population in Montreal, Canada. The age distribution indicates that service delivery planning will need to strongly consider the growing presence of older adults as the baby-boomers approach retirement age. The distribution of their visual and auditory limits indicates that the large majority of this client group has residual vision and hearing that can be maximized in the rehabilitation pro- cess in order to restore functional abilities and social participation. Future research in this area should identify the specific priorities in both rehabilitation and research in individuals affected with combined vision and

hearing loss. Clinicians as well researchers in both vision and hearing impairment rehabilitation will greatly benefit from a more encompassing understanding of the *other* impairment. Eye care specialists need to be aware of the barriers experiences by dually impaired individuals (e.g. adjust the intake approach to assure proper communication) while hearing healthcare professionals need to increase the awareness of the visual requirements when dealing with hearing-assistive technology (e.g. being able to see adjustment knobs on hearing aids). At the same time, researchers will require this insight in order to design appropriate study protocols, collaborate and communicate with researchers across disciplines, and to identify relevant research topics.

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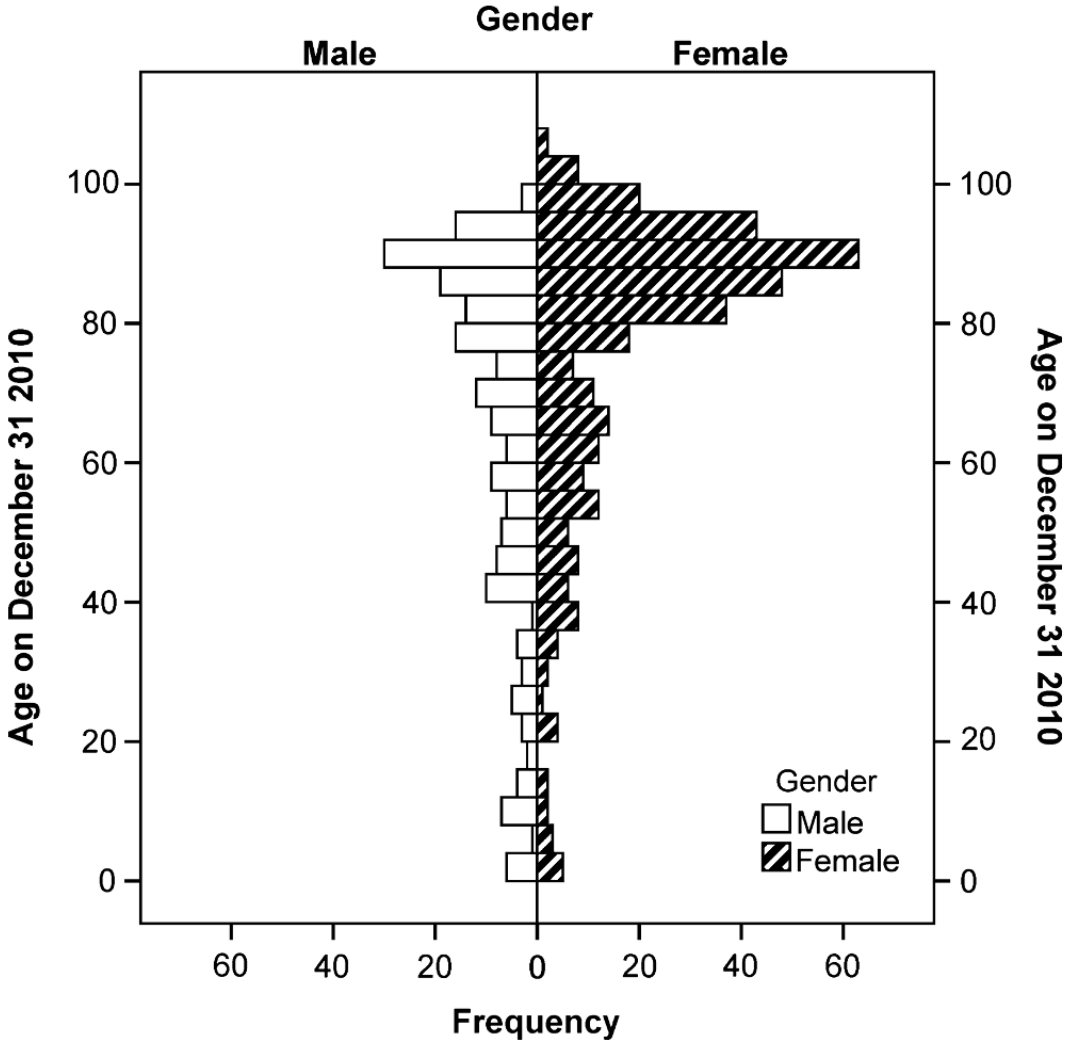

Figure 1. Age distribution for all men and women with active dual impairment rehabilitation files in the Greater Montreal Area.

