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# Visual impairment and traits of autism in children

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**Summary**

Visual impairment present from birth or from an early childhood may lead to psychosocial and emotional disorders. 11–40% of children in the group with visual impairment show traits of autism. The aim of this paper was to present the selected examples of how visual impairment in children is related to the occurrence of autism and to describe the available tools for diagnosing autism in children with visual impairment. So far the relation between visual impairment in children and autism has not been sufficiently confirmed. Psychiatric and psychological diagnosis of children with visual impairment has some difficulties in differentiating between "blindism" and traits typical for autism resulting from a lack of standardized diagnostic tools used to diagnosing children with visual impairment. Another difficulty in diagnosing autism in children with visual impairment is the coexistence of other disabilities in case of most children with vision impairment. Additionally, apart from difficulties in diagnosing autistic disorders in children with eye dysfunctions there is also a question of what tools should be used in therapy and rehabilitation of patients.

**Key words**: visual impairment, autism in children

## Introduction

The majority of children are diagnosed with visual impairment at birth or in early childhood [1]. Global dissemination of vision loss in children is estimated at

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0.8/1000 children, while in Europe this index is lower, i.e., 0.3/1000 [2]. Congenital visual impairment or visual impairment since an early childhood may not only lead to lowering the quality of life in terms of somatic functioning but also to disturbances in the social and emotional life of a child [3–5]. Some research showed that autistic traits may coexist in case of children with visual impairment; such symptoms may be observed with 11–40% of children with acute vision disorders [6–8]. There is, however, no clear evidence that there is a relationship between such disorders and a specific type or severity of visual impairment [7].

## Aim

The purpose of this paper is to present the results of research on the coexistence of autism and visual impairment in children and to describe the available tools for diagnosing autism in children with visual impairment.

## Characteristics and consequences of visual impairment present since birth or diagnosed in an early childhood

Social processes are shaped in the first year of a child's life and eye contact is the basic function in their development. Lack of direct stimulation of blind children may result in establishing improper behaviors, such as atypical movement of arms, wobbling, putting their fingers into their eyes etc. Negative experience associated with social contacts or their lack may lead to low self-esteem, social immaturity, egocentrism, shyness, isolation, passivity, withdrawal and dependence [9–12].

Lack of social contacts in childhood and the inability to read non-verbal communications by children with visual impairment may be the reason why such children have difficulties in understanding social behaviors, in assuming assertive attitudes, in remaining calm and reasonable when playing with their peers [9, 13].

Children learn about the daily living activities by imitation and use their motor skills to perform them. Due to the lack or limited verbal communication children with visual impairment can only perform 44% out of 101 daily living activities on their own and show delays in acquiring basic skills, such as walking, washing, eating [13, 14].

Children with poor eyesight or blind children play with the symbolic toys (e.g., a car, a doll) differently. Due to a limitation of their mobility and spatial orientation, children with visual impairment are less likely to change places and toys while playing compared to children with no disabilities. Another characteristic phenomenon in children with visual impairment is echolalia, which is associated with an increased acoustic sensitivity [15].

## Characteristics of autistic disorders

Developmental disorders pursuant to the ICD-10 are characterized by quantitative abnormalities in social interactions and patterns of communication, as well as in a limited, stereotypical and repetitive interests and activities. They include the following disorders: autism in children and atypical autism, Rett syndrome, other disintegrating child disorders, hyperkinetic disorders with accompanying mental retardation and stereotypical movements, Asperger syndrome, as well as other developmental disorders and various disorders not specified elsewhere [16]. In colloquial terms and in scientific publications a term autism spectrum disorders (ASD or ASDs) was coined, which is present in the current DSM-5 classification (Diagnostic and Statistical Manual of Mental Disorders – 5). Its authors decided to merge the units specified in the earlier DSM-IV classification into a large group of autism disorders. Pursuant to the new classification, two key symptoms are needed to diagnose ASD: disorders in communication/social interaction and stereotypical, repetitive behaviors. The diagnosis was complemented with a precise evaluation of intellectual and linguistic functioning of a given patient [17].

