

Original Article

Knowledge of developmental coordination disorder among health and education professionals

Conhecimento sobre o transtorno do desenvolvimento da coordenação entre profissionais da saúde e da educação

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Abstract

Objective: Developmental coordination disorder (DCD) is a prevalent health condition in childhood. In Brazil, the prevalence varies from 4.3% to 19.9%. Despite its prevalence, surveys conducted in various countries reveal that DCD remains relatively unknown among health and education professionals, resulting in delayed diagnoses and limited access to treatment. The objective of this study was to assess the knowledge of Brazilian health and education professionals working with children and adolescents aged 6-17 regarding DCD. **Method:** Online survey responded by 803 professionals, including teachers, occupational therapists, physiotherapists, and pediatricians. **Results:** DCD ranked among the least known health conditions affecting children and adolescents, with 57% of participants exhibiting some level of awareness. Occupational therapists demonstrated the highest familiarity, followed by physiotherapists and pediatricians. Across all groups, there was greater recognition of motor aspects compared to non-motor characteristics of the disorder. A minimal number of health professionals considered the possibility of a child having DCD, and very few pediatricians formally diagnosed patients with DCD. **Conclusions:** The limited awareness among health and education professionals underscores the need for strategies to disseminate knowledge about DCD. Addressing this gap is crucial to facilitate early identification, diagnosis, and intervention for individuals affected by DCD in Brazil.

Keywords: Neurodevelopmental Disorders, Apraxia, Schoolteachers, Pediatricians, Physical Therapists, Occupational Therapists.

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Resumo

Objetivo: O transtorno do desenvolvimento da coordenação (TDC) é uma condição de saúde prevalente na infância. No Brasil, sua prevalência varia entre 4,3% e 19,9%. Apesar dessa prevalência, levantamentos realizados em vários países revelam que o TDC ainda é relativamente desconhecido entre profissionais da saúde e da educação, resultando em diagnósticos tardios e acesso limitado ao tratamento. O objetivo deste estudo foi avaliar o conhecimento sobre o TDC de profissionais brasileiros de saúde e educação que trabalham com crianças e adolescentes de 6 a 17 anos. **Método:** Pesquisa on-line respondida por 803 profissionais, incluindo professores, terapeutas ocupacionais, fisioterapeutas e pediatras. **Resultados:** O TDC figurou entre as condições de saúde menos conhecidas que afetam crianças e adolescentes, com 57% dos participantes exibindo algum nível de conhecimento. As terapeutas ocupacionais demonstraram o maior grau de familiaridade, seguidas por fisioterapeutas e pediatras. Em todos os grupos, houve maior reconhecimento dos aspectos motores em comparação aos aspectos não motores do transtorno. Um número mínimo de profissionais da saúde considerou a possibilidade de uma criança apresentar TDC, e pouquíssimos pediatras diagnosticaram formalmente pacientes com o transtorno. **Conclusões:** A conscientização limitada entre profissionais da saúde e da educação evidencia a necessidade de estratégias para disseminar o conhecimento sobre o TDC. Abordar essa lacuna é crucial para facilitar a identificação, o diagnóstico e a intervenção precoces em indivíduos afetados pelo TDC no Brasil.

Palavras-chave: Transtornos do Neurodesenvolvimento, Dispraxia, Professores Escolares, Pediatras, Fisioterapeutas, Terapeutas Ocupacionais.

Introduction

Developmental coordination disorder (DCD) is a health condition characterized by gross and fine motor coordination below that expected for chronological age (American Psychiatric Association, 2014). Motor challenges impact daily, school, and leisure activities, leading to restricted social participation (Zwicker et al., 2017; Blank et al., 2019; Izadi-Najafabadi et al., 2019; O'Dea et al., 2021). DCD can lead to poor physical health, depression, anxiety, low self-efficacy, behavioral problems, and being overweight, with potential lifelong effects (Harris et al., 2021; Blank et al., 2019; Tal-Saban et al., 2012; Tal-Saban & Kirby, 2018).