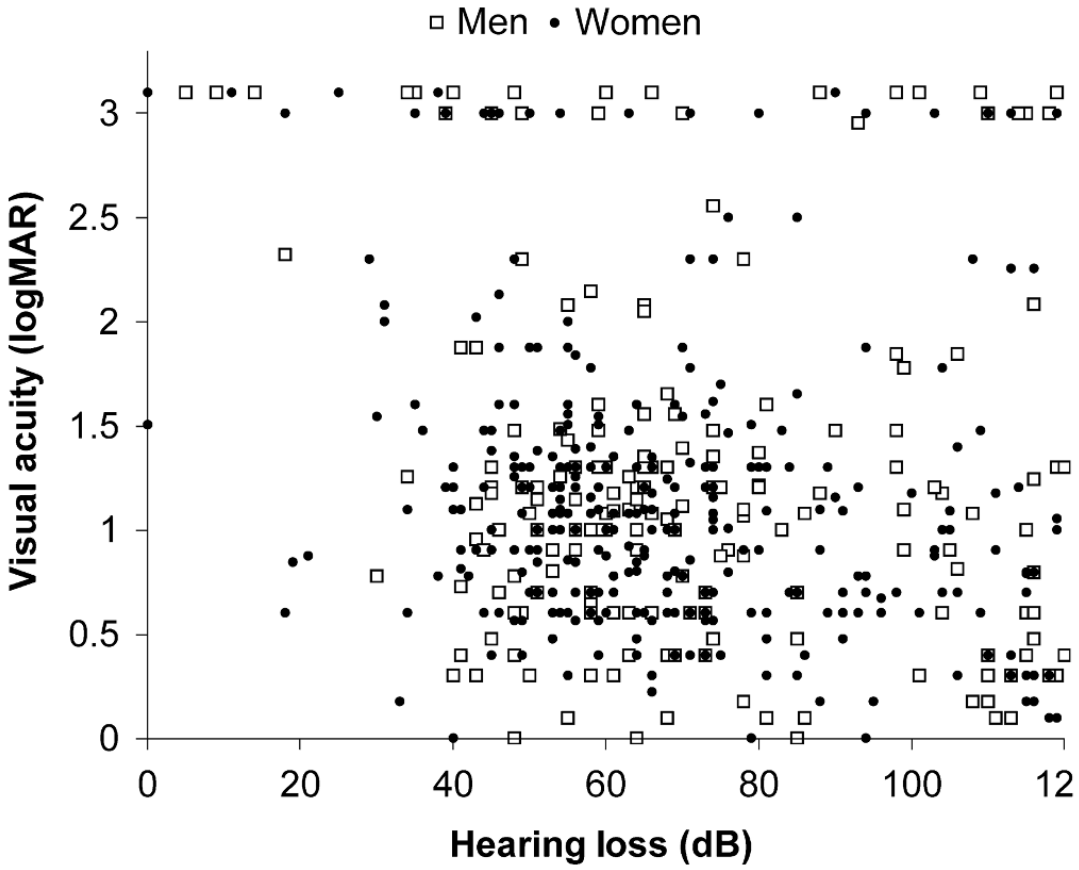

Figure 2. Visual acuity as a function of hearing loss.

