



Effect of motor skills development on psychological and social traits of students of mazandaran province during the covid-19 pandemics

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Abstract

Nowadays, the covid 19 pandemics are challenging all students. The present study aimed to investigate whether motor skill development affects students' psychological and social traits during the covid 19 pandemics. The present study's population consisted of all students aged 9–17 years in the three grades of the elementary, middle, and high school in Mazandaran province in the academic year 2020–2021, which corresponded to approximately 534 thousand students. We used a simple random sampling to determine the sample size because Iranian schools were closed. In this study, we selected 15 individuals for each of the experimental and control groups. Due to some students dropping out or leaving the practice, the samples comprised 42 girls and 45 boys in the control group and 41 girls and 43 boys in the experimental group. To collect data, we used the Standard Student Social Skills Questionnaire by Garsham and Elliott (1990), Cooper-Smith Self-Esteem Questionnaire, and Children's Depression Scale Short Form (CDS-A). We conducted the experimental group for 36 sessions, i.e., three months and three sessions per week, and each session lasted 30–45 min, depending on the quarantine conditions on the 19th day. To analyze the data, we used a two-way analysis of variance and the Scheffe post hoc test. The results showed that all groups had lower scores in psychological traits than those in the pretest. However, no significant difference was found between groups ($P < 0.05$), and this effect was not significant in social traits ($0.05 < P$). We also suggest that school principals and health care professionals use this study to design guidelines for creating a healthy environment and developing health-oriented educational programs to improve students' quality of life and health.

Keywords Motor skills · Psychological traits · Social skills · Covid-19 pandemic

Introduction

All over the world, the coronavirus pandemic has changed almost every aspect of life. How students work, socialize, and educate have been affected by the virus [1]. Most governments have temporarily closed educational institutions to prevent the Covid 19 spread. As a result, these problems have affected hundreds of millions of students worldwide [2]. On the other hand, motor experiences are significant in a child's early life during this period, and motor skills can be developed [3].

These skills underlie later physical development and provide the key to succeed in the various exercise forms [4]. It also expresses itself through the child's movement, achieving creativity, self-knowledge and a better understanding of its physical dimension. Through basic movements, young children explore, grow, and develop significantly [5]. Understanding how we gain coordination and control over movement responds how we live (Bardone-Cone et al. [6]. On the other hand, during the pandemic covid19, students' physical activity also decreased. It can affect different aspects of mental and physical development. Physical activities influence various aspects of human life, including physical, social, and psychological aspects [7], in a 10-year study of 198 Finnish participants, concluded that exercise positively affects the meaning of life, health, and functionality whereas physical activity and meaning of life have indirect effects on participants' health functionality [7]. The research of Tompson, Kahn, Falk, Vettel, and Bassett [8] also showed that physical activity could predict social networks and cognitive function, i.e., the more physical activity increases,

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the larger the participants' social networks develop and the better the participants' cognitive performance appears [8]. Besides, the effect of short- and long-term physical activity on self-perception and self-esteem was reported by [9]. Based on these findings, we can acknowledge the undeniable role of motor skill development in improving students' self-esteem and depression (Amsberger et al. 2019). Research has shown that low self-esteem is associated with depression, poor mental health, and lower educational progress [10]. A decrease in students' self-esteem is associated with decreased overall health [11].

Accompanying the development of motor skills, students' role in society has changed. The socialization begins with their first physical activity, allowing them to develop and evolve their sports in childhood and their sports participation in later years [12]. People and different life circumstances can influence physical activity and sport choices throughout life [13]. For example, peers can influence physical and recreational activities and levels of exercise or inactivity. The social and environmental factors influence motor development [14]. McGlone and Sperry [15] assessed physical, cognitive and emotional aspects with instruments that have good psychometric properties [15]. Although assessment is often possible in school settings, more empirical research relies on evaluating teachers' assessment abilities and assessment tools rather than research teams. Taha and Slewa-Younan [16] found that depression was one of the most common psychological disorders in schooling, affecting 8% to 16% of students in the community [16].

According to the conducted studies, physical activity and motor skill development prevent mental illnesses such as depression in students [17]. On average, active people are 30% less likely to become depressed than inactive people [17]. Although there are effective treatments for depression (e.g., antidepressants and cognitive behavioural therapy), the recent use of exercise as a treatment for depression has attracted much attention [18]. Covid19 has affected all aspects of students' lives while students' physical activity has not been spared from this pandemic. Therefore, the educational institutions are responsible for developing motor skills, and the necessary measures to develop their physical skills during the pandemic. Motor skills can optimize physical activity throughout a career, and schooling must include physical education. Thus, the present study attempts to respond to this question: What is the impact of motor skill development on students' psychological and social traits during the Covid 19 pandemic?

