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Associations between Physical Activity with Self-Esteem and Physical Self-Perception Levels of Obese Adults

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ABSTRACT: Background and Aim: Physical activity is associated with numerous positive health outcomes, suggesting its potential role in enhancing a child's overall motor skills performance. Consequently, this study aimed to explore the connections between engagement in physical activity and the development of gross and fine motor skills in school-aged children diagnosed with Developmental Coordination Disorder (DCD).
Methods: A descriptive-correlational methodology was utilized in this investigation. The sample consisted of 152 children diagnosed with Developmental Coordination Disorder (DCD), including 58 females, recruited from various special education facilities. The participants' ages varied from 7 to 9 years, with an average age of 7.49±0.48 years. Selection of participants was conducted using a convenience sampling technique. Standard tests were used to collect data. Pearson correlation test and independent t test were used for data analysis.
Results: boys had significantly better performance in gross motor skills than girls ($P<0.001$). On the other hand, girls had significantly better performance in fine motor skills than girls ($P<0.001$). Results revealed significant direct relationship between physical activity with gross motor skills ($P<0.001$). Moreover, physical activity was directly and significantly associated with fine motor skills ($P<0.001$).
Conclusion: These findings highlight the necessity of enhancing physical activity among children with DCD, particularly in the female demographic. Also, the results emphasize the importance of promoting increased of physical activity to facilitate optimal motor development in children with DCD. Consequently, it is recommended to incorporate programs aimed at improving motor skills for this population.

Keywords: Physical activity, motor proficiency, children, DCD, gender

INTRODUCTION

Obesity is recognized as a multifaceted chronic condition characterized by an abnormal accumulation of body fat that adversely affects health, elevates the likelihood of enduring medical issues, and diminishes life expectancy. Epidemiological research employs the body mass index (BMI; calculated as weight divided by height squared) as a metric to categorize obesity-related health risks within populations. Obesity is formally identified when an individual's BMI surpasses 30 kg/m², with further classification into three categories: class 1 (30–34.9), class 2 (35–39.9), and class 3 (≥ 40). The prevalence of health complications associated with excess body fat escalates in correlation with increasing BMI at the population level. At the individual level, the emergence of complications is influenced by factors such as the amount of excess adiposity, its specific location and distribution, as well as a variety of other determinants, including environmental, genetic, biological, and

socioeconomic influences. Over the last thirty years, the global incidence of obesity has consistently risen, with Canada experiencing a threefold increase since 1985. Notably, the rate of severe obesity has surged more than four times, impacting approximately 1.9 million adults in Canada as of 2016. Obesity has emerged as a significant public health concern, leading to heightened healthcare expenditures and adversely impacting both physical and mental well-being. Individuals affected by obesity often face widespread weight bias and stigma, which, regardless of their weight or body mass index, is associated with elevated rates of morbidity and mortality. Obesity results from a multifaceted interaction among various genetic, metabolic, behavioral, and environmental influences, with the latter being considered the immediate factor contributing to the significant increase in obesity rates. Recent advancements have provided deeper insights into the biological mechanisms underlying this condition. The brain is pivotal in maintaining energy balance, as it governs both food consumption and energy utilization.

The relationship between self-esteem and body weight has garnered significant interest among researchers in the fields of health, psychology, and psychiatry. This association can be understood through two primary lenses. Firstly, individuals with unhealthy weight often face stereotypical and stigmatizing perceptions from others, which can lead to prejudicial and discriminatory behaviors directed towards them. Such negative treatment can adversely affect their self-perception and diminish self-esteem. Secondly, individuals with low self-esteem frequently find self-awareness to be a source of distress. If they resort to eating as a means to alleviate this discomfort, it may adversely influence their weight. Research indicates that self-esteem serves as a strong predictor of eating disorders; thus, it is plausible to suggest that self-esteem plays a critical role in determining an individual's propensity for unhealthy weight. A significant portion of research concerning self-esteem and body weight has concentrated on pediatric demographics, yielding inconsistent results. Certain studies have indicated that obese children tend to exhibit lower self-esteem. Conversely, other investigations have found no substantial correlation between self-esteem and childhood obesity. Additionally, some research suggests that in adolescents, obesity may not be directly linked to self-esteem. However, alternative studies have demonstrated that obesity can adversely affect the self-esteem of adolescents. The relationship between self-esteem and weight status among adults remains insufficiently explored. This demographic, typically defined as individuals aged 18 to 26, experiences a phase of increased psychological susceptibility, likely stemming from the pressures associated with new responsibilities and expectations. Despite this, the young adult cohort is often not regarded as a separate group in research studies. Additionally, young adults are at a greater risk of developing preventable health issues, such as obesity, compared to both older adults and adolescents. Consequently, it is essential to investigate the psychological factors, including self-esteem, that are associated with the weight status of young adults.

