

5-23-2012

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### Recommended Citation

Stone, T., Santo, J. B., & Wittich, W. (2012). Mediating and moderating effects on the association between vision loss and depression among older adults, *Insight: Research and Practice in Visual Impairment and Blindness*, 5(1), 30-37.

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# Mediating and Moderating Effects on the Association between Vision Loss and Depression among an Older Population

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## Abstract

The purpose of this study was to gain a more holistic view of the association between depression and visual functioning by examining possible mediating and moderating factors. Previous research has established a linkage between low life satisfaction and coping skills and depressive symptoms. Results of this study contribute to this literature by indicating that life satisfaction partially mediates the relationship between visual functioning and depression. Furthermore, a significant coping by visual functioning interaction was discovered, revealing that among this sample, visual impairment is associated with higher levels of depression among individuals with low coping skills; however, little effect was found for individuals with high coping skills. Results provide support for the importance of early screening of satisfaction with life and coping among older individuals experiencing age-related visual impairment.

**Keywords:** depression; vision loss; coping styles; low vision; life satisfaction

## Introduction

Vision loss is generally recognized as a major health care problem among older people. Approximately one person in three has some form of vision-reducing eye disease by the age of 65, the most common causes being age-related macular degeneration, glaucoma, cataracts, and diabetic retinopathy (Quillen, 1999). Given that the average life expectancy in the United States continues to increase, the risk of

vision-reducing eye disease also is increasing, making age-related vision loss one of the most prevalent medical conditions among older people (Congdon et al., 2004). Not only does vision loss reduce a person's ability to perform activities of daily living, it also increases his or her chances of being affected by depression. Recent studies have found that older adults with visual impairment and depressive symptoms are particularly vulnerable to health decline and further disablement (Jones, Rovner, Crews, & Danielson, 2009). Of the different variables that have been postulated to mitigate depressive symptoms, life satisfaction and coping styles have been found to be particularly helpful (Klein, Turvey, & Pies, 2007; Swami et al., 2007). The purpose of this study is to further explore the potential positive impact of life satisfaction and coping styles on reducing the onset of depression among older adults affected by vision impairment.

Depression among older people has long been acknowledged as a prevalent and serious concern. Depression in older adults is associated with an increased risk of cancer, heart disease, stroke, dementia, and Parkinson's disease (National Center for Health Statistics, 2005). Recent studies have broadened understanding in this area by examining the effects of depressive symptoms among older adults with vision loss, another prevalent and debilitating condition. Jones and colleagues (2009) found that older, visually impaired adults with depressive symptoms are particularly vulnerable to physical and mental decline without timely interventions. Specifically they found that this population was more likely to be current smokers, obese, and physically inactive and to rate their health as worse than nondepressed older adults with visual impairments. Because vision impairment and depression are often comorbid, it is important to examine potential factors that may be influencing the association between these two conditions. Of the different variables that have been examined as mitigators of depressive symptoms, life satisfaction and coping styles have been found to be particularly helpful.

A number of studies have found that life satisfaction, which has been described as subjective well-being and "the personal ability to enjoy oneself and one's own life" (Koivumaa-Honkanen et al., 2001), has a strong negative correlation with depression (Koivumaa-Honkanen, Kaprio, Honkanen, Viinamaki, & Koskenvuo, 2004). This

association has been found among adolescents (Hawkins, Hawkins, & Seeley, 1992) and adults (Parkerson, Broadhead, & Tse, 1990), as well as psychiatric patients (Koivumaa-Honkanen et al., 2001). In a study examining the health status of first-year medical students, a population at high risk for depression, researchers found that students who reported high life satisfaction had fewer symptoms of depression and anxiety as well as higher self-esteem, better physical, mental, and social health than students reporting low life-satisfaction (Parkerson et al., 1990).

Life satisfaction has also been shown to be predictive of depression. For example, in a 15-year prospective study of healthy Finnish adults, researchers found that not only was self-reported life satisfaction strongly associated with depressive symptoms, but it was also strongly predictive of subsequent depressive symptoms. Although life satisfaction is strongly affected in depression, research has found that it does improve concurrently with recovery from depression (Koivumaa-Honkanen et al., 2001). A more recent study found similar findings, in that fewer depressive symptoms and greater satisfaction with participation in social roles explained better quality of life in a Canadian sample of older adults with visual impairment (Renaud et al., 2010).

