ASPI | Afarand Scholarly Publishing Institute; Turkey
ISSN: 2008-2630 Iranian Journal of War & Public Health 2023;15(2):159-165 10.58209/ijwph.15.2.159

Predicting the Shooting Accuracy of Soldiers Based on Physical Fitness Factors and Brain-Behavioral Personality Traits

ARTICLE INFO

Article Type
Descriptive Study

Authors
Mirzakhani N.[1] *PhD*
Haddadiniya A.[2] *MSc*
Aghdaei M.[3] *PhD*
Shamsipour Dehkordi P.[4] *PhD*
Pashmdarfard M.[1*] *PhD*

How to cite this article
Mirzakhani N, Haddadiniya A, Aghdaei M, Shamsipour Dehkordi P. Pashmdarfard M. Predicting the Shooting Accuracy of Soldiers Based on Physical Fitness Factors and Brain-Behavioral Personality Traits. Iranian Journal of War & Public Health. 2023;15(2):159-165.

[1]"Physiotherapy Research Center" and "Department of Occupational Therapy, Faculty of Rehabilitation", Shahid Beheshti University of Medical Sciences, Tehran, Iran
[2]Department of Sport Sciences and Health, Faculty of Sport Science and Health, Shahid Beheshti University, Tehran, Iran
[3]Department of Human Motor Behavior, Faculty of Sport Science and Health, Shahid Beheshti University Tehran, Iran
[4]Department of Motor Behavior, Faculty of Sport Sciences, Alzahra University, Tehran, Iran

***Correspondence**
Address: Department of Occupational Therapy, Faculty of Rehabilitation, Shahid Beheshti University of Medical Sciences, Damavand Street, Tehran, Iran. Postal Code: 1616913111
Phone: +98 (21) 77548942
Fax: +98 (21) 77542057
mpashmdarfard@sbmu.ac.ir

Article History
Received: July 21, 2023
Accepted: April 16, 2023
ePublished: April 30, 2023

ABSTRACT

Aims Shooting is one of the most important skills for military forces, and mastery in this skill is valuable. People are very different both physically and in terms of behavioral brain systems and personality traits. Therefore, the present study aimed to predict the shooting accuracy of soldiers based on their physical fitness factors and their brain-behavioral personality traits.
Instruments & Methods The current research was a cross-sectional descriptive study that was conducted on 84 soldiers who were selected from 120 units of the Islamic Republic of Iran Army. Physical fitness factors were evaluated using appropriate tests and brain-behavioral personality traits with Carver scale. Also, each soldier's shooting accuracy score was recorded. For data analysis, Pearson's correlation coefficient and multiple logistic regression were used in SPSS 26 software.
Findings There was a direct and significant correlation between physical fitness and shooting accuracy of soldiers (r=0.569; p=0.001), as well as between personality traits and shooting accuracy (r=0.663; p=0.001). Physical fitness explained 34% of the variance of shooting accuracy, and personality traits explained 51% of the variance of shooting accuracy.
Conclusion Physical fitness and personality traits predict 51% and 34% of the variance of shooting accuracy, respectively.

Keywords Shotguns; Physical Fitness; Soldiers; Behavioral Symptom; Psychological Inhibitions

