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Review Article

Quality of Life and associated Audiological Management Program for Adults with Dual Sensory Impairment: A Scoping Review -

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ABSTRACT

Introduction: Dual Sensory Impairment (DSI) among older adults is increasing in prevalence, and it is known to impact the Quality of Life (QoL), causing mental health problems, cognitive decline and it can impact the Activities of Daily Living (ADL). The audiologist must therefore be knowledgeable on how DSI impacts QoL to manage such patients effectively.

Objectives: To determine how DSI affects the QoL of older adults as well as how QoL aspects are addressed in intervention and rehabilitation programs for patients presenting with both vision and hearing loss and finally to identify the gaps in the literature that require future research.

Method: A search of the electronic database (PubMed, Google-Scholar, Medline and Science Direct) of published papers from 2009-2020 was conducted. All retrieved articles were screened to determine which ones met the inclusion criteria: 1) It was published between 2009-2020, 2) It was peer-reviewed 3) It was published in English, 4) It contained information related to older adults with DSI and discussed QoL and/or intervention strategies in this group. A thematic review was conducted, and three themes were identified.

Results: A total of 38 papers met the inclusion criteria. It was found that DSI impacts mental health, causing depression, anxiety and cognitive decline (*n* = 14), it affects the Activities of Daily Living (ADL) in older adults, which in turn impacts negatively on their QoL (*n* = 13) and can impact on the mortality rate of the elderly with DSI (*n* = 6). There were a limited number of studies on management (*n* = 5), and the search did not find any published studies on the elderly with DSI in the African context.

Discussion: The review highlighted the need for collaboration when managing the elderly with DSI, requiring a transdisciplinary approach that includes the audiologist, optometrist, psychologist and occupational therapist because they all play a role in the QoL enhancement in the elderly population. The finding indicated a lack of literature about audiological management program for those with DSI.

INTRODUCTION

Dual Sensory Impairment (DSI) refers to having both vision loss and hearing impairment [1]. DSI is categorized into four groups which include congenital deaf-blindness, congenital visual impairment with acquired hearing impairment, congenital hearing impairment with acquired visual impairment and acquired hearing and visual impairment [2]. The latter is most prevalent among the elderly population as the physiological process of ageing results in degeneration of both the hearing and vision systems. The global prevalence of DSI among older adults (65 years or older) is reported to be around 34% [3,4]. The acquisition of chronic and degenerative conditions such as diabetes mellitus, high blood pressure and dementia places further exertion on the ageing sensory symptoms of the elderly. These factors can have a negative influence on the Quality of Life (QoL).

Quality of life is defined as the measurable impact of a person's perception of their health and the effect that it produces on satisfaction with life and well-being [5]. Quality of Life (QoL) is a global and multidimensional concept, encompassing the domains of physical, functional, psychological, social and economic well-being.[6] This definition closely aligns with the WHO's definition of health that emphasizes health being related to social and mental well-being and not just the absence of disease [6]. Understanding the impact of DSI on QoL is relevant in ensuring holistic healthcare to a patient. This is especially important since the age-related decline in sensory functioning is gradual and initially unnoticed, but its impact is substantial and wide-ranging. Persons with DSI frequently experience participation barriers and social isolation. DSI often leads to language and communication challenges, limitations in accessing information and participation in social activities, thus impacting QoL.

A perusal of existing scoping, narrative, and systematic reviews was conducted to critically appraise the synthesized information already available relating to DSI in the elderly. As a result, five reviews in the area of DSI in the elderly were identified.

Heyl and Wahl [7] conducted a systematic review on the impact of DSI on older adults. The findings indicated insufficient evidence outlining the combined effects of DSI in older adults and that the management options for this population are the same as those with either hearing or visual impairment. This finding suggests a lack of evidence describing a combined approach to management. The literature asserts that there is a significant relationship between DSI and decreased mental health [8,9] including depressive symptoms. In addition, existing research indicate that DSI affects everyday competence in the elderly [10].

The outcome of the above reviews reflects the impact of DSI on QoL; however, its impact on the specific areas such as mental health and cognition, activities of daily living and even on mortality rates are loosely described. More importantly, little was discussed regarding the management options available to audiologists to address both DSI and QoL in the elderly.

