

Effect of mental imagery on performance and learning the Darts' skills of war mental wounded survivors

Haidarian Majid¹, Sadeghi Nahid², Nobakht Ramezani Zahra³ and CHegini Kobra¹

¹*Department of Physical Education, Karaj Branch, Islamic Azad University, Iran*

²*Department of Physical Education, Parand Branch, Islamic Azad University, Iran*

³*Department of Physical Education, Qazvin Branch, Islamic Azad University, Iran*

ABSTRACT

Due to the outbreak of war in the world, many damages affected the survivors. Many researches have been done to restore these people to the normal life. The objective of the current study is to examine the effect of mental imagery on performance and learning the Darts' skills of war mental wounded survivors. The study samples were 56 mental wounded survivors with the mental imagery score was between 35 and 45 from Hall and Martin (1986) mental imagery questionnaire in Qazvin province. The samples were selected randomly at 4 groups (N=14) with The training program has been for a month, three days a week and each session was 60 minutes. The mental imagery group: 24 minutes of mental imagery, the combined group: 8 minutes inner mental imagery + 16 minutes exercise, the exercise group: 24 minutes of exercise and the control group had no exercise. The Count Up Darts standard test was used to measure the performance and learning skills. The 2 combinational factors analysis of variance 3×4 (group and session) with repeated measurement at the session factor was used to test the hypothesis in the acquisition level and the one-way analysis of variance was used to test the hypothesis in the retention level ($p < 0/05$). The results showed that the darts' skills performance and learning of the subjects of the three training groups have some progress at the acquisition and retention levels compared to the control group but this progress was not significant.

Key words: Inner mental imagery, combined training, survivors with mental disorders

INTRODUCTION

By manipulating the variables scientists have studied the issue that how they can improve the learning of a motor skill and provide a person's happiness. Major volumes of the recent researches in the area of motor behaviors have been dedicated to the effects of the sport in improving the motor skills, in line with this objective. Physical exercise is one of the traditional methods to teach the motor skills which has long been of the most importance. But the use of mere physical exercise is not possible in all situations of learning. For example, when the athlete injured and is not able to do exercise or when physical disabilities as a result of participation in war have been occurred. Therefore, utilizing of complementary methods and probably replacing physical exercises is needed in order to transfer the motor skills to this group of wounded in action (veteran) athletes and similar human groups [1]. Mental imagery is one of the supplementary exercises which have been used in the past few decades to improve the performance. Researchers like Wright and Smith (2007), Guilit et al. (2008); Yenberg (2008), Smith and Holmes (2004), Smith et al. (2008) have done extensive researches about undeniable benefits of in sport exercises (Ghorbani1391 (2012)) and by continuing their researches they always looking for finding new components to develop the exercises of mental imagery. Thomas (2003) states mental imagery is the Mental Representation of objects which are not felt by sense organs at that moment [2].

Based on the Maltz's researches (1954), the effect of mental imagery is parallel and equal to exercises (Kheybari 1372 (1993)). Successful men and women athletes at all levels use mental imagery due to cognitive and motivational reasons to achieve success and elite athletes benefit a more systematic and broader mental imagery than the low level athletes[3].

According to the researches of sports psychologists the mental imagery has two aspects (dimensions). One is the viewing angle of person that divides it to 2 types of inner and outer mental imagery (Mahulen and Avens 1977), and the other is the target of the exercise which divides the mental imagery into Good and Predominance (Abbasi 2008). On the basis of the Mahulen and Avens (1977) definition, the inner mental imagery is that one imagines himself really inside his body and experiences the senses which are expected in real-life situations; contrary to these researches some researchers concluded that mental imagery exercises have no advantages over other exercises methods or the effects of mental exercises are very low and negligible[8]. However, again in the latest researches By Alexander Worrack Sa and Grovaviya (2012), Michel Molina et al. (2014) and Claudia Bot Jlya et al. (2014) the evidences clearly highlight and emphasize the value of mental imagery on learning and performance of motor skills[4,5,6]. But despite all the researches, the gaps relating to the researches about mental imagery are very high and due to the different needs of communities more extensive researches must be done.