CITATION LINKS

[1] Systematic review of the association between physical fitness and musculoskeletal injury risk: Part 3- flexibility, power, speed, balance, and agility [2] It's time to reconsider how we define health: Perspective from disability and chronic condition [3] Impact of physical exercise on substance use disorders: A meta-analysis [4] Psychological therapies for post-traumatic stress disorder and comorbid substance use disorder [5] What is the relationship between physical fitness level and macro- and micronutrient intake in Spanish older adults? [6] Cross-sectional and longitudinal relationship between physical fitness and academic achievement in Japanese adolescents [7] The comparison of brain-behavioral system activation between individual and group sports majors [8] Comparison of behavioral brain systems in soldiers with borderline personality disorder or personality traits with healthy soldiers [9] The effect of type of behavioral brain systems on the psychological health of athletes and non-athletes: Gender moderator role [10] Brain structural and functional abnormalities in mood disorders: implications for neurocircuitry models of depression [11] The effect of physical fitness exercises on improving the shooting performance of military personnel (Case study: One of the army ranger units) [12] Prediction of Shooting performance with cognitive readiness, cognitive emotion regulation and mindfulness [13] Relationship between countermovement jump performance and multijoint isometric and dynamic tests of strength [14] Effects of core training in physical fitness of youth karate athletes: A controlled study design [15] Critical review of the impact of core stability on upper extremity athletic injury and performance [16] Effects of pilates core stability exercises on the balance abilities of archers [17] Relationship between core stability, functional movement, and performance [18] The relationship between core strength with static and dynamic balance in snowboard skiing male athletes [19] The relationship between core stability and performance in: Division I football players [20] The relationship between core strength and performance in division I female soccer players [21] The effect of six weeks training with Aerotrim instrument on the balance and performance accuracy in beginner girl shooters [22] The relationship between core stability, muscular endurance, and static balance, and shooting function in military soldiers [23] Postural balance and rifle stability during standing shooting on an indoor gun range without physical stress in different groups of biathletes [24] Which Are the Most Determinant Psychological Factors in Olympic Shooting Performance? A Self-Perspective from Elite Shooters [25] Air shooting competition effects on visual skills depending on the sport level

Introduction

Health, both individually and collectively, is undoubtedly the most important issue in life. During the last several decades, health has been recognized as a human right and a social goal in the world. The Oxford culture defines health as an excellent state of body and soul and a state in which body actions are performed in a timely and effective manner [1]. The World Health Organization (WHO) defines health as having complete physical, mental, and social well-being and not just the absence of disease and disability [2].

Today, paying attention to the quality of life and health and efforts to improve health and prevent diseases are also considered national priorities [3].

The most common dimension of health is physical health. Physical health is caused by the proper functioning of body parts. One of the aspects of physical health is physical fitness. As an important health factor, physical fitness affects physical and mental health in early life and later. Past research has shown that physical fitness has a positive and significant relationship with appropriate weight, psychological health, and performing tasks in the real world [4] and has been described as an important indicator of health [5]. Physical fitness has beneficial effects, such as improving cognitive control, memory, and concentration of neurotransmitters on brain function and structure [6].

Today, in the world of professional sports, physical fitness is not considered the only determining factor of success and progress, and in addition to physical abilities, tactics, specialized skills, and personality traits are also factors affecting sports progress. For this reason, many personality theories have always sought to predict people's success and behavior by knowing their personality traits [7].

Personality refers to a clear pattern of behavior, emotional regulation, emotion, motivation, self-knowledge, and interaction with others, that exists since adolescence or early adulthood. The different aspects of personality are the way people think about themselves, the way people communicate with colleagues, the way a person interprets environmental events and his dealings with them, and the way a person reacts emotionally to situations [8].

One of the important personality theories is the biological personality theory (2005). According to Gray's theory, there are three separate systems of behavioral inhibition system, behavioral activation system, and fight-flight system, and they interact with each other in the brain of mammals that control emotional behaviors. The predominance and activity of each of these systems in a person leads to different emotional states, such as fear, anxiety, and irritability [9]. Mood and behavioral characteristics of people are closely related to behavioral brain systems, and subsequently, factors related to motor function [10].

Meanwhile, the military forces have always been and are one of the main and most important pillars of any country. The importance and necessity of the military forces can be seen in the allocation of large annual budgets of the governments for the progress and promotion of this pillar of the countries. Big budgets are spent annually to advance strategic goals and improve systems and equipment, as well as prepare and preserve the lives of human forces. Manpower is the most valuable treasure of the world's armies and is considered one of the pillars of military organizations, and success and failure in missions and operations, in addition to expensive weapons and technologies, depend on the physical and mental health and physical fitness of these forces [11]. Nevertheless, many effective factors are involved in the preparation and strength of the military forces of each country, one of the most important of which is the shooting skill of each military person. Shooting skill is important for military and operational units because if military personnel are skilled shooters, they will reach their goal with less time and casualties by consuming ammunition [12]. Therefore, due to the importance of shooting, all military centers must be extremely careful in choosing the right people for this profession.

