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Research Paper: Associations between Physical Activity with Self-Esteem and Perceived Motor Competence among Children with Developmental Coordination Disorder

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Abstract

Evidence shows that physical activity (PA) is associated with better self-esteem and perceived motor competence in typically developing children. Nonetheless, associations between PA with self-esteem and perceived motor competence among children with developmental coordination disorder (DCD) has received very little attention in the literature. As such, the purpose of this study was to survey the associations between PA with self-esteem and perceived motor competence among children with DCD. A correlational approach was used in this study. Participants were forty-nine children with DCD (mean age of 8.85 years old) from special schools. Physical Activity Questionnaire for Older Children was used for assessing PA. Self-Perception Profile for Children was used to assess self-esteem and perceived motor competence. To analyze data, we used Pearson correlation test and regression analysis. Descriptive results showed that our sample participate in very low amount of PA. In addition, they have low levels of self-esteem and perceived motor competence. Furthermore, PA was significantly and directly associated with both self-esteem and perceived motor competence. Finally, PA has significantly and directly predicted both self-esteem and perceived motor competence. Our findings emphasize on benefits of PA for improving psychological status of children with DCD. Thus, it seems necessary to find out proper strategies and interventions for increase the level of PA in this population.

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1. Introduction

Developmental coordination disorder (DCD), also known as developmental motor coordination disorder, developmental dyspraxia or simply dyspraxia, is a lifelong condition that affects learning and executing motor skills and coordination. DCD is not a learning disorder, but it can impact learning. Children with DCD struggle with physical tasks and activities they need to do both in and out of school (Barnett et al. 2019; Cantell et al. 2003; Fogel et al. 2021; Gomez et al. 2017; Tseng et al. 2007). Several studies have demonstrated that children with DCD show poor motor competence in everyday self-care and academic activities such as catching, using scissors, handwriting, riding a bike and participating in sports (Barnett et al. 2019; Cantell et al. 2003; Fogel et al. 2021; Gomez et al. 2017; O'Dea & Connell, 2016; Saban et al. 2014; Tseng et al. 2007). Some studies have also shown that for most individuals with DCD difficulties can persist into adulthood and affect the learning and performance of new motor skills such as driving (Barnhart et al. 2003; Cantell et al. 1994, 2003). Moreover, other line of research has demonstrated that individuals with DCD show low levels of self-esteem, self-confidence, and mental health (Cairney et al. 2005). However, some factors might can positively influence poor physical and psychological components associated with individuals with DCD. An influential factor might be engaging in regular physical activity (PA).

PA refers to any voluntary bodily movement executed by skeletal muscles that requires energy expenditure. Some of physical activities included homework, gardening, sport, walking, etc. (Caspersen et al. 1985; Thivel et al. 2018; Ghorbani et al. 2021). PA leads to numerous physical and mental health benefits in all age categories, including children. Some of these benefits encompass improvement in brain health, helping in weight management, reduction of the risk of disease, strengthening bones and muscles, improving quality of life, and improving ability to do everyday activities (Abdoshahi, Gholami, Naeimikia, 2022; Basterfield et al. 2021; Dana & Christodoulides, 2019; Dana et al. 2021; Hashemi Motlagh, BaniAsadi, Chaharbaghi, & Moradi, 2022; Gholami & Rostami, 2021; Ghorbani et al. 2020, 2021; Lahart et al. 2019; Mohammad Gholinejad, Hojjati, & Ghorbani, 2019; Mohammadi, Nafei, Baniasadi, & Chaharbaghi, 2022; Naeimikia, Izanloo, Gholami, & Ahar, 2018; Naeimikia & Gholami, 2018, 2020; Schwartz et al. 2019; Tremblay et al. 2011; Wafa et al. 2016; Yaali, Naeimi Kia, Gholami, 2018; Zhang et al. 2021). Due to so many benefits of PA, world health organization (WHO) recommends a proper amount of PA for children aged 7 to 18 years old (i.e., at least 60 minutes of moderate-to-vigorous PA across the week) (Bull et al. 2020). Regarding children with DCD, however, it has been shown that they do not follow WHO guidelines (Cermak et al. 2015; Steenbergen et al. 2020). As well, children with DCD demonstrated significantly reduced PA, increased sedentary behavior, poorer fitness and increased overweight compared with typically developing children (Cermak et al. 2015; Steenbergen et al. 2020), which may be due to their physical limitations. It should be noted that lower amount of PA in individuals with DCD can potentially lead to various negative consequences such as enhancing the risk of chronic diseases such

as type 2 diabetes and cardiovascular disease (Kinne et al. 2004; Rimmer et al. 2007).