Autism is a neurodevelopmental disorder whose origins are not fully known [18, 19]. Earlier psycho-analytical theories describing the effects of psychosocial functioning disorders have been supplemented with new theories [20, 21]. They are based mainly on the results of studies on the influence of genetic mutations [22–25], neuro-biochemical mutations [26–28] and environmental insults [29, 30] on the origination of micro – and macrostructural changes and functional disorders in the nervous system, which may lead to a broad autistic spectrum. According to some authors, manifestation of autism may be associated with dysfunctions in the mirror neurons system, which results in a lack of understanding of other people's intentions or inability to learn various skills by imitation [30–33].

Impaired abilities of imagining, recognizing and understanding of psychical states of other people in patients with autism are explained by the theory of mind. According to this theory recognizing psychical states of other people is an inborn ability which shows in early development periods. Disturbances in this area in patients with autism may cause difficulties in communicating or in contacts with other people [34, 35].

## Review of selected reports describing the presence of autistic traits and visual impairment

The source literature presents some instances of the presence of autistic traits in blind children. Research conducted on small groups of children with specific visual disabilities proved relationship between the disorders. On the other hand, research conducted on groups of children with poor eyesight or the blind, which take into ac-

count the heterogenous etiology, exclude the high risk of autism and autistic traits, and visual impairment occurring together [7].

Similarities between symptoms of autism and the behavior of children with visual impairment were first observed by Keeler in 1958. He described five cases of premature babies completely or partially blind since birth, which presented with autistic behaviors. Based on his observations, Keeler made a hypothesis that children with limited sight or completely blind since birth, emotionally neglected and with brain damage are more likely to show autistic traits [36]. Next, there are reports of children with hearing and visual impairment, whose mothers were diagnosed with rubella during their pregnancy. On their basis a hypothesis originated about the influence of environmental factors on damages of brain structures, which may be associated with the existence of autism and autistic characteristics in a group of children with visual impairment [37, 38].

A significant moment in the development of research on autism and visual impairment was Freiberg introducing "blindism", which is determined as a stereotypical and repetitive behavior in blind children, which includes eye rubbing, flapping, rocking and rhythmic swaying [39]. In the same period Chase conducted research on a group of 263 people with retrolental fibroplasia and confirmed that there is a relation between neurological changes in the brain structure, visual impairment and autistic behavior [40]. Rogers and Newhart-Larson confirmed the coexistence of autism and blindness in a group of children with Leber's congenital amaurosis. Authors of these studies found characteristics indicating autism and they connected them with changes in functioning of the nervous system [41]. Research published in 1998 by the team Ek et al. showed a relationship between congenital blindness caused by ROP (Retinopthy of Prematurity) and autistic disorders. Authors emphasized that "blindism" is also associated with the difficulties of psychosocial adaptation [42].

One should also mention follow-up study conducted on a selected group of 9 children with visual impairment, which met the criteria characteristic for autism. Brown et al. published results of a study conducted in a group of 24 children with congenital visual impairment of different etiology. The results confirmed that in case of 9 children with visual impairment diagnostic criteria for autism were met [43]. Two years later the previously selected group was compared with sighted autism children. All participants were aged 5–9 and presented a similar IQ level. Based on the systematic observations of teachers and on diagnostic scales, e.g., CARS (The Childhood Autism Rating Scale) and BCDP (The Behavior Checklist for Disordered Preschoolers), it has been confirmed that blind children showed tendencies for lower values in the CARS scale, mostly with reference to their relations with other people and emotional expression. The examined blind children were more willing to play [44]. Studies conducted on the same group 8 years later showed that autistic traits prevailed in adolescence in only one person.

On the other hand, all 7 people with diagnosed autism but without visual impairment still showed disorders in this area. The studies confirmed that lack of vision in children makes their psycho-social development slower and may contribute to development of autistic-like behaviours. The authors believe that for children with visual impairment, compensating the lack of vision by developing social contacts may have a positive impact on the therapy of people with suspicion for autism [45].

To sum up, we can say that studies describing the relationship between visual impairment and the presence of autism characteristics in young people differ as to their methodology. The study results suggest that deficiency of sensory and social stimuli may be responsible for development of autistic-like behaviours. However, the studies so far do not explicitly confirm that some visual impairment is a factor determining child autism.