With an estimated global prevalence of 6% of school-aged children and varying rates in Brazil (4.3% to 19.9%), DCD stands as one of the most prevalent neurodevelopmental disorders (Valentini et al., 2012; Cardoso et al., 2014; Melo et al., 2014; Beltrame et al., 2017). Diagnosis requires a collaborative, interdisciplinary approach considering four diagnostic criteria (American Psychiatric Association - APA, 2014). While parents may occasionally observe differences, classroom or physical education teachers typically are the ones who identify the motor delays (Winson & Fourie, 2020). Occupational therapists and/or physiotherapists play a crucial role in assessing and characterizing the motor delay (criterion A). The impact of motor incoordination on daily activities is usually assessed by occupational therapists, in collaboration with families and teachers (criterion B). Anamnesis

involves querying the family about early symptoms (criterion C), with psychologists contributing information on cognitive and behavioral aspects as needed. Pediatrician and/or neuropsychiatrist determines the final diagnosis after a thorough investigation to eliminate other physical, neurological, or behavioral disorders (criterion D).

Despite being a prevalent childhood disorder, DCD remains under-recognized by society and healthcare/education professionals. Only 4% of occupational therapists in the United Kingdom (UK) and Northern Ireland accurately described the disorder (Baudinette et al., 2010). A survey with professionals and parents in Canada, United States, and UK, revealed that merely 20% of all participants were familiar with DCD (Wilson et al., 2012). Another survey of the knowledge of DCD among Australian caregivers, teachers, and health professionals identified that only one third of the participants were familiar with DCD (Hunt et al., 2021). Notably, in the Australian (Hunt et al., 2021) and Indian (Sankar & Monisha, 2021) studies, DCD was ranked among the least recognized childhood health conditions, and participants were most familiar with the term "dyspraxia." A study involving English- and German-speaking health professionals, revealed that 58% of participants had heard of DCD, but only 42% had treated individuals with the disorder, and the term "dyspraxia" was more widely recognized (85%) (Meachon et al., 2023).

The lack of awareness about DCD is partly attributed to the use of diverse terms to refer to motor coordination difficulties (Magalhães et al., 2006; Licari et al., 2021). The term DCD, introduced in the DSM-3, was endorsed in an international consensus meeting in 1994 to standardize the terminology (Polatajko et al., 1995; Blank et al., 2019). Despite an exponential increase in publications since then (Wu et al., 2021), Brazilian professionals often face barriers engaging in evidence-based practice, including limited access to articles and language difficulties, as many articles are paid and in English (Silva et al., 2015).

Lack of awareness about DCD among health professionals, educators, and the public leads to delayed or underdiagnosed cases, limiting access to effective treatment (Cabello, 2019; Camden et al., 2015; Winson & Fourie, 2020). Our study aimed to assess the knowledge of Brazilian health and education professionals working with children and adolescents aged 6-17 years regarding the term and main characteristics of DCD. We examined whether professionals are familiar with DCD, the extent of their knowledge about its main characteristics, and whether DCD is as well-known as other common neurodevelopmental and behavioral disorders in childhood and adolescence.

Methods

A descriptive, cross-sectional, *online survey* was approved by the Research Ethics Committee of the Universidade Federal de Minas Gerais (approval numbers: 5.735.033 and 5.824.972; CAAE 61236422.9.0000.5149).

Participants

Brazilian physical education and classroom teachers from primary and secondary schools, pediatricians, occupational therapists, and physiotherapists were invited to participate. Inclusion criteria were higher education professionals of any gender and age,

with a minimum of one year of experience working with children and adolescents aged 6 to 17 years and 11 months. Exclusions comprised professionals on leave for over 6 months, those solely engaged in administrative duties without direct interaction with children and adolescents, and health professionals whose caseload did not include at least 25% of individuals within the specified age range.

The sample size was estimated by referencing similar published studies, as there was no specific information on the number of professionals working with children and adolescents aged 6-17 years. A minimum of 50 professionals from each profession was chosen to ensure the feasibility of the study.

Instrument

An online survey designed by the researchers was used for data collection. The questionnaire was developed based on previous studies (Baudinette et al., 2010; Wilson et al., 2012; Hunt et al., 2021; Karkling et al., 2017; Smith et al., 2019) and submitted to expert opinion: (a) two professionals from each area of interest in Brazil, and (b) two experienced researchers (physical educator, occupational therapist). Based on their feedback, the questionnaire were revised, and its final version optimized for mobile devices.

The questionnaire has three parts: (a) Ethical Aspects, which includes the informed consent form, (b) Part I - Characterization of the Participants, and (c) Part II - Knowledge of DCD. It features a shared core—sections (a) and (b)—accessible through a common link for all professionals. After responding to these sections, the participants were guided to profession-specific inquiries based on their respective categories.