Furthermore, in healthy children, research has shown that children who participate in regular PA have higher levels of self-esteem and perceived motor competencies (Cantell et al. 2008; Haga, 2009). As mentioned earlier, being DCD results in low self-esteem and other psychological components (Cairney et al. 2005). However, associations between PA and psychological variables have not been investigated in children with DCD. Therefore, the aim of this study was to investigate the associations between PA with self-esteem and perceived motor competence among children with DCD. It was hypothesized that children who PA will positively affect self-esteem and perceived motor competence in children with DCD.

2. Methods

2.1 Participants

This study was conducted based on correlational research method. The sample included 49 children with DCD between 8 to 10 years old (mean 8.85 years old) who attended in special schools. All participants have voluntarily attended in the study. The parents of children gave informed consents. Protocol of this study was in accordance with ethical guidelines of declaration of Helsinki. According to school's office, all children were already diagnosed as DCD. In this study, an experienced examiner assessed the symptoms of DCD in children using the American Psychiatric Association's (2000) *Diagnostic and Statistical Manual of Mental Disorders Text Revision. 4th* ed, too.

2.2 Measures

2.2.1 Physical Activity: Physical Activity Questionnaire for Older Children (PAQ-C) was used for measuring PA of children with DCD. The PAQ-C is a self-administered, 7-day recall instrument. It assesses general levels of PA throughout the elementary school year for students approximately 8 to 14 years of age. The PAQ-C contains nine items, each scored on a 5-point scale (Crocker et al. 1997). Reliability of PAQ-C was measured in this study where Cronbach's alpha coefficient was 0.85.

2.2.2 Self-Esteem and Perceived Motor Competence: In this study, the Self-Perception Profile for Children (Harter, 1985) was used to assess self-esteem and perceived motor competence. This is a commonly used scale with good validity and reliability for use with a child population. It comprises a 36-item self-completed questionnaire measuring perceived competence in five domains (scholastic competence, social acceptance, athletic competence, physical appearance and behavioral conduct) and feelings of global self-worth. Each domain consists of six paired statements. Respondents are asked to select the statement that best describes them and then to say whether it is 'really true' or 'sort of true' for them. In this study, for evaluating self-esteem, we used self-worth was used. As such, for assessing perceived motor competence, we used the part of athletic competence. In this study, reliability of these scales was measured where Cronbach's alpha coefficients were 0.93 and 0.90 for self-esteem and perceived motor competence, respectively.

2.3 Data analysis

To describe research variables, we used mean and standard deviation. Kolmogorov-Smirnov test was used for measuring the normality of data. Pearson correlation test was used to measure the associations between research variables. Finally, regression analysis was used to investigate whether PA predicts self-esteem and perceived motor competence in children with DCD. SPSS software version 26 was used to analyze the data. P-value was set at $P < 0.05$.

3. Results

3.1 Descriptive Results

Mean and standard deviations and relationships between of research variables are shown in Table 1. Descriptive results showed that the level of PA was very low in children with DCD. In addition, children with ASD had low scores in self-esteem and perceived motor competence. Results of Kolmogorov-Smirnov tests showed that our data were normally distributed (all $P>0.05$).

Table 1

Mean, standard deviation and relation between research variables

Variables	*M*	*SD*	1	2	3
1.Physical Activity(	1.01	0.53	-		
2.Self-Esteem	6.82	4.19	0.69***	-	
3. Perceived Motor Competence	7.48	5.22	0.51***	0.74***	-

Results in Table 1 demonstrated that there were significant associations between PA and self-esteem among children with DCD (p=0.000). In addition, PA was significantly associated with perceived motor competence among children with DCD (p=0.000).

3.2 Results of Regression Analysis

Results of regression analysis are presented in Table 2. As observed, PA has directly predicted self-esteem among children with DCD (p=0.000). Also, PA has directly predicted perceived motor competence among children with DCD (p=0.000).