Because life satisfaction and depression are commonly associated, it is reasonable to assume that vision impairment, a condition that is frequently comorbid with depression, would also influence this relationship. Furthermore, the many challenges older individuals face when they experience vision loss, as previously noted, would likely contribute to a decrease in life satisfaction. Therefore, it is logical to assume that part of the effect of visual impairment on depression may be a result of decreased satisfaction with life.

A number of recent studies have begun to highlight the important role of life satisfaction among older adults who are visually impaired. For example, individuals with visual impairment have been found to report significantly lower levels of life satisfaction compared with their non-visually impaired peers (Good, 2008). Similarly, a recent study by Brown and Barrett (2011) examined four potential mediators of the association between life satisfaction and visual functioning in a nationally representative sample of older persons. Results from their regression analyses indicated that each of the hypothesized mediators – activity limitations, socioeconomic resources, social

resources, and psychological resources – mediated the relationship between life satisfaction and visual functioning. Specifically, psychological resources (measured by self-efficacy) had the strongest mediating effects, such that visually impaired individuals with higher self-efficacy reported higher rates of life-satisfaction compared with individuals reporting lower levels of self-efficacy. Whereas previous research has focused on the main direct effects of life satisfaction on depression, this study examines the mediating effects of life satisfaction.

Another variable that has been examined for its relationship to depression is coping styles, which have been conceptualized as the specific ways in which individuals respond to internal or external demands they deem stressful (Lazarus & Folkman, 1984). Coping is generally divided into either problem-focused coping, in which the individual attempts to directly influence the stress, or emotion-focused coping, which involves managing the negative affect of the situation (Lazarus & Folkman, 1984). Moreover, these coping styles can be further broken down into either adaptive or maladaptive strategies. Studies have found that maladaptive coping strategies such as denial, distraction, and avoidance not only hinder recovery from sickness but may actually increase the risk of mortality (Doering et al., 2004; Murberg & Bru, 2001). In a recent study, Klein et al. (2007) revealed that maladaptive coping styles such as self-denial, self-distraction, and self-blame were associated with more depressive symptoms among older adults experiencing heart failure.

This study attempts to extend this research by proposing that the relationship between visual functioning and depression is influenced by a third variable-coping. Research has clearly demonstrated the transforming effects that coping style can have on the depressive symptoms of patients, and it is reasonable to assume that a similar pattern would be found among individuals experiencing visual impairment.

Previous research clearly indicates that both vision impairment and depression can individually have debilitating consequences and that having both conditions poses even greater challenges. Given the fact that these conditions are often comorbid, relatively little research has explored the interactive association between visual impairment and depressive symptoms and the factors that may be influencing this association. Whereas previous studies have used simple bivariate associations to

examine the relationship between these variables, this study attempts to take a more holistic view of the associations among vision loss, depression, life satisfaction, and coping styles. Specifically, the first hypothesis is simply that visual functioning is negatively associated with depression. Second, it is hypothesized that satisfaction with life is also negatively associated with depression. The third hypothesis is that life satisfaction will mediate the relationship between vision impairment and depression by transforming the nature of the relationship such that individuals experiencing vision impairment will experience relatively lower levels of depression when they report high life satisfaction. Last, it is also proposed that coping will have a moderating influence on the association between visual functioning and depression.

## **Methods**

### **Study Population**

Participants were recruited at three McGill University-affiliated hospitals (Jewish General Hospital, Montreal General Hospital, and Royal Victoria Hospital) and one University of Montreal-affiliated hospital (Hôpital Notre Dame) in Montreal, QC, Canada.

Recruitment began January 15, 2007, and is ongoing. However, for the purpose of the presented results the database was accessed on December 14, 2009, at which time a total of 623 participants had been recruited (91.48 percent of approached individuals agreed to participate). Participants ranged in age from 26 to 100 years, with the majority of participants being over the age of 60 years (mean= 74.52 years, standard deviation = 13.31 years). Approximately 44 percent of the participants were men and 56 percent were women. Eligible participants were identified through daily chart reviews within the ophthalmology departments the day before patients would arrive at the clinic. Based on visual acuity, those who qualified for free vision rehabilitation services within the province of Quebec (visual acuity of 20/70 or less in the better eye with best standard correction) were approached the following day in the waiting room by a research assistant and informed about the possibility to participate in a survey while awaiting their eye care professional.