In Part II, all professionals indicated their degree of familiarity ("never heard of," "very unknown," "a little unknown," "a little known," and "very known") with 17 health conditions (Wilson et al., 2012; Hunt et al., 2021). We considered "never heard" and "very unknown" as indicator of no knowledge of the condition, and "a little" and "very known" as indicators of some knowledge of the condition. Participants were presented with a list of 15 motor and non-motor characteristics of DCD, supported by the literature. For each characteristic, they were asked to indicate whether it: (1) is a common characteristic of DCD, (2) may be a characteristic of DCD, (3) the characteristic is not a part of DCD, or (4) is uncertain or doubtful if the characteristic is a part of DCD. Responses indicating knowledge of DCD (options 1 and 2) were awarded 1 point, while responses reflecting limited awareness (options 3 and 4) received 0 points. The maximum possible score for knowledge of DCD characteristics was 15.

Additionally, they were asked if they thought they had any undiagnosed children, adolescents, students, or patients exhibiting characteristics of DCD in their classroom or among their caseloads. Health professionals were also asked about their experience in identifying probable cases of DCD, and if affirmative, whether they utilized standardized assessment tools, with a subsequent question to specify these tools. Pediatricians responded if they had ever formally diagnosed a child or adolescent with DCD and whether they relied on reports from other professionals and/or school to support the diagnosis.

Data collection

We employed a multi-pronged strategy, combining purposive, convenience, and snowball sampling. The research team distributed the online survey via a Google Forms link shared through email, Facebook groups, Instagram, and WhatsApp. Invitations were extended to colleagues, postgraduate programs across Brazil, professional entities such as Physiotherapy, Occupational Therapy, and Physical Education Councils, Pediatric Societies, Associations of Parents and Friends of Exceptional Children, and Education Secretariats. The questionnaire was open for five months.

Data analysis

Descriptive statistics, including frequency distributions and means, were used to characterize participants across the total sample and professional groups. Comparative analysis between professional groups was used to identify differences in DCD knowledge scores and length of time in the profession. A correlation was then conducted between these two variables.

Due to non-normality of the continuous data (Kolmogorov-Smirnov test), the Kruskal-Wallis test was used for group comparisons, followed by Dunn's post-hoc test with adjustments for multiple comparisons. The Mann-Whitney test compared the health and education areas. Spearman's correlation assessed the relationship between time in the profession and DCD knowledge score. All analyses were performed using SPSS (version 21), with significance set at $p < 0.05$.

Results

Out of the 907 professionals who expressed willingness to participate, 104 did not meet the inclusion criteria. The survey was completed by 803 professionals: 494 (61.5%) classroom teachers, 53 (6.6%) physical education teachers, 146 (18.2%) occupational therapists, 57 (7.1%) physiotherapists, and 53 (6.6%) pediatricians (Table 1). The average professional experience of the participants was 15.7 (± 9.64) years.

The length of professional experience differed between groups (Chi-square = 45.242, $p = 0.001$, $df = 4$), with pediatricians having more years of professional experience, followed by teachers. The other professional categories did not differ significantly from each other, and there was no distinction in professional experience between classroom teachers and physical educators.

Regarding the question "Do you know or have you heard of DCD?", 63.9% ($n=513$) of the participants responded affirmatively (Table 1). Health professionals expressed more awareness, with 80%, compared to 56% among education professionals. Participants indicated various sources of learning about DCD, with 18% during undergraduate studies, 18% during post-professional studies, 17% through colleagues, and 13% through short courses/updates. A significant proportion, 77.6% of professionals across all categories, asserted that they did not learn about DCD during their undergraduate studies.

The familiarity of professionals with health conditions associated with neurodevelopment, ranked from most to least known, is shown in Table 2. DCD is among the least known health conditions. In the total sample, when evaluating each condition, 26.8% of professionals reported they did not know about DCD, while 56.7% claimed to have some knowledge of DCD. The term "motor learning disability" was more familiar to all participants, with a recognition rate of 79.5%, compared to DCD (56.7%). Conversely, the term "dyspraxia" was less known among Brazilian professionals compared to DCD, with a familiarity rate of 41.8%.

Table 1. Participants' characteristics, number and percentage of professionals who knew or heard about DCD.

