

The Role of Nursing in Supporting the Daily Living Activities of Children with Developmental Coordination Disorder

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ABSTRACT

Background: Traditional nursing intervention often lacks structured engagement, limiting their effectiveness in promoting its objectives. Task-oriented Training (TOT) has emerged as an evidence-based strategy to improve motor coordination skills in children with Developmental Coordination Disorder (DCD). Despite the growing recognition of task-oriented nursing intervention programs, there remains a notable research gap concerning their long-term effects. **Objectives:** This nursing investigation objective to enhance motor skills of daily living activities for children with DCD. **Methods:** This quasi-experimental study employed baseline data and follow-ups for 10 weeks post-training, conducted in primary public schools, Baghdad City. A non-random sample of 64 children with DCD was allocated into control and intervention groups. The intervention group received motor skills training, in contrast, the control group adhere to the standard daily educational schedule only. The enhancement of motor skills was measured by DCD Daily Q. The study is scheduled from November 17th, 2024, to January 23rd, 2025. Data were analysed using descriptive and inferential statistics. **Results:** The intervention group exhibited significant improvements in motor skills related to daily living tasks post-training, compared to the control group at p value 0.001. **Conclusion:** The task-oriented motor training program showed significantly enhances in motor skills and independence in children with DCD, highlighting the need for its implementation in healthcare settings, particularly for nurses aiding children in educational and therapeutic contexts.

Keywords: Daily Living Activities; Developmental Coordination Disorder; Fine and Gross Motor Skills; Paediatric Nurses; Task-Oriented Program

INTRODUCTION

Developmental Coordination Disorder (DCD) is a neurodevelopmental disorder that impairs motor coordination in children, leading to clumsy movements and difficulties in motor skill acquisition (Smits-Engelsman & Verbecque, 2022). Efforts have been made to create a standardised terminology for such conditions through medical criteria, symposiums, and literature. The DSM-V classifies DCD as a neurodevelopmental disorder with specific diagnostic criteria established as of 2013 (Blackman, 2016; Simó, 2022).

The prevalence of DCD in children is estimated at 2% to 20%, with a recognised international average of 5-6% (Blank *et al.*, 2019; Cavalcante Neto *et al.*, 2020, 2021; Subara-Zukic *et al.*, 2022; Wilson *et al.*, 2017), and males are diagnosed more frequently than females, with ratios ranging from 2:1 to 7:1 (Li *et al.*, 2024; Simó, 2022). Additionally, DCD can persist into adulthood for 30-70% of those affected (Saban & Kirby, 2018).

Developmental Coordination Disorder (DCD) is marked by deficits in gross and fine motor skills, leading to clumsiness and difficulties with tasks such as manipulation, dressing, and writing. It commonly coexists with other disorders, such as developmental language disorders and Attention Deficit Hyperactivity Disorder (ADHD) (approximately 50%), as well as autism spectrum disorders (around 47%) and learning disabilities (Blank *et al.*, 2019; Green & Payne, 2018; Ketcheson *et al.*, 2021; Landgren *et al.*, 2021; Licari *et al.*, 2018; Pieters *et al.*, 2015; Visser *et al.*, 2022). The challenges presented by DCD significantly impact daily activities, academic success, social interactions, and job opportunities (Wilmot *et al.*, 2022) along with secondary effects

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like increased anxiety (Harris *et al.*, 2021; Shawq, 2024). negative self-image (Abdulzahra & Shawq, 2024; Wilmot *et al.*, 2022) and susceptibility to bullying (Hervo *et al.*, 2025; Ke *et al.*, 2023).

Various factors, including self-perception, maternal health, family dynamics, and educational context, may contribute to the development of DCD in children. Research indicates that direct training methods are effective, but their success relies on empowering participants (Spencer & Chen, 2023). This empowerment requires healthcare professionals to enhance patient autonomy, build confidence, and promote self-management skills. Moreover, healthcare providers ought to permit participants to partake in a multitude of activities throughout the training process (Ding *et al.*, 2024; Wray *et al.*, 2025).