Considering that shooting skill is effective in increasing the power and success of military units and the implementation of shooting skills with appropriate and desirable quality is considered a basic pillar for estimating the power of the military forces, identifying predictive and effective factors on this skill is necessary for the military units. Therefore, the present study aimed to predict the shooting accuracy of soldiers based on their physical fitness factors and their brain-behavioral personality traits.

Instruments and Methods

The current research was a cross-sectional descriptive study, which was conducted on 84 soldiers who were selected from the 120 units of the Army of the Islamic Republic of Iran in 2022. Based on a similar study [5], the sample size was calculated to be more than 80 people. In this regard, 84 soldiers were studied as subjects. The subjects completed the informed consent by knowing the nature and mode of cooperation.

Inclusion criteria included not having visual impairment to recognize the target signs naturally, having suitable weight for movement, position, and maintaining physical balance while shooting, and having sufficient knowledge and experience.

Assessment tools

- **G-3 rifle:** A 7.62 mm caliber rifle (G-3) was used in the research.
- **Sibel:** A sibel was used for war rifle at a distance of 100 meters.
- **Results recording sheet:** The scores of each subject were recorded separately in the shooting

phase in special sheets designed by the researcher for this purpose.

Physical fitness factors

Physical fitness factors of the participants were considered according to the type of shooting (lying down) and individual experiences, including cardio-respiratory endurance tests (Tekumesh step test), flexibility of trunk and neck muscles (static-body and neck flexibility test), muscle endurance including muscle endurance the upper body (swimming test on the ground), finger grip strength (grip strength test), and shoulder and arm muscle endurance (Barfix pull test).

Cardiorespiratory endurance

• **Tekumesh step test:** The purpose of this test is to control the development of cardio-respiratory fitness of the athlete. The test was performed using a bench or stairs with a height of 20.3cm and a stopwatch. The test was performed as a 4-step cycle (right leg up, left leg up, right leg down, left leg down) by performing 24 times in one minute, in such a way that both cycles were done in a period of 5 seconds. The test was performed in 3 minutes and 30 seconds after the completion of the pulse rate test. The pulse rate was started in 30 seconds, then the number of pulses of the participant was evaluated by the relevant table, and the level of cardio-respiratory fitness was placed in one of the classes of excellent, very good, good, relatively well, low, and weak.

Flexibility

• **Static flexibility test of trunk and neck:** The purpose of this test is to monitor the flexibility of the trunk and neck. This test was done with a one-meter ruler. The participant lay down on the floor and held his hands firmly behind his head, then raised his body as much as possible so that his thighs are in contact with the ground. The amount of rising of the participant's body from the ground to the tip of the nose was measured by a line. This test was repeated in 3 stages, and the best result was recorded as trunk and neck flexibility in one of the excellent, good, average, relatively good, and poor grades.

Muscular endurance

a) Stretching test from Barfix: The purpose of this test is to monitor the muscular endurance of the shoulder and arm of the participant. This test was done with the Barfix bar, in such a way that the participant hangs himself from the Barfix bar in such a way that the palms are towards him, then he pulls himself up until his chin is level with the bar, and then until when his arms are straightened, he comes down and continues this work to the best of his ability. The number of correct movements was recorded, and according to the standard table, the obtained score was placed in one of the excellent, above average, average, below average, and weak classes.

b) Swimming test on the ground: The purpose of this test is to evaluate the endurance of the participant's upper body muscles. This test was done on a flat surface and with a stopwatch so that the participant lies on the floor, opens the hands to the width of the shoulders, and pulls the arms completely. Then he lowers the body so that the elbows are bent to a 90-degree angle, goes back to the initial position, and repeats this as much as possible. The number of correct movements was registered, and according to the relevant standard table and the age of the participant was placed in one of the classes of good, moderate, relatively weak, and weak.

c) Strength test: The purpose of this test is to monitor the participant's strength. This test was evaluated by a manual dynamometer in such a way that the best result obtained in 3 times of the participant's test was recorded and was placed in one of the excellent, above average, average, below average, and weak classes.

