Exploring the lived experience of older adults with dual sensory impairment

Authors: Wittich, Walter; Lorenzini, Marie-Celine

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Abstract

Objective. With the aging of the population, the prevalence of combined age-related vision and hearing impairments continues to rise. This increase results in a higher likelihood for low vision practitioners to serve older adults with dual sensory impairment (DSI). In order to ultimately provide optimal services to this population, the purpose of this study was to explore the lived experiences of older adults with DSI, examine their perceptions of their loss and identify the obstacles they face in their daily lives.

Method. Twenty-nine older adults (age range 60 to 100) with DSI were interviewed about their experience of living with DSI. These interviews were transcribed verbatim and analyzed using a phenomenological approach through qualitative description.

Results. Inter-rater reliability assessment between the two students who conducted the coding was high ($\kappa = .85$). Six themes emerged from the interviews, three of which described participant priorities before the onset of their DSI (diagnosis, symptoms and treatments), and three summarizing concerns thereafter (barriers, facilitators and experiences with assistive technology). The later focused on activities of daily living and leisure activities, as well as specific experiences when coping with DSI.

Discussion. The description of participants' perception and experience with their sensory impairments can help low vision practitioners understand their clients' perspective and their rehabilitation priorities in order to improve the practitioners –patient relationship. Furthermore, in a more general way, this study enables a better understanding of individuals living with DSI.

Exploring the lived experience of older adults with dual sensory impairment

Introduction

With the arrival of the baby boomers at retirement age as well as with higher life expectancy, the proportion of older people in the population has consistently been increasing (Kahn et al., 1977) resulting in a higher prevalence of age-related health problems. Sensory impairment is one of the most common chronic conditions of later life (Chappell, 2011) especially impaired vision and hearing are common problems (Brabyn, Schneck, Haegerstrom-Portnoy, & Lott, 2007; Gopinath et al., 2009; Mitchell et al., 2011; Taylor et al., 2005). It is estimated that dual sensory impairment (DSI), or concurrent impairments of vision and hearing, affect between 5 and 21 % of older adults (Brennan & Bally, 2007; Raina P, 2000). Yet, this population has so far received less attention both in clinic and research. The majority of individuals with dual sensory loss consists of those with mild to moderate impairments in both vision and hearing (Brabyn et al., 2007; W. Wittich, Watanabe, & Gagne, 2012), resulting in part from normal age-related changes in both the auditory and visual systems. Age-related macular degeneration (AMD) is one of the major causes of visual impairment in older persons (Chia et al., 2006). Moreover, with the presence of other age-related ocular pathologies such as glaucoma, further changes occur affecting visual acuity and visual field (Brabyn et al., 2007). In parallel, age-related changes cause hearing loss, including modifications in the inner ear, such as deterioration or damage to the hair cells, resulting in high frequency loss (Frisina, 2009). Deafblindness is described as any level of concurrent vision and hearing impairment, independent of time or order of onset or of severity, whereby age-related or acquired combined impairment of vision and hearing is often termed DSI (Larsen & Damen, 2014; W. Wittich, et al., 2013). From the medical (objective) point of view, deafblindness is defined according to visual acuity and

audiometric thresholds, whereas, from a functional (subjective) point of view, deafblindness is described “a combined vision and hearing impairment of such severity that it is hard for the impaired senses to compensate for each other” (Johansen, 2016, p. 1). Traditionally, the research literature on sensory loss deals with the effects of vision loss and hearing loss separately. Few studies have considered the practical implications arising from DSI and its impact on clinical practice and rehabilitation, as they were mainly quantitative in nature (Brabyn et al., 2007; Fletcher P. C.; Guthrie, 2013; Saunders & Echt, 2007). Yet, individuals with combined hearing and vision loss experience more than the sum of each impairment alone (Brabyn et al., 2007; Smith, Bennett, & Wilson, 2008), appearing to contribute to negative outcomes.

