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REVIEW

The Academic, Psychological, and Physical Impact of Motor Skills Difficulties on College Students: A Scoping Review

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Abstract

Purpose of Review This scoping review examines the extent and quality of research literature to determine the impact of motor skills difficulties on college or university students. It assesses the adequacy of current institutional supports and identifies opportunities for more inclusive educational practices.

Recent Findings Four databases (PubMed, SCOPUS, PsycINFO, and Web of Science) were searched for English-language studies published since 1970. Eighteen studies met inclusion criteria: 12 empirical, 4 descriptive, and 2 program evaluations. Six papers from the UK addressed support, social isolation, and academic confidence; six Israeli studies focused on handwriting, dysgraphia, and accommodations; three US studies examined physical activity; and single studies from Canada, Sweden, and Italy explored social impact, assessment practices, and self-efficacy. Study selection followed PRISMA-ScR and Arksey and O'Malley's five-stage framework. Findings were qualitatively synthesized.

Summary Students with motor difficulties face challenges in executive functioning, communication, confidence, and daily living. While support is inconsistent, physical activity and person-centred approaches show promise. Early identification and inclusive practices are essential, with future research needed to centre the student voice and adopt longitudinal, strengths-based approaches.

Keywords Motor difficulties · DCD · Dyspraxia · Higher education · Inclusion

Introduction

Inclusive education has become a central focus in higher education policy and practice, both in Ireland and internationally. Institutions are increasingly striving to ensure equitable opportunities for all students, including those with disabilities [1–4]. Initiatives such as Ireland's National Access Plan have been instrumental in promoting participation among underrepresented groups. As a result, there has been a notable rise in students with disabilities, including those with motor difficulties, entering higher education [5]. Despite these advancements, students with motor difficulties remain an under-recognised and often under-supported population in higher education. These students face multifaceted challenges that extend beyond physical limitations, encompassing academic difficulties, social exclusion, and psychological strain [6]. This review aims to explore the academic, psychological, and physical impact of motor difficulties, within the context of higher education.

Motor difficulties encompass a range of challenges related to the coordination and execution of movement, which can significantly hinder everyday functioning, academic performance, and social participation [7]. These difficulties are present in a number of neurodevelopmental and neurological conditions, including Developmental Coordination Disorder (DCD), cerebral palsy (CP), autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), dyslexia, language impairments and certain genetic or chromosomal disorders such as Down syndrome and muscular dystrophy [8, 9]. While motor difficulties can manifest differently across these conditions, this paper focuses specifically on DCD due to its distinct impact on motor coordination and its under-recognition in higher education settings.

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According to the DSM-5 TR (Diagnostic and Statistical Manual of Mental Disorders, 5th edition Text Revision), DCD is characterised by a significantly impaired motor coordination that is below age expectations despite opportunities for learning. These difficulties interfere with daily activities and academic, vocational, or recreational functioning, begin in early development, and are not better explained by intellectual disability, visual impairment, or other neurological conditions [10]. DCD is a neurodevelopmental condition that interferes with routine activities, academic engagement, and social integration [11]. Individuals with DCD frequently contend with co-occurring difficulties in executive function, emotional regulation, and fatigue [12–15]. The most recent and widely reported estimate for the prevalence of DCD is approximately 5–6% of school-aged children. A 2024 meta-analysis synthesizing data from 18 studies concluded that about 5% of children are affected by DCD, with regional variations of around 4–6% [16]. The 2019 International Clinical Guidelines also reference a prevalence of 5–6%, reflecting consistent findings across multiple countries [17]. While prevalence rates in specific studies range widely—from 0.8% to over 13% depending on methods—5–6% remains the consensus benchmark for the general paediatric population [16]. Estimates for the adult population suggest a similar rate of around 5–6%, indicating that motor difficulties often persist into adulthood [16–19].

However, the condition remains poorly understood and under-researched relative to other neurodevelopmental disorders [12, 20]. Obtaining a diagnosis in adulthood can be especially difficult, leading to a lack of appropriate support [12]. Adding to the complexity, DCD frequently co-occurs with other neurodevelopmental conditions such as dyslexia, ADHD, ASD, and language impairments [8, 9]. These overlapping conditions often blur diagnostic boundaries and complicate the identification and support of individuals with DCD [9, 21]. Best practice guidelines now emphasise a holistic, functional approach over categorical diagnoses, advocating for person-centred, context-sensitive interventions [22, 23].

Transitioning to higher education is a significant milestone that brings about academic, social, and personal changes. While many neurotypical students find this transition demanding, it poses even greater challenges for those with motor difficulties. Students with disabilities, including DCD, are more likely to leave their studies early and less likely to attain high academic honours [24]. A supportive and positive first-year experience has been linked to improved retention and long-term outcomes [25]. For students with DCD, the transition to higher education often involves managing new living arrangements, academic responsibilities, and social expectations simultaneously, all of which can present considerable challenges [26]. The accumulation of multiple small yet impactful difficulties—such as struggles with organisation, time management, and daily living tasks—can result in increased stress and a higher risk of academic withdrawal [27]. These challenges are frequently compounded by cognitive and emotional difficulties associated with DCD, creating a complex web of obstacles that can undermine students' ability to adapt and succeed. Social support plays a crucial role during this transition, with evidence showing that strong support networks enhance emotional well-being, resilience, and academic performance [28, 29]. However, students with DCD often report difficulties in forming new peer relationships and feelings of isolation, particularly as the support they once received from family may be reduced when living away from home [30].

