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DEVELOPMENTAL COORDINATION DISORDER AND SOCIAL COMPETENCE IN PRESCHOOL CHILDREN

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Abstract:
This study investigated Developmental Coordination Disorder (DCD) and social competence—such as cooperation, interaction, and independence—in young children, along with the relationship between these factors. The sample included 150 preschool children (66 boys and 84 girls) aged between 50 and 70 months. No significant differences were found in motor difficulties based on gender or age. Most children exhibited adequate social skills in areas like cooperation, interaction, and independence, with only a few showing deficits. A relationship was observed between performance on the Movement Assessment Battery for Children (MABC) Test and social skills, although it was not statistically significant. The findings were consistent with some previous studies but contradicted others, indicating the need for further research due to the study's small sample size.

Keywords: developmental coordination disorder, social competence, preschool children

1. Introduction

In a review of literature conducted by Venetsanou and Kambas (2010) on the factors influencing the motor development of children, it was discovered that the primary environmental factor is the family, particularly the socio-economic status of the family, the mother's level of education, and whether the child has siblings or not. Chow, Henderson, and Barnett (2001) conducted a study comparing the motor skills of children aged 4 to 6 from Hong Kong and the USA using the MABC (Movement Assessment Battery for Children) Test. Their findings revealed that the educational level of parents did not have a significant impact on motor skills. In a more recent study, Grønholt Olesen, Kristensen, Ried-Larsen, Grøntved, and Froberg (2014) investigated the motor skills of 607 preschoolers (aged 5-6 years) using the second edition of the MABC Test. Both boys and girls performed well on the MABC-2, with boys scoring higher in object manipulation and girls excelling in balance activities. The percentage of children at risk of or with motor coordination difficulties was higher than anticipated.

Children diagnosed with Developmental Coordination Disorder (DCD) appear to encounter significant challenges with gross motor skills. In a study by Li, Su, Fu, and Pickett (2015), which examined the kinesthetic ability of children with DCD, passive movement equipment was attached to the right hand of each child while their eyes and ears were closed. The results indicated that children with DCD took longer to react compared to the control group, especially those aged 6 to 10. Moreover, for each age group above 6 years, kinesthetic sensitivity progressed more slowly in children with DCD compared to the control group. Cherng, Hsu, Chen, and Chen (2007) investigated the balance of younger children with DCD aged 4 to 6 years under various sensory conditions and found that they exhibited significantly poorer balance abilities across all sensory conditions. These children also experienced more difficulty standing on their non-dominant foot with both eyes open and closed. Fong, Lee, and Pang (2011) examined

balance ability using a sensory organization test and the MABC-2, finding that children with DCD scored significantly lower in static and dynamic balance as well as in the perceptual organization test. They were less adept at utilizing visual information to maintain their static body posture.

In addition to the challenges in gross motor skills, children with DCD also seem to lag behind in fine motor activities. Magalhaes, Cardoso & Missiuna (2011) observed that children with DCD face difficulties such as difficulties in riding a bike, using playground equipment, and engaging in free play, issues with writing and participating in classroom activities, struggles with running, jumping, swimming, and limited involvement in organized sports, limited self-care skills particularly in dressing and eating, poor performance in ball games, deficient social skills leading to feelings of loneliness and marginalization by peers, and language and speech difficulties affecting social participation.

2. Social-emotional proficiency

Ioannidis (2015) discovered in his study that while there were no significant differences in the assessment of preschool children's social skills based on their parents' education levels overall, there was a notable distinction in the aspect of social interaction. Children whose parents had higher education levels tended to exhibit statistically significant better scores in areas such as peer acceptance, maintaining friendships, and the ability to express emotions compared to children of less-educated parents. This indicates that a child's emotional intelligence greatly influences their social behavior, as its interactions with peers are greatly influenced by emotional factors. A more recent study conducted by Arslan, Durmuşoğlu-Saltal & Yilmaz (2011) further supported this idea, showing a positive correlation between interpersonal skills and emotional regulation, readiness for school, self-confidence in social situations, and family involvement. The findings underscore the importance of nurturing social skills in children, as those with weaker social abilities may struggle in peer interactions, potentially leading to feelings of isolation and exclusion. Similarly, McCabe and Altamura (2011) found that children with deficient social skills often face obstacles in socializing with peers due to difficulties in managing their emotions, which can result in them being overlooked or marginalized by their peers. Therefore, fostering opportunities for socialization is crucial for children to develop and enhance their social skills.

