

Original research article

## Knowledge of the Development Coordination Disorder of caregivers and teachers in India.

Abstract

For the early diagnosis of developmental coordination disorder, there is a need to understand the salient features of the disorder among the children. There are few researchers that evaluate the awareness of developmental coordination disorder among caregivers, teachers, medical professionals as well as allied health professional in Indian context. Online survey was completed by 100 participants, 20 caregivers, 30 school teachers, 30 allied health professionals and 20 medical professionals were completed the survey. Results of the study suggest that developmental coordination disorder is the least known disorder among majority of the caregivers and allied health professionals. However half of the sample was familiar with the term developmental coordination disorder but every participant were familiar with the term dyspraxia. Among all the participants, it has been documented that allied health professionals were more familiar with the characteristic features of developmental coordination disorder children. They were familiar with the motor coordination difficulty. Every participant demonstrates poor recognition of psychological effects in developmental coordination disorder. Low percentage of medical professionals reported that they were exposed to diagnose the children with developmental coordination disorder. Teachers play a vital role in evaluating the warning signs of the disorder and they believe that 80% of children in primary schools were lazy and have motor skill impairment. The study concludes that there is a need for appropriate service delivery

and timely evaluation to prevent the development of co-morbidities associated with developmental coordination disorder.

Keywords: DCD, Caregivers, Teachers assessment, allied health professionals, medical professionals

## Introduction

Developmental coordination disorder affects one in 20 children and it is most common but often goes unrecognized and misdiagnosed. Developmental coordination disorder is termed by impairment in ability to acquire the motor skills and execute the task that primarily relies on motor skills<sup>1</sup>. Developmental coordination disorder impedes the child from performing activities of daily living, performance in school as well as leisure activities<sup>2</sup>.

Psychological issues which were secondary to developmental coordination disorder include frustration and anxiety. Externalising and internalizing behaviors will be predominant among children with developmental coordination disorder when compared to children without motor defects<sup>3</sup>. The motor coordination difficulty will have major collision on the quality of life of children and majority of the researchers documented that the difficulties persevere into adulthood. Psychological issues will further enhance the trouble for children with developmental coordination disorder<sup>4</sup>.

Diagnostic and statistical manual 5<sup>th</sup> edition defines developmental coordination disorder with four criteria for diagnosis. Were motor skill acquisition and execution skill were below the typical range as compared to peer group children and when opportunities were provided for

children with developmental coordination disorder, they still experience difficulty in learning the motor skills were other age matched typically developing children acquire the skill very easily without much difficulty<sup>5</sup>. Criterion B describes that these children with motor deficit will have difficulty in executing activities of daily living and also they experience persistent interference with age appropriate execution of task at school as well as in leisure activities. Criterion C elaborates the characteristic features and symptoms at the early stage of child development<sup>6</sup>.

Criterion D elaborates that for the early diagnosis of developmental coordination disorder, the motor coordination difficulty were not because of other hidden difficulty and for the diagnosis of children with developmental coordination disorder; the child should not have intellectual difficulty, visual defects and any other neurological impairment that affects the motor component<sup>7</sup>. The current study aims to evaluate the knowledge as well as perceptions of developmental coordination disorder among caregivers, teachers, and medical and health care practitioners in Indian context.

## Methodology

This cross sectional survey was conducted online for a period of 8 weeks from December to February 2021. A flyer with a complete description of the study details with survey link was circulated through email to primary schools in and around Chennai. Flyer and emails were also sent to pediatric and general health care workers as well as therapists for the recruitment of primary caregivers. Participants were asked to share the link as the sampling we adapted here is a snowball sampling method. Inclusion criteria adapted is the participants should be residents of India and they should be able to complete the survey link in English without any help and they

must be the caregivers for developmental coordination disorder children under 10 years of age. Teachers who previously had experience working within this age group of children were included to participate in the study and health care professionals working with children were included. 100 participants were included in the study and in the survey, we have added up the option of unsure in the response section to understand the knowledge of developmental coordination disorder. On a total four sections of the survey, section A presents with demographic details and here the participants fill up their own personal details and through the details we classify the data collected into groups which will be subdivided into the role of caregiver, teacher, medical and allied health care professionals. In section B, the included participants were instructed to rate their responses in a five point Likert scale, where the responses created will be I have not heard of this condition at all, very unfamiliar, somewhat unfamiliar, somewhat familiar and very familiar. Participants if answered somewhat or very familiar in the response section, they will be transferred to part C of the survey. The part C evaluates the knowledge of developmental coordination disorder and the rating was gathered on a 4 point scale. The questions were directed like motor, social, cognitive defect were the characteristic feature of developmental coordination disorder and the answer will be common feature of DCD, may be a feature, not part of DCD and unsure. In section D, perceptions and opinions of children with developmental coordination disorder were documented and the response was documented in 3 point Likert scale where the options provided will be agree, disagree and unsure. They were asked to answer their level of research in the topic developmental coordination disorder.