Academically, students with DCD may face specific barriers such as poor handwriting, problems with task organisation, and limited time management skills, which hinder performance in fast-paced learning environments. These students tend to experience lower academic confidence and contribute to a greater risk of underachievement compared to their peers [27, 31]. Although many universities provide supports for students with learning differences, these are frequently generic and may not sufficiently address the specific needs of those with motor difficulties. Research indicates that students with DCD are less likely to receive tailored accommodations or disability allowances compared to those with more widely recognised conditions such as dyslexia [27]. In some contexts, including the UK, recent legislative changes have placed greater emphasis on inclusive teaching practices rather than relying solely on individual accommodations [31].

Motor difficulties also significantly affect daily life beyond the classroom. Individuals with DCD often report challenges with self-care, mobility, and organisational tasks, which can lead to reduced independence and heightened frustration [32, 33]. Social participation may also be limited, contributing to feelings of exclusion and diminished self-esteem [34, 35].

Despite the wide-ranging impact of motor difficulties, there remains a lack of awareness among professionals in both educational and healthcare settings. Many students go undiagnosed or unsupported, and their needs can remain invisible in academic environments [36]. Overlapping conditions such as those mentioned above, often blur diagnostic boundaries and complicate the identification and support of individuals with DCD [9, 21]. Best practice guidelines now emphasise a holistic, functional approach over categorical diagnoses, advocating for person-centred, context-sensitive interventions [22, 23]. Greater awareness and a shift toward a strengths-based, inclusive approach are necessary

to address these gaps and ensure that students with motor difficulties receive the recognition and support they need.

Research Objectives

This study seeks to address the academic, psychological, and physical challenges faced by students with motor difficulties in higher education, while assessing the effectiveness of current support systems. It aims to provide actionable recommendations for educators and policymakers to enhance inclusivity and ensure equitable opportunities for all students. Through a comprehensive review of existing literature, the study highlights the need for early identification, tailored interventions, and a move toward a social model of disability that prioritizes strengths and individual potential over diagnostic labels.

In doing so, this research contributes to the growing body of knowledge on how motor difficulties interconnect with educational and social outcomes, offering insights that can guide the development of more inclusive educational systems. By focusing on the unique experiences of students with motor difficulties, this study aims to inform institutional practices and encourage a more equitable academic environment for all learners.

Methods

The methodology outlined in the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist along with the five-stage framework described by Arksey and O'Malley [37] were both used to conduct this scoping review.

Stage 1: Identifying the Research Question(s)

Following a preliminary literature search and author discussions, the primary research question was developed to reflect the population, context and content of the review. What does the literature say about the academic, psychological and physical impact of motor skills on college students, and what knowledge gaps should be addressed in future research?

Stage 2: Identifying Relevant Studies

A comprehensive search of PubMed, SCOPUS, PsycINFO, and Web of Science was conducted on 4th July 2024, with no restrictions on the start date; all studies published up to this date were considered for inclusion. A Research Support Librarian assisted in the development of the specific search strategy. PsycINFO was chosen because it is the most comprehensive database for literature relating to mental health, psychological, and behavioural issues. JBI recommends including PubMed (or Medline) in scoping reviews, and PubMed was also included for its extensive coverage of health-related research. SCOPUS was included because it is a multidisciplinary database to capture material from allied disciplines that could contain relevant studies. Finally, Web of Science was included as it is another high-quality multidisciplinary database with strong indexing across the social sciences, education, and health fields.

The following keywords were used: (Motor difficult* OR coordination difficult* OR movement difficult* OR difficult* with visuo-motor skill* OR difficulties with motor skill* OR motor function difficult* OR "fine motor skill difficult* OR gross motor skill difficult* OR visual motor co ordination difficult* OR development coordination disorder OR " OR DCD OR Dyspraxi* OR Dysgraphi*) AND (university student* OR third level student* OR college student* OR higher education OR further education OR Post secondary school OR third level education).

The search was limited to the English language or papers that have been translated into the English language, human subjects and studies published after 1970. In addition to database searching, prominent authors in the subject area were also contacted to locate any additional relevant studies, and manual searches were performed among the reference lists of the identified studies.

Stage 3: Study Selection

All guidelines identified by the search strategy were initially evaluated against the eligibility criteria by two authors. Studies were eligible if they met the inclusion criteria outlined in Table 1. College or university students were defined as any gender and attending a post-secondary school institution including further and higher education colleges. The inclusion criteria included studies that looked at college students experiencing any kind of motor or movement difficulties and whether these difficulties had an impact on their academic performance and / or physical or psychological wellbeing.

Table 1 Inclusion Criteria

• College or university students with motor difficulties or coordination difficulties (including dyspraxia, developmental coordination disorder, or Dysgraphia)
• Outcome measures of academic performance and/or physical or psychological impact
• All study designs

Stage 4: Charting the Data

The screening of the studies was conducted by 2 reviewers (S.McC.W and D.G.) who independently screened the literature titles and abstracts before comparing results. The second stage involved the independent reviewers (S.McC.W and D.G.) retrieving and screening full text studies, the results were then compared to determine inclusion in the scoping review. Once a final decision had been reached through consensus, the selected studies were included for further analysis in the scoping review. The PRISMA flowchart of the study selection process is summarised in Fig. 1.