3. Materials & Methods

The present study sample consisted of 150 preschool children (N = 150), 66 boys and 84 girls, who attended kindergartens in Greece. The age of the children in the sample ranged from 50 to 70 months, specifically from 48 to 78 months, and they were divided into three age groups: 48 to 54 months (4 years-4 years and six months), 55 to 66 months (4 years

and seven months-5 years and six months), and 67 months to 78 months (5 years and seven months-6 years and six months), as presented in Table 1 below.

Table 1: Features of the sample regarding sex and age

Features	**f**	**%**
Sex		
Boy	66	44
Girl	84	56
Total	150	100
Age		
48-54 months	10	6.67
55-66 months	58	38.67
67-78 months	82	54.67
Total	**150**	**100**

Another characteristic of the sample that was observed was the preferred hand. Out of the total number of children, 121 were right-handed and 29 were left-handed. The following table (Table 2) presents the frequency distribution and corresponding percentages for the entire sample.

Table 2: Frequency distribution table and corresponding percentages regarding the preferred hand of the research sample

Hand preference	**f**	**%**
Right	121	80.67
Left	29	19.33
Total	150	100

3.1 Research tools

The Movement Assessment Battery for Children (MABC) (Henderson & Sugden, 1992) was used to assess children's motor performance. This test has been employed in numerous previous studies (Junaid & Fellowes, 2006; Livesey, Coleman & Piek, 2007; Cherng, Hsu, Chen & Chen, 2007). It is aimed at children aged 4 to 12 and evaluates three main aspects: a) manual dexterity, b) ball skills, and c) balance. The test consists of 32 tasks, divided into four categories based on children's age, with eight tasks in each category.

To assess children's social competence, the Preschool and Kindergarten Behavior Scales (PKBS) (Merrell, 1994) were utilized. This scale is an observational behavior assessment tool used to evaluate social skills and problematic behaviors in preschool-aged children (3-6 years old), completed by parents or educators. It is a standardized tool developed specifically for assessing young children across various environments and gathering information about behaviors. This tool includes two distinct scales: 1) Social Skills (34 items) and 2) Behavior Problems (42 items). Each of these scales comprises several empirically derived subscales used to identify specific groups or categories of social skills and problematic behaviors.

4. Results

4.1 Motor skills

In the table below (Table 3), it is evident that the children, as a whole, performed very well in the manipulative dexterity tests (piggy bank, beads, bicycle). Specifically, 95.33% (143 children) achieved scores below ten, indicating that these children had no motor difficulties in terms of fine motor skills. Conversely, a small percentage of 4.67% (7 children) showed some difficulties, placing them in the risk group.

Table 3: Frequencies and corresponding percentages for the scores achieved by the sample of children in the three manipulative tasks

Score	**f**	**%**
.00	12	8.0
.50	6	4.2
1.00	4	2.8
1.50	5	3.5
2.00	15	10.0
2.50	11	7.5
3.00	9	6.1
3.50	10	7.0
4.00	7	4.2
4.50	9	6.1
5.00	4	2.8
5.50	5	3.5
6.00	7	4.2
6.50	7	4.2
7.00	6	4.2
7.50	7	4.2
8.00	3	2.1
8.50	7	4.2
9.00	5	3.5
9.50	4	2.8
11.50	3	2.1
12.50	2	1.4
13.50	**150** 2	1.4
Total		**100**

The results regarding children's performance in balance tests (walk, jump, stork) are similar to those of manual dexterity tests. In the table below (Table 4), it is evident that the majority of children, specifically 94% of the sample (141 children), achieved good performances, scoring ten or below. This indicates that they did not face any motor difficulties regarding balance ability. However, a small percentage, around 6% (9 children), exhibited some difficulties, placing these children in the risk group.

Table 4: Frequencies and corresponding percentages of scores achieved by the sample of children in the three balance tests

Score	f	%
.00	14	9.3
.50	9	6.1
1.00	4	2.8
1.50	5	3.1
2.00	10	6.7
2.50	10	6.7
3.00	8	5.3
3.50	10	6.7
4.00	11	7.5
4.50	9	6.1
5.00	3	2.1
5.50	5	3.1
6.00	6	4.0
6.50	7	4.5
7.00	6	4.0
7.50	7	4.5
8.50	8	5.3
9.00	5	3.1
9.50	4	2.8
11.50	3	2.1
12.50	6	4.0
Total	**150**	**100**

The children achieved equally good performances in handling object manipulation tests (ball and bag). In the table below, it is evident that all 150 children in the sample (100%) scored low (seven or fewer points), indicating that they encountered no difficulty in the specific tests of gross motor skills that required object manipulation. Remarkably, the majority of the children (28.8%) achieved the highest possible total score, which is zero, indicating completely successful efforts.