Consequently, in response to the motor difficulties experienced by children with developmental coordination disorder, various interventions have been devised to enhance motor coordination. Among these interventions, the task-oriented approach stands out as one of the most efficacious methods for the enhancement of motor skills (Ferguson *et al.*, 2013; Jane *et al.*, 2018). Nurses are tasked with the provision of direct patient care, the coordination with multidisciplinary medical teams, the provision of psychological and social support to children and their families, as well as the education of caregivers concerning appropriate home care methodologies (Bjartmarz *et al.*, 2017; Shawq & Ali, 2019; Wang *et al.*, 2021; Jianmiao *et al.*, 2022; Talib & Hussein, 2024) Nurses play a significant role in alleviating the distress encountered by children and their families through comprehensive patient interactions (Woodgate *et al.*, 2024). As the principal caregivers, they furnish not solely medical assistance but also emotional and spiritual guidance (Konukbay *et al.*, 2024). Their role is particularly salient in comparison to other healthcare professionals, who engage in comparatively less direct patient care (Arslan & Akkoyun, 2022). Empirical studies underscore the challenges faced by parents, thereby accentuating the necessity for emotional and practical assistance (Abdi *et al.*, 2025).

METHODOLOGY

Research Design

This quantitative study employed a quasi-experimental design to assess the impact of a nurse task-oriented motor skills training program on improving daily living activities in children with DCD. This methodology facilitates the establishment of a causal link between the independent variable (task-oriented motor skills training) and the dependent variable daily living activities (DLA). Participants were non-randomly (Pratiwi & Azhar, 2025; Maciejewski, 2020) allocated to two groups: Experimental Group: Those receiving task-oriented motor skills training; Control Group: Those continuing their regular daily activities without additional interventions.

Research Setting

The research was conducted in public schools in Baghdad's third Karkh sector, focusing on special education. Statistics from the Education Directorate revealed 73 primary schools in the area with special education classes. Four schools were chosen based on criteria including adequate sample size of children aged six to eight in special education. The double-shift system enabled three weekly visits, allowing division of the study group into two sections. The retention of intervention tools in these schools reduced transportation needs, enhancing logistical efficiency and standardising experimental conditions. A demographic balance was achieved between male and female participants, enabling analysis of gendered responses to the intervention.

Research Sample

The research comprised 64 children diagnosed with DCD, aged six to nine, including both genders and those with additional disorders like autism. Inclusion criteria were based on the DSM-5 guidelines by the APA (Widiger, 2015), while children with severe cognitive impairments or critical medical issues were excluded from the study. In each group required a minimum sample size is 32, determined using the Richard Geiger Equivalent.

$$n = \frac{\left(\frac{Z}{d}\right)^2 \times (P)^2}{\left(\frac{\left(\frac{Z}{d}\right)^2 \times (P)^2}{N} - 1\right) + 1}$$

The calculation was based on a population proportion of 50%, representing the highest expected variability, with a 5% error probability, a 95% confidence level, and a standard score of 1.96 corresponding to this confidence level.

Measurement Instrument

Developmental Coordination Disorder Daily Questioners (DCD Daily-Q):

The DCD Daily-Q is a 23-item questionnaire designed for parents, addressing children's participation and performance across a wide spectrum of Activities of Daily Living (ADL), encompassing self-care (10 items), fine motor (7 items), and gross motor activities (6 items) (van der Linde *et al.*, 2014). This instrument is the first to provide a comprehensive evaluation of the various difficulties encountered by children with DCD in relation to ADL in their daily lives (Blank *et al.*, 2019).

Data Collection and Intervention

Data were gathered through parent-completed questionnaires regarding children's daily living skills. The intervention spanned ten weeks, comprising three one-hour sessions weekly, with a WhatsApp group established for parental engagement. Assessments were conducted prior to the intervention, at six weeks into the intervention, and at the conclusion of the program at ten weeks. The training environment consisted of a specialised classroom aimed at improving motor skills for children with developmental coordination disorder. The schoolyard was organised for activities, with the program structured into three modalities: Self-care skills involved role-playing activities related to personal hygiene and daily tasks. Fine Motor Skills included realistic practice with wooden boards for tasks like writing and opening packages. Gross Motor Skills focused on play-oriented group activities facilitated by the researcher and educators, including jumping rope and Lego constructions.