These negative outcomes appear to put older adults with DSI at increased risk for reduced independence in activities of daily living (ADLs) (Bodsworth, Clare, & Simblett, 2011; Dalby D, 2009; Lupsakko, Mantyjarvi, Kautiainen, & Sulkava, 2002; Yamada et al., 2014) and instrumental ADLs, (Bodsworth et al., 2011; Dalby D, 2009; Yamada et al., 2014) cognitive impairment, (Dalby D, 2009; Fisher et al., 2014) mortality, (Dalby D, 2009) lower self-rated health, (Dalby D, 2009; B. LeJeune, Steinman, & Mascia, 2003; J. M. Schneider et al., 2011) and social isolation (Brennan, Horowitz, & Su, 2005; B. J. LeJeune, 2010). This isolation may be related to the ability and/or opportunity to communicate. Communication in daily life and interpersonal interaction mainly depend on the ability to see and hear one another, and remain the major limitation associated with DSI, thought to lead to frequent feelings of fatigue and social ostracism (B. LeJeune et al., 2003). LeJeune’s study (2010) highlighted that several challenges emerged in areas of communication, emotional adjustment, social relationships, employment, and independent living. In another study, the major themes that emerged were the daily challenges faced by participants and that they lacked optimism concerning their future (Fletcher P. C.;

Guthrie, 2013). According to Kiely et al. (2013), the associations between depressive symptoms and DSI were explained by difficulties in ADLs and social engagement. Living independently requires the ability to continuously adapt to changing circumstances and functional challenges, and individuals with sensory loss in later life need to find ways of coping with their impairments. For example, communication needs change as older adults often have difficulties with hearing speech in the presence of noise (Smith et al., 2008). In the presence of vision impairment, good hearing becomes more important to analyze the environment, for example for the ability to locate the direction and source of a sound such as a car approaching (Brabyn et al., 2007). At the same time, it is difficult to lip or speech-read and discern facial expressions when an individual cannot hear or see well (Brabyn et al., 2007; Gagné, 2009). Rarely do eyecare professionals ask their patients about their hearing problems (Brabyn et al., 2007) and the same may be true for hearing practitioners who might neglect to ask about vision problems, when both professions could likely improve their communication abilities by addressing concerns about audibility of speech and visibility of printed information in the clinical context (Saunders & Echt, 2007). Therefore, it becomes imperative to further understand the functional effects of having DSI from the perspective of the patients, and to highlight their priorities in their own voice, using a qualitative approach.

Method

Participants

Twenty-nine clients of the MAB-Mackay Rehabilitation Centre, attending their adapted Day Center for older adults with sensory impairment, were recruited to participate in the study (W. Wittich, C. Murphy, and D. Mulrooney, 2014). Inclusion criteria were (a) having the ability to communicate in English, (b) being aged 65 years and older, and (c) having each a hearing and

vision impairment at the level of eligibility for rehabilitation services within the Quebec health system; these criteria for vision were having a visual acuity of less than 20/60 or a visual field diameter (horizontally or vertically) of less than 60 degrees in the better eye with best standard correction; and for hearing, having a pure-tone average of more than 35 decibel Hearing Loss (dB HL) across four frequencies in the better ear (0.5, 1, 2, and 4 kHz) (Régie de l'assurance maladie du Québec, 2006a, 2006b). In addition, all participants were experienced assistive device users in both modalities, given their client status in the rehabilitation centre. Theoretical saturation was applied in the study, in order to establish the sample size. It was estimated that 20 participants would be sufficient for the research project, in order to reach saturation of themes; however, the final sample size was $n = 29$, because of the recruitment within the context of a larger study (W. Wittich, Southall, K., & Johnson, A, 2016). Once the determined categories became redundant and repetitive among participants, further recruitment was suspended (O'Reilly & Parker, 2012). Descriptive demographic statistics and scores on the adapted version of the Montreal Cognitive Assessment for the blind (W. Wittich, Phillips, N., Nasreddine, Z. S., & Chertkow, H., 2010) in Table 1 were calculated based only on twenty-seven participants, as two client charts were not available.