As healthcare delivery moves toward patient-centered care, there is growing attention toward the effects of vision and hearing loss on quality of life, particularly in the elderly [5]. This is especially important in audiological practice, as considerate adaptations must be made to clinical procedures in terms of test conditioning, hearing aid orientation and counselling and vestibular therapy for patients with both vision and hearing loss. Hence, to appropriately manage patients with DSI, there needs to be an understanding of how DSI impacts QoL and how audiologists can tailor their management program for this vulnerable group. Therefore, this paper focuses on understanding the impact of DSI on the QOL in the elderly population and determining what management options are available to the audiologist when working with an elderly patient with DSI. In addition, this review aims at identifying any gaps in the literature that requires future research.

METHODS

Aim

This scoping review aimed to understand how DSI impacts older adults' QoL, identify what management options are available for the audiologist working with elderly populations with DSI, and identify the gaps in literature relating to this study.

Objectives

The objectives of the study were to:

1) To determine how dual sensory impairment impacts the Quality of Life (QoL) of older adults.

2) To determine how QoL aspects are addressed in intervention and rehabilitation program for patients presenting with both vision and hearing loss.

3) To identify the gaps in the literature that require future research.

Search strategy

A search for peer-reviewed articles on DSI was conducted from three databases: Science Direct, Google Scholar and PubMed/Medline. Papers published in the past 11 years from 2009 to 2020 were considered for this review. This time frame was selected because only papers relating to intervention and management could be identified after 2009. MeSH terms were used to define and direct the search. Boolean logic terms (AND, OR and NOT) were used to streamline the search. Keywords such as elderly, vision loss, hearing loss, dual sensory loss were also used to define the search.

Inclusion criteria

Publications were included if they:

- Were published between 2009-2020
- Were peer-reviewed
- Were published in English
- Contained information related to older adults with DSI and discussed QoL and/or intervention strategies in this group.

Data collection procedure

After the search was conducted, both authors read the abstracts of all identified papers independently to ensure they met the inclusion criteria. Disagreements or certainty were resolved through discussion and consensus. After consensus was reached, full-text copies of all selected articles that meet the inclusion criteria were retrieved for a more extensive review. Both authors reviewed all papers. The references of each article were reviewed to identify possible papers that were missed by the study search. The three-step strategy for data extraction outlined by the reviewer's manual from the Joanna Briggs Institute (JBI) [11] was followed:

Step 1: Initial search of at least three online databases relevant to the topic;

Step 2: Second search using all identified keywords and index terms;

Step 3: Final search of the reference list of all identified literature to find additional studies.

Once the final papers were selected, content analysis and subsequent extraction of common themes were conducted as described by Creswell [12].

Extraction of the results

Data extraction was conducted by all researchers from all included studies using a standard data extraction tool.

Data summary, analysis and synthesis of results

The characteristics table of included studies reflected: 1. Authors, 2. Year of publication, 3. Place of publication, 4. Paper title, 5. Theme, and 6. Results.

Thematic analysis was conducted to identify common themes. All the researchers participated in the data analysis, data transcription and data capturing to ensure the accuracy of the process. A six-step process as outlined by Clarke and Braun [13] was used to conduct the thematic analysis.

Data management

Each full text was saved onto a folder on a password-protected laptop, and a backup of the folder was saved on Google drive. Hard copies of all articles were printed and stored in a file. The data was also recorded in the characteristics table of included studies.

Ethical considerations

The research conducted in this review relied exclusively on publicly available information at a chosen library website. Hence, this scoping review contained information that is (a) legally accessible to the public and appropriately protected by law, (b) the information is publicly accessible, and there is no reasonable expectation of privacy. The subject matter of the research is literature distributed through institutional library databases and resources available in public domains through print or electronic publications or official publications. Trustworthiness, credibility and confirmability were assured in line with data collection considerations for qualitative research. All researchers were involved in the selection process by reading both abstracts and full articles to eliminate selection bias. Where there was disagreement, the researchers came together to reach a consensus. All researchers were involved in the data management and interpretation to avoid analysis bias.

RESULTS

The Preferred Reporting Items for Systematic/scoping Reviews (PRISMA) was used to present the results of this scoping review, as displayed in figure 1 [14].

Study designs of included studies

Overall, 38 studies were included in the final sample of the reviewed papers. The studies differed in their study designs and are presented in table 1.

Content analysis

All 38 articles were subjected to content analysis. From the analysis, the following themes relating to QoL as displayed in table 2 were identified. Some articles covered more than one theme.

In addition, five studies relating to Objective 2 on management relating to elderly patients with DSI were identified.

Objective one: To determine the impact of DSI on the QoL of older adults

Three themes were identified from the thematic analysis.