Scale for measuring brain-behavioral personality traits

This scale was prepared by Carver and includes 24 items, of which 7 items are related to behavioral inhibition and 13 items are related to behavioral activation. The other 4 items of this scale are neutral. Items are scored based on a 4-point scale (from 1= "completely disagree" to 4= "completely agree"). Reward subscale evaluates the importance of reward in the occurrence of positive emotions, drag subscale evaluates the individual's tendency to actively search for desirable goals, and the subscale of entertainment seeking measures a person's willingness to perform potentially rewarding activities.

In the present study, the reliability obtained through the alpha coefficient for the questionnaire of the brain-behavioral personality traits scale was 0.75, which showed that the questionnaire used by the researcher has high reliability. In this research, using the opinions of supervisors and advisors, the questionnaires used had favorable face validity.

Procedure

The participants started shooting with G-3 rifles. According to the specifications of the gun and its weight, the shooting was done in a prone position so that each participant first shot 3 shots as a test and then shot 10 shots to record the shooting accuracy. After the shooting and according to the used Sibel, the scores of each participant were recorded. Before taking the measurements and completing the forms related to brain-behavioral personality traits, consent forms were distributed among all the soldiers participating in the research and collected after completion. Due to the time limit for physical fitness tests, the participating soldiers were divided into several groups. After dividing the soldiers into groups at a certain time of the day, a physical fitness test was taken, and the obtained scores were recorded. It should be noted that the conditions for performing physical fitness exercises for all participants in terms of some variables, such as sports clothing, level of fatigue, air temperature, amount of sleep, and nutrition, were considered the same. Indicators of cardio-respiratory endurance,

flexibility, and muscular endurance were used to measure the level of physical fitness of the participants. Then the questionnaire related to brain-behavioral personality traits was completed and collected. After coordinating with the relevant officials, the participants were prepared for the shooting test. After the shooting, the shooting scores and accuracy were recorded for each participant. After recording the score of each shot of all the subjects, the error percentage formula was used to equalize the results of targeting accuracy.

Statistical analysis

The normality of the data was examined using the Kolmogorov-Smirnov test. Pearson's correlation coefficient and multiple logistic regression method were used to predict the shooting accuracy of soldiers in SPSS 26 software.

Findings

84 soldiers were studied as subjects. The age range of participants was 18-22 years, with a mean age of 19.9±3.5 years. Their height range was 160-186cm, with a mean height of 173.6±6.9cm, and their weight range was 55-97kg, with a mean weight of 69.4±.3.1 kg. The frequency distribution of demographic characteristics of participants is presented in Table 1.

Table 1) Frequency distribution of demographic characteristics of the participants (n=85)

Variables	Number	Percentage
Gender		
Male	84	100
Female	0	0
Age (years)		
18	6	7.1
19	14	16.7
20	15	17.8
21	24	28.6
22	25	29.8
Education		
Under diploma	2	2.4
Diploma	17	20.2
Associate degree	29	34.5
Bachelor's degree	36	42.9

The descriptive characteristics of the research variables are presented in Table 2. There was a direct and significant correlation between physical fitness and shooting accuracy of soldiers (r=0.569; p=0.001), as well as between personality traits and shooting accuracy (r=0.663; p=0.001).

Table 2) Descriptive statistics of variables

Variables	Mean±SD	Median	Variance
Physical fitness	2.83±0.912	2.96	0.832
Shooting accuracy	2.93±0.768	2.97	0.579
Personality traits	2.87±0.750	2.91	0.562

Table 3) Multiple logistic regression model to investigate the predicting effect of variables on shooting accuracy

Predictive variables	B	p	OR	95%CI	
				Lower	Upper
Physical fitness	0.630	0.001	3.151	1.129	7.190
Cardio-respiratory endurance	0.540	0.001	2654	1.390	8.210
Endurance of the upper body (trunk and neck muscles)	0.720	0.001	4.760	1.450	7.540
Finger grip strength	0.680	0.001	3.220	1.765	8.220
Flexibility of the upper body (trunk and neck muscles)	0.490	0.001	3.431	1.439	8.635
Personality traits	1.958	0.001	3.230	1.220	7.131
Behavioral inhibition	1.840	0.001	2.150	1.321	7.298
Behavioral activation	1.975	0.001	3.130	1.190	8.119
Constant	-10.651	0.0001	0.0001	-	-

Physical fitness can predict 34% of the variance of shooting accuracy, and personality traits can predict 51% of the variance of shooting accuracy (Table 3).