Table 2

The results of multiple regression analysis for predicting self –esteem and perceived motor competence by PA

criterion variable	B	SE	Beta	T	Sig	Tolerance	VIF
Self-esteem			0.582	4.697			
Perceived motor competence			0.493	3.415			
		R=0.508	R^2=0.285	F=8.694	P=≤0.001		
		R=0.465	R^2=0.216	F=6.128	P=≤0.001		

4. Discussion

Previous studies have shown that PA has direct relationship with psychological status (e.g., self-esteem and perceived motor competence) of typically developing children (Cantell et al. 2008; Haga, 2009). However, associations between PA and

psychological status of children in special groups such as DCD have been not surveyed. Thus, the purpose of this study was to investigate the associations between PA with self-esteem and perceived motor competence among children with DCD. It was hypothesized that PA has significant associations with self-esteem and perceived motor competence among children with DCD.

First of all, results of descriptive data showed that the children in this study had very low level of PA, which are in line with the findings of previous studies (Cermak et al. 2015; Steenbergen et al. 2020), indicating that children with DCD engage in very low amount of PA, which may be because of their physical limitations. Furthermore, the level of self-esteem and perceived motor competence were very low in children with DCD in this study, which are consistent with the findings of previous studies (Barnett et al. 2019; Cantell et al. 2003; Fogel et al. 2021; Gomez et al. 2017; O'Dea & Connell, 2016; Saban et al. 2014; Tseng et al. 2007), indicating psychological problems among this population. Psychological problems in individuals with DCD might be a consequence of their physical limitation and barriers. They do not engage in various physical activities which make them distancing from their peers. Most of children with DCD experience loneliness and it is possible that their mental health is negatively affected. According to the results of this study, it seems necessary to adopt appropriate strategies and interventions to enhance the level of PA and mental health among this population.

Additionally, the results of this study revealed that PA was significantly associated with both self-esteem and perceived motor competence among children with DCD. Also, the results of regression analysis showed that higher levels of PA may directly predict higher levels of both self-esteem and perceived motor competence in children with DCD. These results confirm the findings of previous studies on typically developing children (Cantell et al. 2008; Haga, 2009), indicating the positive role played by PA in improving psychological status among children with DCD. As mentioned earlier, children with DCD suffer from poor motor competence. Our findings indicate that if they participate in more PA, it can be resulted in enhancing the perception of their abilities in performing motor skills. In addition, participating in regular PA can be resulted in increasing the level of their self-esteem, which is an important psychological variable in mental health. Thus, Therefore, it can be proposed that children with DCD who participate in regular PA have better mental health compared with those who do not participate in regular PA. The findings of present study also generalize the positive benefits of PA among children with DCD (Abdoshahi, Gholami, Naeimikia, 2022; Basterfield et al. 2021; Dana & Christodoulides, 2019; Dana et al. 2021; Hashemi Motlagh, BaniAsadi, Chaharbaghi, & Moradi, 2022; Gholami & Rostami, 2021; Ghorbani et al. 2020, 2021; Lahart et al. 2019). In early stages of childhood, participating in regular PA provides optimal condition for enhancing motor proficiency in children, especially those in special groups such as DCD (Baniasadi et al. 2019; Chaharbaghi et al. 2022; Mohammad Gholinejad, Hojjati, & Ghorbani, 2019; Mohammadi, Nafei, Baniasadi, & Chaharbaghi, 2022;

Naeimikia, Izanloo, Gholami, & Ahar, 2018; Naeimikia & Gholami, 2018, 2020; Schwartz et al. 2019; Tremblay et al. 2011; Wafa et al. 2016; Yaali, Naeimi Kia, Gholami, 2018; Zhang et al. 2021). As such, it can be proposed that enhancing the level of PA in children with DCD results in better psychological status.

As a limitation to this study, it can be stated that using questionnaire for measuring PA has self-reporting bias (Ghorbani et al. 2021). Thus, future studies should use modern devices for measuring PA for collecting precisive data. Also, we have included only 49 children with DCD in the study, however, it seems a relatively small size. Future studies should use larger sample size for collecting more reliable data.

5. Conclusion

To summarize, the present study adds some new findings into the literature by showing that children who have higher amount of PA have better mental status (e.g., self-esteem and perceived motor competence). Along with the fact that our sample had very low levels of PA and psychological status, it seems that participating in regular PA can act as a proper strategy for diminish the conditions of DCD among this population. Thus, it is essential to find out the ways to increase the level of PA among children with DCD.

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Conflict of interest

The Authors declare that there is no conflict of interest with any organization. Also, this research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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