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Analysis of the impact of visual impairment on mental disorder

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Abstract:

Visual impairment affects a significant portion of the global population, influencing individuals' daily activities, education, employment, and social interactions, and often contributing to psychological challenges. Mental health disorders represent a major public health concern, and individuals with visual impairments are at heightened risk of developing these conditions due to the unique difficulties they encounter. In response, governments, social organizations, and other stakeholders have recently initiated research and intervention programs aimed at elucidating the impact of visual impairment on mental health and improving psychological well-being in this population.Many studies focus on the relationship between visual impairment and mental health disorders, such as depression, post-traumatic stress disorder (PTSD), and autism spectrum disorder (ASD). The findings consistently show that individuals with visual impairments experience higher rates of mental health issues, particularly depression and PTSD. The link between visual impairment and mental health disorders is multifaceted, shaped by factors including neural processing patterns, stress responses, and social dynamics. This review underscores the need for a deeper understanding of these connections to inform the development of targeted interventions and enhance care practices, offering potential pathways to improve the mental health of individuals with visual impairments.

Keywords: visual impairment; mental disorder; depression; autism; post-traumatic stress disorder.

1. Introduction

Vision plays a crucial role in perceiving the external environment and in cognitive processes at the individual level. The visual system contributes significantly to the neurological system, affecting perception, cognition, and neural regulatory functions. „Visual impairment“ refers to a condition characterized by reduced vision or impaired optical function due to various causes. Such impairments can profoundly impact an individual‘s quality of life and are associated with an increased risk of mental illness. Mental disorders encompass a broad spectrum of conditions that affect cognition, emotions, behavior, perception, and social interactions, often leading

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to substantial declines in psychological, social, and occupational functioning. In recent years, there has been growing interest in exploring the relationship between visual impairment and mental illness. This review seeks to synthesize recent findings on the influence of visual impairment on mental health, providing an in-depth analysis of its impact and mechanisms. The goal is to offer a strong theoretical foundation and practical guidance for optimizing intervention strategies, improving care plans, and enhancing the mental well-being of individuals with visual impairments.

2. Definition and current status of visual impairment and mental disorder

Visual impairment refers to a condition in which vision is diminished or visual function is abnormal due to a variety of causes. It can manifest in degrees ranging from mild blurred vision to severe blindness. The condition may arise from eye diseases such as cataracts, glaucoma, macular degeneration, and retinopathy; eye trauma; congenital eye defects; neurological disorders affecting the visual pathway; or ocular complications from systemic diseases like diabetic retinopathy. Visual impairment (VI) is a significant global health issue, with vision loss being one of the most prevalent conditions worldwide. In 2020, approximately 1.1 billion people globally experienced some form of vision loss, including 43 million individuals who were blind, 295 million with moderate to severe VI, 258 million with mild VI, and 510 million suffering from near vision issues. Furthermore, the number of people affected by blindness is expected to rise, driven by an aging population and evolving lifestyles[1,2].

Mental disorders, on the other hand, encompass a wide array of mental health conditions characterized by diverse symptoms and manifestations. Disorders such as depression, post-traumatic stress disorder (PTSD), attention-deficit/hyperactivity disorder (ADHD), and autism spectrum disorders (ASD) significantly impair individuals‘ lives. The current state of mental health is concerning, with prevalence rates rising steadily—nearly one in eight people worldwide suffers from a mental health issue. These illnesses not only cause personal distress and affect cognition, emotions, volition, and behavior, but also have profound impacts on families, friends, and broader communities. Recent global events, including new epidemics, have exacerbated the mental health crisis, with depression and anxiety disorders anticipated to have increased by 25% globally by 2020. In particular, adolescents and young adults are increasingly affected, as depression and related disorders have become major contributors to illness and disability[3].

Individuals with visual impairment are particularly vulnerable to mental health problems, especially when compounded by other disadvantages. Visual impairment often restricts daily activities, and from a neurological perspective, it can induce structural and functional changes in the brain that may contribute to the development of mental disorders[4].

3. Impact of visual impairment on specific mental disorders

3.1 Impact of visual impairment on depression

Researchers conducted a study on depressive mood in a government-registered cohort of visually impaired individuals aged 15-64 in South Korea. The findings revealed that the overall prevalence of depressive mood among visually impaired individuals was 17.9%, significantly higher than the 11.3% observed in non-visually impaired individuals. This aligns with previous studies, which have similarly reported higher rates of depression in the visually impaired population[4].In patients with major depressive disorder (MDD), alterations in visual information processing are primarily related to retinal and cortical function. The retina, being part of the central nervous system and sharing a common embryonic origin with the brain, has been linked to mental health disorders. Research has shown that modulating neural circuits in the retina (ventral geniculate nucleus) and intergeniculate lobule (lateral geniculate nucleus) can alleviate depression-like behavior in mice subjected to chronic aversive stimuli or social frustration. These findings suggest a potential mechanism for using light therapy in treating depression. Histological analyses further demonstrated structural changes in the brain of visually impaired subjects, with the amygdala being larger and regions such as the superior colliculus, primary visual cortex, and medial secondary visual cortex being smaller in eyeless mice. Activation of the SC-PBGN pathway, which consists of projections from serotonin-positive neurons in the superior colliculus to the parabrachial nucleus, was shown to induce anxiety and depression-like behavior in mice. The visual cortex‘s impact on depression may be primarily mediated through the limbic system and brain regions involved in the reward circuit, with specific neural circuits playing a key role in the visual influence on mood disorders such as depression[5].