Mental veterans have formed a high percentage of human society and according to the relevant agencies reports because of the specific physical (health) and mental problems and their successive failures in everyday activities including sport caused them to distant from the society. But they can be returned to the society by some methods like sport; and since the mental imagery is a scientific proven category and away from any physical special needs can cause them success of sports to be able to experience a healthy social life. And since none of the researches have yet studied the effects of mental imagery on people with specific problems like mental veterans, the present study tried to examine the available secrets on this subject by filling the gap whether training techniques of mental imagery, physical exercise or a combined exercise have effect or not on performance and learning the darts' skills of mental veterans in the acquisition and retention level either as a separate category.

MATERIALS AND METHODS

In this study, a research project consists of a pre-test and a repeated test in 4, 8 and 12 sessions and a retention test 2 weeks after the last training session were used to investigate the effect of mental imagery on darts' skill of mental veterans. To start first 70 veterans were only identified as the population after adapting to the investigation requirements among the 128 mental veterans regarding the target and requirements for project's samples. The requirements for the samples include as follows: lack of experience in throwing darts – the mean age of 5 ± 50 – a minimum score of between 35 and 45 from mental imagery ability revised Martin and Hall questionnaire (MIQ-R). Then the samples were selected 56 people randomly using Morgan table. They fill a consent form after the method of the project's implementation was said. The personal information form and medical records of each of the v were used as well in order to check the accuracy of the injury percentage and the presence or absence of violent behavior. And finally the samples were placed randomly into four 14 homogeneous people from the level of skill in throwing darts: 1- inner mental imagery, 2- combined exercise, 3- physical exercise, 4- control group. All 4 groups get to know with dart, dart board, how to score and pose of placement in the back of dart board during a one-hour training session. But the mental imagery groups and combined group in addition to the public initial training session get to know with Jacobson relaxation method and inner mental imagery during a private session separately as well and eventually the 2 groups were allowed to listen to the audio file related to their group for the first time. All 56 subjects in this study attaining the pre-test session placing in the back of the dart board did 5 rounds of throwing and their scores were recorded. After the pre-test session ended each of the samples in its group do exercise based on the group specific exercise protocol. Every other day (10 min warm-up at the beginning of the training session and 10 min cool down at the end of each training session and 25 min of specific exercise of the group) in 12 sessions, it should be noted that during the 12 training sessions the researcher asked the subjects at the end of 4, 5 and 12 sessions to be in the back of target of the dart and throw 5 rounds and their scores were recorded.

Group exercise protocols are as follows:

*After entering the gym, subjects of mental imagery first listened to the Jacobson's relaxation method for 16 minutes in a quite environment and supine position then entered to the phase of mental imagery continuously and did the inner mental imagery for 8 minutes.

*The combined group subjects first did the inner mental imagery for 8 minutes after entering to the gym and then practiced throwing darts for 16 minutes.

*Physical exercise group subjects practiced throwing the darts from legal distance for 24 minutes after entering to the gym.

But the control group subjects only attained 5 sessions of pre-test, 4, 5 and 8 training sessions and the retention test session and after warming up themselves without any exercising were immediately in the back of the target of the dart and threw darts 5 rounds and their scores were recorded in the list.

To analyze the data, collected information were analyzed and described at three parts.

In the first part the collected data were described using descriptive statistics indices like the mean, standard deviation, tables and related charts.

In the second part the results of Shapiro – Wilk test were used in order to check the assumption of normal data and finally the research hypothesis were used using 2 combinational factors analysis of variance inferential statistics 3×4 (group and session) with repeated measurement at the session factortest the hypothesis in the acquisitionlevel.

RESULTS AND DISCUSSION

The results of data description showed that the progress from pre0test to the acquisition and retention level was very small and negligible in all 4 groups. But the one-way analysis of variance to test the hypothesis of the retention level showed that the dart skill retention rate is more in the mental imagery group than the other 3 groups. The results of Shapiro – Wilk test in tables 1 and 2 suggesting that the scores of dart throwing in the pre-test level, acquisition and retention at independent variables levels are normally distributed(05/0<p).