	Classroom teacher n=494	Physical educator n=53	Physical Therapist n=57	Occupational therapist n=146	Pediatrician n=53	Total
Number of participants, <i>n(% of total)</i>	494 (61.5)	53 (6.6)	57 (7.1)	146 (18.2)	53 (6.6)	803 (100)
Undergraduate degree, <i>n(% of group)</i>	161 (32.6)	18 (34.0)	25 (43.9)	37 (25.3)	7 (28.3)	248 (30.9)
Lato sensu postgraduate courses, <i>n(% of the group)</i>	277 (56.1)	31 (58.5)	21 (36.8)	81 (55.5)	31 (58.5)	441 (54.9)
Stricto sensu post-graduation, <i>n(% of group)</i>	56 (11.3)	4 (7.5)	11 (19.3)	28 (19.2)	15 (13.2)	114 (14.2)
Gender Female, <i>n(% of group)</i>	417 (84.4)	22 (41.5)	49 (85.9)	142 (97.26)	47 (88.6)	677 (84.3)
Age in years, <i>mean (±SD)</i>	44 (±9.8)	41 (±8.5)	37 (±8.6)	37.9 (±9.9)	48 (±11.6)	42.4 (±10.3)
Years of experience, <i>mean (±SD)</i>	16.4 (±9.4)	14.4 (±7.9)	11.4 (±7.2)	12.8 (±9.1)	22.3 (±12.2)	15.7 (±9.6)
Minas Gerais, <i>n(% of group)</i>	410 (82.9)	45 (84.9)	47 (82.4)	63 (43.1)	47 (88.6)	612 (76.2)
Works in the countryside, <i>n(% of group)</i>	372 (75.3)	32 (60.3)	41 (71.9)	62 (42.4)	23 (43.3)	530 (66)
Place of work - private, <i>n(% of group)</i>	44 (8.9)	8 (15.1)	7 (12.3)	80 (54.8)	27 (51.0)	166 (20.7)
Workplace - public, <i>n(% of group)</i>	450 (91.1)	45 (84.9)	8 (14.0)	40 (27.4)	26 (49.0)	569 (70.9)
Workplace - other*	-	-	42 (73.7)	26 (17.8)	-	68 (8.4)
Know or have heard about DCD <i>n(% of group)</i>	272 (55.1)	36 (67.9)	37 (64.9)	138 (94.5)	30 (56.6)	513 (63.9)
Don't know or haven't heard about DCD <i>n(% of group)</i>	222 (44.9)	17 (32.1)	20 (35.1)	9 (5.5)	23 (43.4)	290 (36.1)

Note: SD = standard deviation; *Philanthropic institutions, schools, and others.

Table 2. Percentages of professionals who said they knew or did not know about some childhood and adolescent conditions.

Health condition	Total ¹ n = 803	Classroom teacher n=494		Physical Educator n=53		Education n=547		Physical Therapy n=57		Occupational therapy n=146		Pediatrics n=53		Health n=256	
		Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
Attention Deficit Hyperactivity Disorder	91.1	88.9	7.9	88.6	5.7	88.8	7.6	94.8	5.3	96.2	3.5	98.1	0	96.0	2.7
Learning Difficulties	89.2	87.9	8.3	86.5	7.6	87.7	8.2	87.7	3.5	93.9	3.5	92.4	0	92.1	6.2
Intellectual disability	87.3	84.6	11.3	83.0	11.3	84.4	10.6	91.3	3.5	95.2	4.1	90.5	0	93.3	3.1
Autistic Spectrum Disorder	86.8	82.2	9.7	90.6	7.6	82.9	9.5	92.9	5.3	95.9	3.5	94.4	0	94.9	11.7
Learning Disorders	86.3	84.4	9.9	79.2	13.2	83.9	10.2	89.5	3.5	93.1	4.8	88.7	0	91.4	3.5
Obsessive Compulsive Disorder	84.5	81.9	10.5	84.9	11.3	82.2	10.6	96.2	3.7	86.9	5.4	96.2	0	89.4	3.9
Dyslexia	82.4	84.4	7.6	81.1	7.5	84.0	7.6	77.1	7.0	80.8	4.7	73.5	0	78.5	4.2
Global Developmental Delay	79.9	72.2	16.3	71.6	16.9	72.2	16.4	94.7	5.2	96.5	3.4	98.1	0	96.4	3.1
Speech Disorder	79.7	78.5	11.7	64.2	13.2	77.1	11.8	80.7	3.5	86.3	5.5	86.8	1.9	85.1	4.2
Motor Learning Disability	79.5	75.5	12.9	83.0	16.9	77.1	12.4	91.3	8.8	91.0	5.5	60.3	11.3	84.7	6.2
Oppositional Defiant Disorder	69.4	64.3	22.8	52.8	26.4	63.2	23.2	64.9	14.0	89.0	6.8	83.0	3.7	82.4	7.8
Conduct Disorder	64.5	61.3	22.8	54.7	24.5	60.6	23.0	54.3	26.3	75.3	8.2	84.9	1.8	72.6	10.9
Sensory Processing Problems	64.5	55.9	27.1	49.1	24.5	55.2	26.8	80.7	8.8	95.2	4.1	58.5	11.3	84.3	6.6
Chromosomal changes	60.1	51.0	33.6	50.9	28.3	51.0	33.0	85.9	5.2	78.7	7.5	73.5	5.6	79.2	6.6
Developmental Coordination Disorder	56.7	47.6	35.0	64.2	20.8	49.1	33.6	73.7	12.3	82.2	9.6	45.3	20.7	72.6	12.5
Developmental Dyspraxia	41.8	26.9	52.4	39.6	41.5	28.1	51.3	68.4	10.5	81.5	8.2	45.2	24.5	71.0	12.1
Spina Bifida	39.5	22.6	59.7	33.9	49.0	23.7	58.6	94.7	3.5	59.5	15.0	86.7	5.6	73.0	10.5