Table 5: Frequencies and corresponding percentage scores achieved by the sample of children in the two object manipulation tasks

Score	f	%
0	43	28.8
1	24	16.1
2	33	22.1
3	18	11.9
4	11	7.4
5	10	6.7
6	5	3.0
7	6	4.0
Total	**150**	**100**

From an initial general overview distinguished from Table 6, we observe that 96 children (64%) fall below the risk zones (<9.50), and these children seem to have good motor skills in general. In the risk zone (11.50-13.50) are 39 children (26%) who require intervention to improve their motor performance, while 15 children (10%) are in the high-risk zone >13.50 and require immediate intervention to improve their motor performance. In conclusion, an initial overview of the 150 children in the sample shows that a large percentage of 54 children (36%) need to participate in intervention programs to promote their motor performance.

Table 6: Frequencies and corresponding percentages of scores achieved by the sample of children across all eight motor tasks of the MABC Test

Score	f	%
.00	3	2
.50	3	2
1.00	3	2
1.50	3	2
2.00	3	2
2.50	3	2
3.00	7	4.67
3.50	7	4.67
4.00	3	2
4.50	6	4
5.00	5	3.33
5.50	4	2.67
6.00	5	3.33
6.50	7	4.67
7.00	4	2.67
7.50	5	3.33
8.50	8	5.33
9.00	9	6
9.50	8	5.33
11.50	13	8.67
12.50	13	8.67
13.50	13	8.67
14.50	3	2
19.00	3	2
27.00	6	4
27.50	3	2
Total	**150**	**100**

4.2 Social competence

Generally, most children of the sample demonstrated adequate skills in Social Cooperation, Social Interaction, and Social Independence, with percentages of 63.33%, 58%, and 64.67% respectively, scoring at the functional level of the mean. Additionally, concerning the skill of Social Cooperation and Social Interaction, children showed slightly better performance compared to the last one social skill (Social Independence),

as the percentage of children displaying excellent Social Cooperation skills (24%) was higher than the percentage of children showing moderate deficits (11.33%). Conversely, children displaying moderate deficits in Social Interaction (16%) and Social Independence (10.67%) were less than those classified at the high functionality level (23.33% and 20.67%, respectively, for these specific skills). Finally, it was found that there were also a few children in the sample who exhibited significant deficits in social skills, with the percentage of significant deficits in Social Independence (4%) being higher compared to the percentages of children showing significant deficits in Social Cooperation and Social Interaction (1.33% and 2.67% respectively). These results are summarized in the table below.

Table 7: Frequency distribution and corresponding percentages for each functional level with respect to the total number of children

	Social Cooperation		**Social Interaction**		**Social Independence**	
	f	**%**	**f**	**%**	**f**	**%**
High functionality	36	24	35	23.33	31	20.67
Mean	95	63.33	87	58	97	64.67
Moderate Deficit	17	11.33	24	16	16	10.67
Significant Deficit	2	1.33	4	2.67	6	4

From the table below (Table 18), it is evident that regarding the skill of Social Cooperation, the majority of boys (40 children) achieved a score that placed them at the average level, with a percentage of 26.67%. A percentage of 7.33% (10 boys) showed a moderate deficit in this skill, while a smaller percentage of boys demonstrated excellent Social Cooperation skills (8.67%) and were classified at the level of high functionality. Out of the total number of boys, only 1.33% (2 boys) exhibited a significant deficit in Social Cooperation. As for girls, 36.67% (55 girls) achieved a score that placed them at the average level, followed by 15.33% of girls (23 girls) who demonstrated excellent Social Cooperation skills and were classified at the level of high functionality. Fewer girls (6 girls) showed a moderate deficit, with a percentage of 4%, and none exhibited a significant deficit.

Regarding the skill of Social Interaction, Table 18 shows that 34 boys and 47 girls scored at the average level, with percentages of 22.67% and 31.33%, respectively. Additionally, 11 boys and 19 girls displayed a moderate deficit in Social Interaction, with percentages of 7.33% and 12.67%, respectively. Similar are the performances of boys and girls classified at the level of high functionality, as 11.33% of boys (17 children) and 12% of girls (18 children) showed exceptional Social Interaction skills. Conversely, a percentage of 2.67% of boys (4 children) were found to have significant deficits in this particular social skill, while none of the girls scored low.