Discussion

The present study aimed to predict the accuracy of soldiers' shooting based on physical fitness factors and behavioral brain personality traits.

The results of the present study showed that there is a direct and significant correlation between physical fitness factors and the shooting accuracy of soldiers. The findings of this research showed that physical fitness exercises have a positive and facilitating effect on shooting accuracy. If we attribute its positive effects to factors, such as practical training and the effect of warming up the body, we can recommend that positive and strengthening physical fitness exercises affect shooting accuracy and, consequently, on people's combat ability (in terms of accuracy).

Commanders and military officials can formulate their plans in terms of these positive effects. Although it is necessary to point out that this result is not definitive and undeniable, reaching definitive results requires more research and repeated experiences. Research showed that in the process of learning the speed and accuracy factors in a skill that requires the speed factor before the accuracy factor, it is better to pay attention to the speed first and then the accuracy [13].

On the contrary, when the accuracy factor is involved more than speed in a skill, it is better to focus on accuracy first and then on speed, and if both speed and accuracy factors are important from the beginning of a skill, both factors must be equally important in shooting with a weapon. In operational situations, the third part of the case is more involved than the other parts, and therefore the trainers should develop them by paying attention to both factors of speed and accuracy from the beginning in shooting training [14]. In shooting sports, it can be said that the second clause is relevant, so shooting sports coaches should first develop the athlete's accuracy and then develop his speed. Therefore, it can be said that the quality of execution of shooting skills is one

of the most important and key factors in the calculations related to combat power.

Therefore, the implementation of shooting skills with the desired quality as an essential pillar in the assessment of combat power has attracted the attention of military commanders. Appropriate physical fitness is the main concern of the military forces and is one of the determining factors in the efficiency and performance of these forces. The nature of military activity requires that a military person (whether in peacetime or wartime) should have proper physical fitness. The physical fitness of a soldier includes the capacity to perform continuous and skillful movement, the ability to return to the initial state after a lot of effort, the desire to complete the considered tasks, and the acquisition of expertise in combat skills and self-confidence in facing any situation. Activity and life in areas with limited facilities (in the highlands, plains, and forests) and heavy and long-term physical activity are among the things that soldiers inevitably face. Shooting is an art or method that depends on physical fitness and the desire to win in the shooter. Physical training is necessary to increase resistance and control tremors. Physical exercises should be done to strengthen muscles, better breathing, and body flexibility. In these exercises, it is more important to strengthen the shoulder, arm, elbow, wrist, and finger muscles. Stretching and dynamic movements in small amounts will be beneficial for these organs. Maintaining postural stability or balance as one of the factors of physical fitness plays an important role in the field of gun shooting. When the human skeletal structure is in balance, the lever mechanism of the body is at maximum efficiency and minimum energy consumption.

Numerous researches have addressed the effect of the central region on the balance and performance of people in different communities of athletes, ordinary people, and even patients. Silfies *et al*. have reported a positive correlation between core strength, balance, and performance of motor skills [15]. As an example, we can refer to the research of Park *et al*. [16]. These researchers investigated the effect of 12 weeks of Pilates training on the static and dynamic balance of fencers and observed that the training group had better dynamic balance after 12 weeks than the pre-test and the control group [16]. Therefore, strengthening the central area with Pilates exercises has been considered as a factor in improving the balance of fencers. Okada *et al*. showed that there is a significant correlation between stability of the central region and movement performance [17]. This means that people with better central stability had better movement performance than weaker people in the movement tests.