Stage 5: Collating, Summarizing and Reporting the Results

The 18 selected studies were not suitable for quantitative synthesis (meta-analysis) because of a lack of homogeneity in terms of study design and data analysis. As a result, a qualitative synthesis was used to summarize and explain the characteristics and findings of the included studies. The format used for the qualitative synthesis included information about the study citation, country in which the study was conducted, description of participants (demographics, information about motor difficulties), and key findings. Two independent reviewers (S.McC.W and D.G.) manually extracted the data of the article using tables created on Microsoft Excel, and results were compared.

Results

Quantitative Analysis

Of the 18 documents included in this scoping review, 12 were empirical studies, 4 were descriptive studies, and 2 were evaluations of programmes / protocols.

A total of 1,266 records were identified after systematically screening the results from the database search. Of these, 110 studies were retrieved for abstract and title review and 39 were retrieved for full-text review. 16 papers were eligible based on the inclusion criteria. 2 more studies were included afterwards following consultation with an international expert in the field. 13 duplicate articles were excluded from the final analysis. The 18 studies were from: US ($N=3$), Israel ($N=6$), UK ($N=6$), Canada ($N=1$), Sweden ($N=1$) and Italy ($N=1$) (see Table 2). The studies were all published in the English language between 2008 and 2023. They are authored by researchers in academic departments in universities as well as practitioners and professionals in the field (e.g. occupational therapists, psychologists). It is important to note that the first study that was found as part of this scoping review was as recent as 2008.

The focus of the 18 studies varies, with most written from the point of view that there is very little awareness and appropriate support for students with motor difficulties. The studies were primarily written for practitioners and disability office staff working with and supporting students with disabilities at third level, as well as academic staff. The purpose of some of these studies was to raise awareness and understanding around specific disabilities such as DCD and Dysgraphia. A total of 15 of the papers discussed the academic impact of motor difficulties, 12 papers looked that the psychological impact and 8 talked about the physical impact.

The 2 studies based in the US addressed physical activity and the 3rd study looked at how motor difficulties can affect many aspects of the student's life. The focus of the 6 papers from Israel was on handwriting difficulties, dysgraphia, typing and keyboarding difficulties, and exam accommodations. The 6 papers from the UK focused on types of supports received, types of courses chosen, social isolation, differences between dyslexia and DCD students, academic confidence, the experiences of medical students with DCD, and academic achievement. 1 paper from Canada investigated the life experiences and the social impact of DCD. 1 paper from Sweden looked at the importance of perceived difficulties, the importance of individualised assessment, and the requirement for less emphasis to be placed on the disability label. Finally, 1 paper from Italy focused on differences in perceived difficulties for students with a Learning Difficulty and those with no Learning Difficulty. They also looked at the implications in terms of self-efficacy beliefs of students with a Learning Difficulty.

Qualitative Analysis

Academic Impact

The information extracted from 15 studies that discussed the academic impact of motor difficulties on students was analysed and themed into 5 specific areas. These themes outline the primary challenges, coping mechanisms, and systemic factors that have been found to influence the academic experiences of students with motor difficulties, highlighting areas where additional support and inclusive practices are crucial.

Attention, Focus, and Executive Functioning Keener [39] reported how Physical activity (PA) for Autistic students, many of whom reported significant motor coordination difficulties, can help mitigate challenges related to attention, focus, and executive functioning (EF), thus improving