### **Data Collection**

The medical chart of each patient was obtained to collect best-corrected visual acuity in the better eye, visual field defects, and ocular diagnoses. The visual functioning measure (VF-14; Linder et al., 1999) had a Cronbach's alpha of .94. Participants were also asked a series of interviewer-administered questions. The Center for Epidemiologic Studies-Depression Scale (CES-D; Dreer, Elliot, Fletcher, & Swanson, 2005) 10-item short form was given to assess depression. This instrument has shown excellent sensitivity and specificity in older adults and has a Cronbach's alpha of .79. Scores range from 0 to 30, with higher scores indicating greater depressive symptoms. Scores of 10 have been used to indicate depression. The Brief COPE (Carver, 1997; Cooper, Katona, & Livingstone, 2008), a 28-item questionnaire, determines the frequency with which people engage in different coping mechanisms.

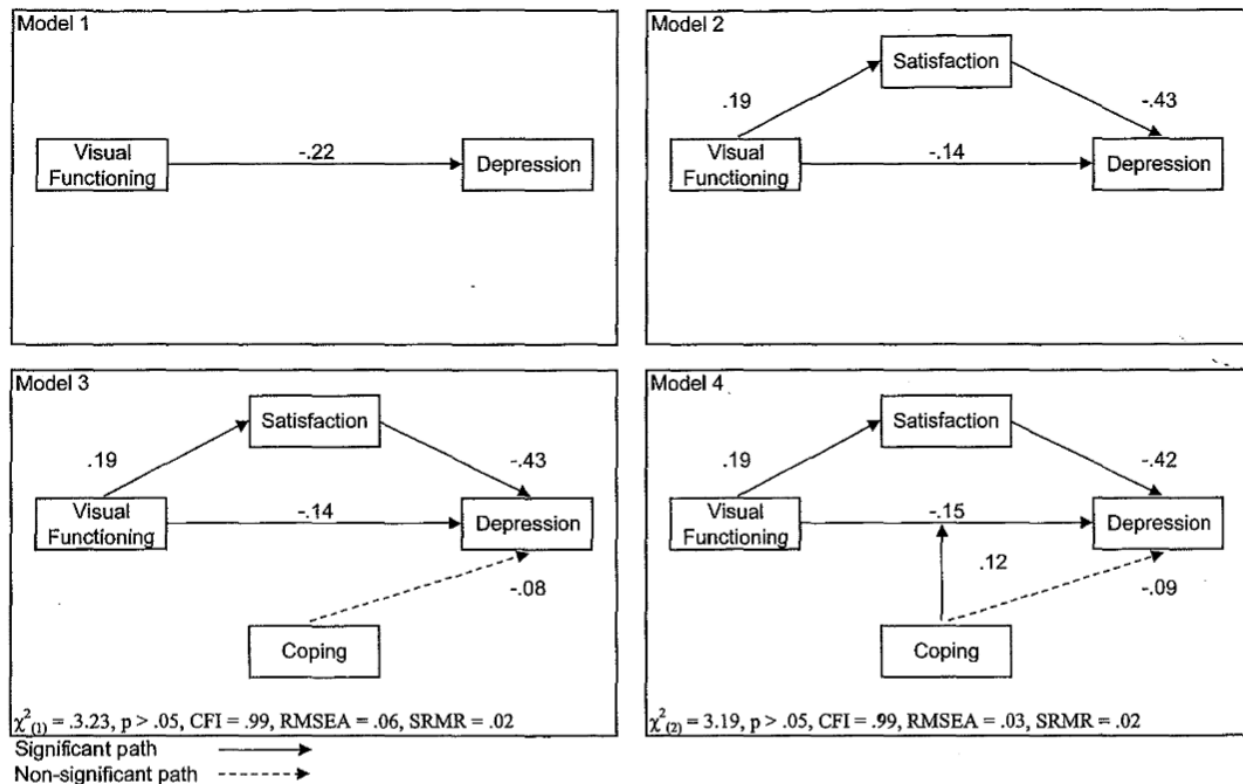


Figure 1. The mediating and moderating effects of satisfaction with life and coping.