Razavi *et al*. studied the relationship between central stability and static and dynamic balance in 40 male ski and snowboard athletes. The results showed that there is a significant relationship between the power and endurance of the central muscles and the performance of the lumbopelvic complex with static balance [18]. Nesser *et al*. reported a weak to moderate correlation between central stability and athletic performance in male college soccer players [19]. However, Nesser & Lee did not find a significant relationship between the strength of the central part and the athletic performance of university female soccer players [20]. In another study, Zolfaghari observed that the use of the Aerotrim device (three-dimensional swing) for six weeks in beginner shooters improves the balance and accuracy in execution, which is due to the effect of this device on the vestibular and physical system of the athletes [21]. Therefore, in shooting, the stability of the central region and balance are the most important physical factors for success because the shooter must bear the weight and balance of the rifle in addition to his own balance while shooting. Increasing accuracy in shooting requires minimizing body sway and creating balance in the shooter-gun system.

Based on the results of the present research, there is a direct and significant correlation between the two indicators of personality traits (behavioral inhibition and behavioral activation) with the shooting accuracy of soldiers, which is in line with the studies of Nourizadeh *et al*. [22], Ehsanbakhsh *et al*. [11], and Sattlecker *et al*. [23]. Therefore, it can be said that a skilled shooter must first have good concentration. He can quickly change the target location, quickly find the target and shoot at it, and be able to focus and notice several points at the same time and monitor various stimuli. Once an athlete has mastered the techniques and perfected the shooting postures, continued future improvements will depend significantly on his mental training and effort. Poor shots by an advanced shooter are often due to mental errors rather than a lack of physical skill. Therefore, it can be seen that a strong shooter, despite numerous successes, sometimes commits gross errors, or it is observed that among two or more competitors, despite equal and similar efforts and training, one person is more successful than the other, and perhaps the loser has had more exercises. This is where the importance of mental preparation, attention and concentration and what was mentioned in the above lines becomes important. Accurate shooting is also influenced by arousal level, which has recently been defined as a person's energetic state at a particular moment and is measured by skin conductance level. Also, activation has been introduced as a change in the arousal level, from the basic level to the task position, which also affects the accuracy in shooting. Arousal is the level of awakening of the central nervous system, which ranges from deep sleep to high excitement and is often measured by physiological measurements such as electroencephalography, electrocardiography, electromyography, measurement of catecholamines, breathing intensity, blood pressure, heart rate,

sweating rate, etc. A shooter will not perform optimally when he is under or over-excited. It is possible to improve executive function and the ability to transfer attention by training and practicing it, and by improving and strengthening it, work that relies on this faculty can be done in a better way. In the conducted research [11, 22, 23], the tasks that should be done following the improvement of attention transfer were based on strengthening concentration, maintaining accuracy and attention, as well as changing according to the situation and quickly of these functions. Because the improvement of shooting skill to a large extent, in addition to its practice, relies on maintaining and accuracy in attention, appropriate and quick change (timely transfer of attention from one stimulus to another stimulus), and more concentration, so the alignment of the results of this research with the research done in this field is logical and justified.

Based on the obtained results, physical fitness and personality traits of behavioral inhibition and activation have been able to explain (predict) 51% of the changes in the dependent variable, i.e., shooting accuracy. Therefore, it is necessary to focus more on their flexibility to improve shooting accuracy in soldiers. In line with these results, Ehsanbakhsh, in a study, showed that the program of selected physical fitness exercises leads to improvement of shooting results in both standing and lying positions in rangers [11]. Nourizadeh *et al*. investigated the relationship between endurance of central stabilizing muscles and static balance with the shooting performance of military soldiers and concluded that endurance in the central region of the body improves balance, and these two indicators improve shooting performance [22]. In this regard, it is suggested that the exercises mentioned in the research should be included in the shooters' physical fitness program. In explaining the results, it can be said that the physical fitness of the soldiers played an important role in victory or defeat. The important goal of physical exercises is to acquire and maintain practical fitness.