Data Analysis

Data analysis utilised SPSS version 26, employing both descriptive and inferential statistics. Descriptive statistics analysed demographic data, including control and study groups. A paired *t*-test was used to compared pre, mid, and post-intervention results within the study group, while an independent *t*-test was applied to assess differences between the study and control groups.

Ethical Consideration

The study received ethical approval from the Committee of Scientific Research (CSR) at the College of Nursing, University of Baghdad, Iraq with reference number 46 on November 7th 2024. Also, this study obtained approval from the Ministry of Planning (Central Statistical Organization) on November 11th 2024.

RESULTS

Table 1: Distribution Study Sample for their Demographic Variables

Demographic Variables	Categories	Groups					
		Intervention		Control		Total	
		F	%	F	%	F	%
Sex	Male	17	53.1%	17	53.1%	34	53.1%
	Female	15	46.9%	15	46.9%	30	46.9%
Age	Mean $\pm$ SD	7.34 $\pm$ 1.096		7.06 $\pm$.982		7.20 $\pm$ 1.042	
	Total	32 (100%)		32 (100%)		64 (100%)	

Table 1 shows that, male percentage was higher than female in the intervention and control groups (53.1%), and their mean of age $M \pm SD$ in both groups (7.34 $\pm$ 1.096, 7.06 $\pm$ 0.982) respectively.

Table 2 presents between-group comparisons of Participation, Quality, and Acquisition across pre-, mid-, and post-tests. Significant differences emerged at mid- and post-tests in all domains (all $p < 0.001$), with moderate effect sizes at mid-test (Cohen's $d = -0.67$ to -1.18) and large effects at post-test (-2.83 to -3.47).

Table 2: The Differences of Mean between Study Groups in their Daily Living Activities

DCD Daily Q	Time point	Groups		Statistical tests				
		Intervention M± SD	Control M± SD	T test	p value	Cohen's d	95% CI	sig
Participation	Pre test	71.12±7.09	69.37±10.13	-0.116	0.908	0.20	-2.62, 6.12	NS
	Mid-point test	60.78±9.08	68.06±9.95	-14.196	0.001	-0.76	-12.04, -2.52	HS
	Post test	44.21±8.72	69.87±9.43	-64.118	0.001	-2.83	-30.20, -21.12	HS
Paired sample test	2- Way ANOVA	67.000	1.93					
	p value	0.000	0.584					
Quality	Pre test	62.09±8.72	61.23±6.79	0.254	0.801	0.11	-3.5, 6.12	NS
	Mid-point test	52±6.98	59.95±6.50	-16.689	0.001	-1.18	-11.32, -4.58	HS
	Post test	37.71±6.72	60.54±6.42	-51.013	0.001	-3.47	-26.12, -19.54	HS
Paired sample test	2- Way ANOVA	64.000	1.54					
	p value	0.000	0.844					
Acquisition	Pre test	21.34±1.55	20.75±2.56	-0.418	0.678	0.28	-0.47, 1.65	NS
	Mid-point test	17.81±1.90	19.23±2.34	-18.395	0.001	-0.67	-2.49, -0.35	HS
	Post test	14.18±1.49	20.06±2.10	-27.929	0.001	-3.23	-6.79, -4.97	HS
Paired sample test	2- Way ANOVA	61.000	2.34					
	p value	0.000	0.368					

M: Arithmetic mean, SD: standard deviation, CI: confidence intervals, Cohen's d: effect sizes. NS: non-significant, HS: highly significant, p value ≤ 0.05.

