

Features of the behavior of children with ADHD in sport

Svetlana S. Gvozdetskaya

dept. of psychology and pedagogy
Novosibirsk State Technical University
Novosibirsk, Russia
s.s.gvozdetskaya@gmail.com

Ludmila V. Kavun

dept. of psychology and pedagogy
Novosibirsk State Technical University
Novosibirsk, Russia
kavun@corp.nstu.ru

Abstract— *The article is devoted to the theoretical analysis of some behavioral and socio-psychological features of children with attention deficit hyperactivity disorder (ADHD), involved in a sport activity. It was found, that adaptive potential of children with attention deficit hyperactivity disorder is studied well in a context of their social behavior at educational organizations and pedagogical influence on this behavior, but there is a lack of psychological research on personal features, motivation, socio-psychological adaptation, psychological comfort of children with attention deficit hyperactivity disorder, especially in a sport activity. There are some psychological problems of children with ADHD such as high aggression, difficulties in social relationships, etc. that could lead to problems in socio-psychological adaptation. In young athletes with ADHD, motor skills are developed less compared to their peers and consequently sports results are worse. But a lot of researchers note the positive effect of different sport activities on correction of symptoms of ADHD, so it is important to maintain the interest in sport in children with ADHD. ADHD is determined by neurobiological, genetic, socio-psychological factors that require a comprehensive individual approach to the correction of the syndrome including not only physical exertion, but also psychological, pedagogical and in some cases medical methods of treatment and recovery.*

Keywords — ADHD, sport, sports psychology, socio-psychological adaptation

I. INTRODUCTION

It is known that children attend sports to improve their health. Actually, in a number of cases children become healthier and physically stronger [1,2], but in other cases child's health may deteriorate because of intense physical activity [3].

It's recommended to involve children with ADHD in sport sections to improve their discipline and to get rid of an excess energy [4,5]. The results of some studies prove the behavior improvement and increasing the level of social adaptation of children with ADHD after short- and long-term physical activity [6,7,8], long-term alleviation of symptoms of ADHD [9], improvement of social skills. But some authors point out an existence of a number of difficulties related to sports in children with ADHD [4,10,11,12,13].

II. LITERATURE REVIEW

The urgency of the issue is due to the fact that, on the one hand, ADHD is one of the most common psycho-

neurological disorders of childhood [14,15,16], and there is a large number of such children in sports. On the other hand, for example, N.N. Zavadenko (2005) [3] notes that there is a tendency to unreasonably frequent diagnosis of ADHD and a common misconception that this diagnosing does not have significant difficulties.

British experts from the National Collaborating Centre for Mental Health in their book devoted to ADHD describe in detail the difficulty of diagnosing of this syndrome. Defining a mental health disorder is a difficult process due to overlapping symptoms and the lack of a standardized biological test.

The forum devoted to ADHD was held in 2006 in Russia, it was supported by the State Duma and the Federal Assembly of the Russian Federation. One thesis of resolution of the round table includes the statement that its participants (doctors, teachers, psychologists, doctors of science) recognize the presence of ADHD but do not consider it a mental disorder. In order to correct this behavior, they have proposed to revise the concept of teacher training instead of medical treatment.

ADHD is an officially recognized disorder of behavior, the study of ADHD traces to ancient times, when the first mention of scattered children appeared, but the researchers of ADHD still dispute about its diagnosing and safe methods of its correction.

According to R.F. Gasanov [17], the first mentions of overly active and inattentive children date back to 493 BC. in the descriptions of Hippocrates as "violations of internal equilibrium". The famous ancient Greek doctor explained the impulsivity and restlessness by an imbalance in the human body, which was created due to the predominance of the element of fire over the element of water. This is similar to the modern idea of a hyperactivity that one nerve process (excitation) prevails over the other (inhibition). Hippocrates offered increased physical activity and a special diet as a treatment. Similar recommendations are found today [18,19].