Table1: Shapiro-Wilk test results

Stage	Group	Statistics	df	Sig
Pretest	Imagery	0/974	14	0/923
	Combined training	0/912	14	0/166
	Physical training	0/950	14	0/555
	control	0/969	14	0/861
Session 4	Imagery	0/952	14	0/595
	Combined training	0/951	14	0/572
	Physical training	0/961	14	0/744
	control	0/902	14	0/122
Session 8	Imagery	0/916	14	0/194
	Combined training	0/941	14	0/432
	Physical training	0/924	14	0/248
	control	0/928	14	0/288
Session 12	Imagery	0/919	14	0/210
	Combined training	0/957	14	0/974
	Physical training	0/929	14	0/296
	control	0/917	14	0/197

Table2. Shapiro-Wilk test results in the retention level

Stage	Group	Statistics	df	Sig
Retention	Imagery	0/961	14	0/744
	Synthetic	0/960	14	0/726
	Physical training	0/937	14	0/380
	control	0/945	14	0/488

The results of Mauchly's test in table 3 suggesting that the sphericity assumption is not established for dart throwing scores (000/0=p). Therefore the greenhouse geisser adjustment was used to report the 2 combinational factors analysis of variance 3×4 (group and session) with repeated measurement at the session factor.

Table3. Mauchly's test results

The effects of intra-group	X2	df	Sig.
Session	33/68	2	0/000

According to the assumption of normal distribution of data (05/0<p) and homogeneity of variance (889/0 = p) the one-way analysis of variance was used to check the primary differences in the pre-test. The results of one-way analysis of variance in table 4 showed that there is no significant difference between the dart throwing scores mean in the pre-test level of groups (873/0=p 232/0=(52 3)F).

Table4. The results of one-way analysis of variance for pretest scores

The source changes	SS	df	MS	F	Sig.
Intergroup	509	3	69/6	0/232	0/873
Within the group	37971/8	52	730/2		
Total	38480/8	55			

Figure(1) shows the chart of improvement rate of dart throwing scores mean from initial tests, acquisition tests (4, 8 and 12) and the retention test of separated group.