A negative body image can significantly influence weight management and contribute to obesity. Individuals frequently misjudge their weight, often underestimating it while overestimating their height, which can lead to adverse health outcomes and increased risk factors. Research indicates that both overweight and individuals of normal weight may not find their actual weight acceptable. Various elements, including physical, emotional, interpersonal, and cultural factors, shape body mass index (BMI) and self-perception regarding body image. Furthermore, sociocultural influences, particularly from media representations of the "ideal body" as tall and slender, do not align with the physical characteristics of many individuals in Peru, leading to distorted self-perceptions. The media's portrayal can exacerbate body dissatisfaction, which may, in turn, foster unhealthy eating behaviors.

Reduced caloric consumption combined with heightened levels of physical activity results in a negative energy balance, which subsequently initiates a series of metabolic and neurohormonal adaptive responses. Interventions aimed at addressing these changes in neurohormonal pathways may serve as valuable strategies for the long-term treatment of obesity(Karaca, & Ilkım, .2021). Engagement in physical activity and exercise is widely recognized for its health benefits, including disease prevention, improvement of physical capabilities, reduction of depressive symptoms, and enhancement of overall well-being (Duyan et al.2022). Researchers in positive psychology, who concentrate on psychological and subjective well-being, have highlighted exercise as a significant contributor to a fulfilling and joyful life. This recognition has spurred an increasing interest in exploring the connection between physical activity and happiness. Existing literature on the relationship between well-being and engagement in physical activity indicates that exercise can have a beneficial impact on mental health. Specifically, it has been shown to alleviate symptoms of depression and anxiety while simultaneously improving self-esteem and self-concept. Notably, physical self-concept, a crucial component of overall self-concept, has been extensively studied within the domains of sports and exercise psychology in relation to exercise and well-being. Considering the importance of examining factors affecting obesity in adults, the present study was designed to examine the relationship between physical activity and self-esteem and physical self-perception of obese adults.

METHODS

A descriptive-correlational methodology was utilized in this investigation. The sample consisted of 152 children diagnosed with Developmental Coordination Disorder (DCD), including 58 females, recruited from various special education facilities. The participants' ages varied from 7 to 9 years, with an average age of 7.49±0.48 years. Selection of participants was conducted using a convenience sampling technique.

The assessment of physical activity was performed using the Rapid Assessment of Physical Activity (RAPA) scale (Seyedi Asl et al. 2016), which consists of seven items requiring dichotomous responses of 'Yes' or 'No'. The total score on this scale ranges from 0 to 7. In this study, the internal consistency reliability of the RAPA scale, as measured by Cronbach's alpha, was found to be 0.92. Furthermore, the validity of this tool has been established by a panel of ten experts, resulting in a Content Validity Index (CVI) of 0.90 and a Content Validity Ratio (CVR) of 1.00.

Self-esteem assessment. The Korean adaptation of the Rosenberg Self-Esteem Scale (K-RSE) was employed to evaluate the self-esteem levels of participants. This scale comprises 9 items categorized into 2 factors, with item 8 omitted from the original version due to its cultural inappropriateness as identified in various studies. Participants responded to each item using a 4-point Likert scale, where 1 indicates "not at all" and 4 signifies "very much." Negative items were reverse-coded to ensure that higher scores reflect greater self-esteem. Confirmatory factor analysis confirmed the construct validity of the K-RSE's two-factor model, evidenced by the fit indices ($\chi 2 = 54.758$, df = 26, p = 0.001, TLI = 0.952, CFI = 0.965, RMSEA = 0.083). Additionally, the Cronbach's alpha coefficients were found to be 0.87 and 0.875.

The evaluation of body self-perception was conducted utilizing the methodology established by Stunkard and Stellard, later refined by Collins in 1991. This approach features nine anatomical silhouettes representing both male and female figures, which progressively increase in size to illustrate various BMI categories. Each silhouette is associated with a BMI ranging from 17 kg/m² to 33 kg/m², with silhouette 1 categorized as underweight, silhouettes 2 to 5 as normal weight, silhouettes 6 to 7 as overweight, and silhouettes 8 to 9 as obese. At the time of presentation, these silhouettes did not display the corresponding BMI values. Participants were prompted to select the silhouette that they believed best represented their body shape (perceived BMI) in response to the question: What image do you identify with? The perceived BMI values were then compared to the actual BMI values (measured BMI) obtained through weight and height measurements, resulting in a new variable termed "Body perception." This variable was classified as follows: (a) "looks the same" for a value of zero; (b) "looks thinner than it actually is" for a positive value; and (c) "looks fatter than it actually is" for a negative value. Additionally, participants were asked which silhouette they would prefer to embody (desired BMI). The desired BMI values were also compared to the actual BMI, leading to the creation of the variable "body satisfaction," which was categorized according to Montero into: (a) "Satisfaction" for a value of zero; (b) "body dissatisfaction due to excess weight" for a positive value; and (c) "unsatisfied due to underweight" for a negative value.