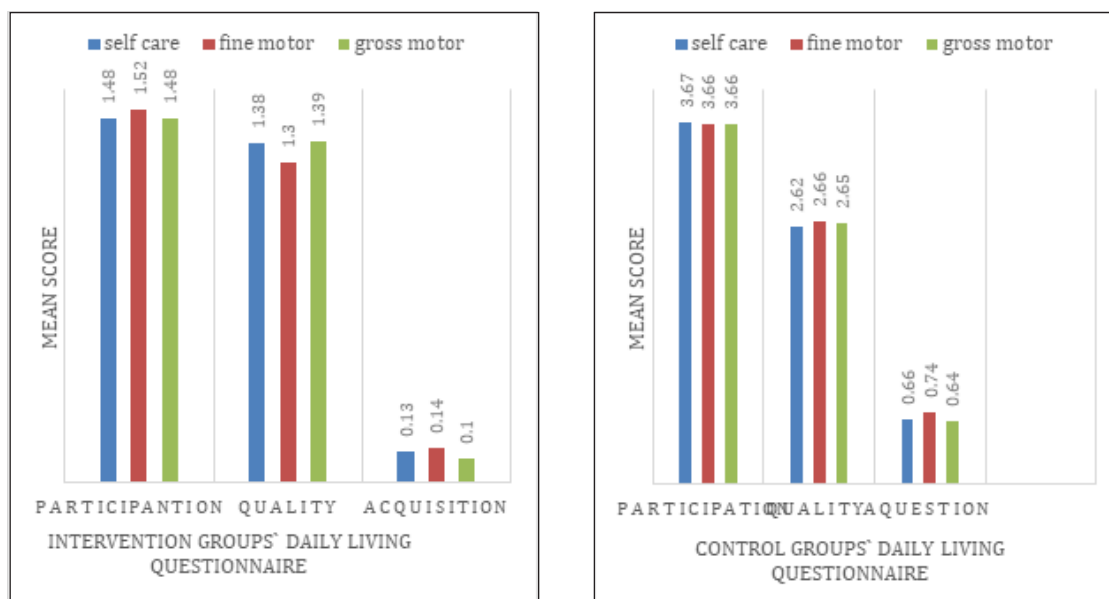


Figure 1: Mean Score of Daily Living Activities in Intervention and Control Groups at Post-test

This Figure 1 shows the mean scores of subscales: self-care, fine and gross motor for DCD daily questionnaire were less than compared to the control children.

DISCUSSION

Developmental Coordination Disorder (DCD), acknowledged and categorised as a substantial impairment in motor learning abilities, necessitates that this specific cohort of children be provided with additional opportunities to thoroughly explore and acquire motor skills in a holistic manner. As reported by the World Health Organization (WHO), approximately 16% of children globally encounter substantial impairments (WHO, 2022). The present research aims for clarifying the influence of task-oriented training program. In alignment with the foundational principles delineated by the European Academy for Childhood Disability

(EACD), it is proposed that task-oriented strategies epitomise the most effective intervention methodologies for children diagnosed with DCD, as these approaches currently present the most advantageous ratio of cost to benefit, thereby emphasising their significance in therapeutic applications (Farhat *et al.*, 2025). The multifaceted appraisal yields invaluable insights into the specific difficulties faced by children when attempting to perform ADLs, encompassing factors pertinent to learning and participation, as well as the intricate interdependencies that exist among these essential domains of development (Gao *et al.*, 2024; Omran & Shawq, 2024).

Nevertheless, the prevailing corpus of literature concerning the consequences of task-oriented interventions especially those executed within a group framework on the motor performance and coordination of children afflicted by DCD remains notably limited and inadequately investigated. As predicted, the control group comprising children with DCD exhibited no statistically significant alterations in any of the outcome measures following an extended period of nearly two and a half months devoid of any structured training intervention. The lack of normative developmental progression and engagement in these activities did not result in any discernible enhancements in performance metrics. The control group manifested no noticeable changes in any of the assessed outcome variables serves to corroborate the conclusion that the standard care practices currently in operation were ineffective in fostering any improvement in motor skills among the participating children.