Theme one: DSI and mental health/cognitive decline (n = 14): A total of 14 studies related to the theme of DSI and mental health/cognitive decline.[15] It was found that elderly patients with DSI performed worse on a depression scale than those with either vision or hearing loss. The elderly presenting with DSI performed worse in the areas of episodic memory, global cognition and mental intactness [15]. Other researchers mirror these findings, stating that DSI not only increased the risk for depression among the elderly but that those with cognitive impairment were nearly three times more likely also to experience depressive symptoms [3,16].

A statistically significant relationship associated with DSI and the severity of cognitive decline compared to the severity of cognitive

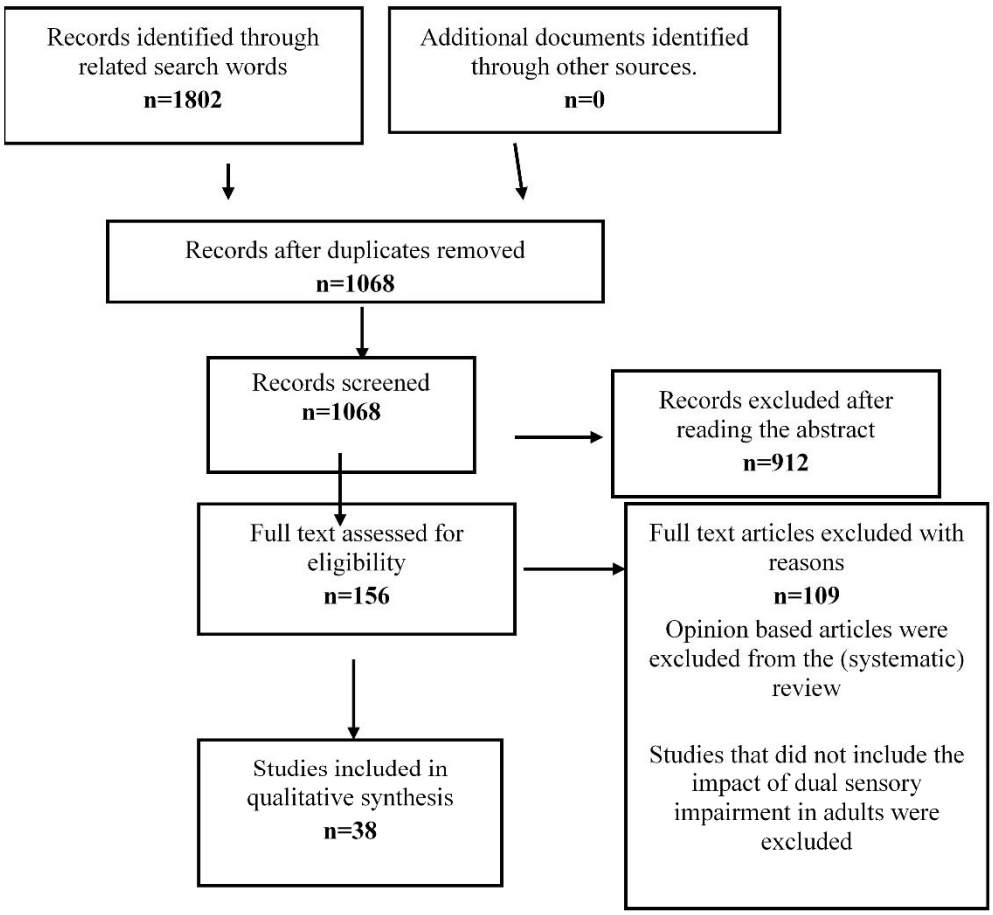

Figure 1: Prisma diagram.

Table 1: The study designs of included studies.

Study design	Number of studies
Descriptive /Cross sectional	12
Correlational	17
Longitudinal	4
Experiemental (control)	4
Qualitative	1

Table 2: Identified themes through content analysis.

