

Role of Vision Loss: Depression and Anxiety of Low Vision Macular Degeneration and Visual Disability

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Abstract

Purpose: Although the prevalence of depression in visually impaired older persons is high, the association between vision loss and depression seems to be influenced by factors other than visual impairment. In this study, the role of vision loss, functional limitations and social network characteristics in relation to depressive symptoms was investigated.

Methods: Cross-sectional data from the Longitudinal Aging Study Amsterdam were used to investigate the prevalence of depression within subgroups with increasing vision loss. In linear regression models, functional limitations and social network characteristics were examined as possible mediators in the association between vision loss and depression. Having a partner was considered to be a potential moderator.

Results: Although a significant linear trend was found in the presence of depressive symptoms with 14% in normally sighted, 23% in mild and 37% in severe vision loss, vision loss was not an independent determinant of depression. Mediators were functional limitations and social network size. No interaction with partner status was found.

Conclusion: In the presence of depression, a trend was found with increasing severity of vision loss, indicating the need for more attention in health care and low-vision rehabilitation. In the general older population, vision loss was not an independent determinant of depression but was mediated by functional limitations and social network size. Rather than receiving actual social support, the idea of having a social network to rely on when needed seemed to be associated with lower levels of depression.

Keywords: Low vision; Depression; Anxiety; Face perception; depression; functional limitations; Vision rehabilitation

Introduction

Low vision is associated with a reduced quality of life, defined as a “complex trait that encompasses vision functioning, symptoms, emotional well-being, social relationships, concerns, and convenience as they are affected by vision”. Vision loss can reduce quality of life in a wide variety of ways, including difficulties in reading, restrictions in activities and employment, and limitations in both physical and practical mobility. As a consequence, it is easy for vision loss to result in reduced engagement in social and pleasurable activities. The effects of vision loss on quality of life are complex and multifaceted. In this review we focus on one single aspect of quality of life that has not been explicitly examined - the potential causal influence of poor face recognition on social isolation, anxiety and depression [1].

It is now well established that low vision and blindness are risk factors for both anxiety and depression. However, the relationship between loss of vision and these psychosocial impacts is not yet fully understood. Current models of depression and anxiety emphasize their strong comorbidity. Up to two-thirds of adults with anxiety disorders may also suffer from depression. Anxiety and depression share clinical symptoms as well as social, psychological, neurobiological and genetic and risk mechanisms.

As far as psychological and social risk factors are concerned, it is believed that anhedonia and the withdrawal from pleasurable activities may be a major contributing component for both anxiety and depression. The relationship is thought to be bidirectional: depression leads to a withdrawal from pleasurable and/or social activities, and the loss of pleasurable activities and social contact worsens depressive or anxiety symptoms.

Consistent with this model, it has long been recognized that the susceptibility to anxiety and depression observed, based on meta-studies, in almost every low vision and blind population may be at least partially driven by a lack of access to pleasurable and social activities. The practical impacts of vision loss on quality of life and social function are well recognized. For example, individuals with peripheral field loss can no longer drive safely, which can easily lead to social isolation [2]. Individuals with central field loss which impacts reading are likely to have restricted employment opportunities. This can be exacerbated by worry about disease progression, which contributes to feelings of frustration, fear, and sadness.

Facial cues clearly have deep ecological importance. Processing of these cues is associated with a wide network of subcortical and cortical areas that include the putamen and the cerebellum as well as visual, limbic, temporoparietal and prefrontal cortices. Difficulties in recognizing individuals or recognizing emotions makes social functioning more difficult across a wide range of disorders, including prosopagnosia and Autism Spectrum Disorder (ASD), as described in more detail below. Thus, it seems plausible that low vision that impairs face processing may be a hitherto unexplored additional risk factor for depression, social isolation and anxiety [3].

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In this review, we begin with a selective review of early and late onset blindness as a risk factor for social anxiety and depression. Although quality of life assessments have clearly demonstrated the impact of blindness on social and mental health, and multiple potential contributing factors have been identified, the causal pathways are still not well understood, and are likely to differ as a function of the type of vision loss. Next, we discuss a potential relationship between difficulties in understanding visual facial information and social anxiety and depression in individuals with prosopagnosia and ASD. Finally, we discuss evidence that training might improve voice recognition abilities, and thereby lessen social difficulties due to face recognition loss.