Regarding the skill of Social Independence, most boys (37 children) and girls (60 children) achieved scores that placed them at the average level with percentages of

24.67% and 40%, respectively. The percentages for both boys and girls that showed a moderate deficit in Social Independence were 6.67% and 4%, respectively. Boys (14 children) and girls (17 children) achieved outstanding performances in this skill with percentages of 9.33% and 11.33% respectively. Finally, in contrast to the two previous skills, a percentage of girls, around 0.67% (1 girl), displayed a significant deficit in Social Independence, while the corresponding percentage of boys was 3.33% (5 boys). The above results for all three social skills are summarized in the table below.

Table 8: Distribution of frequencies and corresponding percentages for each functional level by sex

	Sex	Social Cooperation		Social Interaction		Social Independence	
		f	%	f	%	f	%
High functionality	B	13	8.67	17	11.33	14	9.33
	G	23	15.33	18	12	17	11.33
Mean	B	40	26.67	34	22.67	37	24.67
	G	55	36.67	47	31.33	60	40
Moderate deficit	B	11	7.33	11	7.33	10	6.67
	G	6	4	19	12.67	6	4
Significant deficit	B	2	1.33	4	2.67	5	3.33
	G					1	0.67

5. Conclusions

According to the results, the majority of preschool children did not exhibit problems with their motor coordination. Specifically, only 10% of the total sample showed severe motor coordination disorders (i.e., 15 children). According to international literature Waelvelde, Peersman, Lenoir, Smits Engelsman & Henderson, 2008; Lingam, Jongmans, Ellis, Hunt, Golding & Emond, 2012), the prevalence of motor clumsiness is around 5%, while according to the American Psychiatric Association (APA, 1994; APA, 2000), this percentage ranges from 5% to 10% for children in the United States.

In terms of children's social skills, the results of the present study indicate that the majority of children demonstrated sufficient skills in Social Cooperation, Social Interaction, and Social Independence. This finding is in line with the research by Denham et al. (2003), which suggests that preschool-aged children exhibit adequate social skills despite their young age, making them cooperative and likeable to peers and adults rather than isolated. Additionally, adequate social skills serve as a predictive factor for future social competence in older age. It has been found that knowledge of emotions has a beneficial impact on social relationships with peers, resulting in positive attitudes towards social skills, particularly for self-presentation and cooperative behavior. Thus, accurate recognition and interpretation of others' facial expressions help children decide how to positively interact with others and provide guidance for interpersonal transactions, indicating that emotional knowledge lays the foundation for positive social

behavior (Izard, Fine, Schultz, Mostow, Ackerman & Youngstrom, 2001). Another factor associated with significant social skills is positive parenting. Positive upbringing, especially increased maternal involvement in family routines, has been found to correlate with children's cooperative behaviors, self-regulatory behaviors, and overall greater social skills, while family conflicts have been linked to behavior problems (Koblinsky, Kuvalanka & Randolph, 2006). Therefore, a good understanding of emotions and positive parenting can be a possible explanation for the specific findings of this study.

However, from the results of the current research, it appears that there are children who exhibit deficits in various social skills. Specifically, two boys showed deficits in social cooperation, four others in social interaction, and six children, five boys and one girl, exhibited deficits in social independence. Regarding the gender of the children, it was observed that out of the twelve children who showed deficits in social skills, eleven were boys. This indicates a tendency for boys to have lower social skills compared to girls. These results differ from the research of Kaiser, Cai & Hancock (2002), which showed that girls exhibited lower social skills to a greater extent than boys in certain aspects, such as cooperation and self-control.

According to the literature, children who experience difficulties with motor coordination also face behavioral challenges, making them vulnerable to exclusion (Iversen, Knivsberg, Ellertsen, Nødland & Bade Larsend, 2006). They also have difficulties with social interaction with peers (Jarus, Lourie-Gelberg, Engel-Yeger, Bart, 2011; Kennedy-Behr, Rodger & Mickan, 2011) and issues with social independence (Bart, Jarus, Erez & Rosenberg, 2011). It has also been found that children with motor difficulties exhibit low scores in social cooperation during play, leading to frequent involvement in negative interactions (Kennedy-Behr, Rodger, Michan, 2013a), and low levels of social participation in areas related to communication, interpersonal relationships, and responsibility (Sylvestre, Nadeau, Charron, Larose & Lepage, 2013). Reduced motor skills make children more introverted and insecure, judging themselves as less capable both physically and socially and less adept at recognizing emotions, which, as mentioned above, is a predictor of social behavior (Cummins, Piek & Dyck, 2005). Generally, reduced motor skills are associated with decreased social skills (Magalhaes, Cardoso & Missiuna, 2011).