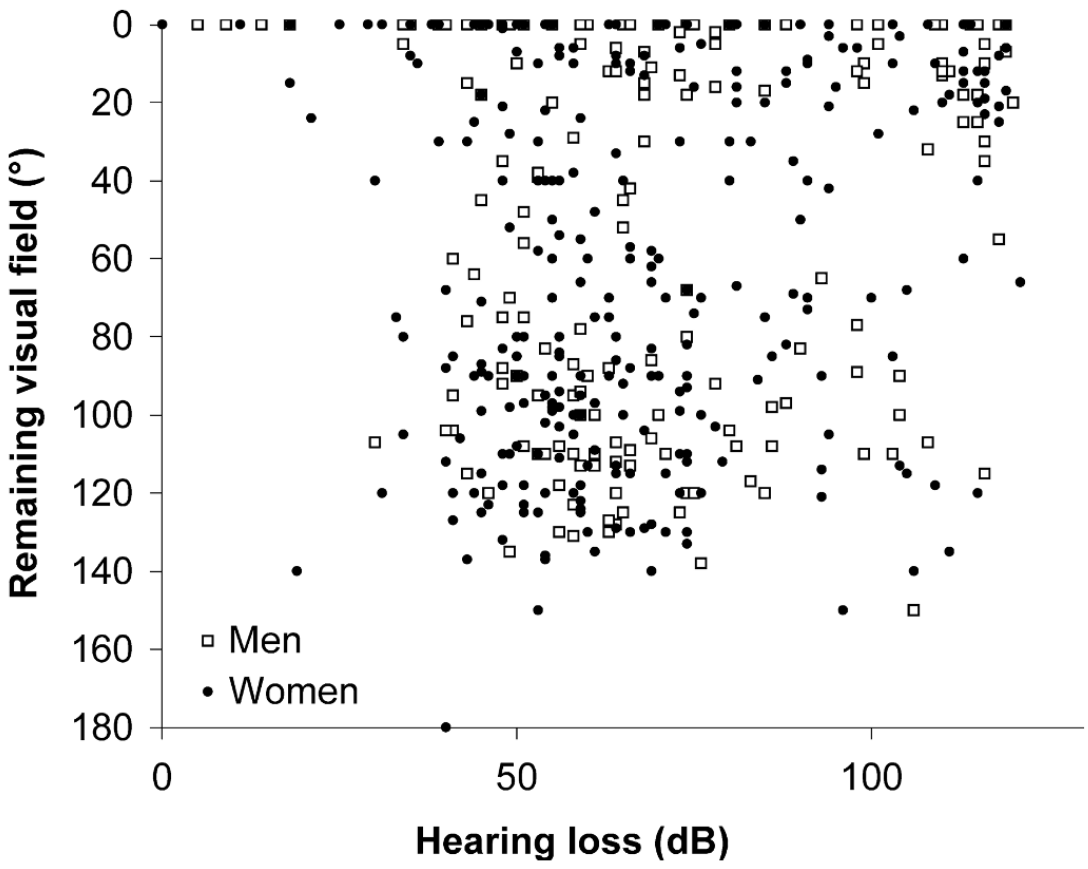

Figure 3. Remaining visual field as a function of hearing loss.