[insert Table 1.]

Research approach

We decided to utilize a phenomenological approach to the description of the lived experience of DSI, by conducting individual interviews with older adults with combined vision and hearing loss (Creswell, 2007). Qualitative description was used in order to summarize and describe the content of the interviews (Sandelowski, 2000).

Materials

The interviews were conducted within a study that focused on assistive device usability in the context of DSI, and the component of the present protocol that dealt with the evaluation of the usability of these devices has been published elsewhere (W. Wittich, Southall, K., & Johnson, A, 2016). Three devices were used for elicitation purposes during the semi-structured interviews, and were presented to the participants in order for them to initiate their thoughts and opinions on the use of their own devices (Johnson, 2002). They were a Serene ® Amplified Corded Phone, Model HD-65, an Analogue Talking Clock by MagAids and a Pocketalker® PRO Personal Amplifier by Williams Sound. An audio recorder was utilized to record and document the semi-structured interviews with the patients, for later verbatim transcription.

Procedure

After ethical approval from the Center for Interdisciplinary Research in Rehabilitation of Greater Montreal (CRIR# 857-0713), a list of older adults, attending the MAB-Mackay Rehabilitation Center that met the inclusion criteria was prepared. Randomly selected individuals from the list were approached and asked to participate in the study. Before data collection, two optometry students had undergone a training period, which entailed sessions given by their research director (WW) on interviewing and analyzing experience-based data, collected from participants. Students had individually attended three training sessions, before carrying out their own semi-structured exploratory interviews. At first, they had attended a practice interview conducted by a research assistant, allowing them to gain a better understanding of the participants' perspectives. Then, in the second session, a participant from the center had been interviewed by the research assistant and observed by the optometry students. Finally, the last session included an interview conducted with a participant by both the research assistant and the students. After the trial period, the remaining interviews were carried out and audio recorded by

the students alone. All participants provided informed written consent, and they completed a cognitive screening test, the MoCA-blind (nobody was excluded based on their MoCA score, this measure was used simply to better describe the sample). Given the context of data collection within a larger mixed-methods protocol (Wittich, Southall, K., & Johnson, A, 2016) and to avoid fatigue, the interviews were up to 15-minute-long, exploring the opinions of participants. The questions asked were generally open-ended and allowed the participants to express their ideas, rather than simple yes-or-no answers, in order to explore the issues they faced every day regarding their impairments and the use of their assistive devices (see Table 2).

[insert Table 2.]

Participants' answers included descriptions and comments beyond their experience with technology (as was the focus of the larger study), allowing us to conduct the present secondary analyses of the data with a focus on the lived experience with DSI. Secondary analysis of qualitative data is a common qualitative methodology procedure, whereby the analysis of an existing data set allows for examination of a topic different than the original project (Szabo, 1997). Additional background information about the participants was obtained through their client charts, and all participants received \$10.00 as a compensatory indemnity.

Data analysis

The recordings were transcribed verbatim and analyzed using qualitative description (Sandelowski, 2000) starting with open coding. Significant sentences in each transcript that had relevance to the research question of better understanding the lived experience of older adults with DSI were highlighted (Creswell, 2007). Then, all codes were grouped together according to common themes. The first transcript was read, coded and analyzed by the two students and the

research director. Then, the second transcript was read and coded individually by both students, and further analyzed with the research director. The same procedures applied to the third transcript, however the students, without the help of their director, further compared the codes and categories. Inter-rater reliability (kappa) was calculated for the codes of the fourth and fifth transcripts (Cook, 2012), and was considered acceptable after the fifth transcript with a kappa value of 0.85. At this point, the students continued the analysis independently and merge their findings once all transcripts were coded. The final step was to group the codes into themes and to establish an overall descriptive picture of the interview content that allows the reader to better understand the perspective of patients with DSI (Colorado State University, 1996).

