

Brief report

# Combined effect of vision and hearing impairment on depression in older adults: Evidence from the English Longitudinal Study of Ageing

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## Abstract

*Background:* No longitudinal study has been conducted to examine the relation between dual sensory loss and depression in older adults. The objective of this study was to examine the role of dual sensory loss in the onset and persistence of depression in older persons living in U.K.

*Methods:* The data used in this study was a 2-year, population-based, prospective, observational study of 3782 older adults aged 65 and above selected from the English Longitudinal Study of Ageing Waves 1 and 2. Sensory loss in vision and hearing, 8-item CES-D, socio-economic variables, health indicators, and social support were assessed. We calculated the odds ratio for any association between sensory loss and depression.

*Results:* Vision loss was a consistent predictor of both onset and persistence of depression even after a wide range of covariates had been adjusted, but the association between dual sensory loss and depression disappeared once health indicators were controlled for.

*Conclusions:* Aged care service practitioners must take this risk factor, visual impairment, into consideration in their preventive intervention and treatment for depression in aged population.

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*Keywords:* Depression; Sensory loss; Aged; ELSA

## 1. Introduction

Sensory impairment and depression are common conditions affecting the aged population (Woo et al., 1994; Cruickshanks et al., 1998; Mulsant and Ganguli, 1999). The separate impacts of hearing loss and vision impairment on depression have been established but the impact of dual sensory loss (i.e. in vision and hearing)

on depressive symptoms has been only investigated in a few recent studies, in which mixed findings have been shown (Rovner and Ganguli, 1998; Ip et al., 2000; Lupsakko et al., 2002; Kramer et al., 2002; Chou and Chi, 2004; Crew and Campbell, 2004; Capella-McDonnell, 2005). These conflicting results may be explained by the different samples and methods used and the inability to adjust for a number of potential confounders. In addition, one major common limitation of all these previous studies is due to the nature of cross-sectional study design, which restricts the ability to draw causal

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inferences concerning the temporal order between sensory loss and depression. It is well documented in the literature that factors contributing to the onset and persistence of depression differ (Cole and Dendukuri, 2003). We examined whether older persons with dual sensory loss are more likely to experience depression than those with single sensory loss in vision or hearing because, to our knowledge, no study has been conducted to investigate this issue, which is imperative from both an aetiological point of view and the perspective of public health.

## 2. Method

### 2.1. Sample

Data were derived from the English Longitudinal Study of Ageing (ELSA) of persons aged 50 and above and details about the procedure employed and the response to the study have been published previously, but will be summarized briefly (Marmot et al., 2002; Banks et al., 2006). The first wave of the ELSA is based on a random sample and was conducted in 2002–03 with a response rate of 64.3% ( $n=11,234$ ). Two years later, the same respondents were approached for the second wave of the ELSA, in which 9432 were interviewed (78% response rate). Non-respondents were more likely to have limiting chronic illness, live in London at baseline, be of non-white ethnicity, be single or married, be non-smokers and be older (Cheshire et al., 2006). For this study, we only analyzed a sample of individuals aged 65 and above, who were interviewed directly in person on both occasions ( $n=4003$ ). Due to some incomplete questionnaires, the present study reports findings from the 3858 individuals for whom full data were obtained, for the variables we were interested in. Weighting was devised to reduce the non-response bias between HSE and ELSA wave 1 and between ELSA waves 1 and 2; all analyses reported in this study have used relevant estimation weights. After weighting adjustment, the sample here represents 3782 adults aged 65 or above.

### 2.2. Measures

Depressive symptoms were measured by 8-item Center for Epidemiologic Studies-Depression scale (CES-D) (Steffick, 2000; Gallo et al., 2006) developed by Radloff (1977). We used the dichotomous core based on the cut-off score of 3, which is proved to be clinically significant (Steffick, 2000; Kessler et al., 1998). Participants were asked to rate their vision and hearing

with aids on a 6-point (ranging from excellent to legally blind) and a 5-point scale (ranging from excellent to poor), respectively. We created two binary measures of sensory impairment to indicate poor eye sight (0 = excellent, very good, and good; 1 = fair, poor, and legally blind) and poor hearing (0 = excellent, very good, and good; 1 = fair and poor) so as to maximize the association for binary categories of sensory impairment and depression. Baseline socio-economic variables included age, gender, marital status, education, employment status, and total income in decile while health indicators consisted of the number of medical conditions in eight areas (i.e. cardiovascular diseases, lung diseases, bone diseases, cognitive diseases, diabetes, stroke or cerebral vascular disease, Parkinson's disease, and cancer) and functional health (mobility, ADL, and IADL disabilities). Two health behaviors, smoking (never smoker; ex-smoker; current smoker) and frequency of alcohol consumption (not at all; less than twice a month; at least once a week; daily or almost daily; twice a day or more), were also included as covariates. Finally, social network of spouse, children, and family members in two aspects, emotional support (3 items) and negative interaction (3 items), were assessed. In all these 6 measures of network, summary scores were obtained by adding the relevant three items' responses after recoding, to ensure that the magnitude of the scores indicated are consistent with the constructs they present.

### 2.3. Measures

Outcome variables were depression onset and persistence, calculated by comparing the binary CES-D scores across the two measurements. Onset was assessed from participants not depressed at baseline ( $n=2929$  before weighting) and persistence from those depressed at baseline ( $n=929$  before weighting). Associations between sensory loss (dual loss, vision and hearing loss) and each outcome in turn were examined using multiple logistic regression, initially controlling for the effects of socio-economic variables. The second logistic regression model was the same as the first one, except that health indicators were also controlled for. The third and fourth models repeated the first one, except that health behavior and family support variables were added, respectively. In the fifth model, all covariates were adjusted for. The process was then repeated for depression persistence. All predictive variables were entered into the model, with an inclusion criterion of  $p<0.05$ . Results were reported using ORs and 95% confidence intervals (CIs).

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