3.2 Impact of visual impairment on Autism Spectrum Disorder (ASD)

Autism spectrum disorder (ASD) is a neurodevelopmental

condition characterized by impairments in social functioning, including difficulties with communication and social interaction, repetitive behaviors, and restricted interests[5,6]. Individuals with ASD may also experience a variety of vision-related abnormalities. Some children with ASD are hypersensitive or oversensitive to certain visual stimuli, while others may have issues with visual attention, difficulty focusing on specific visual targets, or may become easily distracted by irrelevant visual information.

Williams et al. (2014) found that non-visually impaired children exhibited more symptoms of ASD before the age of four, with these symptoms decreasing between the ages of six and nine. This change was attributed to developmental progression and children becoming more comfortable engaging with their environment. In contrast, ASD in very young children with visual impairment may be less reliably diagnosed than in sighted children, and the diagnosis may not persist over time. A longitudinal study followed sighted and non-sighted children diagnosed with ASD between the ages of three and nine. After an eight-year follow-up, only one in nine non-sighted children still met the criteria for ASD, while seven of the sighted children retained their original diagnosis[7].

Another study suggests that cerebral visual impairment (CVI) may lead to cognitive and social developmental deficits similar to those seen in ASD. Likewise, children predominantly affected by cognitive and social developmental disorders may also experience visual and perceptual impairments that contribute to their challenges. An example of this is seen in children with severe impairments and minimal visual behavior who begin to engage visually for the first time when placed in an environment free from distracting visual stimuli, such as a tent. This phenomenon, potentially linked to synesthesia (the blending of sensory perceptions), warrants further investigation (Little and Dutton, 2015).

Thus, while autistic features are often observed in individuals with CVI, visual impairments have also been identified in people with autism. This suggests that further research is needed to explore the relationship between CVI and various forms of ASD. Ocular deficits such as refractive errors, strabismus, and amblyopia are common in individuals with autism, particularly those with intellectual disabilities. Impaired central visual function can contribute to atypical ASD development, with early to advanced visual processing impairments potentially playing a role in the manifestation of autism-related behaviors[6].

3.3 Impact of visual impairment on Post-traumatic stress disorder (PTSD)

There is a significant link between post-traumatic stress disorder (PTSD) and visual impairment. Severe traumatic events can directly damage the visual organs or affect visual processing areas in the brain, resulting in visual impairments such as reduced visual acuity and blurred vision. Conversely, for individuals with pre-existing PTSD, visual impairment can heighten feelings of insecurity and uncertainty, intensifying anxiety and fear. This may trigger a recurrence or worsening of PTSD symptoms due to the discomfort and increased dependency on others. The higher exposure to potentially traumatic events in visually impaired individuals also suggests a greater susceptibility to mental health problems. Several experts have examined the prevalence of PTSD in the visually impaired population compared to the general population, and have identified factors associated with PTSD in this group[8]. In a cross-sectional study, researchers found that both men and women with visual impairments were more likely to develop PTSD than the general population. For men, the most common event leading to PTSD was illness or injury resulting in vision loss, while for women, sexual assault was the primary trigger. Factors associated with a higher risk of PTSD included younger age, being female, vision loss, and the presence of additional impairments beyond visual impairment. A Dutch study further explored the role of visual impairment in trauma and PTSD. It revealed that individuals with disabilities, including those with visual impairments, are at a higher risk of abuse compared to the general population. This vulnerability was partially attributed to factors such as attending special schools or institutions, abusive home environments, and dependency. Low self-esteem and a lack of acceptance, often linked to visual impairment, were identified as correlates of abuse, making it easier for abusers to exert control over their victims. The study emphasized that adverse childhood experiences and maltreatment are significant risk factors for PTSD, and visual impairment itself increases the likelihood of PTSD by intensifying feelings of helplessness, uncertainty, and fear during and after traumatic events. These findings align with previous studies, which have shown that impaired access to visual information during traumatic events exacerbates emotional distress. A lack of critical visual cues hinders emotional coping, and an intense emotional reaction is a strong predictor of PTSD. The symptoms and consequences of PTSD in visually impaired individuals generally align with DSM-5 criteria. However, participants have reported that visual impairment affects their PTSD symptoms, particularly the content of intrusive symptoms, which differs in individuals with poor vision or congenital blindness. Previous research has also noted the prevalence of auditory intrusions in visually impaired individuals, and the condition may influence the severity of other symptoms, including avoid-

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ance, negative mood, and heightened anxiety[9].

4. Summary

In summary, there is a strong and multifaceted relationship between visual impairment and mental illness. As a physiological condition, visual impairment can profoundly affect an individual‘s psychological well-being through various mechanisms. Recognizing this connection has significant clinical implications. The treatment and rehabilitation of individuals with visual impairment should address not only the physical aspects of the condition but also the associated psychological and mental health challenges. Implementing comprehensive measures, including psychological support, social interventions, and targeted neuromodulation therapy, can effectively prevent or mitigate the development of mental disorders. This approach enhances the quality of life for people with visual impairments and facilitates their successful integration into society. Moving forward, it is essential to further investigate the specific mechanisms through which visual impairment influences mental health. Doing so will provide a solid theoretical foundation for the development of more scientific and effective intervention strategies.

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