Psychosocial consequences of early onset low vision

It is now well established that early vision loss has psychosocial consequences. Children with retinopathy of prematurity perform significantly worse across multiple subscales of the Children's Visual Function Questionnaire, with increasing severity of ROP linked to worsening overall quality of life. Consistent with our hypothesis that impairments in face recognition has social consequences during development, children with ROP had lower CVFQ personality scores.

At least some of these psychosocial impairments may persist into adolescence. One small study using congenitally blind and sighted matched adolescents found that depression and self-concept characteristics of adolescents with visual impairments were similar to those of sighted adolescents [4]; however the anxiety levels of adolescents with visual impairments were significantly higher than those of their sighted peers.

Psychosocial consequences of late onset low vision

Visual impairment is associated with reduced social participation, with a recent meta-review finding a strong consensus in the literature those visual impairments results in a withdrawal from social activities. There was also some indication that participation in group based activities was more heavily impacted than the quality of relationships with friends or family.

Depression and anxiety is also common in individuals with late onset visual loss, regardless of whether foveal or peripheral vision is primarily affected [5]. Although the association between visual loss and anxiety is not as clear as the association between visual loss and depression, anxiety is a significant symptom in many individuals. Consistent with a model where depressive symptoms result in social isolation, which in turn worsen depressive symptoms, agoraphobia and social phobia are the most prevalent anxiety disorders in visually impaired older adults.

Much less is known about whether psychosocial impairments vary with the type of vision loss. Unfortunately, most studies have focused on a particular type of vision loss, and have rarely clearly differentiated difficulties in social functioning, generalized anxiety and depression [6]. One exception is the Michigan Vision-related Anxiety Questionnaire, designed to measure psychosocial outcomes across a variety of inherited retinal degenerations. This work provides one of the few attempts to differentiate different forms of psychosocial impairment based on the form of vision loss. This questionnaire revealed two domains of anxiety in patients with inherited retinal degenerations: cone dysfunction and rod dysfunction related anxiety. Only central vision loss due to cone dysfunction resulted in worries about recognizing faces.

Age related macular degeneration (AMD)

In the earlier stages of AMD symptoms include difficulty seeing

objects clearly and/or apparent distortions. Over time, without treatment, vision slowly deteriorates, resulting in the loss of significant regions of central vision.

Unsurprisingly, AMD has been shown to significantly reduce individuals' sensitivity to faces, to an extent likely to impact recognition of familiar faces and facial expressions [7].

Several quality of life studies examining AMD have included measures of anxiety and depression. Individuals with foveal vision loss due to AMD are more likely to suffer from depression and report poorer quality of life than individuals without AMD. Elderly individuals with AMD scored significantly worse on their quality of life, emotional distress and depression, with prevalence levels as high as 33%, especially when the loss of vision was relatively recent or there was a perceived lack of social support. This depression seems to be related to loss of social function: depressed individuals with AMD reported poorer social functioning as compared to non-depressed individuals with AMD [8].

The association between depression and AMD may be stronger than the relationship with anxiety. One study has demonstrated an association of AMD with both depression and anxiety; however, in a second study, depression but not anxiety scores were found to be strongly associated with visual acuity loss severity. In a later meta-study, prevalence estimates from nine cross-sectional and cohort studies found that depressive symptoms were more common than anxiety symptoms in individuals with AMD.

Glaucoma

Early symptoms of glaucoma include a loss of peripheral vision, but in more severe cases of the disease a large proportion of the visual field can be impacted. Once again, quality of life studies that have specifically examined scores associated with psychosocial function have found that glaucoma negatively affect psychosocial functioning, with a higher prevalence of generalized anxiety and depression, especially in those that lack social support [9].