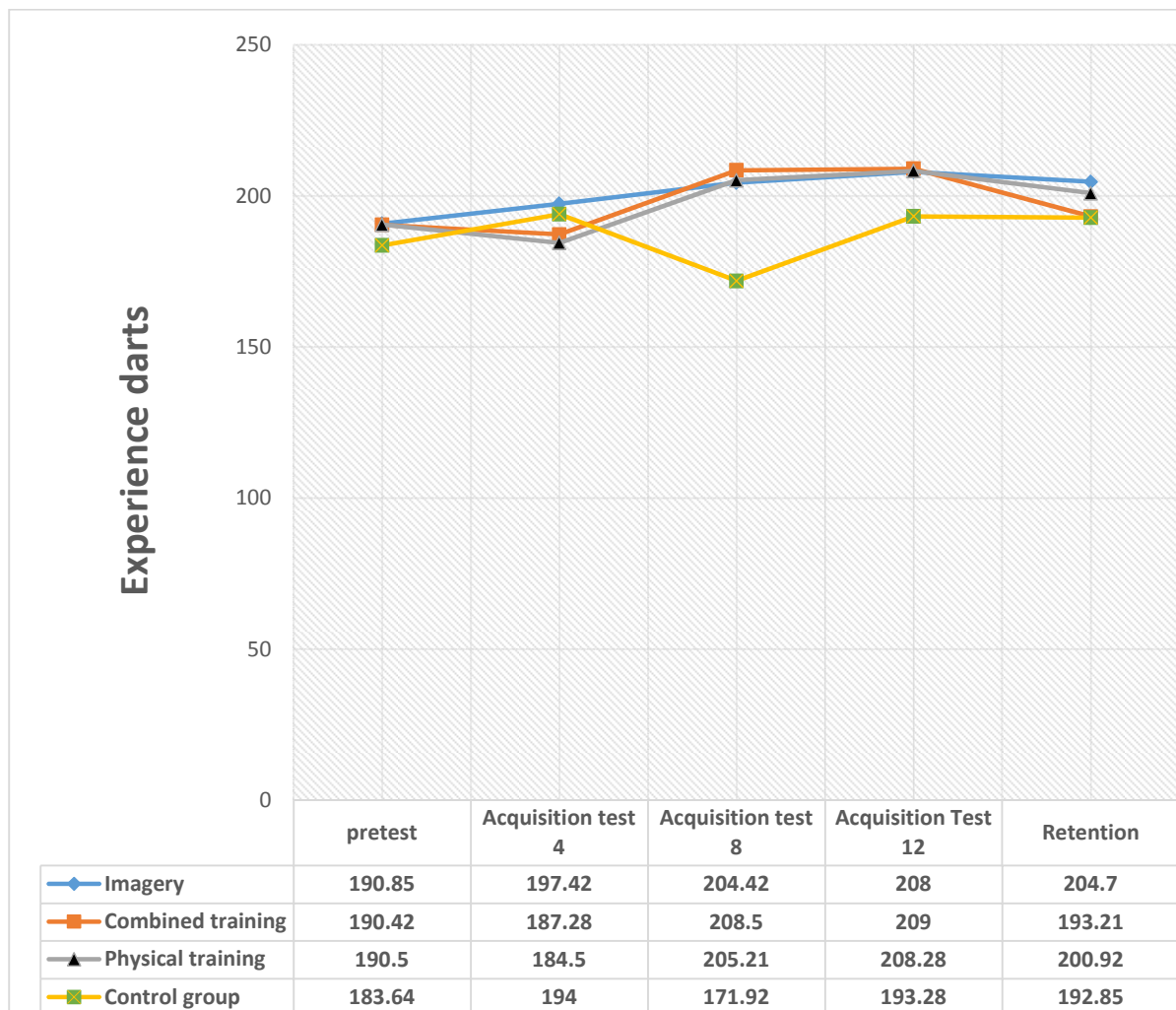


Figure1. The chart of improvement rate of dart throwing scores mean from initial tests, acquisition tests (4, 8 and 12) and the retention test of separated group

Given that all of the groups showed no significant progress the type of training of each group is separately described.

A. Mental imagery and learning dart skills

The mental imagery is of the most widely used training method in the area of motor learning to strengthen the motor skills. In recent years, extensive researches have been done about the effects of mental imagery on performance and learning sport skills (Abbasi 1388 (2009), Magill 1998, Schmitt 1991) [7]. The results of the current study showed that in three groups with intervention training, the mean of skill had progress in the acquisition and retention level compared to pre-test level, but not significant progress.

* Age and mental health of the subjects and the speed of mental imagery: the results of the study reject any significant difference between the effect of mental imagery, physical exercise and combined exercise groups on dart skill of mental veterans and these results are exactly contrary to the results of Adams (1990), Annette (1996), Ghorbani, Varzaneh and Parhizkar (1391 (2012)) researches[5]. The cause of lack of this research's results consistency with the above-mentioned researches' seems to be related to the differences in the subjects of this research, studies showed that the researches in which the mental imagery positive effect and its priority are shown

over the other researches have had samples with full mental health. Evidences have showed that mental imagery has effect on various sports skill but these effects would be effective if the athletes have acceptable imagination on how the skill is formed and the formulation is imprinted on their brains[6], in Faky et al. (2000) study which examined the relationship between brain damages in mental veterans and other POW (prisoners of war) suffering from PTSD(Post traumatic stress disorder) and those injured from parts of brain and normal individuals, it was cleared that the risk of brain injuries because of blast wave is possible[9], and because the samples of the current study were mental veterans with 20 to 70 percentage of injury, they perhaps have not a successful mental imagery and also the average age of study subjects in this study was 5 ± 50 . In the research of Barghi et al. (2013) and Nabs et al. (1989) the same conditions were exist as well, all subject were more than 50 years old and the test of assessing the effectiveness of mental imagery was on a solo act which results suggested that there is no difference between the effects of mental imagery group with physical exercise and combined exercise on the subjects[10], and these results were in line with Alexander Worrack Sa and Alexander Grovaviya(2012) as well, therefore based on the results of this study it can be said that one of the reasons of lack of superiority of mental imagery group over the others would be perhaps the later age and individual dart sport playing; and if the subjects were younger and were examined in a team sport the results of mental imagery group would be superior over to the others. Bashiri(2003) and Blair (1989) are for example the studies during which the effects of mental imagery on a team sport by young samples were evaluated and positive results have been shown.