In 1973 J. Satterfield [20] suggested that the cause of ADHD may be a delay in the development of neural connections in the brain and a disruption in the work of some mediator systems, i.e. there is a failure in the conduction of the impulse from the neuron to the neuron from the

subcortical structures to the frontal and precentral parts of the cerebral cortex. In the works of A.J. Zametkin [21] a decrease in metabolism in the frontal and central regions of the brain in ADHD was represented. Modern studies include the data about a violation of the processes in the cerebral cortex with this syndrome [22, 23].

There is increasing number of papers devoted to studying the contribution of genetic factors to ADHD [5,24,25]. A number of researchers consider them paramount in the formation of the disorder. The findings, including the data of molecular genetics, demonstrate that there is a correlation between genetic predisposition and attention deficit, hyperactivity.

Some authors explain the occurrence of ADHD by social factors, such as unfavorable social conditions, a single-parent family, traditions adopted in a society [15, 26]. There is also a suggestion that the abuse of TV-watching can lead to hyperactivity.

Summarizing the above, it can be concluded that researchers identify neurobiological, genetic, social and psychological factors as the causes of the main violations in ADHD.

III. MATERIALS AND METHODS

E.M. Sinelnikova [27] defines two tasks of neurological control in sports: 1) assessment of the health status of athletes; 2) determination of the functional status of the nervous system of athletes as one of the components of sport.

The solution of these two tasks is important, first of all, when admitting to certain types of sports, as well as in determining the compliance of physical activity with the functional abilities of athletes. But in modern reality this control appears only at the professional level of training athletes. If we are talking about sections or the first two or three years of classes in sports schools usually there is no medical supervision, despite the providing first aid. Parents and the trainer may not have information about whether the changes in the behavior and physical condition of the child are adequate at some stage of the training process. There is a chance to miss the moment of deterioration of the child's health.

An opinion of various specialists about the specifics of syndrome in behavioral features raises the question of the possibility and environmental friendliness of participation of children with ADHD in sports activities.

N.N. Zavadenko [11] writes, that impaired coordination and «mild neurological symptoms» are detected by using of special tasks for walking along the line and maintaining balance, tests for alternating limb movements during a neurological examination. The signs of motor discomfort are inherent in younger children, but gradually disappear as motor control develops, these processes in children with ADHD are delayed. 84% of children with ADHD have a lot of teeters and mistakes in the form of deviations from the line when walking and the use of auxiliary hand movements to maintain balance during doing a task for walking along the line.

The research of N.P. Karpunina [28] showed, that children with ADHD did tasks for coordination worse, than healthy children. More errors, a tendency to use auxiliary hand movements to maintain balance and fall during doing tasks for walking and balance were found at this research. A slower rate of successive movements was observed in fine motor skills in children with ADHD.

Some specialists have an opinion, that not traumatic kinds of sport can contribute to the correction of the behavior of these children and make a significant contribution to the solution of the issue of their discipline. I.G. Izmailova, V.S. Korolkova, M.V. Popova [4] describe motor problems and note, that physical education and certain sports (depending on age) are indispensable in the complex correction of ADHD and contribute to the improvement of the organization of movements and discipline. But weak motor mastership of children with ADHD due to the worse physical education because of inability to quality work for a long time [29] can be perceived as a breach of discipline.

The idea about moderate physical activity in a form of healing fitness is most popular. Such form of fitness can contribute to correction of coordination, balance and attention [30].

In a teaching material «Prevention of drug and alcohol addiction in children and adolescents using motor correction methods» (dedicated to children with MBD) of Russian national researching medical university named after N.I. Pirogov authors write about the need for special events aimed at improving the quality of the movement due to specificity of motor development of children with ADHD. The aim of this special psychomotor education is a improvement of motor coordination, reducing of hyperactivity and impulsivity, increasing of concentration of an attention. Children with ADHD need an active release of energy, which determines the order of physical culture and sports. But authors note, that not every kind of physical activity is useful for children with hyperactivity. Games with a strong emotional component (competitions, performances) are not for them. Physical exercises that are aerobic in nature for a long, uniform training of light and medium intensity are recommended for children with ADHD, because these children need to achieve maximum loads, however, it is necessary to ensure that they are not overworked and occupations with children with ADHD should be based on the basic principles of healing fitness.

