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Risk Factors for Depression Among Older Adults with Dual Sensory Loss

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Objectives: The purpose of this study was to identify risk factors that are associated with depression among older adults with dual sensory loss, evaluating variables typically associated with depression in an elderly population and variables related to sensory loss.

Method: Survey data was collected from a sample of 203 adults aged 55 and older with significant hearing and vision loss. Independent variables included demographics (as control variables), sensory loss-related factors, activity factors, and social factors. Correlation and hierarchical linear regression were used to analyze the data.

Results: A large proportion of participants experienced depression. Risk factors typically associated with depression in the elderly were also significant for this group, with the exception of functional disability, but only one variable directly related to sensory loss was significant in the final model. The block of variables with the greatest relationship to depression was the social factor.

Discussion: Receipt of rehabilitation services and use of assistive devices are two strategies that could be used to address the issue of depression with this population. Interventions could target some of the variables found to be associated with depression in this study: communication problems, loss of activity, and physical activity.

KEYWORDS: depression, hearing loss, vision loss, elderly

Risk Factors for Depression Among Older Adults with Dual Sensory Loss

Introduction

The elderly population in the United States is increasing at a rapid rate, and depression is a common mental health problem among this group. It has been associated with many negative outcomes, including decreased quality of life, psychosocial impairment, functional impairment, disability, and even mortality (Blazer, 2003). Some subgroups of elderly adults are known to experience a higher incidence of depression; one such subgroup is persons with dual sensory loss.

One result of the increasing lifespan of the population in the United States has been a rise in the incidence of dual sensory loss (i.e., combined vision and hearing loss). Estimates of the prevalence of dual sensory loss among elderly persons in the U.S. have ranged from 7.8% to 21%, depending on the data source, age of the sample, and the manner in which vision and hearing loss were measured (Campbell, Crews, Moriarty, Zack, & Blackman, 1999; Capella-McDonnall, 2005; Crews & Campbell, 2004; Brennan, Horowitz, & Su, 2005). Previous research has established the relationship between sensory loss and several negative outcomes, including a strong association between vision loss and depression and a less consistent or weaker relationship between hearing loss and depression (e.g., Brody et al., 2001; Keller, Morton, Thomas, & Potter, 1999; Kramer, Kapteyn, Kuik, & Deeg, 2002; Lee, Smith, & Kington, 1999; Rovner & Ganguli, 1998). Research involving sensory loss and depression has documented that a substantially larger proportion of persons with visual impairment or dual sensory loss experience depression or depressive symptoms than the general population (e.g., Brody et al., 2001; Capella-McDonnall, 2005; Chou & Chi, 2004; Casten, Rovner, & Edmonds, 2002; Horowitz, Reinhardt, & Kennedy, 2005; Rovner, Casten, & Tasman, 2002). The reported

percentages of those with dual sensory loss or visual impairment who experience depression or its symptoms have ranged from 28% to 43%, while percentages for the general population are reported to be between 8% and 16% (Blazer, 2003).

Because depression is a significant problem faced by many older adults, a considerable amount of research has been conducted in this area. Covariates of depression have been investigated, and the association of a number of variables with depression has been documented. The relationship between depression and functional disability, gender, poor health, and social support has been well documented (Blazer, 2003; Bruce, 2001; Cummings, 2002; Djernes, 2006; Jang, Haley, Small, & Mortimer, 2002; Taylor & Lynch, 2004). A considerable amount of research has also supported the inverse relationship between depression and activities, including physical activity (Baker, Cahalin, Gerst, & Burr, 2005; Glass, Mendes de Leon, Bassuk, & Berkman, 2006; Herzog, Franks, Markus, & Holmberg, 1998; Horowitz, Reinhardt, & Kennedy, 2005; Strawbridge, Deleger, Roberts, & Kaplan, 2002; Taylor et al., 2004). Some studies have documented the association between reduction in activities and greater depressive symptoms (Benyamini & Lomranz, 2004; Williamson, 2000), and loss of activities has been suggested as one of the pathways through which sensory impairment leads to depression (Horowitz, 2003).