Method

This study is quantitative and applied research. As a study population, we selected all male and female students aged 9–17 years old in the three grades of elementary, middle and high school in three cities (Babol, Ghaemshahr, and Sari) Mazandaran province, Iran in the academic year 2020–2021, which numbered about 534 thousand students. For repeated measures analysis of variance (ANOVA; within-between interactions, two groups, two measurements) the required sample size was 50 participants, using G*Power software based on repeated measures ANOVA (with in-between interaction), at 95% confidence level; $\alpha = 0.05$, power = 0.85, number of groups = 2, with a small—moderate effect size = 0.22 a sample size of 50 to be sufficient.

Considering the sample size in previous studies and their recommendations, we chose 15 participants as the minimum sample size necessary for experimental research. We used the simple random sampling method to determine the sample size due to school closures' limitations. In this study, we also selected 15 participants for each experimental and control groups for the elementary, middle, and high schools, i.e., three groups of 15 male and female students (45 girls and 45 boys as the control group and three groups of 15 male and female students as the experimental group, 45 girls and 45 boys, participated in this study. Since some students dropped out or stopped participating in the study, the exact number of samples became 42 girls and 45 boys in the control group and 41 girls and 43 boys in the experimental group. All participants were selected from urban areas of Mazandaran province and students were not selected from rural areas.

Instrument

Garsham and Elliott designed the Student Social Skills Questionnaire in 1990. This questionnaire was validated by Mottaqi et al. (2020) on Iranian students. This questionnaire contains 27 questions, including four constructs of self-control, empathy, assertiveness, and cooperation. It is also scored based on Likert's three-value scale with questions such as "I do good things for my parents, such as helping in housework without being asked." This questionnaire benefits acceptable content and face validity. The Cronbach's alpha coefficient for this questionnaire calculated in the study was estimated to be above 0.7 [19].

Psychological skills

To assess psychological skills, we used two psychological skills, including self-esteem and depression. Cooper-smith (1967) Self-Esteem Scale is a 58-item pencil-and-paper self-evaluation questionnaire. We used eight items

to detect untruth responses, dividing the other 50 items into four subscales: General Self-Esteem, Social Self-Esteem, Family Self-Esteem, and Academic Self-Esteem. The purpose of this questionnaire is to assess students' self-esteem. This test has other forms: The test has different forms. The original test was initially designed for 8- to 15-year-olds (Form A, or school form), but later revisions were designed for participants over age 16 (Form C, or adult form) to adapt the original form for adult use. We rewrote some materials. There is also a short form of the test (Form B, Coopersmith, 1987) consisting of 25 items extracted from a 50-item scale. Coopersmith (1987) designed this form as an alternative form for when the

time was limited. The reliability coefficient of this test is 0.77. Sabzi [20] standardized Cooper-Smith Self-Esteem Scale in Iran in 2004 [20]. In the present study, to measure the internal consistency of the self-esteem test, Cronbach's alpha showed acceptable (Cronbach's alpha = 0.71) Tables 1, 2, 3.

Najarian developed the Child Depression Scale (CDS-A) in 1994, reducing CDS items in Iran through the factor analysis method. In Najarian (1994) administered Child Depression Scale to 531 male and female third-grade students in the eighth middle schools in Ahvaz city. The short form of the Child Depression Inventory (CDS-A) consists of 25 items. For each item, there are five options: *completely false, false,*

Table 1 Results of Frequency distribution of participants' parents based on education level

Characteristics	Highest education	Frequency	Percentage
Father's education level	High school degree or equivalent	29	16.95
	Bachelor's degree	67	39.18
	Diploma/Certificate	43	25.14
	Master's degree	32	18.71
	Total	171	100
Mother's education level	High school degree or equivalent	65	38.01
	Bachelor's degree	44	25.73
	Diploma/Certificate	46	26.90
	Master's degree	16	9.35
	Total	171	100

Table 2 Results of two-way preliminary analysis of variance for depression

Variable	Group	Stage	Normality test (Shapiro–Wilk)		Equality test error variance (Levin)		Homogeneity regression slope	
			Statistics	Significance	Statistics	Significance	Statistics	Significance
Depression	Experimental	Pre	0.674	0.083	2.54	0.384	1.294	0.435
		Test	0.748	0.254				
	Control	Post	0.967	0.186				
		Test	0.931	0.284				
Self-esteem	Experimental	Pre	0.954	0.170	0.251	0.279	0.362	0.247
		Test	0.937	0.257				
	Control	Post	0.657	0.452				
		Test	0.724	0.369				
Social skills	Experimental	Pre	0.725	0.137	0.328	0.321	0.362	0.214
		Test	0.383	0.149				
	Control	Post	0/954	0/352				
		Test	0/827	0/247				