Complete preparation should include physical activities and body building of people so that they can function under any environmental weather conditions. Physical fitness comes from the combination of exercises that develop physical skills and body building that increase strength and endurance. For every soldier, a degree of physical fitness is necessary, which can only be obtained through physical activities. The purpose of physical fitness programs is to strengthen people so that they can perform their assigned tasks and missions well during war or maneuvers. Moreira da Silva *et al*. [24] and Mon-López *et al*. [25] also stated in this context that there is a great relationship between the psychological performance and practical skills of shooters. Therefore, the success or failure of a shooter depends on executive abilities, such as technique and key skills, along with psychological preparations, such as self-confidence, concentration, and emotional control.

The relationship between physical and psychological aspects in shooting is a worthy consideration. Shooters often talk about mental skills, i.e., skills that are effective in difficult tasks such as involuntary trigger release, breathing and heart rate control, rather than physical skills. In fact, experienced shooters admit that using good mental performance ensures a high percentage of success. For this reason, prominent and well-known shooters emphasize uniformity in work, stability in the implementation of techniques, quick and accurate decision-making, and calmness as the most important assets of a good shooter. Therefore, due to the fact that in sports and military conditions, using exercises and physical sports is inevitable and is considered part of everyday tasks, we can benefit from behavioral tasks that are based on the intention of transferring attention and performed exercises and sports in a purposeful and scientific manner.

One of the limitations of the present study was about the shooting of soldiers with G-3 combat weapons, which has limited the generalizability of the present study to other combat groups and to other combat weapons. In addition, the findings of the present study cannot be considered a criterion for the final judgment and decision of commanders and military leaders, so wider studies and researches should be conducted in the matter of shooting by different weapons at different distances and with different subjects.

It is suggested that the topic of this research should be carried out in the conditions of laboratory vision, that is, in shooting halls and using the step test as an intense sports activity and the use of a moving sable, so that more accurate results can be obtained by removing the atmospheric factors and approximating the research conditions.

Conclusion

Physical fitness and personality traits predict 51% and 34% of the variance of shooting accuracy, respectively.

Acknowledgements: Nothing has been declared by the authors.

Ethical Permission: This research was approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences (Ethical No IR.SBMU.RETECH.REC.1400.532).

Conflict of Interests: The authors declare no conflict of interests.

Authors' Contribution: Mirzakhani N (First Author), Introduction Writer/Main Researcher (20%); Haddadiniya A (Second Author), Methodologist (20%); Aghdaei M (Third Author), Discussion Writer (20%); Shamsipour Dehkordi P (Fourth Author), Statistical Analyst (20%); Pashmdarfard M (Fifth Author), Assistant Researcher/Discussion Writer (20%)

Funding/Support: This study was supported by Shahid Beheshti University of Medical Sciences.