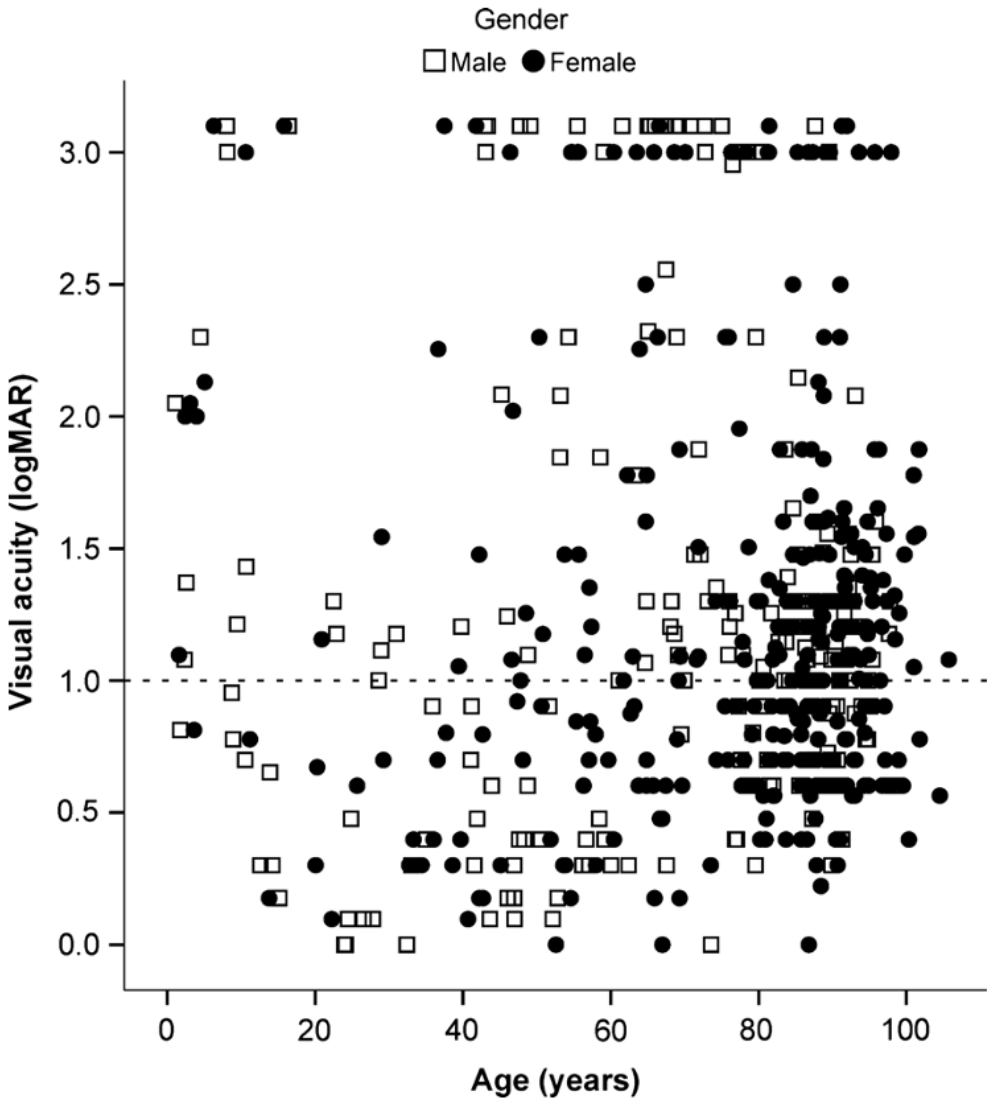

Figure 4. Visual acuity as a function of age and gender for all dual impairment rehabilitation clients. The dotted reference line indicated the limit for legal blindness 6/60 (20/200). Individuals in this graph above this line are considered legally blind based on acuity.