¹Total= sum of "very well known" and "somewhat well known"; Y= yes, know the condition - categories very well-known and somewhat well known; N= don't know the condition - categories never heard of it and very unknown.

Table 3 presents the number of professionals who correctly identified the characteristics of DCD. Health professionals demonstrated greater familiarity with the characteristics of DCD compared to education professionals, with correct identification percentages ranging 48-92% and 42-74%, respectively. Motor characteristics of DCD were more widely recognized than non-motor characteristics, with 79% of participants identifying delayed gross and fine motor skills, 79% recognizing difficulty in writing, and 77% acknowledging motor learning disability as common characteristics of DCD. Among the non-motor characteristics, sensory processing problems were the most identified (70%), followed by low self-esteem (67%), poor physical conditioning (67%), and anxiety (67%).

In the analysis of the overall level of knowledge, estimated by the sum of responses to the DCD characteristics questionnaire, no significant correlation was found between the length of time in the profession and the level of knowledge for the total sample ($R_o = -0.13$, $p = .71$), or within each professional group. The correlations were low (-0.006 to 0.197) and non-significant. The Kruskal Wallis test identified a significant difference between the groups in the level of knowledge of DCD characteristics (Chi-square = 33.14, $p = 0.001$, $df = 4$), but Dunn's post-hoc test found difference only between the level of knowledge of teachers and occupational therapists ($D = 114$, 38, $p = 0.001$). Considering areas, there was a significant difference ($U = 54308.50$, $p = 0.001$) between the median of health (12) and education professionals (10).

All professionals reported encountering children and adolescents without a diagnosis but displaying signs of DCD. These signs included "being stressed about their motor skills", "having difficulty keeping up with other children of the same age in physical activities or sports", "being clumsy and prone to accidents when compared to peers of the same age", and "having difficulty performing activities of daily living". The percentage of professionals who observed these signs exceeded 47% for all the statements presented.

Out of the 256 health professionals, 146 (57%) stated that they had previously identified probable cases of DCD. Among these, only 48 (33%) reported using standardized assessments. Regarding pediatricians, 29 out of 53 (55%) use reports from other professionals to support the diagnosis of DCD when they raise this diagnostic hypothesis. Additionally, 9 (17%) pediatricians had diagnosed DCD. Among the pediatricians who provided information about the assessment tools they use, only one reported using them in the diagnostic process. For 21% of health professionals, the DSM-5 contains enough information to diagnose the condition and only 14% believe that DCD is easy to diagnose. Considering only pediatricians, 30% agree that the DSM-5 has sufficient information and 15% consider that the diagnosis of DCD is relatively easy to make.

Discussion

The objective of this study was to assess the awareness of Brazilian health and education professionals regarding DCD and its primary characteristics. Our findings indicate that DCD ranks among the least recognized neurodevelopmental conditions affecting children and adolescents. Moreover, professionals tend to be more familiar with the motor aspects of the disorder than its non-motor characteristics. While these results align with similar studies conducted in other countries (Wilson et al., 2012;

Hunt et al., 2021; Sakar & Monisha, 2021; Meachon et al., 2023), some issues are specific to the Brazilian context.