Themes	Studies
Mental health and cognitive decline	14
Mortality	6
Activities of daily living	13

decline related to either of the sensory impairments was reported by Luo, et al. [17] and supported by other researchers [18]. People with DSI were found to be more at risk of developing cognitive impairment and might show a faster track of cognitive decline than those without sensory impairment [3,19-21]. This decline is strongly associated with conditions such as Alzheimer's disease and dementia. A long-term analysis of DSI in long term care patients found that alongside increased rates of depression, loneliness and cognitive decline, the rate of Alzheimer's disease was higher among patients with cognitive impairment and DSI than in the groups with a cognitive decline only.[4] Similarly, the research found that the prevalence of dementia was the highest in patients with DSI as opposed to those with either hearing or vision impairment [22,23]. Harithasan, et al. [24] explored the relationship between sensory impairment (hearing loss only, vision loss only, and Dual Sensory Impairment [DSI]) and depression, loneliness, quality of life, and cognitive performance in older adults. They found a significant relationship between DSI and cognitive function ($p < .05$) in older adults. Such findings were also suggested by other researchers [19].

The literature also addresses the effect of gender differences. DSI among men was found to be associated with higher levels of depression compared to females. On the other hand, women with DSI presented with a higher prevalence of cognitive impairment [25]. These findings suggest that the associations between DSI and geriatric mental health outcomes vary according to gender. Therefore, gender-specific strategies in healthcare policies are needed. However, more studies relating to gender differences need to be conducted to verify these findings

Based on this finding, HL appears to be the main driver of the association between clinically defined DSI and increased depressive symptoms.

Theme two: DSI and mortality (n = 6): Six studies described

the relationship between the DSI and the increased risk of mortality [6,26-30].

The mortality rate of the elderly with DSI is higher than the general elderly population [6,28]. Although Huddle, et al. [27] alluded to similar findings, they could not relate the mortality rate of patients with DSI alongside their burden of disease or patterns of hospitalization and suggests that this needs to be done to confirm that the rate of mortality is higher in patients with DSI. Kim, et al. [26] attempted to evaluate the association between suicide ideation and DSI among elderly Koreans. Their study shows that those with DSI had higher suicide ideation than those with a visual sensory impairment only. In a similar study, Kim, et al. [26] found that the risk of suicidal thoughts in the elderly is higher among individuals with DSI than those without DSI.

In relation to this theme, the results suggest that older adults with DSI are at an increased risk of mortality compared to their non-impaired counterparts or those with only a single sensory impairment [6,27]. Therefore, it is important to understand how DSI impacts the mortality rate, especially in those patients with comorbidities.

Theme three: DSI and activities of daily living / QOL (n = 13): Thirteen studies investigated the relationship between DSI and activities of daily living. Cimarolli and Jopp [31] investigated the association between sensory disability and functional disability in the elderly and reported that DSI was the strongest predictor of functional disability. Mobility limitations, lack of access to communication and technology as well as lack of control of their personal belongings were described by the elderly with DSI [32,33].

Patients with DSI were found to be more likely to be socially inactive than their counterparts without sensory deficits [34,35]. These findings agreed with Fischer, et al. [36], who found a statistically significant ($p < 0.01$) association between DSI and reduced social functioning. DSI is significantly associated with worse balance (OR = 0.59/p = 0.05) [37] leading to daily functioning and mobility limitations [21,37,38]. In addition, elderly patients with DSI and other comorbidities such as diabetes had increased limitations on daily functioning [35], while intellectual disabilities in combination with DSI have devastating effects on the activities of daily living [39].

The research articles highlighted impairments in daily living activities [29,40] while communication difficulties due to DSI were also emphasized [3,32]. The research articles concluded that the HRQoL of the elderly with DSI was lower than that of older individuals with single sensory impairments [29]. Ramamurthy, Kasthuri and Sonavane [41] indicated that whilst hearing and vision impairment are among the most burdensome disorders for older adults they are common long-term conditions that diminish the quality of life and restrict independent living without greatly reducing longevity, making them ideal targets for efforts to compress morbidity.

Lengthier hospitalizations and poor physical health were reported for patients with DSI, although the exact relationship between DSI, hospitalization and burden of disease remains unknown [28]. Several studies highlight the impact of DSI on social inactivity [29,34,36]. Participants with dual sensory loss had higher odds for social inactivity and reduced social functioning in general compared to persons without hearing or vision difficulties [34]. Patients with DSI had diminished quality of physical, emotional and social functioning and suffering social isolation [29,36]. Research findings indicated that participants with total blindness and profound deafness have higher odds for conflicts with children and contact persons than participants with residuals of both senses, which impacted their daily activities [42]. The literature confirmed these findings, highlighting the challenges of internal family support, isolation and social integration into the population for those with DSI and those associated with a reduced desire to engage in activities of daily living [40]. One study looked at the prevalence and characteristics of DSI among the elderly of a rural community and reported that DSI prevalence is high within rural contexts and that further investigation into this finding is warranted [41].