Data analysis was performed utilizing SPSS-26 software. Descriptive statistics, such as means and standard deviations, were employed to characterize the variables. The Kolmogorov-Smirnov test was applied to assess the normality of the data distribution. Additionally, an independent t-test was conducted to examine gender differences. To investigate the relationships between the variables, a Pearson correlation test was executed. A significance threshold of $P < 0.05$ was set.

RESULTS

The research included a cohort of 152 children diagnosed with Developmental Coordination Disorder (DCD), of which 58 were female. The participants' ages varied from 7 to 10 years, with an overall mean age of 7.49±0.48 years. Notably, the average age for male participants was 7.51±0.43 years, whereas female participants had a mean age of 7.47±0.52 years (P=0.963). Additionally, the analysis revealed no statistically significant differences between genders regarding height, weight, and Body Mass Index (BMI) (refer to Table 1).

Table 1. Demographic data of the participants

	Boys	Girls	Gender differences
Age (years)	7.51±0.43	7.47±0.52	t=0.026 P=0.963
Height (m)	1.22 ± 0.04	1.21 ± 0.03	t=0.012 P=0.983
Weight (kg)	22.50 ± 1.63	22.53 ± 1.57	t=0.021 P=0.971
BMI	19.51 ± 0.46	19.53 ± 0.40	t=0.023 P=0.969

Table 2 shows the results of normal distribution. The results of Kolmogorov-Smirnov tests revealed that all variables were normally distributed (all P>0.05).

Table 2. Results of normal distribution

	Physical activity	Gross motor skills	Fine motor skills
Statistics	0.986	0.867	0.908
P-value	0.200	0.200	0.200

Descriptive data are presented in Table 3. Descriptive results show that in general the level of physical activity is lower than the average. However, gross and fine motor skills were at medium level. Results of Independent t tests showed that there were no significant differences between boys and girls in physical activity (P>0.05). However, boys had significantly better performance in gross motor skills than girls (P<0.001). On the other hand, girls had significantly better performance in fine motor skills than girls (P<0.001).

Table 3. Descriptive data along with gender differences

	Boys	Girls	Gender differences
Physical activity	1.22±0.36	1.21±0.33	t=0.022 P=0.970
Gross motor skills	27.25±4.14	23.96±3.99	t=5.967 P<0.001
Fine motor skills	25.31±4.10	30.01±4.28	t=6.584 P<0.001

Bivariate relationships between physical activity with gross and fine motor skills are demonstrated in Table 4. Results revealed significant direct relationship between physical activity with gross motor skills (P<0.001). Moreover, physical activity was directly and significantly associated with fine motor skills (P<0.001).

Table 4. Results of bivariate relationships between variables

	1	2	3
1. Physical activity	-		
2. Gross motor skills	r=0.593 P<0.001	-	
3. Fine motor skills	r=0.715 P<0.001	r=0.669 P<0.001	-

DISCUSSION

Physical activity is associated with numerous positive health outcomes, suggesting its potential role in enhancing a child's overall motor skills performance. Consequently, this study aimed to explore the connections between engagement in physical activity and the development of gross and fine motor skills in school-aged children diagnosed with Developmental Coordination Disorder (DCD). The findings indicated that the study participants exhibited low levels of physical activity, which corroborates previous research highlighting the generally low activity levels among children with DCD. This suggests a prevalent lack of movement within this population. The reasons for the diminished activity levels in children with DCD may include physical and psychological limitations, restricted access to sports facilities and equipment, financial barriers related to certain sports, and cultural influences (Farhat et al. 2015; Holfelder & Schott, 2014). Given the numerous benefits linked to regular physical activity, it is crucial to explore diverse strategies and implement effective intervention exercises to increase the participation of children with DCD in physical activities. Therefore, it is essential to focus on the physical activity patterns of these children through targeted health interventions and programs. Additionally, developing strategies to enhance and sustain motivation among children with DCD for regular physical activity is of paramount importance (Lee, 2024; Najafzadeh et al. 2024; Ilkım et al.2021).