There are 14 subscales, one for each coping mechanism, and scores on each subscale range from 0 (never use) to 8 (use most of the time). This measure has a Cronbach's alpha of .74. The Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) is a short five-item questionnaire that has been shown to have excellent

reliability in past studies (Burr, Santo, & Pushkar, 2009; Diener, Suh, Lucas, & Smith, 1999), with a Cronbach's alpha of .79 in the current sample. An interview was performed to collect information on demographics, general health status, and visual problems.

## Results

In order to test the proposed hypotheses, structural equation modeling with M-Plus (Muthén & Muthén, 2006) was used to test four separate models (see Figure 1). Means and standard deviations were calculated for the study variables and are presented in Table 1 along with the zero-order correlations. In the first model, depression was regressed on visual function. Results indicated that visual functioning significantly predicted depression ( $\beta = -.22$ ,  $b = -.05$ , standard error [SE] = .04,  $z = -5.58$ ,  $p < .05$ ) and explained 4.90 percent of the variability in depression.

Table 1. Zero-Order Correlations and Descriptive Statistics

Models	1	2	3	4	Mean	SD
1. Visual Functioning (mean)	–				38.56	24.61
2. Brief COPE (total)	-.07	–			71.30	15.29
3. CES-D (total) <sup>a</sup>	-.22**	-.09*	–		7.75	5.97
4. Satisfaction with Life	-.19**	.07	-.46**	–	5.01	1.20

<sup>a</sup> CES-D = Center for Epidemiologic Studies-Depression Scale.

\* $p < .05$ , \*\*  $p < .01$ .

In the second model, depression was again regressed on visual functioning and satisfaction with life was examined as a possible mediator. Visual functioning ( $\beta = -.14$ ,  $b = -.03$ , SE = .04,  $z = -3.73$ ,  $p < .05$ ) and satisfaction with life ( $\beta = -.43$ ,  $b = -1.97$ , SE = .03,  $z = -12.70$ ,  $p < .05$ ) both significantly predict depression, accounting for 22.70 percent of the variability in depression. Vision functioning significantly predicted satisfaction with life as well ( $\beta = .19$ ,  $b = .01$ , SE = .04,  $z = 4.74$ ,  $p < .05$ ), accounting for 3.6 percent of the variance. A test for indirect effects revealed that the effect of visual functioning was partially mediated by satisfaction with life ( $p < .05$ ). In other words,



32.00 percent of the effect of vision loss on depression can be accounted for by the subsequent reduction in life satisfaction that occurs when visual functioning declines.

In the third model, coping style was examined as a potential moderator of the relationship between vision loss and depression. Once again, visual functioning ( $\beta = -.14$ ,  $b = -.04$ ,  $SE = .04$ ,  $z = -3.88$ ,  $p < .05$ ) and satisfaction with life ( $\beta = -.43$ ,  $b = -1.95$ ,  $SE = .03$ ,  $z = -12.48$ ,  $p < .05$ ) significantly predicted depression. Coping style, however, did not have a significant main effect on depression ( $\beta = -.08$ ,  $b = -.03$ ,  $SE = .02$ ,  $z = -1.84$ ,  $p > .05$ ). In fact, the addition of coping style only explained an additional .20 percent of the variability in depression. Visual functioning remained a significant predictor of satisfaction with life ( $\beta = .19$ ,  $b = .01$ ,  $SE = .04$ ,  $z = 4.74$ ,  $p < .05$ ), accounting for 3.60 percent of the variability in life satisfaction. Notably, results indicated that this model was a good fit to the data ( $\chi^2(1) = 3.23$ ,  $p > .05$ , CFI = .99, root mean square error of approximation [RMSEA] = .06, standardized root mean square residual [SRMR] = .02).