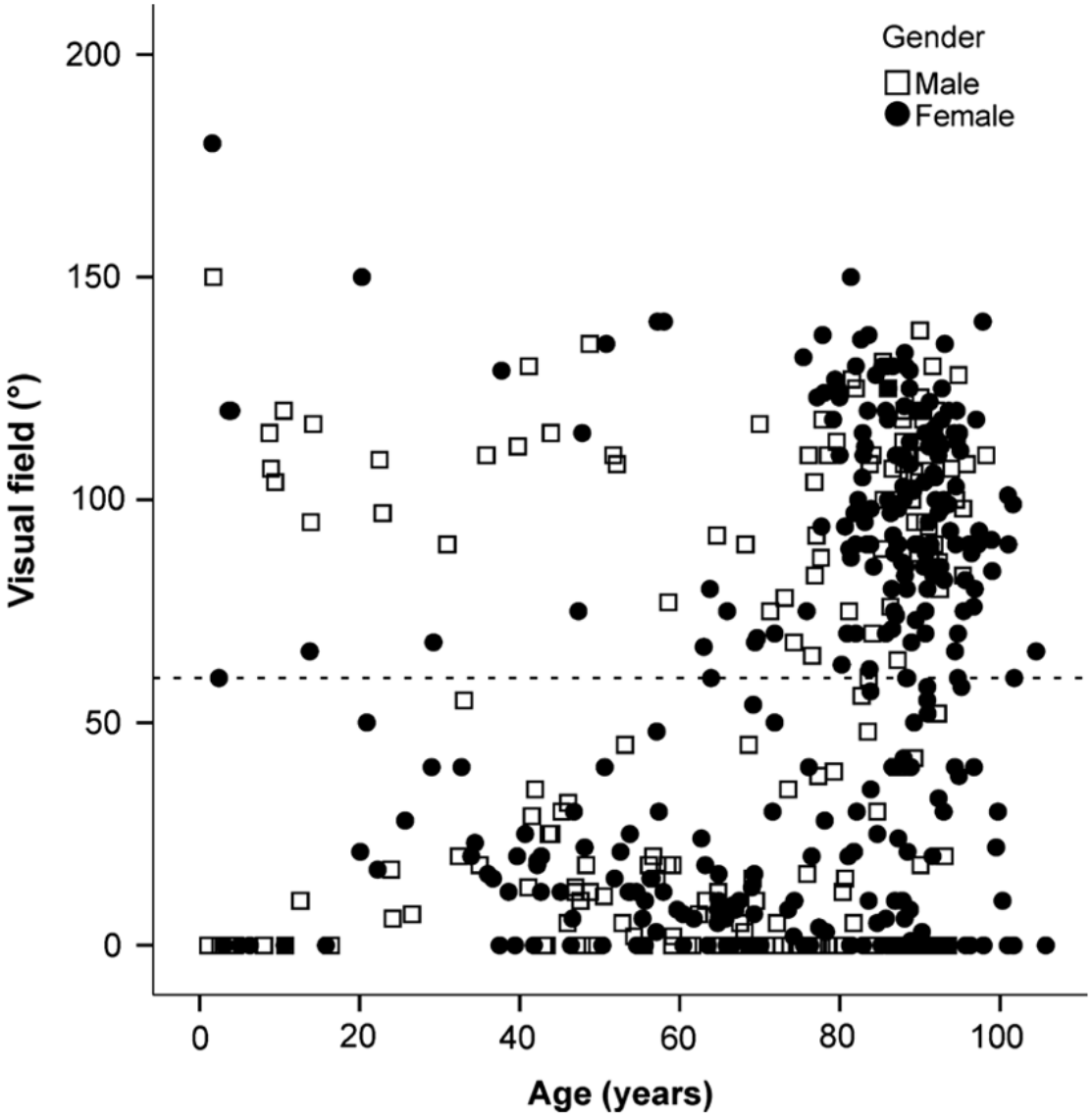

Figure 5. Visual field as a function of age and gender for all dual impairment rehabilitation clients. The dotted reference line indicates the visual field limit for legal blindness 60 degrees horizontally or vertically, including the fovea. The individuals in this graph that fall below this line are considered legally blind according to their visual field measure.