Although a substantial amount of research related to single sensory loss and depression has been conducted, fewer studies involving persons with dual sensory loss have been completed. Much of this research has focused on determining the likelihood of experiencing depression for persons with sensory loss. A very limited amount of research has focused on examining risk factors for depression among persons with a single sensory loss (Horowitz, Reinhardt, Boerner, & Travis, 2003; Horowitz et al., 2005; Reinhardt, 2001), and no studies were located that involved risk factors for persons with dual sensory loss. Horowitz et al. (2005)

determined that self-rated health, functional disability, adequacy of social support, self-efficacy, and the experience of depression in the past all predicted current depressive symptomatology in a sample of persons aged 65 or older who were seeking rehabilitation services for vision loss. Reinhardt (2001) also found that functional disability and social support received were significantly associated with depression among a group of visually impaired elders. However, Horowitz et al. (2003) only found self-rated health, quality of social relationships, and use of rehabilitation services to be associated with depression in a group of older adults with vision loss. Functional disability, functional vision loss, and worsening vision were not found to be related to depression in this sample.

Research has established that older persons with dual sensory loss are much more likely to experience depression than the general population (Capella-McDonnall, 2005; Chou & Chi, 2004). This represents a major public health concern for this population, as the experience of depression or symptoms of depression can negatively impact all areas of a person's life (Blazer, 2003). However, the risk factors for depression among this population have not been investigated yet. The fact that a substantially larger proportion of older adults with dual sensory loss experience depression leads to the question of what factors are associated with depression in this population. Are the risk factors the same as already documented for the general population, with persons with dual sensory loss more likely to experience these risk factors, or are factors related specifically to the sensory losses the cause of the high rates of depression?

The purpose of this study is to determine what factors are associated with depression among older adults with dual sensory loss. In evaluating the covariates of depression, two questions will be investigated: (a) Do the factors associated with depression in older adults with dual sensory loss correspond to the factors traditionally associated with depression in the general

elderly population? and (b) Do disability-related variables have a greater association with depression for older adults with dual sensory loss than the factors traditionally associated with depression in the general elderly population?

Method

Procedure

This study represents a small piece of a large research project involving the experiences of persons aged 55 and older with dual sensory loss. That research project, funded by the National Institute on Disability and Rehabilitation Research (grant #H133A 020701) and conducted by the Rehabilitation Research and Training Center on Blindness and Low Vision, in collaboration with the Hellen Keller National Center and San Diego State University, is referred to as the Persons Aging with Hearing and Vision Loss (PAHVL) study. It is an exploratory study investigating the experiences of older persons with dual sensory loss in the areas of employment, housing, communication, community integration, service delivery options, assistive technology, and psychosocial adjustment.

A focus of the project is collecting primary data from a group of persons with dual sensory loss, referred to as the PAHVL study group. This group was recruited from a variety of sources, including through national conferences of organizations of persons who are blind and/or deaf (e.g., American Association for the Deaf Blind, Deaf Seniors of America, American Council of the Blind, National Federation of the Blind), announcements in consumer group publications, and through the Helen Keller National Center's registry of deaf-blind adults in the United States. Criteria for inclusion in the study group were an age of 55 or older and combined hearing and visual impairments. Measured visual or hearing acuity deficits at specific levels were

not required, although the majority of participants were aware of their visual acuity and frequency of hearing loss.

Participants in the PAHVL study group were requested to complete a series of four surveys, covering the topics described previously. As the combined hearing and vision loss made survey completion challenging for some participants, a variety of formats were used. The surveys were administered in the following formats (from most to least common): large print, telephone, regular print, Braille, email, and cassette tape. A number of participants received assistance from another person in order to complete the surveys, but the majority (58%) were able to complete them independently.

Sample

A total of 273 participants in the PAHVL study group completed all four surveys in the series. Due to missing data, the sample available for analyses in this study was reduced to 203. Their demographic characteristics are presented in Table 1.