The necessary time is of the points that you should always keep in your mind at the time of mental imagery.in this study the subjects of mental imagery group did their mental imagery immediately after the relaxation, the amount of mental imagery time might has been one of the possible reasons of lack of significant effect of combined exercises, according to Debarnote et al. (2010) real-time mental imagery or faster than will adjust the motor implementation of the skills and cause to improve the performance[11], but based on the Lewis et al. (2008) results the slow mental imagery has no effect on skill progress especially in sports that a person does not get know with the skills[11], therefore according to the stated above it can be said that because of researcher's lack of accessibility and full control over the subjects' mind it is likely the subjects of the present study have done their mental imagery slower than the real time and so have decreased the significant of the average scores of mental imagery group.

B. Physical exercise and learning dart skill

The results showed that the physical exercise improves the subjects' skill in the acquisition and retention level but this progress is not significant and the results are in line with Fensler et al. (1985) research, the research results of Deborah et al. (2007) suggested that physical exercises partially increase the strength of the lower limbs, but had no effect on most aspects of the move[12], in Kalu et al. (2007) research the above results were repeated as well and stated that the physical exercises have no effect on most of the elderly women walking cycle parameters[11]. But Sohrabi et al. (2004) research results contrary to the present study results showed that physical exercise groups had better performance than the mental imagery groups[13]. Soleimani and Farrokhi (1999) conducted in the meta-analysis of mental imagery that based on the 95% of the reports physical exercise improves the performance of motor skills[14], this emphasizes the theory of nervous - muscle coordination which has been formed as a result of practicing [9]. Due to the researches contrary to the present study results the following reasons can be known as the possible causes of lack of significant of physical exercise on dart skills during the acquisition and retention.

***The effect of massed and distributed physical exercise on single skills:**

Athletes utilize tow type of exercising to improve the single motor skills: distributed practice (taking a break between each round of practice) and massed practice (no rest between rounds). In the present study the researcher has used the distributed practice in his exercise protocol to improve dart throwing single skill in mental veterans according to Aghdasi (2009) research, Xia et al. (2000) have achieved the superiority of distributed practice compared to massed practice[15]. However, in another part of the conducted researches such as Lee and Jenoise (1989) and Krone (1969) concluded that the massed practices have tangible superiority in single-motor skills improvement compared to distributed practices. So that Krone stated massed practices have better and more useful effects in comparison with distributed practices both in acquisition and retention test[15]. And based on the above results one of the likely reasons of lack of significant in the progress of physical exercises can be using distributed practices in this study.

C. Combined exercise and learning dart skill

Combined exercise including mental imagery and physical exercises caused to improve the learning rate of veterans dart skills. But the progress rate of subjects was not significant. These results were consistent with Fletz and Landrs (1983) that in their meta-analysis found that the effectiveness of combined exercise was lower than the other exercises. Moore (2003) also done meta-analysis of 16 studies that said 6 cases of combined exercises cause improve performance and 10 cases with no additive effects have had lack of adequate effect on the performance[16].

But the results of the present study have been opposite of some researches. Mac Braide and Rutsetine (1979) have investigated the effect of mental imagery on learning the open and closed skills in gulf sport. The results showed that the effect of combination mental imagery and physical exercise in learning the closed skills is higher than open skills compared with the effect of mental exercise singly[16]. Beira (1982) also carried out a research of the effects of mental imagery on the performance of volleyball motor skills and concluded that a combination of mental and practical mental imagery better progresses the motor activities compared to practical exercise singly[17]. And according no significant effect of the combined exercise in this study the likely reasons of this lack of effect can be as follows.

***Relaxation in combined exercises:** in combined group the subjects entered to the mental imagery level without relaxation in order to homogenize the groups in terms of exercise time and immediately started their physical exercises and based on the non-dual principle (dual ban principle) there would not be two contradictory emotions at same time and together. In other words it is not possible to be quite calm or very anxious at the same time[18]. Simpler to be said, one must first reach to a state of relaxation and then begins the mental imagery activity. Some sport psychology scientists like Williams and Harris (2001) claim that of the athletes are in the comfortable and relax position they are best able to visualize (imagine) the move or skill[19]. Given that the descriptions, it can be said that although much researches know the combined exercise effective on skill, but because in the current study the subjects of the combined group did not do the relaxation before mental imagery perhaps this can be said as one of the reasons of the lack of impact. Therefore, the combined exercise has un-significant effect on improvement of veterans dart skills.