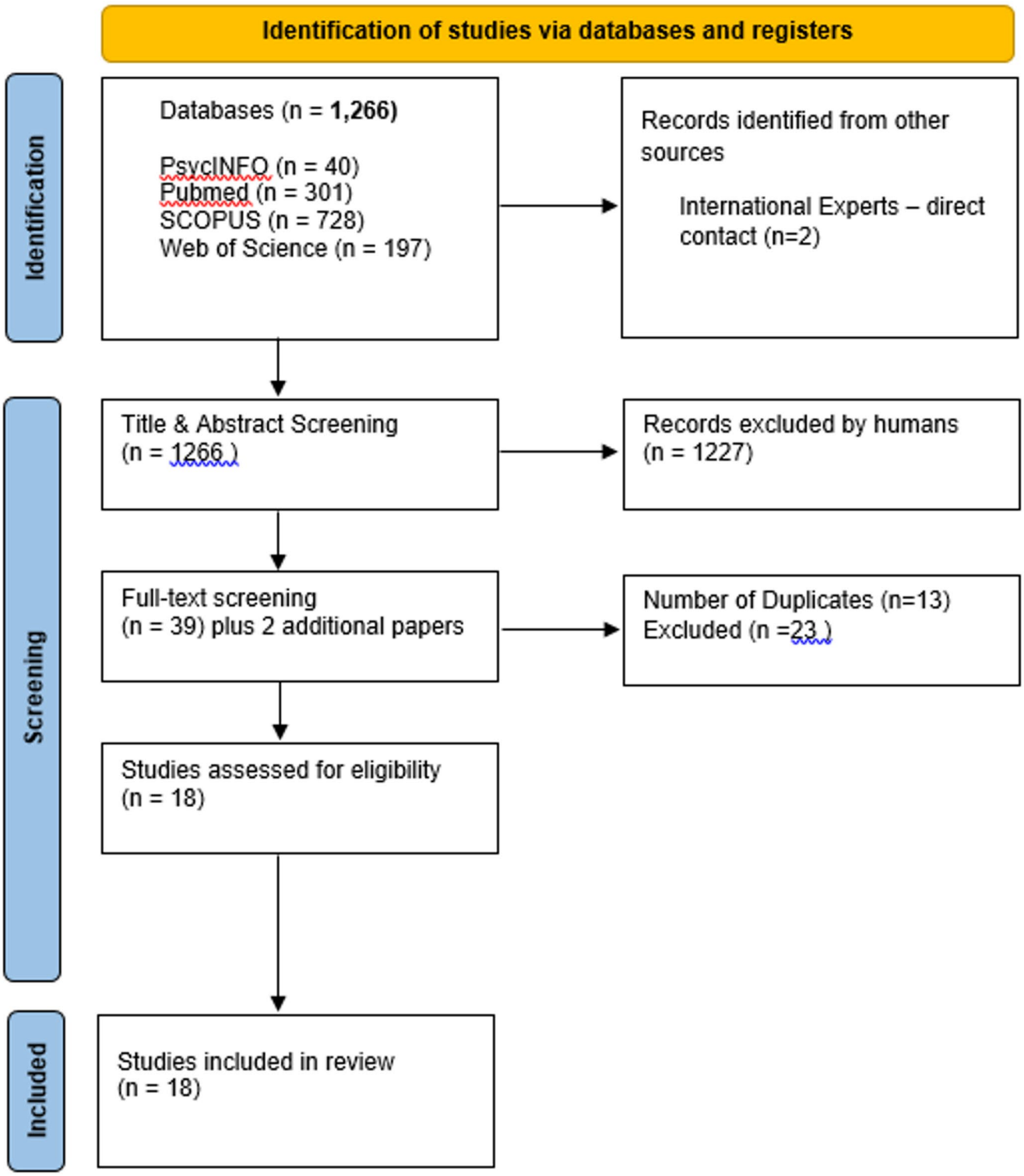

Fig. 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for scoping reviews flow chart [38]

Table 2 Number of papers from each country and some of the common areas investigated

Country	Number of papers	Some common themes within the papers
US	3 papers	Physical activity and how motor difficulties affect many aspects of the student's life
Israel	6 papers	Handwriting, dysgraphia, typing and keyboarding, exam accommodations
UK	6 papers	Types of supports received, type of course chosen, social isolation, differences between dyslexia and developmental coordination disorder (DCD), academic confidence, experiences of medical students with DCD, academic achievement
Canada	1 paper	Life experiences, social impact of DCD
Sweden	1 paper	Importance of perceived difficulties and individualized assessment - less emphasis needed on disability label
Italy	1 paper	Differences in perceived difficulties for learning difficulty (LD) and no LD and the implications in terms of self-efficacy beliefs of students with an LD

their academic achievement at college. Another study by Southon [40] demonstrated how students with high levels of ADHD or DCD traits and poor executive functioning skills are more at risk of lower academic achievement.

Academic Skills and Written Communication Students with dysgraphia, dyslexia, and motor difficulties often struggle with spelling, punctuation, and the organization of their ideas. These difficulties can be compounded by low confidence in asking for accommodations [31, 41]. According to Kirby et al. [30] motor challenges increase as academic demands grow, particularly for students with DCD, who may avoid certain subjects due to the motor skills required (e.g., physical science and health). Dysgraphia and DCD impact both handwriting and typing speed, often leaving these students at a disadvantage compared to their peers. It was also found that these students demonstrated less accuracy both in the final product and during the actual process of typing [42, 43]. Specific learning disabilities (SLDs) like dyslexia and dysgraphia, may require extended time, assistive technology, and accommodations like keyboarding, though this is not always a full solution [43, 44].

Confidence, Self-Esteem, and Academic Engagement Students with dyslexia and DCD report lower academic confidence compared to non-SpLD students [31]. Griffin & Pollak [45] provided insights from neurodiverse students in Higher Education looking at the treatment by educational staff and how this significantly influences students' self-esteem and academic engagement. According to the students who were interviewed in this study, negative interactions can worsen self-confidence and make academic tasks feel overwhelming, whereas supportive mentors encourage resilience and coping mechanisms.

Use of Assistive Technology and Accommodations Typing and touch-typing programs help students with writing difficulties, providing an alternative to handwriting and supporting students to match their peers' speed [46]. Despite accommodations, students with both handwriting and keyboarding difficulties may still struggle due to additional linguistic processing challenges and accommodations like extended time and keyboarding support are essential, although effectiveness varies with individual needs [43].

Institutional Support and Inclusivity Students with motor difficulties often continue to require sustained support across their academic careers, especially in handwriting-intensive tasks. Varied institutional support highlights inconsistent awareness and understanding of neurodiversity among staff. While some students receive meaningful support, others face a lack of coordination and understanding, impacting their academic confidence and career planning [45].

Psychological Impact

The information extracted from 12 studies that discussed the psychological impact of motor difficulties on students was analysed and themed into 3 specific areas. These three themes highlight the complexities of being able to manage and understand social participation, emotional well-being, and self-identity for neurodivergent students.

Social Participation and Relationships Students with DCD often experience social isolation, feeling left out or describing themselves as "a loner" [45]. These students often face persistent challenges with daily living, organization, and time management, leading to greater reliance on parental support and increased risk of social isolation [30]. Keener [39] looked at physical activity experiences for neurodiverse learners and found that social physical activities had mixed impacts: while some neurodivergent students avoided it due to having being bullied in the past, others found it helpful for building social skills, friendships, and confidence. It seems that college fitness programs and peer

mentoring offer supportive environments that can enhance social interaction, a sense of belonging, and emotional well-being [39, 47].