Results

From the 29 verbatim interview transcripts, 30 significant codes emerged and were categorized into six major themes, divided into two categories (categories I and II). Figure 1 comprises those categories, themes and their sub-themes.

[insert Figure 1.]

Table 3 includes sub-themes examples for category II and statements with their respective themes. In the sections below, example participant quotes are indicated within quotation marks.

[insert Table 3.]

Participant priorities before the onset of their DSI:

Diagnosis. Individuals with DSI described the diagnosis they received and the way their eye care specialist announced and identified their condition. One participant stated: “the doctor told me there was no cure, and it was gonna get progressively worse”. *Symptoms.* Participants gave a clear image of how they experienced specific eye diseases and hearing loss. For example, one person portrayed macular degeneration as having “the feeling [of] wearing glasses [...] which are dirty”. *Treatment.* Many participants described their experience undergoing treatment. For example, in one case, a participant talked about the numerous ocular injections she had to receive.

Participant priorities after the onset of their DSI

Barriers. The two subdivisions in this category were *social and leisure* as well as *activities of daily living*. Most participants discussed their loss of independence and having to give up certain habits and hobbies such as going for walks, driving, playing bridge and cooking. “Little things” that used to be effortless like picking up a dropped object or measuring the amount of oil needed have become “very irritating”.

Facilitators. Participants also mentioned their ways and means of overcoming problems encountered daily. This theme contained four principal sub-themes: *internal, service and rehabilitation, family and friends, and social participation and exercise*. The first mainly contained optimistic attitudes like “being easy to please” and “appreciate[ing] everything”. The services persons with DSI obtained helped them greatly to learn “practical things” and be prepared for further loss. It was also noted that support from family and friends was important, especially in making major decisions and overcoming difficulties. Finally, “going out as much as possible” and going for walks and “everyday exercises” helped individuals feel independent and stay active.

Assistive technology devices. The emergence of this theme is likely linked to the context of the data collection within a larger project of the usability of assistive devices. (W. Wittich, Southall, K., & Johnson, A, 2016) After using the pocket talker, the talking clock and the telephone preceding the interview, participants were asked their opinion on all three of these and their own assistive devices. Not all of the participants had previously used all of the three devices available as part of this elicitation component, but they were all experienced assistive device users. Most comments on the pocket talker were positive. One participant commented that it would be “much better than [their] hearing aid [...] because the hearing aid brings in all the noises” and it “would be in hand, between [them] and [their] guest. Another participant said: “[The pocket talker] is heaven [...] I would give you my right arm [to have one]”. However, it is worth mentioning that participants had difficulty setting up this device because the jacks to plug in the head phones and microphone are small. Comments on the telephone were mostly positive because participants were able to see the numbers and hear the calls using the amplifier. The talking clock obtained mixed reviews, whereby the participants could not see the numbers and were not able to change the settings because they were too small and not readable. One participant commented on other visual aids she used, such as magnifiers, who were of limited use because she could only “make out one letter or number [at a time] and have to go very close.” When discussing hearing aids, one person stated: “I don’t always wear my hearing aids all the time because there is nothing to hear!”

Discussion

The purpose of the present study was to explore and better understand the experience of older adults living with combined vision and hearing loss. Using a phenomenological approach, two main categories emerged from the qualitative interviews depicting participants’ main preoccupations before and after the onset of their DSI. The category I comprised the retrospective

reflections on the early experiences of the participants with DSI, consisting of their ocular and hearing diagnosis, symptoms and treatments. The category II focused on the later experiences of these individuals with their sensory impairments, reporting barriers they faced in their everyday lives, the facilitators they were available to overcome their obstacles, and their opinions about assistive technology devices.