Table 3 Results of bilateral analysis of variance in psychological variables (depression and self-esteem)

Source	Sum of squares	df	Mean of squares	F	Sig	η ² p
Stage	276.27	1,84	276.27	1.86	0.001	0.133
Group	246.49	5,84	49.29	3.42	0.65	0.026
Stage × group	199.56	5,84	39.91	1.85	0.110	0.100

don't know, true, absolutely true. The respondent is asked to mark the option that best describes their condition with a multiplication sign. The Pediatric Depression Scale [21] is one of the pediatric depression scales. The Child Depression Scale discriminates between depressed and nondepressed children in reference samples [22, 23]. Both scales are highly correlated with other depression scores and depression-related symptoms scores (e.g., self-esteem). Cronbach's alpha coefficient of this questionnaire was reported to be 0.82 [24].

Procedure

To conduct this research, firstly, according to the quarantine days in Mazandaran province, we selected three male students for each level of school and also three female students for each level of a school, using random sampling. We also invited the participants' parents to participate in this project. The principal provided the participants' contact numbers at the school, while we explained the research objectives when contacting them. Then, we selected the parents who had volunteered to continue the research. After the parents agreed to participate, we gave them a consent form. Afterwards, we taught the students how to develop their motor skills involved in at-home exercises. Before conducting the study, all tests and scales used in this study were first administered to the students to evaluate these tests' validity and reliability in the population and sample.

We also conducted these tests with the help of parents. The experimental group was then exposed to the treatment for 36 sessions (3 months and three sessions per week), and each session lasted for 30–45 min during the days of quarantine. We also conducted these tests with the help of parents. all exercises were checked under the supervision of the Practitioner and in coordination with the students' parents. the experimental group was then exposed to the treatment for 36 sessions (3 months and three sessions per week), and each session lasted for 30–45 min on the days of quarantine with low to medium intensity. We measured students' growth at the end of 36 sessions in which motor skills were developed, and physical literacy was increased using the scales listed in the pretest and compared the pretest and post-test scores.

We extracted the exercise program for motor skill development from the Green Movement Program (CHAMPS Community Healthy Activities Model Program for Seniors FSST) [25]. The exercise program included stretching, strengthening, power, and endurance movements in different body areas to improve various factors of physical fitness and develop motor skills such as flexibility, body strength, cardiovascular endurance, and improve gross and fine motor skills. The exercise lasted three months and three sessions per week for one hour at school and home. The green exercise consists of several stages. The first stage is the warm-up,

which includes stretching exercises for specific muscles within five minutes. The second stage is performing exercises to improve the heart's respiratory readiness, including brisk walking within five minutes and walking up and down the steppe within five minutes. The third stage is to perform exercises for 15 min, such as stretching movements in all joints of the main muscles, walking forward, backward, sideways, on the heel and toes, weight shifting from front to back, balance training on the legs, standing on one leg, weight shifting from side to side, Scott, strengthening the hamstring and quadriceps muscles, bringing the elbow to the knee of the opposite leg in the supine position. The fourth stage consisted of exercises in sitting and lying for 15 min. These exercises included flexibility movements of different body parts to strengthen the abdominal, lateral and back muscles. The movements included various sitting positions, one-legged lifting movements, cradling movements, cat movements, prostration movements, butterfly movements, and the fifth stage included cooling [25].

In the current study, first, using comparison tests (analysis of variance in the normal state of distribution), we investigated the homogeneity of motor skill scores in the pretest phase, in which no motor skill intervention had been applied. Determining equal motor skill scores were intended to show that there were no differences in motor skill abilities between the participating groups at baseline. Besides, to investigate whether the study groups differed in the studied factors before and after the researcher's intervention in the exercise program, according to two independent groups (experimental, control), we used two-way ANOVA and Scheffe's post hoc test. Since the factors studied consisted of subscales, we used SPSS version 22 software for the analysis.

Findings

We used a two-way ANOVA test to assess motor skills development on students' psychological and social traits. We calculated how much motor skill development affects psychological and social traits in students as follows:

The normality test results show that depression, self-esteem and social skills agree with a normal distribution in the experimental phases. This is because the Shapiro–Wilk test's significance value is more significant than 0.05 in all phases.