Emotional Well-Being and Mental Health Neurodivergent students frequently face emotional challenges such as anxiety, frustration, low self-esteem, and feelings of isolation [30, 45, 48]. In a few studies, participants reported the negative impact of criticism, bullying, and stigma on their mental health and self-image. Some, however, used this adversity as motivation to succeed and prove others wrong [36, 45]. Physical activity participation was associated with improved emotional well-being and mental health, providing a coping mechanism for stress [39, 47].

Self-Image, Confidence, and Coping Some students with neurodivergence struggle with imposter syndrome, low confidence, and difficulties disclosing their challenges to peers or staff [41]. A focus on strengths and adopting a "difference" perspective may help some students view their neurodivergence more positively [43]. Developing coping strategies during adolescence and adulthood helped participants navigate [36].

Physical Impact

The information extracted from 8 studies that discussed the physical impact of motor difficulties on students was analysed and themed into 4 specific areas. These themes outline the physical impact of motor difficulties and highlight the interplay between challenges, benefits, support needs, and coping strategies:

Health Benefits of Physical Activity Physical activity improves overall health and is often used as a strategy to manage neurodiverse conditions [39]. Physical activity also enhances cardiorespiratory fitness, muscular endurance, flexibility, and fosters a sense of belonging [47].

Physical Challenges Related to Motor Conditions Dysgraphia, a condition specifically affecting handwriting, can cause pain that interferes with academic work and motor-related daily activities [6, 41]. Difficulties in visual-motor spatial organization further impact self-care, work, and leisure tasks [6]. Similarly, individuals with developmental coordination disorder (DCD) face significant challenges with organizational skills and coordination [30]. Moreover, handwriting performance time is closely linked to overall functional abilities in daily life [48].

Support Needs for Individuals Pain, fatigue, and physical limitations often interfere with activities such as writing, cleaning, and cooking [32]. Students with mobility or motor disabilities have a greater need for support in completing daily tasks, yet many do not receive adequate assistance [32].

Coping Strategies and Adaptations Slowing down may help individuals with coordination challenges manage clumsiness and improve memory retention [44]. Regular engagement in physical activity builds competence in motor skills and understanding of exercise techniques [47].

Please see Table 3 *below for "Charting the data" summary of the 18 studies*.

Discussion

This scoping review explored the academic, psychological, and physical impacts of motor difficulties on students in further and higher education by synthesising findings from 18 international studies. Notably, the earliest identified study was published in 2008, underscoring the relatively recent attention given to this area and the pressing need for further research. Despite variation in geographic focus—particularly between Israel and the UK—a consistent theme emerged across the literature: students with motor difficulties face significant barriers in higher education settings, often compounded by a lack of awareness, inconsistent support, and institutional practices that struggle to accommodate their unique needs.

The studies reviewed revealed that academic challenges are multifaceted and closely tied to motor impairments. Students often experience difficulties with handwriting and typing speed, organisation, and task completion, all of which contribute to reduced academic confidence and heightened frustration [30, 42, 44]. While accommodations such as assistive technologies and extra time can be beneficial, their effectiveness depends heavily on timely identification and individualised implementation [49] Institutional inconsistencies in the provision of such supports leave many students feeling overlooked or unsupported, further exacerbating academic strain. Crucially, where staff demonstrate understanding and proactively engage in inclusive practices, students report greater resilience and academic