It is interesting to observe that the two overarching categories evoked by the participants correspond to the two principal definition approaches to DSI: the medical definition focusing on diagnostics and treatments, and the functional definition which refers to (dis)ability. The participants exhibited a certain duality in how they perceived their DSI, whereby they adopted both an external (medical) view of themselves in parallel to a more internal (functional) perspective of their own abilities. For example, some of the attitudes towards the participants' challenges could be viewed by this impairment/ disability duality, when participants were not able to use their residual senses for communication and ADLs (functionally) even though they were neither blind nor deaf as objectively measured (medically). Conversely, participants with only a minor residual vision or hearing impairment may be more highly functioning (Larsen & Damen, 2014). This contrast likely reflects the variation in definitions used to identify DSI. Some authors suggest mixed methods that include both clinical, referring to visual acuity and audiometric thresholds, and functional assessments, reflecting subjective assessments in order to provide more ecologically valid definitions of DSI (Brennan et al., 2005; Smith et al., 2008). The literature indicates that further research is clearly needed, and future studies will likely benefit from clear entry criteria with an agreed definition of DSI (Tiwana, 2016).

Based on previous qualitative work (Fletcher P. C.; Guthrie, 2013; B. J. LeJeune, 2010; Watters, 2005), the following codes group into sub-themes emerged as expected: participants mentioned compromised ADLs, lack of independence, the impact on their psychosocial

environment and their emotional adjustment, specifically referring to coping. In addition, family and support services as well as some assistive technologies were described as facilitators. Support relationship has also been reported by Shneider (2006) as a compensatory strategy in individuals with acquired deafblindness. However, codes that were not expected but emerged from the data in the present study included the 3 themes in the first category, comprising the retrospective reflections on the early experiences of older adults with DSI. They consisted of their ocular and hearing diagnosis, symptoms and treatments. Finally, several codes or sub-themes were expected based on previous studies (Capella-McDonnall, 2005; Fletcher P. C.; Guthrie, 2013; LeJeune, 2010; Schneider, 2006), but were not found in the present data, including depression, fear and anxiety, communication issues, and family and friends as barriers. It has been demonstrated that older adults with DSI are also more inclined to exhibit depressive symptoms than individuals with single sensory impairments (Lupsakko et al., 2002). Interestingly, even though communication barriers and social isolation are often a central concern in the rehabilitation of older adults with DSI (Wittich, Jarry, Groulx, Southall, & Gagné, 2016), these problems may not have been mentioned in this specific sample because the majority of participants were recruited through their participation in a fully adapted day centre for older adults with sensory loss (W. Wittich, C. Murphy, and D. Mulrooney, 2014). Their participation as well as their access to free assistive devices and services in Quebec may contribute to their observed independence and mental health as well as their reports of functional communication abilities. Moreover, even though the present study reported service and rehabilitation as facilitators, accessing services in the community (the limited availability of intervenor services, public transportation difficulties and physical inaccessibility of public building), and community service (lack of intervention programs, shortage of trained intervenors) have been reported as barriers by Watters et al. (2005). Finally, while Fletcher et al. (2013) highlighted that most individuals with DSI lacked optimism

about their future and asked for preparation to better face their DSL, the present data did not make reference to this aspect. The same author also reported that among challenges faced by DSI individuals, loneliness and isolation are experienced as major results of their DSL (Fletcher P. C.; Guthrie, 2013).

The DSL consequences reported by the study and / or in the literature are for the most part more important than a deficit in vision or hearing alone. This is particularly the case for depression, cognitive and general functions, activities of daily living and quality of life (Caban, Lee, Gomez-Marín, Lam, & Zheng, 2005; J. M. Schneider et al., 2011; Valentijn et al., 2005).

Communication issues have not been reported by the participants of this study, yet according to Watters et al. (2005, p. 53) deafblindness is “a condition, [...] that interferes with communication and acquiring information, even though individuals who are deafblind may still have varying levels of useful vision and hearing”. This definition is all the more important that difficulty in communication impact on loss of independence and quality of life. Indeed, in the context of communication, it has been shown that a loss in one sensory modality (e.g., vision) can be compensated using the other (e.g., hearing); however, if loss occurs in two modalities, this will make it harder or preserve the person’s ability to compensate (Brennan & Bally, 2007). Therefore, the impact of DSI is considered to be more severe than single-sensory loss; hence the approach to rehabilitation should conceptually be more global, considering medical, functional and social aspects of the individual. For example, a breakdown of the two primary modes of communication, listening and speech reading, can easily lead to social isolation, leading to a global reduction in information available from the environment, resulting in more difficulties with tasks of daily living, and thereby broadly impacting quality of life (Brennan & Bally, 2007; Erber, 1999; Heine, 2002). Another point of concern is that research highlights that it is not unusual for most older individuals to choose autonomy over safety, whereby they wish to