References

1- Sarah J, Lisman P, Gribbin TC, Murphy K, Deuster PA. Systematic review of the association between physical fitness and musculoskeletal injury risk: Part 3- flexibility, power, speed, balance, and agility. J Strength Cond Res. 2019;33(6):1723-35.
2- Krahn GL, Robinson A, Murray AJ, Havercamp SM, Havercamp S, Andridge R, et al. It's time to reconsider how we define health: Perspective from disability and chronic condition. Disabil Health J. 2021;14(4):101129.
3- Wang D, Wang Y, Wang Y, Li R, Zhou C. Impact of physical exercise on substance use disorders: A meta-analysis. PloS One. 2014;9(10):e110728.
4- Roberts NP, Roberts PA, Jones N, Bisson JI. Psychological therapies for post-traumatic stress disorder and comorbid substance use disorder. Cochrane Database Syst Rev. 2016;2016(4):CD010204.
5- Aparicio-Ugarriza R, Luzardo-Socorro R, Palacios G, Bibiloni MM, Argelich E, Tur JA, et al. What is the relationship between physical fitness level and macro- and micronutrient intake in Spanish older adults?.Eur J Nutr. 2019;58(4):1579-90.
6- Sasayama K, Nonoue K, Tada T, Adachi M. Cross-sectional and longitudinal relationship between physical fitness and academic achievement in Japanese adolescents. Eur J Sport Sci.2019;19(9):1240-9.
7- Khosravi S, Haghayegh S. The comparison of brain-behavioral system activation between individual and group sports majors. Neuropsychol. 2017;3(8):69-84. [Persian]
8- Taheri S, Rahnejat A, Manouchehri M, Sabayan B, Hobbi M, Donyavi V, et al. Comparison of behavioral brain systems in soldiers with borderline personality disorder or personality traits with healthy soldiers. Military Psychol. 2020;11(42).
9- Shamsipour P, Agdai M, Sajedi R, Heydari M. The effect of type of behavioral brain systems on the psychological health of athletes and non-athletes: Gender moderator role. Sport Psychol Stud. 2021;10(36):81-100. [Persian]
10- Drevets WC, Price JL, Furey ML. Brain structural and functional abnormalities in mood disorders: implications for neurocircuitry models of depression. Brain Struct Funct. 2008;213(1-2):93-118.
11- Ehsanbakhsh H. The effect of physical fitness exercises on improving the shooting performance of military personnel (Case study: One of the army ranger units). Q J Military Sci Tactic. 2018;3(42):169-84. [Persian]
12- Naji A, Karami M. Prediction of Shooting performance with cognitive readiness, cognitive emotion regulation and mindfulness. Military Psychol. 2018;10(38):45-56.
13- Nuzzo JL, McBride JM, Cormie P, McCaulley GO. Relationship between countermovement jump performance and multijoint isometric and dynamic tests of strength. J Strength Cond Res. 2008;22(3):699-707.
14- Kabadayı M, Karadeniz S, Yılmaz AK, Karaduman E, Bostancı Ö, Akyildiz Z, et al. Effects of core training in physical fitness of youth karate athletes: A controlled study design. Int J Environ Res Public Health. 2022;19(10):5816.
15- Silfies SP, Ebaugh D, Pontillo M, Butowicz CM. Critical review of the impact of core stability on upper extremity athletic injury and performance. Braz J Phys Ther. 2015;19(5):360-68.
16- Park JM, Hyun GS, Jee YS. Effects of pilates core stability exercises on the balance abilities of archers. J Exerc Rehabil. 2016;12(6):553-8.
17- Okada T, Huxel, KC, Nesser TW. Relationship between core stability, functional movement, and performance. J Strength Cond Res. 2011;25(1):252-61.
18- Razavi S, Norasteh A, Banparvari M. The relationship between core strength with static and dynamic balance in snowboard skiing male athletes. J Res Rehabilit Sci. 2014;10(3):432-43. [Persian]
19- Nesser TW, Huxel KC, Tincher JL. Okada T. The relationship between core stability and performance in: Division I football players. J Strength Condit Res. 2008;22(6):1750-4.
20- Nesser TW, Lee WL. The relationship between core strength and performance in division I female soccer players. J Exercise Physiol. 2009;12(2):21-8.
21- Zolfaghari L. The effect of six weeks training with Aerotrim instrument on the balance and performance accuracy in beginner girl shooters. J Res Sport Rehabilitation. 2015;3(6):21-9. [Persian]
22- Nourizadeh S, Mirjani M, Naserpour H. The relationship between core stability, muscular endurance, and static balance, and shooting function in military soldiers. J Sport Biomech. 2019;5(1):62-71. [Persian]
23- Sattlecker G, Buchecker M, Müller E, Lindinger SJ. Postural balance and rifle stability during standing shooting on an indoor gun range without physical stress in different groups of biathletes. Int J Sports Sci Coaching. 2014;9(1):171-84.
24- Moreira da Silva F, Malico Sousa P, Pinheiro VB, López-Torres O, Refoyo Roman I, Mon-López D. Which Are the Most Determinant Psychological Factors in Olympic Shooting Performance? A Self-Perspective from Elite Shooters.Int J Environ Res Public Health. 2021;18(9):4637.
25- Mon-López D, Bernardez-Vilaboa R, Sillero-Quintana M, Alvarez Fernandez-Balbuena A. Air shooting competition effects on visual skills depending on the sport level. Eur J Sport Sci. 2022;22(3):336-43.