Finally, in the fourth model, visual functioning ( $\beta = -.15$ ,  $b = -.04$ ,  $SE = .04$ ,  $z = -4.01$ ,  $p < .05$ ), coping style ( $\beta = -.09$ ,  $b = -.03$ ,  $SE = .04$ ,  $z = -2.07$ ,  $p < .05$ ), visual functioning-by-coping interaction ( $\beta = .12$ ,  $b = .74$ ,  $SE = .04$ ,  $z = 2.93$ ,  $p < .05$ ), and satisfaction with life ( $\beta = -.42$ ,  $b = -1.94$ ,  $SE = .03$ ,  $z = -12.49$ ,  $p < .05$ ) significantly predicted depression. As can be seen in Figure 2, the visual functioning-by-coping interaction indicates that among this subsample, changes in visual functioning had little effect on depression among individuals with high coping skills. However, individuals with low coping skills and low visual functioning tended to experience a greater number of depressive symptoms than their counterparts with high visual functioning. Overall, the total set of predictor variables explained 24.40 percent of the variability in depression. Visual functioning was also significantly predictive of satisfaction with life ( $\beta = .19$ ,  $b = .01$ ,  $SE = .04$ ,  $z = 4.73$ ,  $p < .05$ ), indicating that poor visual functioning is associated with lower life satisfaction. Visual functioning accounted for 3.60 percent of the variability in satisfaction with life. Like the previous model, statistics indicated that this model was also a good fit to the data ( $\chi^2(2) = 3.19$ ,  $p > .05$ , CFI = .99, RMSEA = .03, SRMR = .02).

## Discussion

The primary objective of this study was to integrate the existing literature on visual impairment and depression and to examine the mediating and moderating role that life satisfaction and coping have on this relationship. The results of the analyses confirm the original predictions that life satisfaction would mediate the relationship between visual functioning and depression and that coping style would moderate it. Although the data revealed that there was no main effect of coping, there was a significant interaction between visual functioning and coping, providing important information about the role that life satisfaction and coping can play when an individual is faced with declining visual functioning. This study provides valuable knowledge for clinical practitioners as well as anyone who is affected by visual impairment. Furthermore, as the knowledge base on comorbid visual impairment and depression continues to grow, so does our understanding of these debilitating conditions.

