

DYSPRAXIA AS A PSYCHOMOTOR DISORDER OF SCHOOL AGE CHILDREN

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Abstract. *Purpose.* The purpose of the study was to define the epidemiology of dyspraxia among children from 6 to 10 years' age, attending grades I-III of primary schools in Wrocław, Poland. *Material.* The study was conducted among pupils of primary schools in Wrocław, Poland. The studied groups included 48 girls and 52 boys. The study employed Polish version of Questionnaire for the screening assessment of dyspraxia's occurrence among children from 5 to 15 years' age (DCDQ-PL), as well as the Coordination Test for Children (KTK). *Results.* After assessing the occurrence of dyspraxia among studied children, it was found out that this disorder is present in the studied group. The prevalence of dyspraxia depends on studied children's gender; however, it is not related to their age. The results of tests, conducted with the DCDQ-PL and the KTK are consistent and confirm the observed inter-dependencies. *Conclusions.* Dyspraxia is a widespread psychomotor disorder, which can be diagnosed among children in the early school years. A diagnosis of a child's development with respect to this disorder should constitute a constant element of work for teachers and educationists dealing with children at this stage of education.

Key words: dyspraxia, psychomotor disabilities, diagnosis, education.

Introduction

Dyspraxia also called the *Developmental Coordination Disorder (DCD)* is a pervasive disorder. Dyspraxia cases are relatively widespread, affecting ca. 6-10% of children (APA, 2000). In the majority of cases, this disorder is diagnosed for children at the school age, since at that time differences in a child's performance are the most noticeable in comparison to the peer group (Polatajko, Cantin, 2006).

DCD manifests with irregularities with respect to the development and motor functions of a child from the early age, which persist until adulthood (Kirby, Peters, 2010; Portwood 2000). Despite having an IQ within the accepted standards, a DCD child performs the majority of actions slower and worse than other children of the same age group, which frequently leads to irregularities in the emotional and social aspects of life, which in turn manifests itself in low self-respect, anxieties, difficulties in establishing relationships, improper interpersonal contacts, or avoidance of physical functioning, and - as a result - obesity and other somatic diseases. Researches define such consequences as the secondary dyspraxia impairments, which are as serious as the primary symptoms of this disorder (Cantell, Smyth, Ahonen, 1994; Mandich, Polatajko, Rodger 2003).

It is not easy to diagnose dyspraxia due to the heterogenic character of its symptoms. Frequently, it is recommended that the diagnosis of the disorder should be done with the use of motor tests (Polatajko, Cantin, 2006). The most recommended are the Bruininks-Oseretsky Test of Motor Proficiency - Second Edition (BOT-2) and the Movement Assessment Battery for Children (MABC), whose sensitivity and specificity have been confirmed in numerous analyses (Bruninks, Bruininks, 2006; Henderson, Sudgen, 1992).

Due to the fact that the DCD symptoms include disorders observable in the daily performance of a child, researchers also deem it justified to apply screening tools for dyspraxia diagnosing (Wilson et al., 2000; Green et al., 2005; Schoemaker et al., 2006). They believe that such type of a diagnosis allows for collecting crucial information about the performance of a child observed in various daily situations, which is particularly important in the case of dyspraxia (Portwood, 2000).

For the purpose of making such a diagnosis, several questionnaires have been developed, of which the *Developmental Coordination Disorder Questionnaire (DCDQ)* is the most popular. It has already been used in many countries as an accurate and reliable instrument to diagnose dyspraxia. Currently, the study on the Polish cultural adaptation has been completed. The procedure has been successful, and the Polish results confirm the high validity and reliability of the analysis instrument.

The purpose of the study was to determine the epidemiology of dyspraxia among children from 6 to 10 years of age, attending grades I-III of primary schools in Wrocław, Poland.

Material and Method

The study group comprised 100 parents of children from grades I-III of primary schools in Wrocław, Poland.