Table 3. Percentage of professionals who correctly identified the characteristics that are common to or may be present in DCD.

Features	Total ¹ n=803	Classroom Teacher n = 494	Physical Educator n=53	Education ² n=547	Physical therapist n=57	Occupational Therapist n=146	Pediatrician n=53	Health ³ n=256
<i>Common motor features in DCD</i>								
- Motor learning difficulties	77.0	68.8	84.9	70.3	92.9	95.8	77.3	91.4
- Difficulty writing	79.3	73.0	84.9	74.2	85.9	95.8	79.2	90.2
- Gross motor and fine motor skills delay	79.3	71.8	86.7	73.3	92.9	97.2	77.3	92.1
<i>Non-motor features common in DCD</i>								
- Low self-esteem	67.2	57.8	73.5	59.4	77.1	93.8	64.1	83.9
- Poor physical conditioning	67.1	60.1	73.5	61.4	77.1	84.9	66.0	79.2
- Sensory processing problems	70.7	63.5	75.4	64.7	82.4	88.3	71.6	83.5
- Anxiety	66.5	57.8	64.1	58.5	77.1	87.6	79.2	83.5
- Difficulty making friends	58.9	50.2	58.4	51.0	71.9	80.8	66.0	75.7
- Poor social skills	60.0	52.4	64.1	53.5	77.1	74.7	67.9	73.8
- Depression	54.9	50.4	47.1	50.0	64.9	67.8	58.4	65.2
<i>Features that can be part of the DCD</i>								
- Poor academic performance	70.6	64.3	71.6	65.0	75.4	87.6	75.4	82.4
- Average cognitive ability	45.3	41.7	45.2	43.8	47.3	57.5	43.3	52.3
- Below-average cognitive ability	53.1	53.0	66.0	54.2	52.6	51.3	47.1	50.7
- Low cardiorespiratory fitness	43.8	39.8	62.2	42.0	54.3	44.5	49.0	47.6
- Overweight	46.4	41.9	58.4	43.5	49.1	52.7	56.6	52.7

¹Sum of all professional categories, ²Sum of Teacher and Physical Education Teacher, ³Sum of Physiotherapist, Occupational Therapist and Pediatrician.

Despite meeting the minimum expected response rate for the study's viability, the number of pediatricians, physiotherapists, and physical educators was relatively small. Considering that we distributed the survey through several class-representative institutions, the limited response suggests a lack of interest in DCD among these Brazilian professionals. However, it is important to acknowledge that factors such as a lack of research tradition, professional concerns about exposure, and demanding work routines may have potentially influenced their motivation to participate in the survey.

Within the list of 17 common neurodevelopmental conditions, DCD ranks 15th, with 56.7% of the total sample indicating some level of familiarity with the condition. This positioning as one of the least known conditions aligns with international studies that highlight the relatively lower recognition of DCD compared to other health conditions (Wilson et al., 2012; Hunt et al., 2021; Sakar & Monisha, 2021; Meachon et al., 2023). However, health professionals assert more knowledge about DCD (72.6%) compared to education professionals (49.1%). Among health professionals, occupational therapists stand out with the highest claimed awareness of the disorder (82.2%), followed by 73.7% of physiotherapists and 45.3% of pediatricians. The fact that the authors are occupational therapists with several publications on DCD may have exposed the survey to professionals who already follow their work and are more aware of this disorder.

The length of professional experience was not related to the level of knowledge about DCD, which means that learning about DCD is something fortuitous, as it is not taught at school in Brazil and depends on the individual's interest. It is worrying that few health professionals have ever raised the hypothesis that a child has DCD and few pediatricians have ever diagnosed the disorder, which suggests that the condition is underdiagnosed.

Although the use of the term DCD has been recommended since 1994 (Polatajko et al., 1995; Blank et al., 2019), as in Canada (39%), Australia (53%) and India (95%) (Wilson et al., 2012; Hunt et al., 2021; Sakar & Monisha), the term "motor learning disability" is more familiar to Brazilian professionals (80%) than DCD (57%). In contrast to international studies (Wilson et al., 2012; Hunt et al., 2021; Sakar & Monisha, 2021; Meachon et al., 2023; Smith et al., 2019), the term "dyspraxia" is less recognized by Brazilian professionals (42%) and is rarely used in clinical practice. This inconsistency in terminology, still observed in different studies (Meachon et al., 2023; Licari et al., 2021), poses a challenge in achieving accurate diagnosis and appropriate treatment of DCD.