I.P. Briazgunov and E.V. Kasatikova [30] write that treatment of children with ADHD must include physical rehabilitation (special exercises aimed at restoring behavioral reactions, developing coordinated movements with voluntary relaxation of the skeletal and respiratory muscles).

A. García-Gómez [31] consider hippotherapy not only for physical load but also to reduce negative social behavior. The authors describe the possible positive effects of therapy with horses, among which, besides improving social skills, self-confidence and self-esteem of children with ADHD can be increased because of the ability to control a large animal.

It is believed that children with ADHD should adhere to energy-saving daily routines and physical activity will not benefit them. L.A. Yasiukova [32] write, that a «hyperactive»

child have excessive activity and excess energy in somebody's mind, but one of the main features of this disease is a fatigue: children with ADHD are energetically poor. The activity of the environment and its own excessive mobility quickly deplete the child's energy resources, and as a result, any conscious perception of the situation, adequate interaction with children, and understanding what adults are trying to explain to him become impossible.

Also researches note some difficulties of ADHD, that could adversely affect the success of sports activities [33]. Many children with ADHD are in the normal system of sports activities, they are subject to the same requirements as other children, but their capabilities may be limited by the syndrome, which can have negative consequences for socialization and self-esteem.

Children with ADHD perform worse than rivals in age in solving problems associated with coarse and fine motor skills, as well as in performing movements such as jumping, catching, throwing and kicking the ball [29, 34]. Lower motor skills of children with ADHD probably act as a barrier to participating in an active free play and organized team physical activity, they prefer to participate less in social activities based on skills [13, 35].

In skills-based actions a long-term experience of participation is needed until the child reaches remuneration and positive results, whereas for children with ADHD, the ability to accept remuneration and maintain motivation is impaired [36].

Children with ADHD are more likely to get injured not only because of problems with coordination, but also because of heightened risk behavior, they can overestimate their physical abilities because of low deterrent control [37].

Team sports can create problems for children with ADHD that limit the benefits they enjoy [38].

Children with a weak attention may have difficulty in learning the rules of the game and applying these rules in game situations and in analyzing the conditions of training and competitive activity [10]. Similarly, children who show impulsive behavior while playing can make careless mistakes, for example, hammering in the wrong gate or earning a fine, they find it difficult to maintain a certain behavioral strategy for a long time.

Boys with ADHD are more likely to show aggression, because of which they can be disqualified during sports competitions [10]. Asocial behavior is typical for many young athletes with ADHD [12]. Due to poor social adaptation they may violate accepted rules and norms of behavior. Therefore, children with ADHD are less likely to join group games than their peers without ADHD. The coaches of youth sports teams do not have a very good attitude towards the inclusion of these children in their teams, because violation of social relationships is also manifested with adults. Their social incompetence can lead to decreasing of a self-confidence [39].

Theoretical analysis allows us to say that there is not a single specialist who would not single out the presence of problems in the sports activities of a child with ADHD. For further confirmation, we conducted a survey among sports

coaches. The purpose of this survey - to find out about the experience of working with children with ADHD directly from the coaches and seek their professional opinion on what problems such children have in sports.

We have conducted a survey of 37 coaches working in children's sport because of contradictory scientific information. There were coaches of acyclic (artistic gymnastics, sports aerobics, figure skating) and cyclic (swimming, athletics, skiing) sports. There are questions of a survey:

1. What do you know about ADHD?
2. Did children with ADHD attend your sport section?
3. Was the diagnosis documented?
4. Did you have some difficulties with these children? If it's yes, what were the difficulties?
5. How long did these children attend the sport section?

After first two questions we used answers only of 32 coaches for analysis because they had an understanding of ADHD and an experience of coaching of them (not less than 10 kids during 10 and more years of practice).

Answers about medical condition of ADHD:

- Medical condition is absent, but parents told about medical suspicion of a diagnosis;
- There is a medical condition about MBD (minimal brain disfunction) with oral medical explanation, that it means ADHD;
- There's a medical condition with ADHD diagnosis;
- The diagnosis was discussed by teachers, parents did not contact doctors.
- In all cases, parents brought the child to the sport's section based on the recommendations of a doctor, a teacher, friends, a literature, an internet.