To manage the impact of DSI on ADL in the elderly, it is evident that health care organizations must urgently develop early detection and active treatment policies and practices to ensure that health care workers know how to assess for DSI and are familiar with how to improve ADL [3,4,32]. Ideally, assessment systems should flag older individuals who need further evaluation of their vision and hearing so that that individualized care plans can then be created. Different communication strategies for this population may furthermore be warranted to ensure that the needs of people with DSI are met and have the highest quality of care and quality of life possible [3,4,32,36,42].

Objective two: DSI and management (n = 5)

A limited number of five studies provided information on how to effectively manage elderly patients with DSI [29,33,41,43,44]. Findings from all of the above-cited studies indicate that support for the elderly with DSI requires person-centered communication attitudes and long term care professionals' skills. This is especially true of the nurses who provide daily care to these clients since DSI leads to a complex of invasive problems that threaten the older person's social, mental and physical health with DSI.

The researchers advise that clinicians should encourage and implement the correction of visual and hearing impairment [45], including the provision of corrective lenses, assistive devices (e.g. magnifiers, listening devices) and rehabilitative services such as visual, auditory and communication training [39]. Dupuis, et al. [19] suggest several strategies that can be integrated into practice. These include: (1) incorporation of hearing and vision screening into protocols for cognitive screening; (2) use of assistive technology during testing (e.g. glasses, hearing aids or other devices; (3) ensuring that test environments meet standards for ambient noise levels and lighting to optimize sensory functioning; (4) development of referral protocols for patients who fall below cut off limits for normal upon initial screening; (5) increased frequency of follow-up appointments to monitor for change and (6) use of alternative scoring or alternative presentation modality options to assist in the interpretation of results.

The literature emphasizes that both visual and hearing impairments can be managed through comprehensive rehabilitation programs and sensory aids [29]. In addition, Ramamurthy, et al. [42] advised that a team approach at the primary health care level is necessary to diagnose and rehabilitate elderly patients, thereby enabling them to lead an independent life easily.

Objective three: Gaps in the literature

The lack of structured audiological management program for the elderly with DSI is limited. Although some of the studies focus on intervention programs offered to people with DSI, the execution of these programs is not clearly outlined. There were no studies that were conducted in Africa. Most of the studies conducted were done

in developed countries where resources are available. A limited number of research studies were conducted in developing countries, so not enough is known about how DSI affects the QoL of the elderly populations in different countries and cultures. The literature, therefore, states that caution should be exercised in attempting to extrapolate the findings beyond these particular regions as socio-economic and cultural factors largely impact QoL [4,29].

Regarding study designs and methods, data collection methods in several studies were subjective as they were based on self-reports [31,35], and rating scales. Selection bias might also have been encountered as studies had more likely included those in better physical and mental health when compared to the near-centenarians and centenarians who did not choose to participate in the study. Several studies were cross-sectional and, therefore, do not permit causal interpretations of the findings) [31,43]. Therefore, there is a need for more experimental studies to show direct cause-effect relationships between DSI and reduced QoL.

DISCUSSION

The findings of this review indicate that patients with DSI present with mental health challenges reduced ADL and could present with higher mortality rates. The negative impacts of DSI on the elderly are diverse; therefore, intervention should be planned to fit each patient's individual needs. Regarding the management of DSI, very few articles outline structured management programs for patients with DSI. Limited articles mention the collaboration of different team members, and although some articles speak of the collaboration, they do not mention the necessary team members to be involved. The audiologist involved cannot just continue to manage the hearing difficulties whilst dismissing the visual impairment as the literature is overwhelming on its impact on QoL. If we address these factors, we will be able to improve the QoL in the elderly.

The findings support the need for the inclusion of specific management approaches for patients with DSI, such as ongoing mental health screening, a combined approach of the optometrist and audiologist to managing patients with DSI. Simning, et al. [16] recommend that routine mental health screening of older adults with DSI be conducted to identify treatment opportunities to optimize health and well-being. This recommendation provides an impetus for the collaborative relationship of the audiologist and psychologist to ensure holistic management of the elderly with DSI. Targeted interventions aim at addressing some of the variables associated with depression, such as communication problems, loss of activity, and physical activity, should be considered. It is advised that these interventions focus on socially engaging and mentally stimulating activities, daily functioning, use of sensory aids, sense of control, social and environmental support, and changes in expectations to promote mental well-being and improved quality of life.

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