Variables and Measures

Depression. The dependent variable in the analysis was depression, as measured with the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The CES-D, one of the most widely used instruments to measure depressive symptomatology, is a 20-item instrument that asks respondents how often they have experienced common symptoms of depression in the past week. In order to maximize the available sample, mean imputation was used for the 12 respondents who had three or fewer missing items on this scale. Items are scored on a scale of 0 to 3, with total possible scores ranging from 0 to 60. Higher scores indicate greater symptoms of depression, and a score of 16 or greater is considered to be indicative of experiencing depression. It is not a diagnosis of depression, but indicates that a person should be

evaluated for depression by a professional. A large percentage of this sample (40%) received a score of 16 or greater on the CES-D.

Demographic Factor. Three demographic variables that have been associated with depression in prior research were included in the analysis to control for their effect. The three variables were gender, age, and general health. General health was measured with a self-reported rating of health on a 5-point scale ranging from "Excellent" to "Poor," with higher scores indicating better health.

Sensory Loss-related Factor. Four variables that were associated with dual sensory loss comprised this factor. Two of these were directly associated with the sensory losses and two were difficulties experienced by respondents that were caused by the sensory loss(es). Variables comprising this factor were used to evaluate the second research question. The two directly-related variables were a self-report of whether the sensory losses were getting worse (worsening hearing and worsening vision). These were dichotomous variables measured with two separate questions regarding whether hearing and vision had gotten worse within the last few years. (The interaction between worsening hearing and worsening vision was also tested as a variable in the model, but was insignificant and was therefore not included.)

The third variable comprising the sensory loss-related factor was a measure of difficulty the person experienced with communication. This measure consisted of five items each measured on a 5-point scale. The items relate to others' ability to understand the person when communicating, missing information due to communication problems, and avoidance of communication due to communication problems. (See Appendix A for a list of the items.) A total score was calculated by summing the score on each item, with scores ranging from 5 to 25.

Chronbach's alpha for this scale was .76. Higher scores indicated greater problems with communication.

The fourth variable was help needed with functional activities, due to sensory losses. Participants were provided with a list of six instrumental activities of daily living (IADLs) that persons with sensory loss often experience difficulty with (i.e., grocery shopping, preparing meals, cleaning, taking medications, paying bills, and reading mail), and were asked whether they needed help with each activity because of sensory loss. The score for this variable was the total number of IADLs that the person reported needing help with (possible score range was 0 to 6). This variable corresponds to the functional disability variable used in prior research, but was asked in relation specifically to help needed due to sensory losses.

Activities Factor. Two variables comprised the activities factor: activity loss and physical activity level. Activity loss was a continuous variable, based on the number of activities that the person reported that he or she had stopped participating in or decreased participation in. Eight activities were listed (church or religious activities, volunteer work, driving, traveling independently, exercise, support groups, hobbies, and shopping), with the option of writing in another activity that was not listed. Examples of other activities that were written in were going to the movies or the theatre, watching TV, and employment. Scores on this variable ranged from 0 to 9. Physical activity level is a summed score based on answers to three items about the frequency of participation in vigorous, moderate, and mild physical activities. These items were taken from the 2004 Health and Retirement Study Questionnaire. Higher scores were given for participation in more demanding physical activity, and for more frequent activity in each category. Scores on physical activity level ranged from 0 to 24, with higher scores indicative of a greater level of physical activity.

Social Factor. This factor was comprised of three variables: social support, interactions with others, and satisfaction with social activities. Social support was measured with a summed scale of three items, each rated on a 4-point scale, relating to how many neighbors the person knows, availability of family members to provide assistance when needed, and availability of support from members of the community. Scores ranged from 3 to 12, with higher scores indicating a greater amount of social support. Interactions with others was measured with a summed scale consisting of four items, each evaluating the weekly frequency of contacts (in person and via phone or other telecommunication device) with family and friends on a 6-point scale ranging from "rarely or never" to "daily." These items were taken from the annual National Health Interview Survey. The score on this summed scale could range from 4 to 24, with higher scores indicating a greater amount of weekly interaction with others. The final variable for this factor was a single-item measure of satisfaction with amount of social activities the person engaged in, rated on a 5-point scale, from very happy to very unhappy.