Every coach point out some difficulties of working with children with ADHD, some of it are:

- Aggressiveness – 93,7%
- Difficulties in memorizing the sequence of elements or tasks – 90,6%
- Difficulties in learning the rules of the game – 84,4%
- Problems with coordination – 78%
- Communicative problems – 62,5%
- Frequent mistakes due to inattention – 53%
- Reluctance to follow established rules of behavior - 43,7%
- Self-doubt – 37,5%
- Offishness – 15,6%

These difficulties also were found in other studies, which were previously presented.

Coaches noted that children with more severe difficulties attended sport section less, than children with less difficulties. Also trainers told, that after some time the difficulties of some children increased, others, on the contrary, smoothed out and subsequently these young athletes achieved some success.

IV. CONCLUSION

- Theoretical analysis allows us to say that there is not a single specialist who would not single out the presence of problems in the sports activities of a child with ADHD. According to the professional opinion of coaches and teachers who participated in our survey, more pronounced difficulties is tie to the less time of a child with ADHD in sports. The intense of physical activity for children with ADHD due to the severity of the problem in behavior disorder and general health, as well as the appropriate types of physical activity are topics of contemporary research in different countries.

- There are some psychological problems of children with ADHD such as a high aggression, difficulties in social relationships with peers and adults (coaches), unwillingness to follow established rules of behavior, self-doubt, difficulties in socialization and instability of self-esteem, increased risk of injury due to increased risk behavior associated with low deterrent control and overestimation of their physical abilities, could lead to problems in a sociopsychological adaptation. Their intellect is not injured, so they understand, what happens, but can't control because of syndrome their behavior, and it can negatively affect self-esteem and motivation for sports and training activities.

- The researchers mention neurobiological, genetic, socio-psychological factors as a reason of ADHD, that provides the need of a comprehensive individual approach to the correction of the syndrome including not only physical exertion, but also psychological, pedagogical and in some cases medical methods of treatment and recovery. Practically it's complicated to realize because of a number of ambiguities and variability of views in the consideration of the syndrome by researchers in various branches of science and there are quite a few works devoted to the study of this syndrome in sports activities.

- It was found, that adaptative potential of children with ADHD is studied well in a context of their social behavior at educational organizations and pedagogical influence on this behavior, but there's a lack of psychological researches of personal features, motivation, sociopsychological adaptation, psychological comfort of children with ADHD, especially in a sport activity. Observations of coaches indicate that sports lead to increasing of difficulties in some children with ADHD, in others, it's smoothed out, that can allow young athletes to achieve some success. It also prove the need of individual approach to work with children with ADHD.

- A lot of researchers note the positive effect of different sport activities on correction of symptoms of ADHD, so it's important to save the interest to sport in children with ADHD, that is impossible without taking into

account personal characteristics that promote and prevent adaptation to sports activities and the preservation of its motivation. In young athletes with ADHD their motor skills are developed less than in their peers and consequently sports results are worse. In conditions of a great importance of competition situations where an athlete is weaker than the others can significantly affect his self-perception and self-esteem in a negative sense.

- It's important to develop a program of psychological diagnosis and correction for children with ADHD who play sports. It requires the study of psychological factors that contribute to and hinder the socio-psychological adaptation of children with ADHD in sports and the development of appropriate psychodiagnostic tools.

ACKNOWLEDGMENT

The research completed with the support of the RFBR grant №19-013-00208/19 «Network practices in education as a resource for personal social adaptation».