The study included all parents of pupils from randomly selected classes. Studied pupils were healthy and they had never been diagnosed with respect to any psychomotor development disorders. In the case of those children, parents and teachers did not observe any specific symptoms, which might indicate dyspraxia, although not all parents assessed highly the daily performance of their children. During discussions, some parents used phrases that their children were *clumsy, slow, avoid movement* or *do not have a feel for things*.

The study was conducted in two stages. In the first stage, parents filled in the DCDQ-PL. Parents received the questionnaire from class tutors and within two weeks they returned completed copies.

The second stage of the study was to test the children with the KTK test. This took place on three occasions, during the physical education classes. The examination was conducted by a person prepared to diagnose with the use of

the KTK test.

The study employed the DCDQ-PL. The questionnaire includes 15 questions concerning the every day performance of the observed child. The questions are answered by parents, who fill in the Questionnaire. The child's performance is defined in the context of the performance of the child's peers. In each question, a parent may chose a score from 0 to 5, where 0 signifies "not at all like my child", and 5 signifies "extremely like my child". The total score of the Questionnaire corresponds to the result of the child in the study and, according to its values, it may suggest a suspected dyspraxia or normal development of a child. The authors of the Questionnaire recommend that children with the lowest score should be subjected to a more detailed diagnosis to either exclude or confirm the developmental disorders.

The *Coordination Test for Kinder* (KTK) is a measure developed in 1974 by E. Kipharda and F. Schilling. High values of psychometric parameters of this test were confirmed in the research conducted by the authors in 2007, as well as by other researchers in the following years [15-19]. This test is designed for children from 5 to 15 years of age. It comprises four items: one-legged hopping, moving sideways on wooden boards, walking backwards along balance beam, and two-legged jumping from side to side.

The raw performance score is converted depending on the age and (in the case of two items) gender of the child. The assessment of the general motor coordination of the tested child is given in five categories, starting from the high-range to the impaired development.

Results

48 girls and 52 boys participated in the study. Mean age was 8.66 (SD 1.59); the age of girls (mean 8.7 SD 19.8) was not statistically significantly different from the age of boys (mean 8.62 SD 18.5) (Table 1).

Table 1.

Group size with mean ages and standard deviations (SD) (N=100)

	DCD		non-DCD		Total	
	Number	Age	Number	Age	Number	Age
Boys	12	8.75 (1.25)	14	8.58 (0.629)	52	6.49 (0.89)
Girls	7	9.10 (0.84)	15	8.62 (0.819)	48	6.78 (0.81)
Total	19	8.89 (1,36)	29	8.06 (0.72)	100	6,62 (1.59)

The score diversification is big and gender-related. Girls achieve statistically significant higher score than boys, which is shown in Table 2. According to the observations, in the girls' group, the number of children with the lowest score indicating suspected dyspraxia was smaller (n=7). In the studied girls' group the mean score was (67.7 points).

Table 2.

Mean DCDQ-PI Scores by DCD, Age and Gender (n=100)

	With DCD				Non DCD			
	DCDQ-PL Total M(SD)	Control during movement M (SD)	Fine motor/hand writing M (SD)	Gross motor M (SD)	DCDQ-PL Total M (SD)	Control during movement M (SD)	Fine motor/hand writing M (SD)	Gross motor M (SD)
Boys n=48	46.2 (7.93)	14.45 (3.87)	15.6 (3.71)	16.4 (2.74)	65.39 (6.88)	21.23 (3.27)	22.03 (2.42)	21.77 (2.99)
Girls n= 52	48.91 (5.83)	15.84 (1.9)	17.23 (2.16)	16.23 (3.08)	67.7 (5.49)	21.25 (2.94)	23.05 (1.96)	22.99 (2.11)
Total n=100	47.27 (7.21)	15.0 (3.27)	16.24 (3.25)	16.33 (2.83)	66.59 (6.31)	21.24 (3.08)	22.54 (2.25)	22.36 2.64)

Additionally, to verify the validity of the diagnosis made with the use of the DCDQ-PL among the girls, the group was subjected to the KTK, which is used in numerous studies as a valid and reliable test for diagnosing dyspraxia in children.