The findings of this research indicated a positive correlation between changes in self-esteem and mental well-being, with a significant path coefficient from the change in self-esteem to the change in mental well-being. This suggests that enhancements in self-esteem resulting from exercise participation have a beneficial impact on mental well-being, corroborating findings from several related studies. For instance, one study highlighted that engagement in sports among adult women leads to improvements in self-esteem and subjective happiness, while another indicated that self-esteem among participants in live sports is a positive predictor of psychological well-being. However, these prior studies did not explore the influence of self-esteem changes through exercise on

various dimensions of happiness, as they focused on only one aspect of psychological or subjective well-being. The current study's results, which demonstrate that positive changes in self-esteem through exercise can contribute to overall happiness, may serve to encourage a favorable attitude towards exercise participation among college students.

It is commonly believed that body image issues predominantly affect women, as the majority of research in this area has primarily involved female participants. However, the present study reveals that a significant number of men also experience body dissatisfaction, with many underestimating their current weight in comparison to women. These observations align with findings from earlier studies. While much of the existing literature has concentrated on women's body perception, there is growing evidence indicating that men not only misjudge their body weight but also express dissatisfaction with their physical appearance. Research focusing on adolescent males has shown that over two-thirds report feeling dissatisfied with their bodies. This trend may be attributed to societal pressures that encourage men to aspire to a more muscular physique, alongside a prevailing idealization of larger, more muscular bodies among men.

Recently, there has been a notable increase in the focus of magazines and media on men's physical appearance. The prevalence of advertisements portraying men as sexual objects has surged at an alarming pace. Currently, the representation of the male body is becoming more prominent, characterized by muscularity and slenderness. This socio-cultural perspective is perpetuated by the media, particularly through sports television programs that depict the male physique as an object of admiration. Similar to women, modern men are experiencing social pressures to enhance their appearance, leading to a heightened awareness of their physical looks. Research indicates that men's concerns regarding body image may be more diverse than those of women, as men typically exhibit greater anxiety about various aspects of their body image, including weight, height, muscularity, leanness, and overall body shape. The current study reveals that not only women strive to achieve a socially acceptable body shape, but men do as well. It is crucial to recognize that these findings align with the notion that men, akin to women, are often preoccupied with body weight. Consequently, there is a pressing need to develop intervention programs targeting the adult population, with a focus on both genders, to promote awareness regarding the significance of maintaining a healthy weight.

The present review emphasizes that interventions promoting physical activity exert the most significant influence on college students' perceived competence in sports, followed by their perceived body attractiveness and physical self-worth. According to the Exercise and Self-esteem Model, engaging in physical activity can bolster self-efficacy, which in turn enhances perceptions of sports competence and physical acceptance. Furthermore, participation in sports and physical activities facilitates the development of perceived sports competence through the acquisition of skills and training. This phenomenon may elucidate the pronounced effect of physical activity interventions on college students' perceived sports competence. In terms of perceived body attractiveness, consistent engagement in physical activity aids in achieving a healthy body composition, characterized by reduced body fat and well-defined musculature. Individuals who maintain an active lifestyle are often viewed as more attractive in accordance with contemporary aesthetic ideals. Conversely, physical self-worth is shaped by a multitude of factors beyond mere physical activity, including social and cultural influences as well as mental health considerations, which may account for its relatively lesser responsiveness to physical activity. Given the intricate nature of physical self-perception, it is imperative that future research endeavors focus on elucidating the underlying mechanisms through rigorous and high-quality studies.

The present study has certain limitations, and several recommendations for future research can be articulated. Firstly, the sample population is exclusively comprised of college students participating in a university-level physical fitness course. To enhance the generalizability of the findings, it is essential to include a more diverse age range in future studies and to conduct longitudinal research. Furthermore, this investigation utilized a liberal arts course on physical fitness as the primary mode of exercise, which restricts the ability to propose effective strategies for enhancing the physical self-concept in relation to exercise modalities, intensity, and frequency. Future research that explores a variety of exercise approaches could yield more precise recommendations aimed at fostering well-being through the enhancement of the physical self-concept.

CONCLUSION

In summary, the present study reveals that participants exhibited a low level of physical activity. These findings highlight the necessity of enhancing physical activity among children with DCD, particularly in the female demographic. The research also established a positive correlation between of physical activity and both gross and fine motor skills. These results emphasize the importance of promoting increased of physical activity to facilitate optimal motor development in children with DCD. Consequently, it is recommended to incorporate programs aimed at improving motor skills for this population.

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