Leven's test results also show that this test's significance value for depression, self-esteem and social skills variables is greater than 5% in the experimental groups and phases, so the variances are equal. The regression slope's homogeneity results, one of the assumptions required to analyze variance, show that this assumption was met with a significance greater than 0.05 in both variables.

As the results of the above table show, the main effects of stage showed a significant $F(1.84) = 1.86$, $P = 0.001$

$\eta^2=0.133$, neither the main effect of group is $F(5,84)=3.42$, $P=0.65$, $\eta^2=0.026$, nor the interaction between stages and groups, $F(5,84)=1.85$, $P=0.110$, $\eta^2=0.100$ was statistically significant. Although the post hoc test showed that all groups' psychological traits were lower than pretest, no significant difference was found between groups, all $p_s < 0.05$. The post hoc test results at group segregation showed that both boys and girls in all three educational levels were the same in the psychological variable, and there was no difference between them in the comparison.

According to the above table, based on the Scheffe test conducted to examine the difference between the mean scores of the psychological traits in the three groups of educational levels and the control group, the test calculated at the 99% confidence level is significant because the motor skills development program reduces depression and increases self-esteem. We observed a reduction in depression and an increase in the self-esteem of the students. According to the above table, the average posttest of elementary school students' psychological traits participated in the motor skills development showed a decrease of 6.3 points compared to the pretest, while the average posttest of the control group compared to the pretest showed a decrease of 0.1 points. As a result, no difference was found between the group of male and female participants Table 4.

As the results in the above table show, since pvalue is, the main effects of the stage which is $F(1,84)=12.75$, $p=0.124$, $\eta^2=0.124$ is significant, but since pvalue is 0.17, the main effect of the group which is $F(5,84)=3.37$, $p=0.17$, $\eta^2=0.037$ is not significant, and nor interaction between stages and groups $F(5,84)=1.74$, $p=0.109$, $\eta^2=0.100$. the mean difference in social skills scores between the three educational groups and the control group was not significant at the 99% confidence level. This result indicates that the motor skills program did not improve the students' social skills, and we did not see any improvement in the students' social skills. also clearly shows, while the mean post-test scores for social skills in the elementary students who participated in the motor skill development program increased by 1.5 points compared to the pretest, the control group's mean post-test scores increased by 0.5 points compared to the pretest.

Discussion and conclusion

This study aimed to investigate motor skill development's effect on students' psychological and social traits in Mazandaran province during the Covid-19 pandemic. According to the results, physical activity participation significantly affected psychological traits, but this effect was not significant on social traits. Regarding the effect of exercise on depression and self-esteem, we showed a significant difference in the variables of depression between the two groups. In self-esteem, we observed a significant difference between the two groups of participants in a physical activity course. This result was inconsistent with [26] findings that selected aerobic exercise caused a significant increase in plasma serotonin concentration by 21%. However, the effect of physical activity on depression was not significant, which may be due to the small number of participants. It is also inconsistent with the results of Islam et al. [27], who investigated the association between depressive symptoms and attitudes toward addictive substances in high school students who regularly participated in sports and students who did not because he also found no significant association between depressive symptoms and regularly active or inactive students [27]. The results of some studies, including Miller, Gonçalves-Bradley, Areerob, Hennessy, Mesagno, and Grace [28] in a systematic review of depression exercise, found that this method may not be useful in the long term. A longitudinal study of twin brothers and sisters also concluded that increased physical activity was associated with reduced depression and anxiety [28].

Although the effect of physical activity on depression has been demonstrated in various studies, according to some studies, the reduction of depression is not positively correlated with exercise. Various factors such as the exercise environment, participant, exercise type, genetic background and experiences can be determinant. This finding contradicts the results of Conley, Hindley, Baskin et al. (2020) study on the effect of activity and exercise on depression and loneliness in children, which examined the effect of aerobic exercise on depression and loneliness in female adolescents and obtained considerable results [29]. Thus, it may seem that the reason for this discrepancy can be attributed to the type of exercise used, and the individuals participated in the study. From a cognitive perspective, the exercise-based environment creates

Table 4 Results of two-way analysis of variance in social characteristics variable