remain autonomous and in their own homes for as long as possible (Pavey, Douglas, Hodges, Bodsworth, & Clare, 2009). A vicious circle is being established when there is a lack of communication ability or opportunity, for example due of isolation, or a defective sensory input. Indeed, according to the *sensory deprivation hypothesis* explaining the relationship between cognitive decline and sensory impairment, it was demonstrated that a prolonged lack of adequate sensory input induces a neuronal atrophy leading to a deterioration of communication (Valentijn et al., 2005).

Limitations of the study

Several limitations of the current study have to be considered. The participants that were recruited from the Day Centre of the MAB-Mackay Rehabilitation Centre were self-selected and attended the daily social and exercise activities that were offered there (W. Wittich, C. Murphy, and D. Mulrooney, 2014). Therefore, this sample was highly functional and may not be necessarily representative of older adults with DSI in general, because our participants all still residing independently in the community. Time was a further limiting factor during the interviews, as the complete study protocol also included a component examining the usability of assistive devices (Fletcher P. C.; Guthrie, 2013). Conducting in-depth interviews would require more time and would certainly reveal more details about their experience with DSI but participants had to return to their routine activities in the day centre. A further limitation consisted of differences between how DSI was defined as compared to a suggested mixed method, including both clinical and functional assessments, and providing more ecologically valid definitions of DSI (Brennan et al., 2005; Smith et al., 2008). In the present data, the definition only took the medical aspect into account (e.g., acuity or decibel hearing loss) and not the functional abilities of the participants. Thus, it could limit a comparison of findings with other

studies. Finally, in the present study, all the participants were trained and experienced users of assistive devices and they have had their sensory losses for several years. Therefore, this sample depicts only a specific part of the DSI population, and caution should be exercised in attempting to extrapolate the findings beyond the entire DSI population. The experience of using an assistive technology and living with DSI at the beginning of their diagnosis might not be the same as the experience lived after 10-15 years with DSI.

Practical applications and conclusion

Elderly adults with DSI are part of a vulnerable population, they may be misunderstood and their sensory losses may be ignored or undetected. This has significance for clinicians, both audiologists and eye care practitioners, in that finding a deficit in one domain is a call sign indicating an increased likelihood of deficits in the other domain (Schneck, Lott, Haegerstrom-Portnoy, & Brabyn, 2012). With the increase in the prevalence of DSI, it is becoming relevant that more cross-disciplinary collaboration and referral are conducted between experts in vision and hearing health care, rehabilitation, and research (Brabyn et al., 2007). For example, as first-line professionals, ophthalmologists and optometrists hold a great responsibility in evaluating, diagnosing, and treating their patients and to know *where* to refer to the right services. It is also very important to know *when* to refer patients. In the context of DSI, vision care professionals should engage their patients in a conversation about seeking hearing rehabilitation care, should they notice that vision care provision is threatened because of possibly communication difficulties that could be treated.

Research highlights that practitioners in both vision and hearing service provision can benefit their patients by devoting greater attention to the interactions between their vision and hearing problems (Chia et al., 2006). Optimization of their interactions requires some simple adaptations such as conversing with their patients under bright illumination minimizing glare or

increasing the contrast of facial features by, for example, wearing darker shades of lipstick (if appropriate). Indeed, Brabyn et al. (2007), mentioned techniques that may facilitate the transfer of information between both individuals. They explained that female professionals, who wear red vibrant lipstick, could help patients read their lips and interpret verbal instructions better. Obviously, physically approaching the patient is relevant in order to increase the ability of a client to recognize the face of the clinician. Interestingly, the study revealed that certain instruments, such as a pocket talker, might be useful to have in examination rooms during patient evaluation. Pointing the microphone of the pocket talker towards the professional may clarify instructions and questions for the patient and favour a mutual understanding between the two.