Data analysis

Table 1: Details of the participants

	N=100	Years of Experience
Primary caregivers	30	-
Primary school teachers	5	5
Allied health professionals		
Occupational therapist	10	10
Physiotherapist	10	10
Speech therapist	10	5
Social worker	10	5
Medical professionals		
Pediatrician	20	5
General practitioner	5	5

Table 2: Response given by the participants for various childhood conditions with very familiar or somewhat familiar.

Childhood conditions	AHP n =40	MP n =25	T n =5	PC n =30
Autism	92	99	70	50
ADHD	95	98	95	90
Learning disorder	89	95	90	90

Intellectual disorder	89	92	60	55
Asperger syndrome	80	90	50	30
Developmental delay	95	99	50	40
Spina bifida	95	98	40	30
Dyspraxia	90	95	20	30
Motor learning disability	95	95	30	30
Developmental coordination disorder	50	55	20	20
Clumsy child syndrome	55	50	30	25

## Result and Discussion

The study was conducted on Indian population to evaluate the knowledge and understanding of Developmental coordination disorder among caregivers, teachers, medical and allied health professionals. The study suggests that nearly one third of the primary caregivers and teachers were familiar with the term developmental coordination disorder. Despite the decreased percentage of knowledge on developmental coordination disorder, there is inconsistency in knowledge gained among health professionals<sup>8</sup>. Wilson et al in 2012 identified that majority of

the parents and teachers were familiar with the old terminology like clumsy child syndrome and dyspraxia. Clinicians were familiar with the term dyspraxia and learning difficulty. For the early diagnosis and accurate identification it is crucial to understand the terminology DCD and there is a need for accurate evaluation of children with developmental coordination disorder at the early stage<sup>9</sup>. Motor coordination difficulty is the key characteristic for evaluating the child with developmental coordination disorder. American psychiatric association and World Health Organization were framed diagnostic criteria for DCD and DSM-5 criteria were used to identify the child with motor coordination difficulty<sup>10</sup>. In the current study only half of the sample recruited identified the terminology DCD and there is a need for understanding the fine motor and gross motor difficulty exhibited by children. Gagnon-Roy et al in 2016 documented that psychological trouble persists into adulthood if not recognized and treated at the early stage. Prevalence of developmental coordination disorder is estimated to be around 5-6% of primary school children and there is wide range of terminologies used to identify the children with motor coordination difficulty<sup>11</sup>. Terms like clumsy, dyspraxia, motor learning defects, minimal brain dysfunction, sensory integration disorder and disorder of attention and motor perception were common terminology used to describe the children with developmental coordination disorder. Due to the use of various terminology and various assessment methods to evaluate the prevalence estimate, it is complicated to review the literatures documented and researchers used more than 2 assessments to evaluate the child's motor coordination difficulty. Inconsistent methods of assessment and terminologies were the barrier for early diagnosis and intervention<sup>12</sup>. The inconsistencies lead to poor evaluation of prevalence rate of children with developmental coordination disorder. Wide range of confusions will lead to poor comparability and transfer of knowledge in the field of developmental coordination disorder. At London, Ontario Canada in

1994, the issues of nomenclature were concluded and the inconsistencies were addressed at the consensus meeting<sup>13</sup>. Were at the consensus meeting, the international panel members recommended the use of DCD to describe the children with difficulties in motor coordination disorder. The term developmental coordination disorder is not well understood by the caregivers, teachers, and allied health care professionals and there is no sound idea of the significant difficulties of this disorder and without the clear understanding of the disorder<sup>14</sup>. Developmental coordination disorder is not well understood by caregivers and without adequate knowledge of the impact of the disorder, teacher's fails to understand the child with symptoms of developmental coordination disorder due to poor diagnostic methods<sup>15</sup>. There is a need for clear diagnostic methods and a thorough knowledge of the impact of the disorder to identify the children with developmental coordination disorder at the early stage. In 2012, Wilson et al evaluated that only 20% of the medical professionals were aware of the symptoms of developmental coordination disorder<sup>16</sup>. The various terminologies used for developmental coordination disorder were reframed by the consensus definition and majority of them were unaware of the disorder and majority of the researchers documented that 30% of children were identified as having developmental coordination disorder before starting their primary schooling and they were identified through delay in developmental milestone<sup>17</sup>. It is not clear whether there is a clear understanding of DCD among caregivers, teachers, medical and health care professionals. Majority of the children were identified at their primary schooling when they experience difficulty in executing poor ball skills, immature handwriting and drawing skills. During the first year of schooling these difficulties were identified and teachers were the first to identify the child is significantly behind the peer group children in academic performance and in other tasks. Gibbs et al in 2007 in his study proved that caregivers were at the first line to

encounter a child with developmental coordination disorder. Thus there is a need for educating the parents about the signs and symptoms of developmental coordination disorder.

## Conclusion

Every participant in the study had an imperative role towards recognizing the children with developmental coordination disorder. A thorough knowledge of the various disorders is mandatory for early identification of children with disorders. The familiarity and knowledge of developmental coordination disorder helps for the planning of long term care and treatment options. Primarily parents and teacher need to identify the disorder. Medical professionals must appropriately diagnose the child with developmental coordination disorder so that families must receive appropriate services.