Consistent with the idea that difficulties in face recognition may contribute to depression, the psychosocial impacts of glaucoma are correlated with the extent of vision loss; with increasing glaucoma severity, at levels where face recognition is likely to be impaired, quality of life decreases and depression is more common. When comparing progressed glaucoma with severe visual field defects to glaucoma patients in general, patients with severe visual field deficits had a higher prevalence of both depression and anxiety, with a linear increase in anxiety as a function of worsening acuity.

Retinitis pigmentosa (RP)

In the earlier stages of Retinitis Pigmentosa symptoms include trouble seeing at night and decreased peripheral vision. As peripheral vision worsens, people may experience "tunnel vision". Once again, multiple studies show that RP is a strong risk factor for depression and anxiety. Prevalence estimates suggest that approximately 37% of RP patients suffer from anxiety and 15–26% suffer from depressive symptoms.

Once again a correlation is seen between quality of life scores, including social life, anxiety and depression, and the degree of visual impairment, as measured by visual acuity and the residual visual field [10].

Given that individuals with RP retain the ability to recognize faces

until very late stages of the disease, difficulties in face recognition are unlikely to be causally responsible for psychosocial distress. Indeed, the causal link may work in the other direction. Worry about disease progression or restricted mobility may be the primary causes of depression which may in turn reduce social activity. Consistent with this proposed reversed directional relationship, objective visual function does not predict depression scores in individuals with RP, but depressed RP individuals have significantly worse social functioning than non-depressed individuals, independent of visual loss.

Conclusion

As described above, it is now well-established that low vision and blindness is a risk factor for anxiety and depression. This relationship has been attributed to multiple factors, including anxiety about disease progression, and a lack of access to work and social activities. However, we believe a potential additional contributing factor, that has been hitherto overlooked, is that blindness may make it more difficult to effectively engage in social interactions, due to a loss of visual information about facial identity and expression.

As described above, several studies in the literature suggest an association between blindness and impairments in social function. However a critical gap in the literature is that all of these studies have tended to focus on specific blind populations, have used a wide variety of instruments to measure visual impairment, and have used a wide variety of quality of life instruments, that vary in their measurement of social function, social anxiety and depression. This heterogeneity precludes collating quantitative data across studies to infer the effects of different types of vision loss on social anxiety and depression. Previous meta-reviews have similarly noted the need for a unified definition for quality of life, and studies better targeted towards understanding the specific associations between particular types vision impairment and varied measures of well-being.

Generally, rehabilitation for low vision and blindness has focused on improving reading speeds, training in the use of assistive technologies such as magnifiers, orientation and mobility skills, and developing assistive computer skills. In this review, we suggest that the additional inclusion of rehabilitative training in voice recognition might lessen social difficulties and anxiety due to blindness.

It has already been demonstrated that early blind individuals have enhanced voice recognition compared to sighted individuals. In the case of early blind individuals this enhanced voice recognition may be the result of developmental cross-modal plasticity. However, work in adult sighted individuals shows that voice discrimination can improve with training, even in adulthood. Rehabilitation training in voice recognition and processing vocal social cues is therefore likely to be effective in late blind individuals, even if these improvements have a different neural basis from the enhanced performance observed in early blind individuals.

Finally, we believe an important future direction will be developing better models of how blindness impacts mental health. To date, most studies of depression, anxiety, emotional distress and social anxiety in early blind individuals have had an ophthalmological perspective. As a result, these studies have tended to focus on assessing the prevalence of psychosocial symptoms via relatively broad psychiatric subscales. This approach leaves the causal relationships between vision loss and psychosocial impairments a mystery, making it difficult to effectively target psychosocial treatment. Individuals with AMD and RP may both suffer from similar levels of depression and social isolation – but the causal pathways may be very different.

A closer examination of how different kinds of vision loss impair different types of activities and have varied psychosocial consequences has the potential to provide important new insights. With richer and more detailed data sets, it would be possible to use more sophisticated models, such as dynamic latent variable analyses, network analyses, and structural equation models, to generate a better understanding of comorbidities, risk factors, and potential mediators of the psychosocial distress caused by blindness. More informed models could be used to better guide both rehabilitative intervention and the clinical treatment of psychosocial distress.

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