The findings that have emerged from the results of this particular study strongly suggest that the implementation of interventions specifically aimed at enhancing motor skills plays an integral role in improving the overall quality of performance, learning capabilities, and participation levels in daily activities. An among children diagnosed with developmental coordination disorder; this assertion is further substantiated by a comprehensive review conducted by (Alghadier & Alhusayni, 2024). The aforementioned review underscores the importance of customising instructional approaches to align with the daily tasks and environments encountered by children with DCD, proposing that even short durations of training can yield considerable improvements in essential daily living skills (Azeez *et al.*, 2023).

There exists an array of scholarly investigations, including those conducted by (Lee & Zwicker, 2021; Vens *et al.*, 2022) which collectively underscore the critical importance of the early identification of developmental coordination disorder, a necessity that serves as the foundational underpinning for the establishment of a suitable educational and therapeutic framework, aimed at enhancing not only the quality of life for both the affected child and their parents but also at mitigating or alleviating the potential physical, emotional, and behavioural ramifications associated with this disorder.

Among the body of research, there are notable studies such as those conducted by (Smits-Engelsman & Verbecque, 2022; Wilson *et al.*, 2017), which assert that the majority of school-aged children demonstrate a pronounced enthusiasm for engaging in play and are adept at acquiring foundational skills with relative ease, a phenomenon that is frequently facilitated through the medium of active play. Through this dynamic avenue of engagement, children are able to enhance their proficiency in various skills as they mature and accumulate experiential knowledge over time.

In light of these findings, researchers are positioned to draw the conclusion that age exerts a significant influence on the daily activities of children who are afflicted with Developmental Coordination Disorder (DCD). This relationship is contingent upon a multitude of factors, among which early intervention has been shown to diminish the adverse effects associated with DCD and foster improvements in the motor skills of children as they age. Furthermore, it is essential to recognise that social and environmental support systems provided by family, educational institutions, and the broader community play a pivotal role in facilitating skill enhancement and alleviating the challenges encountered by children grappling with DCD.

Limitations

The current nursing intervention investigated encountered numerous obstacles attributable to its pioneering nature as the inaugural study of its type. The most significant of these obstacles include the restricted availability of structured training programs specifically tailored for children diagnosed with developmental coordination disorder, in addition to the lack of standardised nursing protocols aimed at training pain-oriented motor skills. Furthermore, there exist logistical limitations within the educational system, which render the execution of randomised controlled trials unfeasible. Additional variables may also impact the study,

such as parental engagement, teacher collaboration, and children's cognitive competencies. Furthermore, the small sample size reduces the statistical power and limits the generalisability of these findings. Future multi-site studies with larger and more heterogeneous samples are recommended to strengthen external validity.

CONCLUSION

Based on the findings derived from this investigation, nurse-led research indicated that the implementation of a systematic, task-oriented motor training regimen significantly enhances the execution of activities of daily living among children diagnosed with DCD. This intervention yielded notable advancements in both fine and gross motor competencies, particularly in the domains of throwing, catching, and kicking a ball. The findings underscore the criticality of initiating training at an early stage to foster autonomy and efficacy in motor performance. Subsequent inquiries should examine the long-term viability of these enhancements. Consequently, forthcoming research endeavours should focus on establishing standardised guidelines for nursing interventions and broaden the scope of the study to encompass various health and educational institutions, while also incorporating a larger and more heterogeneous sample.

The future scope of the study on the role of nursing in supporting daily living activities of children with Developmental Coordination Disorder (DCD) includes several avenues for further investigation. Future research can explore the long-term effects of task-oriented motor skills training on children with DCD, particularly beyond the 10-week post-training period used in this study. Investigating the sustainability of motor skill improvements over extended periods will be crucial in understanding the lasting impact of such interventions. Additionally, expanding the study to include diverse healthcare settings, such as hospitals and rehabilitation centres, will provide a broader perspective on the generalisability of the findings. It is also recommended to incorporate larger and more heterogeneous samples, including children with varying levels of severity and co-occurring conditions such as ADHD and autism, to assess how task-oriented training may benefit these subgroups. Finally, future studies could focus on developing standardised protocols for nurse-led task-oriented interventions, enabling consistent implementation across different regions and educational institutions.

Conflict of Interest

The authors declare that there is no conflict of interest.

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