REFERENCES

- [1] D.O. Conant-Norville, I.R. Tofler. "Attention deficit/hyperactivity disorder and psychopharmacologic treatments in the athlete". *Clin Sports Med*, vol 24, pp.829-843, 2005
- [2] B. D. Kiluk, S. Weden, V. P. Culotta. "Sport Participation and Anxiety in Children with ADHD". *Journal of Attention Disorders*, vol 12(6), pp.499-506, 2009
- [3] L.A. Balykova, S.A. Ivyansky and K.N. Chigineva, "Actual problems of medical support for children's sports". *Russian Bulletin of Perinatology and Pediatrics*, vol 2, pp.6-11, 2017
- [4] I.G. Izmaylova, V.S. Korolkova, M.V. Popova. "Minimal brain dysfunction. Attention deficit hyperactivity disorder (clinic, diagnosis, rehabilitation)". Astrakhan, 2006
- [5] J.M. Halperin and D.M. Healey, "The influences of environmental enrichment, cognitive enhancement, and physical exercise on brain development: can we alter the development trajectory of ADHD?" *Neurosci Biohav Rev.*, vol 35, pp.621-634, 2011
- [6] A.J. McKune, J. Pautz, J. Lombard. "Behavioural response to exercise in children with attention-deficit/hyperactivity disorder". *South African Journal of Sports Medicine*, vol 3(15), pp.17-21, 2003
- [7] C. Verret, M.C. Guay, C. Berthiaume, P. Gardiner, L. B'eliveau. "A physical activity program improves behavior and cognitive functions in children with ADHD: an exploratory study". *Journal of Attention Disorders*, vol 16, pp.71-80, 2012
- [8] M.B. Pontifex, B.J. Saliba, L.B. Raine, D.L. Picchiatti, C.H. Hillman. "Exercise improves behavioral, neurocognitive, and scholastic performance in children with attention-deficit/hyperactivity disorder". *The Journal of Pediatrics*, vol 162(3), pp.543-551, 2013
- [9] N. Khalife, M. Kantomaa and V. Glover, "Childhood attention-deficit/hyperactivity disorder symptoms are risk factors for obesity and physical inactivity in adolescence" *Journal of the American Academy of child & adolescent psychiatry*, vol 4(53), pp.425-436, 2014
- [10] R.C. Johnson, L.A. Rosen. "Sports behavior of ADHD children". *Journal of Attention Disorders*, vol 4(3), pp.150-160. 2000
- [11] N.N. Zavadenko, "Hyperactivity and attention deficit in childhood" Moscow, Academy, 2005
- [12] B.C. O'Connor, G.A. Fabiano and D.A. Waschbusch, "Effects of a Summer Treatment Program on Functional Sports Outcomes in Young Children with ADHD" *Journal of Abnormal Child Psychology*, vol 42(6), pp.1005-1017, 2014
- [13] R.D. White, G.D. Harris and M.E. Gibson, "Attention Deficit Hyperactivity Disorder and Athletes" *Sports Health*, vol 6(2), pp.149-156, 2014
- [14] W.J. Barbaresi, S.K. Katusic, R.C. Colligan, V.S. Pankratz, A.L. Weaver, K.J. Weber, D.A. Mrazek, S.J. Jacobsen. "How common is attention- deficit/hyperactivity disorder? Incidence in a population-