Table 3 Summary of Charting Data for the 18 papers selected

Title, Author, Year, Country	Aims and Purpose of the study	Population, Sample Size & Gender	Main Themes
1. *Physical Activity Experiences of Young Adults Attending a College for Neurodiverse Learners* Keener, E. (2022) **US**	To examine the physical activity experiences of young adults attending an Institute of Higher Education for Neurodiverse Learners (IHENL)	10 IHENL students (18–24 years) 6 male, 4 female recruited through purposive sampling., self-identified as neurodivergent, current/past participants in IHENL Fitness & Recreation programs.	PA enhances attention, focus, and social skills while improving health and managing neurodiverse conditions. Inclusive programs in HEIs are vital for accessibility and support.
2. *The four-year college experience of one student with multiple learning disabilities*. Hadley (2016) **US**	To examine the college experience of one student (M) with multiple LD including dyslexia, dysgraphia and ADHD	10 first-year students with LDs (8 Female, 2 Male), selected from a class of 26 (16 Female, 10 Male). Focus on "Mitchell," diagnosed with dyslexia, ADHD, and dysgraphia.	M faced challenges with dysgraphia, confidence, and support, impacting academics. Collaboration and internships are recommended for workplace readiness
3. *Motor functions of higher education students with dysgraphia* Tal Saban & Weintraub (2019) **Israel**	Examines motor skill difficulties in HE students with/without dysgraphia and their impact on handwriting.	***N*=82 students** (a) **NDD** ($n=34$, M age=24.9, 82% male, 74% RH); (b) **Dysgraphia–Legibility** ($n=38$, M age=24.4, 76% male, 89% RH); (c) **Dysgraphia–Legibility+Speed** ($n=10$, M age=24.3, 90% male, 70% RH). Dysgraphia diagnosed by poor legibility (b) or legibility+speed (c). ADHD (via ASRS): 16–19% in dysgraphia groups.	HE students with dysgraphia require ongoing academic and daily life support. Motor difficulties persist into adulthood, linking handwriting and motor function challenges.
4. *Dyslexia and Developmental Co-ordination Disorder in Further and Higher Education—Similarities and Differences. Does the 'Label' Influence the Support Given?* Kirby et al. (2008) **UK**	Examines characteristics and support variations for FE/HE students with DCD, dyslexia, or both.	79 FE and HE students (16–24 years) 48 male, 26 female. Self-reported having coordination difficulties since childhood with either a diagnosis of DCD, dyslexia, or a combination of both.	DCD students face significant organizational challenges, often requiring parental support and experiencing greater difficulties than those with dyslexia.
5. *Developmental co-ordination disorder (DCD) in adolescents and adults in further and higher education* Kirby et al. (2008) **UK**	To examine differences in students presenting with a diagnosis of DCD, DCD plus other diagnoses, dyslexia, and with no diagnosis.	93 FE and HE students (16–25 years) 38 male, 53 female who reported having co-ordination difficulties since childhood	DCD students face intensified motor challenges, social isolation, and persistent coordination and executive function issues, with females often receiving less support.
6. *Examining academic confidence and study support needs for university students with dyslexia and/or developmental coordination disorder* Sumner et al. (2020) **UK**	Evaluates the ABC scale's ability to differentiate SpLD types and examines support received and views on inclusive teaching.	367 students (18 - >50) 97 male, 258 female 163 with dyslexia, 50 with DCD, 62 with dyslexia/DCD, and 92 non-SpLD. Request was sent to the disability offices in 106 universities across UK	Dyslexia/DCD students showed lower confidence, with DCD students facing greater behavioral and social challenges. Limited awareness of DCD highlights its lifelong impact.
7. *Life Experiences of Young Adults Who have Coordination* Difficulties Missiuna et al. (2008) **Canada**	Explores the impact of coordination difficulties on adolescence across education, work, leisure, and social life.	9 participants (19–26 years) 4 male, 5 female. A diagnosis of DCD was not a prerequisite for inclusion. Participants needed to have significant coordination difficulties during childhood or adolescence, normal intellectual ability, & coordination difficulties could not be due to a medical condition	Social context shaped self-image; despite motor skill challenges, participants developed coping strategies and created positive environments. Coordination difficulties persist but lessen in impact with maturity
8. *The experiences of foundation doctors with dyspraxia: A phenomenological study* Walker et al. (2021) **UK**	To explore the experiences of foundation doctors with dyspraxia through medical school and foundation school?	Junior doctors with dyspraxia (JDWD)were invited to participate. 3 student doctors in first year of training (no age given) 3 male, 0 female	Supportive mentors aid JDWD, who are determined to excel despite stigma, balancing strengths and challenges with effective coping strategies.

Table 3 (continued)

Title, Author, Year, Country	Aims and Purpose of the study	Population, Sample Size & Gender	Main Themes
9. *A Peer Mentored Physical Activity Intervention: An Emerging Practice for Autistic College Students* Todd et al. (2019) **US**	Develop a physical activity program to improve motor skills in autistic adults, promoting regular exercise, fitness, and overall health.	16 students (18–28 years) 13 male, 3 female. Students who were autistic, at least 18 years of age, enrolled in college, and able to participate in moderate to vigorous physical activity were eligible.	Peer mentors fostered belonging and positive experiences. IFiT participants improved fitness, motor skills, health, sleep, and energy.
10. *The relationship between executive function, neurodevelopmental disorder traits, and academic achievement in university students* Southon (2022) **UK**	Explores how ASD, ADHD, and DCD traits predict academic achievement and affect the relationship between executive function and performance.	158 students (18–47 years) 17 male: 138 female; 3 other. 21 at least one neurodevelopmental condition; 9 (Autism); 9 (ADHD), 2 (ADD); 7 (dyslexia), 1 (dyspraxia); 6 (co-occurring ND disorders); $N=137$ were neurotypical, a majority non-clinical sample. Participants had to be university students aged 18 and above. PhD students were not included.	ASD traits posed no academic risk, but ADHD/DCD traits with poor executive function increased risk of lower achievement; High neurodevelopmental traits without diagnosis may pose less academic risk than clinical diagnoses, contrary to initial hypothesis
11. *Typing Performance and Technique of Higher Education Students with Specific Learning Disorders* Abecassis et al. (2023) Israel	Investigates typing performance and processes in students with SLD to understand and explain their slower typing speeds.	35 students with SLD (54.3% male, 77.2% first-year) and 30 TD students (43.3% male, 80% first-year) recruited via convenience sampling from 3 Israeli HEIs; aged 18–30, Hebrew-speaking; SLD group had DSM-5 diagnosis and reading/writing difficulties; TD group excluded if learning difficulties or low literacy scores; comorbid ADHD allowed	Findings revealed significantly slower typing speed among students with SLD than their TD peers; nan; nan; This study's findings showed that higher education students with SLD exhibited slower and less accurate typing performance than their TD counterparts and exhibited a less proficient typing technique
12. *Keyboarding Difficulties: Frequency and Characteristics among Higher Education Students with Handwriting Difficulties* Rosenberg & Weintraub (2020) **Israel**	Examines the prevalence of KD in students with HD and the functional differences between those with and without KD.	90 HE students (50 SLD + HD, 40 TD), aged 18–33, mostly first-year; no prior keyboarding instruction; recruited via convenience sampling. Inclusion: no recent upper limb/back issues, no meds affecting motor function (except ADHD meds). SLD + HD group had self-reported childhood diagnosis and standardized HD; TD group had no diagnosis, no test accommodations, and typical performance	The study finds that while most students with handwriting difficulties (HD) have adequate keyboarding speed, a subgroup (HDKD) struggles with both handwriting and keyboarding; nan; nan; Theoretically, these results support models suggesting that handwriting and keyboarding share linguistic processes
13. *Students with disabilities in higher education - perceptions of support needs and received support: a pilot study* Simmeborn-Fleischer et al. (2013) **Sweden**	Assesses methods for studying functional issues in students with disabilities and compares challenges in AS to individual differences.	34 HE students (AS = 16, MD = 11, HD = 7), aged 22–52 (26 F, 8 M), recruited via disability coordinators at 12 Swedish universities (of 52 contacted). All had applied for pedagogic support; most enrolled in professional programs. Recruitment involved coordinators; direct student contact was not permitted	The students with AS and MD, to a higher extent compared with students with HD, reported that they had a need for support to successfully complete tasks and chores, but only one student was supported; The results of this study showed that to succeed in HE, students with AS, MD and HD need support both in their daily life activities and their student life
14. *The effect of a touch-typing program on keyboarding skills of higher education students with and without learning disabilities* Weigelt Marom & Weintraub (2015) **Israel**	Examines improvements in keyboarding speed and accuracy after a touch-typing program and its efficacy immediately and 3 months later for students with LD vs. peers.	74 HE students (44 LD, 30 No LD), aged 20–37, from 4 Israeli institutions; 78% first-year, 88% in humanities/social sciences. LD group: 25% reading, 40.9% handwriting, 34.1% both; 20% female. No LD group: 60% female. All graduated from regular education high schools	The study highlights touch-typing programs as effective for students with learning and writing disabilities, helping them approach peers' typing speeds and addressing handwriting challenges, particularly in higher education.
15. *Difficulty in writing perceived by university students: A comparison of inaccurate writers with and without diagnostic certification* Malagoli et al. (2021) **Italy**	Compares inaccurate writing performance and self-perceived challenges in students with and without LDs to identify their most difficult tasks.	From 639 Italian university students (mean age 22.15), two groups were selected: 48 with writing scores < 5th percentile and 51 with prior LD diagnoses (dyslexia, dysgraphia, dysorthography). Recruited via voluntary participation in classes across 7 universities (scientific and humanities). Equal gender split in each group. All over 18 years.	Students with LDs often compensate well but struggle with high cognitive load tasks. They report greater perceived difficulties, highlighting the need for interventions addressing cognitive challenges and emotional impacts to improve outcomes like career paths and education retention.