In line with findings from Canada (Wilson et al., 2012) and Australia (Hunt et al., 2021), Brazilian professionals exhibit greater familiarity with the motor characteristics of DCD, with correct identification rates ranging from 77% to 79% of the overall sample, surpassing their recognition of non-motor characteristics. However, Brazilian professionals seem to be more aware of the non-motor characteristics of DCD in comparison to studies from other countries.

A bibliometric review of studies conducted on children with DCD over the past two decades revealed that "clumsiness," "clumsy children," and "motor skills" are the most frequently used keywords (Wu et al., 2021). Indeed, motor deficits and

performance deficits constitute the core of DCD, and studies focusing on other important outcomes and long-term effects on adult life are more recent, which may explain the more frequent identification of motor characteristics by professionals. It should be noted that children with motor difficulties alone tend to be diagnosed later (on average at 12 months) than children with co-occurring conditions such as apraxia of speech, ADHD, and autism spectrum disorder (ASD) (Licari et al., 2021). Consequently, children with an isolated diagnosis of DCD may have fewer opportunities to access intervention.

The failure of professionals to connect observed motor signs in children and adolescents with the possibility of DCD may impede access to diagnosis. Both education and health professionals reported meeting children and adolescents without a diagnosis but showing indicative signs. Winson & Fourie (2020) underscore the role of elementary school teachers in identifying DCD by observing students' behavior and recognizing both motor and non-motor characteristics. Teachers can provide crucial support in the classroom and facilitate necessary referrals for diagnosis (Winson & Fourie, 2020).

Despite recognizing DCD characteristics, only 57% of health professionals report identifying a probable case, and just 17% of pediatricians have diagnosed DCD. The study also reveals that most pediatricians find the DSM-5 diagnostic criteria unclear, and many are unfamiliar with specific motor assessments for DCD. Only one pediatrician reported using standardized assessments in the diagnostic process.

Over the past two decades, consensus meetings and international task forces have provided guidelines to define, diagnose, assess, and intervene with individuals with DCD (Polatajko et al., 1995; Blank et al., 2019; Blank et al., 2012). Despite these efforts, studies from various countries consistently highlight the ongoing need for greater awareness of DCD (Hunt et al., 2021; Sakar & Monisha, 2021; Meachon et al., 2023; Karkling et al., 2017; Smith et al., 2019; Soriano et al., 2015). This persistent situation prompts reflection on the most effective ways to exchange information, given that there appears to be no direct relation between the increase in the number of publications and a corresponding improvement in professionals' knowledge about DCD (Wu et al., 2021).

Canadian studies using knowledge translation strategies with physiotherapists (Camden et al., 2015), interdisciplinary team (Schell et al., 2020), and physicians (Gaines et al., 2008). resulted in evidence-based practices, better management, and more confidence in diagnosing DCD. Moreover, it is recognized that the involvement of people with lived experience, such as children and youth with DCD and their family, is crucial in disseminating information and transferring research findings into practice (Vat et al., 2017). The challenge in Brazil lies in actively engaging people (society and government) and obtaining funding for such actions.

Limitations of the study include a relatively small pool of participants, mostly from Minas Gerais, Brazil, where access to health care and education is better, which limits the generalizability of the results. As participants were recruited through professional institutions and social networks, the response rate could not be calculated, leaving uncertainty about whether lack of interest or limited access influenced participation.

Conclusions

The study reveals that DCD is one of the neurodevelopmental conditions least known by Brazilian health and education professionals. In Brazil, alternative terms such as "motor learning deficit" are more commonly used than DCD itself. Furthermore, professionals tend to have a better understanding of the motor characteristics of the disorder than the non-motor characteristics. Given the crucial role of these professionals in identifying and diagnosing DCD, the fact that only 57% are familiar with the condition emphasizes the need for increased awareness. Implementing knowledge translation strategies is essential to educate professionals about DCD. Involving people with DCD in this endeavor as well as in research, can make its results more meaningful to both professionals and the wider community.

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Author's Contributions

The authors of the article had equal participation in study design, data collection, analysis and interpretation, manuscript writing and revision. Study supervision: Lívia de Castro Magalhães. All authors approved the final version of the article.

Data Availability

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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