Data Analyses

Descriptive statistics were calculated for all study variables. Correlation and hierarchical multiple regression were the statistical techniques used to answer the research questions, and SAS 9.1 was the statistical package used for the data analyses. Multicollinearity of the data was tested: variance inflation factors ranged from 1.05 to 1.43, indicating that multicollinearity was not an issue (Cohen, Cohen, West, & Aiken, 2003).With hierarchical multiple regression, variables or sets of variables (referred to as factors) are entered into a regression model, one at a time (referred to as steps), to evaluate the change in variance explained by each variable or factor. The order of entry should be guided by causal priority and the removal of potential confounding variables (Cohen et al., 2003). In this study, the demographic variables were

entered in the first step (to control for their effects) and sensory loss-related factors were entered in the second step, as they are believed to have an influence on the remaining variables. The activity factor and then the social factor were entered in the third and fourth steps.

Results

Descriptive statistics and bivariate correlations of study variables with depression are provided in Table 2. All variables other than age, worsening hearing, and functional disability were significantly related to depression. The regression models tested at each step were statistically significant at the $p < .01$ level. The final model explained 39.6% of the variance in depression for older adults with dual sensory loss (see Table 3 for complete results). The factors added at each step resulted in a significant R^2 change. Although the addition of the sensory loss-related factor resulted in a significant R^2 change (step 2), only one of the four variables included in this factor was an important predictor (communication difficulty). Only one of the two activity factor variables, activity loss, was significant at step three. The social factor was the strongest predictor of depression for this population, resulting in a much greater unique amount of variance accounted for than any other factor. All three of the variables that comprised this factor were statistically significant in the final model. The only other significant variables in the final model were self-rated health and communication difficulties.

Discussion

The purpose of this study was determining risk factors associated with depression among elderly persons with dual sensory loss. Variables that are commonly associated with depression in the elderly population, with the exception of functional disability, were also associated with depression in this sample of older adults with dual sensory loss, at least at the bivariate level. When evaluated in the multivariate model, the activity variables became nonsignificant, while

strong associations remained for the social variables. Only two of the four sensory loss-related variables had a significant relationship with depression, and only one of these – communication difficulty – was significant in the multivariate model. While communication difficulty is directly related to the sensory losses, and was therefore included in this factor, it is also important to social interactions.

Functional disability, specifically associated with sensory losses, was not significantly related to depression in this sample. In fact, there was essentially no relationship between the two variables. This is an interesting finding given that functional disability has consistently been associated with depression among the general population of elderly persons, although one study involving elderly persons with vision loss also did not find a relationship between functional disability and depression (Horowitz et al., 2003). A large majority of the participants in this study had their sensory losses for a period of 10 or more years (88% for hearing loss and 86% for vision loss), and more than half had one or both of their sensory losses for at least 35 years. Experiencing sensory loss for such a long time period may have helped them adjust to the need for assistance with some specific IADLs, thereby eliminating its effect on depression. Additionally, most participants reported that they received the help they needed with these IADLs, which may be another reason that it was not related to depression. Alternatively, it is possible that the variable used in this study simply underestimates the overall functional disability of participants, as the question was asked specifically related to disability caused by sensory loss.

Social variables have consistently been associated with depression, in both the general population and in studies that involved elderly persons with vision loss (Horowitz et al., 2003, 2005; Reinhardt, 2001). Few studies have included both activities and social support in the same

model as predictors of depression, but one such study also found that participation in activities became nonsignificant when social support and physical activity, which remained a significant predictor, were added to the models (Baker et al., 2005). Research with persons with vision loss has documented the association between loss of valued activities and dissatisfaction with valued activities and depression (Rovner & Casten, 2002; Rovner, Casten, Hegel, Hauck, & Tasman, 2007). The relationship between loss of activities and depression also existed in this sample of older adults with dual sensory loss, but the relationship was moderated by the social variables. This indicates that social support and social interactions may act as a "buffer" to loss of activities, and possibly to other negative effects of dual sensory loss as well.