Table 3 (continued)

Title, Author, Year, Country	Aims and Purpose of the study	Population, Sample Size & Gender	Main Themes
16. *Reliability and preliminary outcomes of a protocol for selection of test accommodations for higher education students with Dysgraphia: A pilot study* (Rosenberg-Adler & Weintraub, 2020) **Israel**	To establish a relaibale, valid, evidence-based protocol for selecting individually tailored test accommodations for students with dysgraphia.	25 Israeli university students (88% male, mean age 24.9), mostly first-year, recruited via campus LD support unit. All had prior LD diagnosis and standardized evidence of dysgraphia; 52% also had reading difficulties. Convenience sample; exclusions included recent physical conditions or non-ADHD medication affecting motor function	Most students ($n=20$) had poor legibility, and 10 also had slow handwriting; nan; nan; The selection of an appropriate accommodation for students with dysgraphia should be based on standardized tests, be tailored to each student's writing abilities, and follow a systematic process
17. *Handwriting measures as reflectors of executive functions among adults with Developmental Coordination Disorders (DCD)* Rosenblum (2013) **Israel**	Compares handwriting and organizational skills in students with DCD and controls, exploring handwriting's role in predicting daily planning abilities.	60 Hebrew-speaking students (30 DCD/self-reported motor impairments, 30 matched controls), aged 24–41; 67% female. No vision/hearing issues. 43% of DCD group reported frequent handwriting difficulties vs. 3% in controls; 69% of controls vs. 40% of DCD group reported no handwriting difficulties	The study finds that 43% of students with DCD struggle with handwriting, impacting well-being and daily functioning, with EF deficits linked to motor coordination challenges.
18. *Student experiences of neurodiversity in higher education: insights from the BRAINHE project* Griffin & Pollak (2009) **UK**	Explores identity development, shared experiences, and support implications for neurologically diverse HE students.	27 UK university students/graduates (14 M, 13 F; mean age 30), recruited via university disability services and DANDA. All reported single ($n=18$) or multiple ($n=9$) neurodiversity. Majority White/British. 8 had graduated and were employed; interviews focused on student and work experiences	Participants faced poor treatment and inconsistent support, impacting confidence and career outlook; Participants felt isolated and unfavorably different, facing bullying, anxiety, and social challenges;; Nearly half viewed LDs as medical deficits, using terms like 'suffering

engagement—highlighting the importance of targeted staff training and awareness.

The psychological impact of motor difficulties is also significant. Students commonly report social isolation, anxiety, low self-esteem, and imposter syndrome—often stemming from years of under recognition and misunderstanding of their needs. While interventions such as peer mentoring, counselling, and physical activity programs have shown potential to alleviate some of these effects by promoting social connection and self-confidence, participation can be hindered by past negative experiences, including bullying. Additionally, many students feel pressure to mask their difficulties to avoid stigma, which further isolates them from potential sources of support. These findings suggest a critical need to reframe neurodivergence in more positive terms and to embed strength-based approaches into institutional culture and student services.