Source	Sum of squares	df	Mean of squares	F	Sig	η^2p
Stage	354.31	1,84	354.31	175	0.001	0.124
Group	258.64	5,84	42.22	3.37	0.17	0.037
Stage \times group	167.32	5,84	38.98	1.74	0.109	0.100

vitality and intimacy to relieve stress and conflict. On the other hand, it is inherent in being dynamic and interacting with the environment to lift loneliness and improve mood. A positive self-image (positive body image) and self-confidence influence the effect. On the other hand, practices can eliminate loneliness and lift mood because of their dynamism and interaction with the environment. A positive self-image (positive body image) and self-confidence influence the effect. Moreover, these factors can act as a barrier to the emergence of components that cause depression. Furthermore, in terms of the effect of exercise on self-esteem, data analysis showed that self-esteem plays a vital role in developing a significant impact on a person's mental health while organizing goals, thoughts, feelings, desires, and values. The more a person fails to acquire self-worth, the more they experience anxiety, mental instability, self-doubt, feelings of inadequacy, and apostasy. Self-esteem affects development, performance, and social interaction. Therefore, it is necessary to strengthen a person's positive self-esteem because a person who has high self-esteem can efficiently deal with threats and anxious life events.

However, Lamb & King, [30] and Lasslo [31] showed no significant relationship between physical activity and self-esteem, physical self-esteem and socio-physical anxiety [30, 31]. However, there is a significant positive relationship between self-esteem and physical self-esteem and also a significant negative relationship between self-esteem and physical self-esteem with social-physical anxiety. This discrepancy lies in each region's specific socio-economic and cultural factors, training and exercise conditions, and participants' traits. Therefore, according to the effect of exercise on self-esteem, exercise can significantly affect self-esteem. Thus, drawing on the effects of physical activity on self-esteem, we can argue that exercise influences self-esteem. Although the cause is unknown, it can be proved by indirect effects on physical appearance, physical and academic ability, feeling happy, an increase in neurotransmitters such as endorphins and monamines, and social acceptance. In general, exercise induces a sense of adequacy and accomplishment and increases self-esteem. Another trait that affects exercise is self-efficacy, which refers to a person's belief in their ability to do things. Thus, exercise can affect self-efficacy and leadership, better mood, lower levels of anxiety and depression [32], higher academic ability (So & Brush, 2008), better health, and lower rates of illness positively [15], and better physical function [33, 10] so that influence a person's self-esteem. This finding is consistent with the findings of Ravi et al. [34] who examined the effect of physical activity for the two age groups of 9–9 years and 11–12 years but showed no significant effect in the 7–9 year age group,

but did show a significant effect in the 11–12 year age group. This significant effect contradicted the results of this study. Although the social growth index increased in all groups, we did not see a significant improvement in the 7–9 year age group [34]. According to Erikson's theory, a more efficient competitive group at the age of 11–12 may further foster a sense of pride, competence, competence and belief in one's abilities concerning one's achievements and capabilities. There is a significant reason for this result that reveals itself in the segregation condition. Due to the isolation conditions, this exercise's study conditions were conducted almost individually during the implementation phase. If conducted in small groups, we would have seen different results whereby the Covidien-19 pandemic may have been the leading cause of isolation and lack of communication among students.

In this study, the results contradict the findings of [35, 36–38, 39], and [40]. They argue that sports competition allows children to experience success and failure in sports, maturing their social disposition and improving their performance; it maintains social bonds and intergroup communication while allowing children to practice, apply rules, and interact with peers through sports competition to develop social adaptation, integration, and emotions holistically. Through youth sports competitions, there are opportunities to interact with others. These activities also provide a context for learning. Possible reasons for this difference are the differences between the communities studied and the tools used, and many factors can influence individuals' social characteristics. However, regarding the discrepancy between the results of the present study and those of some studies examining the effects of physical activity on social development, we can conclude that individuals develop their social skills through exercise, which is influenced by several factors, including gender, age, beliefs and attitudes, social support, exercise type, and physical and psychological traits. Because younger children tend to be less social, their communication circle is more limited compared to adolescence. Boys also have more social support and are more likely to participate in sports. Participation in group sports leads to more interaction and friendly relationships than individual exercise [41]. As the results indicated the adequacy of motor skill development in improving students' psychological skills during Covid19 pandemic, we suggest that educational policymakers and health professionals must create a healthy environment. Although health education programs improve the quality of life and health, we should develop health protocols in comprehensive physical activity guidelines for students.

Declarations

Conflict of interest The authors declare they have no conflict of interest.

Ethical approval The governing Medical Ethics and History of Medicine Research Center for each Iranian university study site reviewed and approved the study before enrollment. The authors declare that this manuscript and research have been developed based on the Helsinki statement of ethical principles.

Informed consent Written informed consent was obtained from all individual participants included in the study.

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