- based birth cohort in Rochester Minn". *Arch Pediatr Adolesc Med.*, vol 156, pp.217-224, 2002
- [15] R.A. Barkley. "International Consensus Statement on ADHD". *Clinical Child Family Psychol Rev*, vol 5, pp.89-111, 2002
- [16] A.S. Rowland, C.A. Lesesne, A.J. Abramowitz. "The epidemiology of attention- deficit/hyperactivity disorder (ADHD): a public health view". *Mental Retardation and Developmental Disabilities Research Reviews*, vol 8, pp.162-170, 2002
- [17] R.F. Gasanov. "Formation of the concept of attention deficit disorder in children". St. Petersburg, SPbNIPNI, 2009
- [18] E.P. Gora, "Attention Deficit Hyperactivity Disorder" *Health and Education in the 21st Century*, vol 3, pp.370-371, 2010
- [19] T. R. Chumbadze, S. G.,Makarova, A. A. Karkashadze and S. D. Polyakov, "Bioimpedance method for assessing the effectiveness of nutritional approaches in the complex treatment of children with attention deficit hyperactivity disorder" *Nutrition Issues*, vol 5, pp.157-158, 2018
- [20] J. Satterfield (1973). "EEG issues in children with minimal brain dysfunction". *Seminars in Psychiatry*, vol 5, pp.35-46, 1973
- [21] A.J. Zametkin and LL. Liebenauer, "Brain metabolism in teenagers with attention-deficit hyperactivity disorder" *Archives of general Psychiatry*, vol 50(5), pp.333-340, 1993
- [22] E.V. Fesenko. "Diagnosis and treatment of attention deficit hyperactivity disorder (ADHD) in children". St. Petersburg, 2009
- [23] T.A. Muller, N.A. Lisova and S.N. Shilov, "Features of the activation of the frontal cortex in children 7-10 years old with attention deficit hyperactivity disorder" *Health and education in the XXI century*, vol 4, pp.116-119, 2017
- [24] S.V. Faraone, R.H. Perlis and A.E. Doyle, "Molecular genetic of attention-deficit/hyperactivity disorder" *Biological Psychiatry*, vol 57, pp.1313-1323, 2005
- [25] J. Elia, M. Devoto. "ADHD genetics: 2007 update". *Current Psychiatry Reports*, vol 9, pp.434-439, 2007
- [26] V.V. Kirichenko (2013). "Optimization of health-saving support of the training process in the junior sports school". *Kemerovo State University Bulletin*, vol 4 (56), pp.75-79, 2013
- [27] E.M. Sinelnikova. "Fundamentals of neurological control in sports". Moscow, Physical culture and sport, 1984
- [28] N.P. Karpunina, "Attention deficit hyperactivity disorder in children (prevalence, risk factors, some clinical and pathogenetic features)": dis. ... cand. med. sciences. St. Petersburg, 2007
- [29] R. Beyer, M.M. Flores and T.M. Vargas-Tonsing, "Coaches' attitudes towards youth sport participants with attention deficit hyperactivity disorder" *International Journal of Sports Science & Coaching*, vol 3, pp.555-563, 2008
- [30] I. P. Bryazgunov, E.V. Kasatikova. "A restless child or All about hyperactive children". Moscow, Institute of Psychotherapy, 2000
- [31] A. García-Gómez, M. Rodríguez-Jiménez, E. Guerrero-Barona, J.C. Rubio-Jiménez, I. García-Peña, J.M. Moreno-Manso. "Benefits of an experimental program of equestrian therapy for children with ADHD". *Research in Developmental Disabilities*, vol 59, pp.176-185, 2016
- [32] L.A. Yasyukova. "Optimization of training and development of children with MMD". St. Petersburg, Imaton, 2010
- [33] W. E. Pelham, K. McBurnett, G. Harper, R. Milich, D. Murphy, J. Clinton, C. Thiele. "Methylphenidate and baseball playing in ADD children: Who's on first? ". *Journal of Consulting and Clinical Psychology*, vol 58, pp.130-133, 1990
- [34] S.S. Fong, V.Y.Lee, N.N. Chan, "Motor ability and weight status are determinants of out-of-school activity participation for children with developmental coordination disorder" *Research in Developmental Disabilities*, vol 32, pp.2614-2623, 2011
- [35] W.J. Harvey, G. Reid, N. Grizenko, V. Mbekou, M. Ter-Stepanian, R. Joobar. "Fundamental movement skills and children with attention-deficit hyperactivity disorder: peer comparisons and stimulant effects". *Journal of Abnormal Child Psychology*, vol 35, pp.871-882, 2007
- [36] R. Marco, A. Miranda, W. Schlotz. "Delay and reward choice in ADHD: An experimental test of the role of delay aversion". *Neuropsychology*, vol 23 (3), pp.367-380, 2009
- [37] D.C. Schwebel. "Longitudinal and concurrent relations among temperament, ability estimation, and injury proneness". *Child Development*, vol 70 (3), pp.700-712, 1999
- [38] J.I. Gapin, J.L. Etnier. "Parental perceptions of the effects of exercise on behavior in children and adolescents with ADHD". *Journal of Sport and Health Science*, vol 3(4), pp.320-325, 2014
- [39] P. H. Kuo, C.C. Lin, H.J. Yang, W.T. Soong and W. J. Chen, "A twin study of competence and behavioral/emotional problems among adolescents in Taiwan" *Behavioral Genetics*, vol 34, pp.63-74, 2004