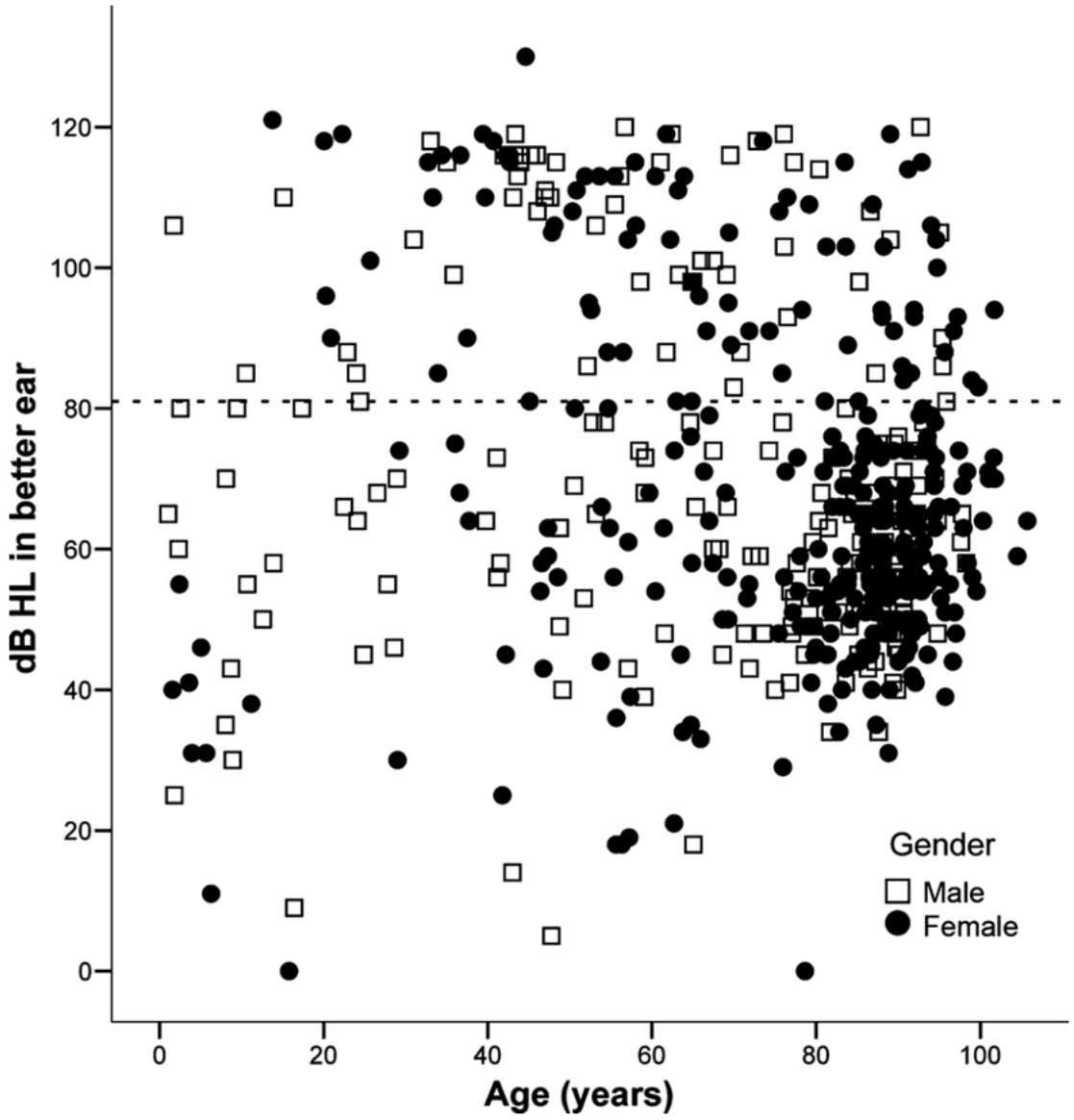

Figure 6. dB Hearing loss as a function of age and gender for all dual impairment rehabilitation clients. The dotted line indicates the limit for profound hearing loss, 81 dB, according to the standards for admission in Quebec. Individuals above this line are considered profoundly hearing impaired.

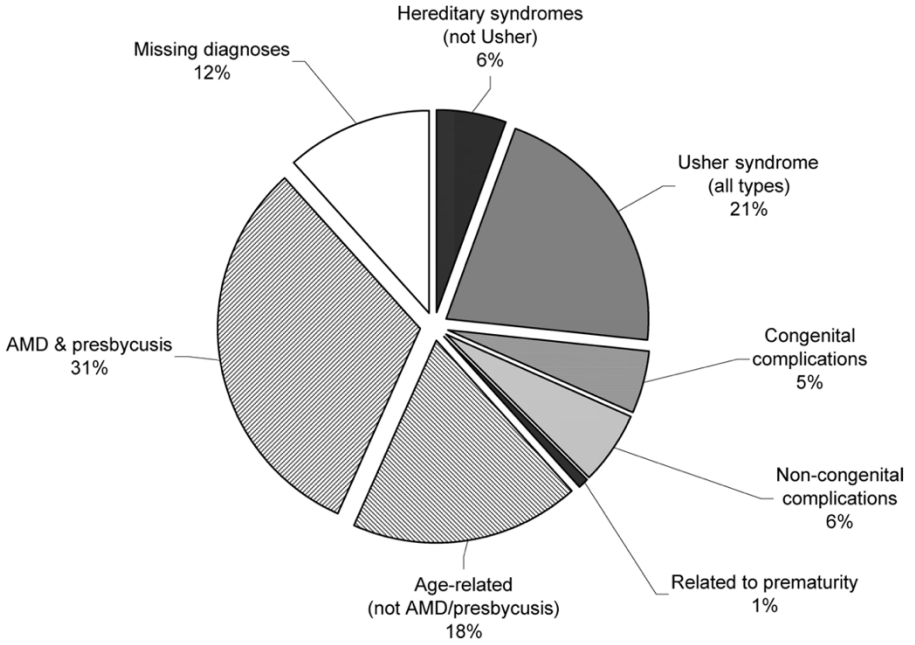

Figure 7. Proportional distribution of all diagnostic categories for individuals within dual sensory rehabilitation (total *n* = 564).

Table 1. Admission criteria for the dual sensory impairment program within the province of Quebec. Additional criteria, based on functional impairment and age-group apply as well (see text)

	Hearing impairment					
	Normal	Mild	Moderate	Severe	Profound	Total
	<26 dB	26–40 dB	41–60 dB	61–80 dB	81 dB+	Deafness
Vision impairment						
Near or total blindness						
5° > VF 6/360 > VA	Not eligible	Not eligible	Eligible	Eligible	Eligible	Eligible
Profound low vision						
10° > FV > 5° 6/120 > VA > 6/360	Not eligible	Not eligible	Eligible	Eligible	Eligible	Eligible
Severe low vision						
20°> VF > 10° 6/60 > VA > 6/120	Not eligible	Not eligible	Eligible	Eligible	Eligible	Eligible
Moderate low vision						
60°> VF > 20° 6/21 > VA > 6/60	Not eligible	Not eligible	Not eligible	Not eligible	Eligible	Eligible
Normal						
VF > 60 VA > 6/21	Not eligible	Not eligible	Not eligible	Not eligible	Not eligible	Not eligible