CONCLUSION

The findings of the current study indicate that dart throwing progress in subjects with all three intervention exercise methods compared to control group. But given that accuracy of the obtained data in Martin and Hall test (MIQ-R) and the speed of subjects dart throwing mental imagery in their mind cannot be controlled which in the opinion of Fathi and Jahatlu (2013) if it has been done slower than real time will have no effect on the performance and the subjects of the current study were also at the beginning of the old age which based on tSeif Barghi et al. (2013) and Alexander Worrack Sa and Alexander Grovaviya (2012) research the effect of physical exercises and mental imagery ability have been decreased in them and caused them to learn with a slow speed; and because the mental veterans with younger ages were not available to be placed as a group in the investigation and also the used dart throwing skill in this study on the basis of Migle opinion (1998) is also considered as relatively simple and single motor behaviors and all of the exercise methods can lead to its development partially, as a result statistical analysis obtained of the data from mental imagery, combined and physical exercises groups have not shown significant difference in none of the levels of acquisition and retention test. In other words, the mental, combined and physical exercises have very minor effect on the performance and learning the dart skill in subjects suffering from mental disorder who are in their old age.

REFERENCES

- [1] Qlkhany M, Ali H, tadibi V, *Development and motor learning - Sport*, 2011, 8, pp117 to 99.
- [2] gorbaniA, gotbi A, Parheizcar J, *Motor Behavior*, 2012, 13, pp138 to 125.
- [3] KhabiriM, *Sports Psychology*, Tehran, 2004, pp189.
- [4] Claudia B, Emanuele D, Artibale G, Fiorilli M, Piazza D, Tsopani A, Giombini G, Calcagno A, Di, Cagno, *Human Movement Science*, 2014, 38, Pp 225-234.
- [5] Michèle, Molina C, Kudlinski J, Guilbert S, Spruijt B, Steenbergen F, Jouen, *Developmental Disabilities*, , 2015, Volume 37, Pp 95-101.
- [6] Aleksander V, Aleksandra G, *Procedia - Social and Behavioral Sciences*, 2012, Volume 33, Pp 338-342.
- [7] Abbasi.parvaneh, Graduate thesis, Islamic Azad University (Islamic Azad, Karaj, 2008).
- [8] TahmasebiF, AslankhaniMA, Namazizade M, *Research in Sport Science*, 2009, 25, pp. 126 to 99.
- [9] Bahrainian. S. Abdul. Majid, Borhani.Hosein, *Research*, 2003, 4, pp. 312 to 312.
- [10] MehrabiHaidar, Graduate thesis, Islamic Azad University (Islamic Azad, Karaj, 2007).
- [11] FathizadehA, MohamdzadehH, *Development and motor learning - Sport*, 2013, 4, pp. 145 to 125.
- [12] DeborahR, Vickers C, Palks AS, McIntosh K, BeattyT, *Elderly unilateral tran-stibial amputee gait on an inclined walkway, A Biomechanical Analysis*, 2007.
- [13] sohrabeyM, FarokhiA, BahramA, RezaargamiN, *Movement and Exercise Sciences*, 2005, 4, pp.76 to 61.
- [14] SoleimanianA, FarokhiA, *Olympic*, 2008, 1, pp.108 to 99.
- [15] Aghdasi M T, *Research in Sport Science*, 2009, 23, pp.33 to 46.
- [16] Mousavi MK, ShojaeiM, *Motor learning, Concepts and applications*, Tehran, 2012, pp188.
- [17] Byre.M, *Teach*, 1982, 7, pp. 19-23.
- [18] SeghatIslamic.Ali, Graduate thesis, Tehran University (Thran, Tehran, 1993).

[19] Williams JM, Harris DV, Relaxation and energizing techniques for regulation of arousal, Williams JM, London, **2001**, 229-246, 4.