The results from this research are important as they provide one of the first analyses of the covariates of depression with a sample of older adults with dual sensory loss. A value of knowing the covariates of depression for persons with dual sensory loss is identifying variables that are adaptable (i.e., can be changed by the individual) which, when altered, can potentially reduce the experience of depression. These variables could be targeted for interventions with this population. The variables with the greatest relationships with depression in this study were all related to interactions with others. Communication difficulties was one of the strongest predictors of depression and is something that could potentially be addressed through rehabilitation services, including providing the person with appropriate assistive devices, for both hearing and vision, that may improve conversational abilities. Problems with communication are likely a contributing factor to decreased social contact, and have been associated with reduced activities (Resnick, Fries, & Verbrugge, 1997). Improvements in communication could have a positive impact on these variables that are also associated with depression.

These results indicate that if persons with dual sensory loss can maintain their social resources, their likelihood of experiencing depression could be reduced. However, social variables would be difficult to target for intervention. The activity variables, which exhibited a bivariate relationship with depression, are factors that could be targeted for change, and changes in these areas may in turn have a positive influence on the social variables. An intervention that targeted increased physical activity might involve assisting the person with dual sensory loss to identify activities that he or she is interested in and physically capable of doing and showing the person how to do these activities safely, with modifications if necessary. An intervention to help a person increase his or her activities might focus on transportation, which is often the primary reason for reduction in activities of persons with vision loss. Working with the person to identify available transportation options might be what is needed to help him or her continue participation in enjoyable activities. Another focus could be identifying assistive devices that would enable the person to continue with normal activities. When previously enjoyed activities are no longer possible even with assistive devices, an intervention could assist persons with identifying alternative activities they could engage in. For example, someone who enjoyed needlework may no longer have the vision necessary to participate in this activity. With an appropriate assistive device, such as a standing magnifier, the person may be able to continue doing needlework. If this is not an option, the person may be able to participate in other types of craft activities at a local senior center. Assistance with and encouragement for this type of replacement activity could be valuable to persons with dual sensory loss.

Limitations

Limitations of this research should be mentioned. A primary limitation is the sample used for the study: it can not be considered a representative sample of the population of persons with

dual sensory loss. A large percentage of elderly persons with dual sensory loss experienced both losses as a result of aging, while the majority of persons in this sample had at least one loss prior to age 55. Therefore, the ability to generalize these results to the population of persons with dual sensory loss in the United States is uncertain. It is possible that different associations with depression exist for persons who experience both sensory losses as a result of aging. A relatively large percentage of participants who completed the surveys could not be included in these analyses due to missing data on one or more variables. Elimination of those cases with missing data may have introduced an unknown bias.

This study is based on survey, rather than clinical, data. As a result, all measures are self-reported. The lack of objective measures of severity of hearing and vision loss and physical health are also limitations to the study. Finally, these analyses are cross-sectional in nature and therefore significant relationships must be considered associations rather than causes and effects. Although it is likely that communication difficulties, social support, and interactions with others contribute to symptoms of depression, it is also possible that depression has an influence on these variables.

Summary

The experience of depression for older adults with dual sensory loss is common: 40% of the participants in this sample experienced significant symptoms of depression. The risk factors found to be associated with depression for this group were the same factors associated with depression for the general population of elderly adults, with the exception of functional disability. Risk factors directly related to sensory loss did not have a greater relationship with depression than these common covariates, in fact, only one – difficulty with communication – was significantly associated with depression in the multivariate model.

Rehabilitation services and use of assistive devices have been associated with decreased depression for older adults with vision loss (Horowitz, Brennan, Reinhardt, & MacMillan, 2006; Horowitz, Reinhardt, & Boerner, 2005). These are two strategies that could be used to assist in alleviating the depression experienced by a large percentage of older adults with dual sensory loss, specifically targeting some of the variables shown to be associated with depression in this study: communication problems, loss of activity, and physical activity. Improvements in these areas have the potential to have a positive influence on social support, interactions with others, and satisfaction with social activities as well. Research has shown that many people with low vision are unaware of the rehabilitation services and assistive devices that are available (Casten, Maloney, & Rovner, 2005; Lighthouse International, 1995; National Eye Institute, 1997); it is likely that older persons with dual sensory loss are also unaware of them. It is important for health care providers who come in contact with older persons with dual sensory loss to inform them about the availability of rehabilitation services and assistive devices which could have a positive impact on their lives, including a reduction in the experience of depression.