Overall, this research effort showed that the children in the sample demonstrated adequate motor and social skills.

5.1 Proposals for future research

In the future, research could expand the sample size of children, ensuring an equal distribution of age and gender, to yield more representative results. Additionally, future studies could examine the impact of more variables, such as the ethnicity of children, the education and profession of their parents, the socioeconomic level of their families, parental involvement in children's physical activities and parent-kindergarten collaboration regarding these activities.

Conflict of interest statement

The authors declare no conflicts of interest.

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References

1. American Psychiatric Association (1994). Diagnostic and statistical manual of mental disorders. (4th ed.). Washington, DC: Author. Retrieved from https://psychiatryonline.org/doi/10.1176/ajp.152.8.1228
2. American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders*. (4th ed., text revision). Washington, DC: Author. https://psychiatryonline.org/doi/book/10.1176/appi.books.9780890425596
3. Arslan, E., Durmuşoğlu-Saltalı, N., Yilmaz, H. (2011). Social skills and emotional and behavioral traits of preschool children. *Social Behavior and Personality*, *39*, 9, 1281 – 1288. Retrieved from https://psycnet.apa.org/doi/10.2224/sbp.2011.39.9.1281

4. Bart, O., Jarus, T., Erez, Y., Rosenberg, L., (2011). How do young children with DCD participate and enjoy daily activities? *Research in Developmental Disabilities, 32*, 1317–1322. https://doi.org/10.1016/j.ridd.2011.01.039
5. Cherng, R.J., Hsu, Y.W., Chen, Y.J., Chen, J.Y. (2007). Standing balance of children with developmental coordination disorder under altered sensory conditions. *Human Movement Science, 26*, 913 – 926. https://doi.org/10.1016/j.humov.2007.05.006
6. Chow, S.M.K., Henderson, S.E., Barnett A.L. (2001). The Movement Assessment Battery for Children: A Comparison of 4-Year-Old to 6-Year- Old Children From Hong Kong and the United States. *The American Journal of Occupational Therapy, 55*, 1, 55 – 61. https://doi.org/10.5014/ajot.55.1.55
7. Cummins, A., Piek, J.P., Dyck, M.J. (2005). Motor coordination, empathy, and social behaviour in school-aged children. *Developmental Medicine & Child Neurology, 47*, 437–442. http://dx.doi.org/10.1111/j.1469-8749.2005.tb01168.x
8. Denham, S.A., Blair, K.A., DeMulder, E., Levitas,J., Sawyer, K., Auerbach-Major, S., Queenan, P. (2003). Preschool Emotional Competence: Pathway to Social Competence? *Child Development, 74*, 1, 238 – 256. https://doi.org/10.1111/1467-8624.00533
9. Fong, S.S.M., Lee, V.Y.L., Pang, M.Y.C. (2011). Sensory organization of balance control in children with developmental coordination disorder. *Research in Developmental Disabilities, 32*, 2376 – 2382. https://doi.org/10.1016/j.ridd.2011.07.025
10. Grønholt Olese, L., Kristensen, P.L., Ried-Larsen, M., Grøntved A., Froberg K. (2014). Physical activity and motor skills in children attending 43 preschools: a cross-sectional study. *BMC Pediatrics, 14*, 229 – 239. https://doi.org/10.1186/1471-2431-14-229
11. Henderson, S.E., Sugden, D. (1992). *The Movement Assessment Battery for Children*. The Psychological Corporation, London, UK. Retrieved from https://www.pearsonassessments.com/store/usassessments/en/Store/Professional-Assessments/Motor-Sensory/Movement-Assessment-Battery-for-Children-%7C-Second-Edition/p/100000433.html
12. Iversen, S., Knivsberg, A.M., Ellertsen, B., Nødland, M., Bade Larsend, T. (2006). Motor coordination difficulties in 5–6-year-old children with severe behavioural and emotional problems. *Emotional and Behavioural Difficulties, 11*, 3, 169 – 185. https://doi.org/10.1080/13632750600833817
13. Izard, C., Fine, S., Schultz, D., Mostow, A., Ackerman., Youngstrom, E. (2001). Emotion Knowledge as a Predictor of Social Behavior and Academic Competence in Children at Risk. *Psychological Science, 12*, 18 – 23. https://doi.org/10.1111/1467-9280.00304
14. Jarus, T., Lourie-Gelberg, Y., Engel-Yeger, B., Bart, O. (2011). Participation patterns of school-aged children with and without DCD. *Research in Developmental Disabilities, 32*, 1323 – 1331. https://doi.org/10.1016/j.ridd.2011.01.033