From a physical perspective, students with motor difficulties frequently report pain, fatigue, coordination challenges, and slower execution of tasks, which interfere with both daily living and academic functioning. Many rely on continuous support with tasks such as self-care, cooking, and managing assignments. However, support provision is often sporadic and difficult to access. Research suggests that regular physical activity, targeted motor skill training, and the development of practical coping strategies can enhance overall functioning and quality of life. Research suggests that regular physical activity, targeted motor skill training, and the development of practical coping strategies can enhance overall functioning and quality of life [50]. These findings reinforce the value of holistic and person-centred interventions that account for physical, cognitive, and emotional well-being.

The transition to independent living presents additional challenges for students with motor difficulties, particularly in terms of executive functioning. Difficulties with time management, cooking, budgeting, and organisation are common, and these everyday demands can become overwhelming when layered on top of academic expectations. Tal-Saban and Kirby [27] emphasise the importance of providing targeted support in areas such as functional living skills and physical fitness to reduce fatigue and promote independence. The ongoing role of parents during this transition is also highlighted, as many continue to provide informal scaffolding well into adulthood—an area that remains underexplored in research and practice.

A further key theme arising from this review is the persistence of a medical model of disability in many higher education institutions. Supports are often contingent on formal diagnosis, meaning that students with significant motor difficulties—but without a clinical label—may not receive the help they need. This is particularly concerning given the

known challenges in diagnosing conditions such as DCD in adulthood. Kirby et al. [27] argue for a shift toward a social model of disability and recommend the use of an initial strengths-and-weaknesses profile for all students entering university to identify potential needs early. Such a proactive approach could promote greater inclusivity and reduce the reliance on formal diagnostic pathways as the gateway to support.

Ultimately, the findings of this review point to the need for systemic changes in how institutions identify, understand, and support students with motor difficulties. Early screening, accessible and individualised accommodations, and integrated physical activity and peer mentoring programs can form the foundation of effective support systems. Importantly, adopting a strengths-based model—one that focuses on students' capabilities rather than their limitations—can help to foster more positive educational experiences and outcomes. As research by Fastame et al. [22] and De Bruijn et al. [51] suggests, combining cognitive and motor interventions offers promising potential for improving academic performance and psychosocial well-being, particularly given the high rates of co-occurrence between motor difficulties and other neurodevelopmental conditions. These insights underscore the need for collaborative, multidimensional approaches that place student strengths and lived experiences at the centre of educational practice.

Implications and Recommendations

The findings highlight several areas for intervention:

1. ***Customized Accommodations***: Personalized strategies for written communication and assistive technology are essential to meet diverse student needs.
2. ***Institutional Inclusivity***: Staff training and awareness initiatives can help understanding and provide more consistent, meaningful support for students with motor difficulties.
3. ***Strength-Based Approaches***: Encouraging a positive reframing of neurodivergence can boost confidence and resilience among students.
4. ***Physical Activity Programs***: Developing initiatives that combine physical and social benefits can improve fitness, well-being, and social engagement, and ultimately academic success.

Limitations

The study addresses a critical gap by concentrating on motor difficulties in further and higher education settings, where academic demands and independence requirements intensify for students. This study integrates findings from 18 research papers across multiple domains—academic, psychological, and physical—providing a holistic view of the challenges faced by students with motor difficulties. However, the majority of studies were conducted in Israel (6) and the UK (6) leading to potential cultural or systemic biases that may not reflect the experiences of students with motor difficulties in other countries. The study identifies actionable strategies and recommendations, such as tailored accommodations, strength-based approaches, and the promotion of physical activity, offering practical guidance for educators and policymakers. However, a wide range of topics was addressed, from handwriting challenges to psychological well-being, making it difficult to draw unified conclusions or prioritize specific interventions. Most of the included studies did not assess the long-term impacts of motor difficulties or interventions, making it challenging to evaluate how support strategies affect academic, psychological, and physical outcomes over time. The inclusion criteria in many of the studies favoured students with formal diagnoses, potentially excluding those with undiagnosed or less severe motor difficulties but who still face significant challenges, reflecting a medical model of disability. This focus may have overlooked broader, inclusive strategies aligned with the social model of disability. The role of parents and faculty in supporting students was acknowledged but not deeply examined, limiting insights into how their attitudes, training, and involvement affect student outcomes. Addressing these limitations in future research would provide a more comprehensive understanding of the challenges and potential solutions for students with motor difficulties in higher education. By addressing topics such as exam accommodations, assistive technology, and the transition to independent living, the study is highly relevant to ongoing efforts to improve accessibility and inclusivity in education.

Conclusions

This scoping review highlights the significant academic, psychological, and physical challenges faced by students with motor difficulties in higher education. Despite promising interventions—such as assistive technology, physical activity programs, and strengths-based approaches—support remains inconsistent and largely tied to formal diagnoses. A shift toward a social model of disability, early identification, and inclusive institutional practices is essential to address the complex, interconnected needs of this population. Future efforts should prioritise tailored, person-centred interventions and systemic change to foster meaningful inclusion and long-term student success. Further research should include both quantitative and qualitative approaches that capture the lived experiences of students, giving voice

to their stories and uncovering nuanced insights into their support needs.

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