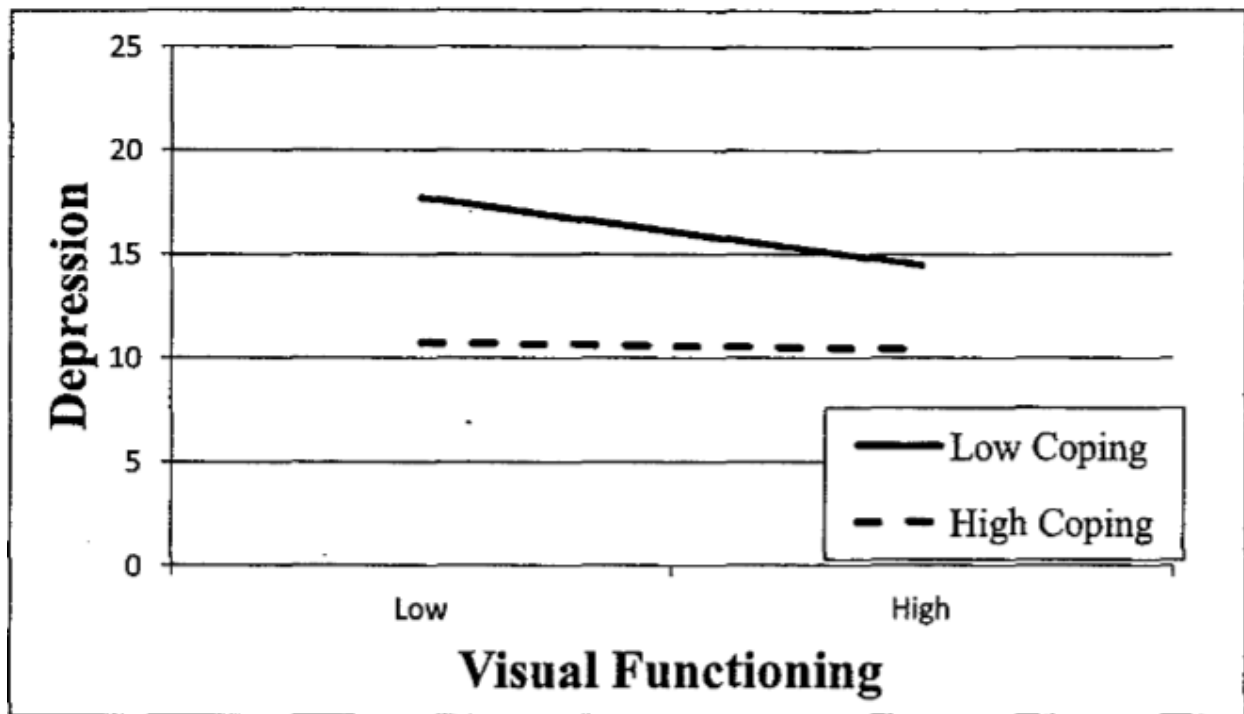


Figure 2. Interaction between visual functioning and coping.

It was hypothesized that both visual functioning and life satisfaction would be negatively associated with depression. The results of the first two models indicate that visual functioning has a direct effect on depression, as well as an indirect effect,

through life satisfaction. The fact that part of the effect of visual functioning on depression can be explained by satisfaction with life indicates that among this population, low life satisfaction may be an early indicator of depression. Administering a life satisfaction measure to patients experiencing vision impairment may help with early detection of depression. Moreover, because life dissatisfaction is oftentimes an indicator of additional problems in an individual's life, assessment of life satisfaction in clinical practice offers many benefits. Beyond the role of screening, efforts to improve the subjective well-being of individuals affected by visual impairment may reduce or guard against current and future depressive symptoms.

Regarding the role of coping, the results confirmed the prediction that coping style would moderate the relationship between visual functioning and depression. Despite the significant visual functioning-by-coping interaction, there was no main effect of coping. In fact, when coping was added to the third model, it added less than .20 percent to the explained variance. This finding should be carefully interpreted, however, because this study used a mean coping score rather than specifying emotion versus problem-focused styles. Splitting the interaction into high versus low coping, it is evident that the effect of visual functioning on depression is not the same for everyone. Among this subgroup, changes in visual functioning had little effect on depression among the high coping group. Individuals with low coping, however, tended to experience more depressive symptoms when visual functioning was low. It is interesting to note that the specific coping items that participants rated most highly (with average scores above 3.90 out of a possible 4) included "I've been thinking hard about what steps to take" and "I've been learning to live with it."

These findings suggest that high coping skills may buffer some of the effects of vision loss on depression, which is consistent with the current literature on coping and other medical illnesses. Given that coping is a learned skill, these results are encouraging. Emphasizing the protective benefits of effective coping and helping persons affected by visual impairment to adopt and employ these strategies is clearly beneficial. A limitation of this study is the relatively broad measure of coping. Future research could obtain a more sensitive analysis by separating coping into multiple variables such as emotion focused versus problem focused.

Future research would also benefit by obtaining further background information regarding additional factors in the participants' lives that may be necessitating the use of these coping strategies. Because coping strategies are learned responses to a situation, taking into account factors other than vision loss, such as social support, financial need, and marital status, would provide a more robust image of this relationship.

As the rate of visual impairment in North America continues to rise, interventions aimed at preventing or reducing the onset of comorbid depression are crucial. Given the serious nature and exacerbating effect that depression can have on individuals experiencing visual impairment, it is essential that those at high risk for comorbid depression and visual impairment be identified as early as possible. The mediating and moderating effects of life satisfaction and coping skills may provide clinical practitioners with an indicator of individuals at high risk. If taken into account, the mitigating effect of these factors will likely improve the quality of life of individuals experiencing visual impairment.

## **Acknowledgements**

The Montreal Barriers Study Data Base is funded by the Vision research network of the Fonds de la recherche en santé du Québec, the Institut Nazareth et Louis Braille, and the MAB-Mackay Rehabilitation Centre. The protocol was approved by the institutional Review Board of McGill University, with subsequent individual approval by all hospital institutional review boards at each data collection site. In accordance with the Canadian Tri-Council Policy Statement of ethical conduct for research involving humans.

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