Practitioners are aware of the importance of auditory and vision function for activities of daily living and communication; however, coordinated joint rehabilitation programs for individuals with DSI remains rare (Smith et al., 2008; W. Wittich et al., 2012). Regarding the assessment of DSI, inappropriate tools are used and the standard acuity test often underestimates the problems actually faced by patients, therefore it is important to include other vision measures in assessing the likely impact of dual sensory loss (Brabyn et al., 2007). Indeed, standard high contrast acuity was found not to be significantly associated with hearing impairment and the vision variable that was most strongly associated with a co-existing hearing loss was low contrast (15%) acuity under low luminance conditions (SKILL Dark Chart) (Schneck et al., 2012). Moreover, working in multidisciplinary teams or networks with other rehabilitation clinicians (such as occupational therapists, social workers, psychologists) support a better assessment and enable directing them towards appropriate rehabilitation center according to their specific needs. In this type of network, Schneck and al. (2012) suggested that audiologists should include a brief test of low contrast vision while eye care practitioners should consider performing a screening test of hearing on their patients. Furthermore, it seems essential that clinicians in these disciplines

should be aware of the rehabilitation centers in their immediate region, as well as the services they offer in order to provide personalized support to maximize independent functioning and adjustments to progressive sensory loss.

To conclude, six themes emerged from the interviews of the present study that helped depict patient's preoccupations before and after the onset of their dual sensory loss. The description of the early experience focused on information such as diagnosis, symptoms and treatments. The remaining information clustered around the topics of barriers and facilitators, including activities of daily living and leisure activities issues; internal, family and service supports, as well as specific experiences with assistive technology when discussing coping methods while living with dual sensory loss. Although not discussed in the interviews, loneliness, isolation and depression (Capella-McDonnall, 2005; Fletcher P. C.; Guthrie, 2013; Lupsakko et al., 2002) need to be addressed as the more dramatic consequences, summarized by the evocative statement of a participant from Lejeune's study (2010, p. 151): "There is nothing to help my mind think". It seems obvious that more support would help to reduce these challenges, favoring better social integration of this population. This study contributes to a better understanding of dual sensory loss and will help inform health care specialists on the experiences these individuals live on a daily basis. It is expected that these results will sensitize them to take different approaches by: a) encouraging cross-interdisciplinary collaboration, b) adopting better strategies to communicate with their patients, and c) using and developing the right methods and tools, when evaluating patients with DSI. Indeed, it was identified that many of the problems caused by DSL might be ameliorated by appropriate rehabilitation methods, aids, and techniques (Brabyn et al., 2007). Furthermore and more broadly, through better awareness of this disability, and by creating new policies and rehabilitation services to support these patients and their families, there is large potential to maintain and reinforce their capacity to be independent and to optimize quality of

life.

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Figure 1: Emerging categories, themes and sub-themes from participant statements

Table 1: Descriptive variables for study participants

	Mean	SD	Range [min-max]
Age	84	9.56	60-100
Visual Acuity (better eye) Snellen fraction [logMAR]	6/72 [1.08]	[0.44]	6/12-NLP [0.3-NLP]
Hearing loss (better ear) dBHL: Hearing impaired for adults >40hl dBHLB	46	13.50	21-68
Total Number of			
Men	8		
Women	19		
unknown	2		
MoCA blind			
Pass/Fail	15/14		

Note. NLP: No Light Perception, SD: standard deviation, dB HL: decibel hearing loss, MoCA: Montreal cognitive assessment

Table 2: Interview Questions for participants
How did you find out about the existence of hearing assistive technologies and are they adapted for visual impairment?
What type of assistive technologies do you use for your hearing loss and where/when do you use them?
What type of other magnification devices do you use when operating your devices? And what type of difficulties do you experience when using more than one device at the same time?
Are there assistive technologies that you tried out but then decided that they were not useful for you? Which ones are they and why did you stop using them?