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Table 1

Demographics of Study Sample

Variable	Level	*N*	Percentage
Gender	Male	95	46.8
	Female	108	53.2
Race/ethnicity	White	187	92.6
	African-American	5	2.5
	Hispanic	4	2.0
	Native American	2	1.0
	Asian American	1	0.5
	Other	3	1.5
Education	Less than high school	25	12.6
	High school	40	20.1
	Some college	41	20.6
	AA or BA degree	56	28.1
	Graduate degree	37	18.6
Age	55 to 64	69	34.0
	65 to 74	57	28.1
	75 to 84	50	24.6
	85 or older	27	13.3
Vision loss	Totally blind	53	26.1
	Legally blind	117	57.6
	Less severe or unsure	33	16.3

Hearing loss[a]	Mild	68	33.8
	Moderate	81	40.3
	Severe	20	10.0
	Profound or Deaf	32	15.9

[a]Hearing loss represents best corrected level, with use of hearing aids if applicable.

Table 2

Descriptive Statistics for Study Variables and Correlations of Variables with CES-D Scores

Variable	Mean	SD	Correlation with CES-D
CES-D	13.34	10.33	
Gender (Male)	0.47	0.50	-0.18*
Age	71.57	10.14	-0.04
Health	3.19	1.01	-0.34*
Worsening vision	0.46	0.50	0.23*
Worsening hearing	0.47	0.50	0.04
Communication difficulty	11.98	3.28	0.35*
Functional disability	3.02	1.93	0.03
Activity loss	2.37	2.52	0.31*
Physical activity	12.73	7.57	-0.20*
Social support	8.08	2.30	-0.38*
Interaction with others	14.36	4.59	-0.30*
Satisfaction with social activities	3.29	1.24	-0.36*

* $p <= .01$

Table 3

Results of Hierarchical Multiple Regression Model: Standardized Estimates and t-values

Variable	Step 1	Step 2	Step 3	Step 4
	β (t-value)	β (t-value)	β (t-value)	β (t-value)
Gender	-0.12 (-1.79)	-0.08 (-1.25)	-0.05 (-0.81)	-0.06 (-0.98)
Age	-0.09 (-1.39)	-0.07 (-1.07)	-0.11 (-1.67)	-0.06 (-1.05)
Health	-0.33 (-4.85)*	-0.31 (-4.68)*	-0.28 (-4.17)*	-0.27 (-4.39)*
Worsening vision		0.10 (1.47)	0.07 (1.06)	0.08 (1.30)
Worsening hearing		-0.05 (-0.79)	-0.06 (-1.00)	-0.06 (-1.06)
Communication difficulty		0.32 (4.94)*	0.25 (3.83)*	0.17 (2.70)*
Functional disability		0.03 (0.58)	-0.01 (-0.14)	0.01 (0.19)
Activity loss			0.20 (2.87)*	0.09 (1.32)
Physical activity level			-0.06 (-0.89)	-0.01 (-0.22)
Social support				-0.18 (-2.65)*
Interaction with others				-0.13 (-1.99)*
Satisfaction with social activities				-0.21 (-3.48)*
Model R^2	0.14	0.25	0.28	0.40

* $p < .05$

Appendix A: Communication difficulty items

1. In communicating with people you know well, how much do you think you miss due to communication problems? (Scale: None to Almost everything)
2. In communicating with people you don't know, how much do you think you miss due to communication problems? (Scale: None to Almost everything)
3. Can people understand you when you communicate with them? (Scale: Always to Never)
4. Do you think that difficulty in communications causes people to avoid communicating with you? (Scale: Always to Never)
5. Does difficulty in communications cause you to avoid communicating with other people? (Scale: Always to Never)