15. Junaid, K.A., Fellowes, S. (2006). Gender Differences in the Attainment of Motor Skills on the Movement Assessment Battery for Children. *Physical & Occupational Therapy in Pediatrics, 26*(1/2), 5 – 11. Retrieved from https://pubmed.ncbi.nlm.nih.gov/16938822/
16. Kaiser, A.P., Cai, X., Hancock, T.B. (2002). Teacher-Reported Behavior Problems and Language Delays in Boys and Girls Enrolled in Head Start. *Behavioral Disorders, 28*, 1, 23 –39. Retrieved from https://psycnet.apa.org/record/2002-11366-004
17. Kennedy-Behr, A., Rodger, S., Michan, S. (2013a). A comparison of the play skills of preschool children with and without Developmental Coordination Disorder. *OTJR (Thorofare N J), 33*, 4, 198 – 208. https://doi.org/10.3928/15394492-20130912-03
18. Kennedy-Behr, A., Rodger, S., Mickan, S. (2011). Physical and social play of preschool children with and without coordination difficulties: preliminary findings. *British Journal of Occupational Therapy, 74*, 7, 348 – 354. http://dx.doi.org/10.4276/030802211X13099513661199
19. Li, K.Y., Su, W.J., Fu, H.W., Pickett, K.A. (2015). Kinesthetic deficit in children with developmental coordination disorder. *Research in Developmental Disabilities, 38*, 125 – 133. https://doi.org/10.1016/j.ridd.2014.12.013
20. Lingam, R., Jongmans, M.J., Ellis, M., Hunt, L.P., Golding, J., Emond, A. (2012). Mental Health Difficulties in Children With Developmental Coordination Disorder. *Pediatrics, 129*, 4, e882 – e891. http://dx.doi.org/10.1542/peds.2011-1556
21. Livesey, D., Coleman, R., Piek, J. (2007). Performance on the Movement Assessment Battery for Children by Australian 3- to 5-year-old children. *Child: care, health and development, 33*, 6, 713 – 719. https://doi.org/10.1111/j.1365-2214.2007.00733.x
22. Magalhaes, L.C., Cardoso, A.A., Missiuna, C. (2011). Activities and participation in children with developmental coordination disorder: A systematic review. *Research in Developmental Disabilities, 32*, 1309 – 1316. https://doi.org/10.1016/j.ridd.2011.01.029
23. McCabe, P.C., Altamura M. (2011). Empirically Valid Strategies to Improve Social and Emotional Competence of Preschool Children. *Psychology in the Schools, 48*, 5, 513 – 540. https://psycnet.apa.org/doi/10.1002/pits.20570
24. Merrell, K.W. (1994). *Preschool and Kindergarten Behavior Scales. Test Manual.* Clinical Psychology Publishing Company, Inc., Brandon, Vermont. Retrieved from https://eric.ed.gov/?id=ED378210
25. Sylvestre, A., Nadeau, L., Charron, L., Larose, N., Lepage, C. (2013). Social participation by children with developmental coordination disorder compared to their peers. *Disability and Rehabilitation, 35*, 21, 1814 – 1820. Retrieved from http://dx.doi.org/10.3109/09638288.2012.756943
26. Venetsanou, F., Kambas, A. (2010). Environmental Factors Affecting Preschoolers' Motor Development. *Early Childhood Educ J, 37*, 319 – 327. Retrieved from https://link.springer.com/article/10.1007/s10643-009-0350-z

27. Waelvelde, H.V., Peersman, W., Lenoir, M., Smits Engelsman, B.C.M., Henderson, S.E. (2008). The Movement Assessment Battery for Children: Similarities and Differences Between 4- and 5-Year-Old Children from Flanders and the United States. *Pediatric Physical Therapy*, *20*, 1, 30 – 38. http://dx.doi.org/10.1097/PEP.0b013e31815ee2b2