## Tools for diagnosing autism and autistic disorders in children with visual impairment

Available tool, such as ADOS (The Autism Diagnostic Observation Schedule), which identify problems with interpersonal communication in children and ASD is partially based on the diagnosis with evaluation of visual behaviors. Therefore, there are some limitations in case of children with visual impairment [46]. It should also be noted that it was only 2 years ago that the so-called "golden standard" of diagnosing autism in the Eastern countries, ADI-R (Autism Diagnostic Interview – Revised), was translated into Polish. There is still research conducted to standardize this tool since the Polish version of ADI-R was only accepted for use in scientific research [47].

The available literature suggests that tools for diagnosing autism in children with visual impairment are still being developed. One should not forget the study conducted by Mukaddes et al. In order to evaluate the frequency of autism risk factors in the first stage, they conducted a quantitative research with the ABC (Autism Behavior Checklist) test on 257 children and youngsters aged 7–18 attending Turkish schools for children with visual disorders. The second stage was observing the participants in their school activities; their social contacts with teachers and peers were also evaluated. The third stage was diagnosing children pursuant to the DSM-IV criteria with the use of CARS (Childhood Autism Rating Scale). During the diagnosis, tasks which required using the eyesight were omitted and not included in the analysis. The obtained results show that 30 children met the criteria for autistic disorders. The study also revealed that blind people with diagnosed autism showed significant neurological deficits compared to children with visual disorders without autistic traits [7].

In 2011, a pilot study on the standardization of the observation test VISS (Visual Impairment and Social Communication Schedule) based on the CARS (Childhood

Autism Rating Scale) was published. 23 children aged 2 to 7 years participated in the study. Those children were evaluated with the use of both diagnostic tools and the final results were later compared. Statistical analysis proved that there is a correlation between the results in scales VISS and CARS. This proves that VISS is useful as an observation tool, which will help clinicians in the ASD diagnosis in children with visual impairment. Authors of the study emphasize that VISS requires further standardization on a larger scale, which will help make the test more reliable [6].

Williams et al. [48] evaluated the usefulness of the standard autism diagnostic methods in a group of children with severe visual impairment. They studied their social functioning and language competences with the use of ADOS and ADI-R. They investigated children aged 5 to 9 years. Based on the consultation with experts working with children with visual impairment the tools were adjusted to the visual perception. ADOS was modified to the extent of the free game, where toys with an interesting texture and sound toys, which may interest children with poor eyesight, were added to the standard set. Few ADI-R elements were also modified for the purpose of this study, e.g., the question "what is the child's reaction when someone smiles at him/her?" was replaced with a question "what does the child do when someone tells him/her something nice?". According to the authors, such pilot study confirms clinical usefulness of both methods in the evaluation of children with severe visual disorders. The authors emphasize, however, that the character of autistic symptoms in the blind children may change with age and such persons must be therefore monitored by specialists.

## Direction and further research development

The review of research on autistic disorders among young people with eye dysfunctions shows that this issue is still valid and has not been sufficiently explained. There are still problems in distinguishing "blindism" from traits typical for autism and autistic disorders because they lack, e.g., specialist diagnostic tools based on the ICD-10 and DSM-V criteria, which would help find the differences.

In order to improve the effectiveness of work of psychiatrists, psychologists and teachers, we should initiate multiple-centre studies whose aim should be development of standardized tools for diagnosing autism in children with visual impairment. We should pay attention to adapting these tools to visual perception of people with sight dysfunctions.

While considering problems of autism in young people with visual impairment, we should also analyze mirror neurons or the so-called theory of mind in order to study and explain abnormalities which may be associated with the deficit of cognitive functions in this group. At this stage, however, a lot of questions appear concerning selection of

the studied groups as to their heterogeneity and small number. Further problems that may be encountered in the planning of studies of the described problems are other co-existing disabilities in most children with visual impairment [9].

Further activities should be directed onto improvement of rehabilitation effects in young people with visual impairment and suspicion of autism. Therefore, there is a need to create psychoeducational programs for parents, who will co-operate with therapists in order to improve or change channels of communication with the patients. Initial international studies confirmed the effectiveness of using touch symbols [49].

Authors of the foregoing repot hope that studies will increase the effectiveness of diagnosis and psychosocial rehabilitation of children with visual impairment.

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