Table 3: Themes and sub-themes examples for category II

Category II: Living with dual-sensory impairment		
Problems	Social / Leisure	"I listen to the TV and the radio that's all. I don't [...] get out much to exercise [...] because somebody has to take me out and walk me around. I wish I can get more exercise."
		"I was driving a car, I had no problem. I could see the stop signs way ahead [...] so it's hurtful [...] and suddenly I can't see [...] My hearing was the same; was very acute and suddenly, gone." 07
		"I wanted to give [my son's high school ring] to my grandson [...] I'm looking for the ring to give to him. I looked high and low [...] it's on the rug and I spent a day looking for it [...] it's the little things like that, very irritating." 103
		"I had to give up bridge years ago because bridge people [don't] use large cards or numbers, and I couldn't play because of the dummy card. I couldn't play the dummy hand, so I had to give it up."
	Activities of daily living	"I can see vaguely. I can see a person, but I can't tell who it is" 049
		"Oh I sewed all my life [...] I'm not able to thread a needle" 051
"I don't cook because I'm afraid to [...] if I use oil, I can't see to measure how much I need [...] or how much I use, if it's sugar or flour for example, same thing, I have a problem to measure [...] and so I decided I'm not cooking anymore." 11		
Solutions	Internal	"I have to find ways. I accepted years ago that [my vision] will never be what it [was]" 057
		"I like all the instruments [...] I'm very easy to please [...] I appreciate everything" 091
		"Everything has a purpose at one point or another." 001
	Services	"After my husband died, they sent me here [...] they were very nice [...] and we learned how to walk and how to be [...] blindfolded, how to go with a guide. All these practical things, which was very good. And then I made an application to come here and they took me." 069
	Friends & family	"I used to drive a car and when I told my grandchildren, when they were in my car [...] Is it a green light or a red light? [...] They went home and told [their mother] my family [...] took the car away from me" 113
	Social participation	"[I] get out as much as possible [...] Wednesday I go to Plaza Pointe Claire. I have my hair done, go shopping a little bit [...] Friday coming here [...] sometimes ever so often with my son, I go to the restaurant." 071
Assistive technology devices	Exercise	"I like to go walk and we do everyday exercises [...] where I am, and if not I do the exercises for myself."
	Telephone	"The whole phone is unbelievable. It's user wonderful and I was able to [use it] because of the way it was made. I was able to feel my way around, and the lights!" 075
	Talking Clock	"[The talking clock] wasn't of any use, because I can't see the numbers [but] the voice is fine." 057
		"The fact that [...] it's not lighted [...] when you press the button, the light should come on to help you see it [...] even to set it, if the light would come on, it would help [...] The size, to make it a little more attractive and perhaps a little smaller in size because not everybody has room for such a thing near their bed, and I personally would use it near my bed." 119
	Pocket talker	"I think this would [...] be actually much better than my hearing aid [...] because the hearing aid brings in all the noises. If I have phone going or my air condition [...] It picks on everything and this is distracting. This pocket [talker] would be in hand, between me and my [guest] or in my case, my black stock and read a book, so this would be a nice. I'm interested in this." 069
	Other	"[The pocket talker] is heaven [...] I would give you my right arm [to have one]" 091
"I have a machine like you know, if I cannot read anything only if I put the machine (CCTV) [...] but you know, I cannot see with a magnifier. The one that I have I cannot use at all."		
"This is very hard [...], the [magnifier] I have I can make out one letter or number and I have to go very close." 069		
		"[I] just [want] even an amplifier to put beside [my doorbell] that would bring it louder when it rings. Because it's hard to hear and I don't always wear my hearing aids all the time because there is nothing to hear!" 001