In the KTK, the majority of girls with the lowest score in the Questionnaire also scored the lowest results. Only in the case of three girls, the study with the use of the Questionnaire did not confirm the developmental disorders diagnosed with the KTK (Table 3).

In the Questionnaire test, the boys' group achieved a lower score than the girls (Table 2). The mean score of this group was 65.39 points and was statistically significantly different from the score achieved by the girls. Also the number of boys with the lowest score, suggesting a risk of dyspraxia in their development, turned out to be higher than in the corresponding group of girls and amounted to 12 boys.

In the case of studied boys, the results of the additional KTK showed a larger number of boys with irregular

development that it was defined according to the Questionnaire (Table 3). In the case of 5 boys, the Questionnaire did not reveal any disorders.

Table 3.

Classification of DCD with the KTK compared to the DCDQ-PL

DCDQ	KTK		
	DCD	Non DCD	Total
DCD	24	0	24
Non DCD	8	68	76
Total	32	68	100

Discussion

A significant conclusion from the performed study is the difference in the development level of boys and girls. According to the observations, the development of boys in the early school years is slower in comparison to the development of girls, which was also shown in other studies [11, 14]. This regularity was also described by Kiphard and Schilling, who in the case of two items of their test applied different standards for boys and girls respectively [20]. The gender-related difference in the development level can be also observed in the group of children with diagnosed dyspraxia, where boys constitute the majority (n=12), achieving significantly lower scores than girls. An additional conclusion from the study is also the fact that dyspraxia is more frequent among boys, than among girls. This conclusion is in line with the research conducted by Portwood, who also observes higher epidemiology of dyspraxia among boys [6]. Also according to APA, the observed regularity is described as a peculiar characteristic of dyspraxia [1].

Differences in the psychomotor development of tested children were also confirmed with the KTK, where girls also achieved higher scores. The comparison of scores in both tests showed their high convergence, however the KTK has proven to be more sensitive. The high value of this parameter is typical for diagnostic tests, while it is not typical of screening tests, which allow to identify the most typical and intense symptoms of a specific disorder [12, 14].

However, the most important conclusion from the conducted research is the fact that now in Poland it is possible to apply the screening diagnosing for children with respect to the regularity of their development. In the past, such diagnosis was not possible due to the lack of diagnosing tools. As a result, many children with developmental disorders were not diagnosed and were not subjected to proper preventive or therapeutic measures. An important consequence of a lack of such a diagnosis is also a lack of information on the epidemiology of dyspraxia in Poland. Therefore, the problem was underestimated and frequently overlooked as a reason for school difficulties or failures. According to the study results, it is possible to see such opportunities with the application of the DCDQ-PL.

Conclusions

According to the conducted research, it was deemed to perform screening tests to diagnose children's dyspraxia in Polish schools. Such studies will help in economical, valid and reliable manner to identify children at risk with the disorder within the tested group, and as a result, to undertake deliberate and specialized actions related to a proper diagnosis and consequently a relevant therapy for such children. Researchers stress the fundamental importance of the child's age, when the discussed disorder is diagnosed, underlying the fact that the sooner it is diagnosed, the greater is the chance for a successful therapy addressing the preliminary symptoms of the disorder.

The results of conducted research clearly confirm that the screening assessment of a child's development is possible, which creates an opportunity to identify any irregularities.

In the studied group, as much as 19% of children subjected to the screening diagnosis were assessed as being at risk of dyspraxia. It is a significant percentage value, which confirms the importance of the analysed problem.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Cite this article as: Nowak Agata, Gnitecka Jolanta, Romanowska-Tolloczko Anna. Dyspraxia as a psychomotor disorder of school age children. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2015, vol.6, pp. 56-59. <http://dx.doi.org/10.15561/18189172.2015.0609>

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Received: 01.05.2015

Accepted: 20.05.2015; Published: 30.05.2015