### **Availability of data and other materials**

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request. Please mail and reach us in [monisha\\_ravikumar@srmuniv.edu.in](mailto:monisha_ravikumar@srmuniv.edu.in)

### **Ethics approval and consent to participation**

The study was approved by the Institutional Ethics Committee (Human Studies) of the SRM Institute of Science and Technology, Kattankulathur with Approval No. 1755/IEC/2019. Written informed consent for interviews was obtained from all participants. The privacy and confidentiality of all the participants was strictly maintained.

### Competing interests

Authors declare no conflict of interest

## References

1. American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders – 5th ed. (DSM-5)*. Arlington, VA: American Psychiatric Association.
2. Blank, R., Barnett, A., Cairney, J., Green, D., Kirby, A., Polatajko, H., . . . Vinçon, S. (2019). International clinical practice recommendations on the definition, diagnosis, assessment, intervention, and psychosocial aspects of developmental coordination disorder. *Developmental Medicine and Child Neurology*, 61, 242-285. doi:10.1111/dmcn.14132
3. Boniface, G., Glegg, S, Montgomery, I, & Zwicker, J.G. (2017). *Developmental Coordination Disorder (DCD) Advocacy Toolkit*. Retrieved from <http://www.childdevelopment.ca/DCDAdvocacyToolkit/DCDAdvocacyToolkitIntro.aspx>
4. Crane, L., Sumner, E., & Hill, E. (2017). Emotional and behavioural problems in children with developmental coordination disorder: Exploring parent and teacher reports. *Research in Developmental Disabilities*, 70, 67-74. doi:10.1016/j.ridd.2017.08.001
5. Cousins, M., & Smyth, M. (2003). Developmental coordination impairments in adulthood. *Human Movement Science*, 22, 433-459. doi:10.1016/j.humov.2003.09.003
6. Falck, A. (2018). *Developmental coordination disorder: Knowledge and familiarity among key stakeholders in Western Australia*. Unpublished manuscript, Edith Cowan University, Perth, Australia.
7. Gibbs, J., Appleton, J., & Appleton, R. (2007). Dyspraxia or developmental coordination disorder? Unravelling the enigma. *Archives of Disease in Childhood*, 92, 534-539. doi:10.1136/adc.2005.088054

8. Graham, I. D., Logan, J., Harrison, M. B., Straus, S. E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation: time for a map? *Journal of Continuing Education in the Health Professions*, 26, 13–24.  
<https://doi.org/10.1002/chp.47>
9. Harris, S.R, Mickelson, E.C.R, & Zwicker, J.G. (2015). Diagnosis and management of developmental coordination disorder. *Canadian Medical Association Journal*, 187, 659-665.
10. Kite, D., Gullifer, J., & Tyson, G. (2013). Views on the diagnostic labels of autism and asperger's disorder and the proposed changes in the DSM. *Journal of Autism and Developmental Disorders*, 43, 1692-1700. doi:10.1007/s10803-012-1718-2
11. Ip, A., Mickelson, E. C. R., Zwicker, J. G., & Canadian Paediatric Society, Developmental Paediatrics Section (under review). CPS Practice Point: Diagnosis and management of developmental coordination disorder. *Paediatrics & Child Health*.
12. Magalhães, L., Missiuna, C., & Wong, S. (2006). Terminology used in research reports of developmental coordination disorder. *Developmental Medicine & Child Neurology*, 48, 937-941. doi:10.1111/j.1469-8749.2006.02040a.x
13. Timler, A., McIntyre, F., Cantell, M., Crawford, S., & Hands, B. (2016). Development and evaluation of the psychometric properties of the Adolescent Motor Competence

Questionnaire (AMCQ) for Adolescents. *Research in Developmental Disabilities*, 59, 127-137.

14. Kenten, C., Wray, J., Gibson, F., Russell, J., Tuffrey-Wijne, I., & Oulton, K. (2019). To flag or not to flag: Identification of children and young people with learning disabilities in English hospitals. *Journal of Applied Research in Intellectual Disabilities*, 32, 1176-1183. doi:10.1111/jar.12608
15. Zwicker, J.G., Suto, M., Harris, S.R., Vlasakova, N., & Missiuna, C. (2018). Developmental coordination disorder is more than a motor problem: Children describe the impact of daily struggles on their quality of life. *British Journal of Occupational Therapy*, 81, 65-73. doi:10.1177/0308022617735046
16. Wilson, B., Neil, K., Kamps, P., & Babcock, S. (2012). Awareness and knowledge of developmental co-ordination disorder among physicians, teachers and parents. *Child Care, Health and Development*, 39, 296-300. doi:10.1111/j.1365-2214.2012.01403.x
17. Zwicker, J.G., Harris, S.R., & Klassen, A.F. (2013). Quality of life domains affected in children with developmental coordination disorder: A systematic review. *Child Care, Health and Development*, 39, 562-580. doi:10.1111/j.1365-2214.2012.01379.x