ISSN: 2345-5896
Research in Sport Management and Psychology
http://www.pgsrn.com

Research in Sport Management and Psychology, Volume 2, Issue 8: 89-93, 2014

Effect of a Single Bout Exercise on Mental Health in Young Adults

Zohreh Meshkati*[1], Rezvan Mirsafaei Rizi[2], Rokhsareh Badami[1]

1. Assistant Professor. School of Sport Sciences, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran
2. MSc of Physical Education. School of Sport Sciences, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran

Received:
13, May 2014
Accepted:
08, July 2014
Available online
29 August 2014

Key Words:
Mental health, Fatigue, SCL-90-R, Single bout exercise

Abstract

Background: Exercise improves mental health and well-being, reduces depression and anxiety and enhances cognitive functioning. Many studies have tested the effects of a period of exercise on mental health but the present study investigated mental responses to a single bout exercise in healthy subjects.

Materials and methods: Twenty-one healthy male participants (age 21.25 ± 1.95 years old; weight 66.44 ± 10.89 kg; height 1.75 ± 0.07 m) agreed to take part in this research. By SCL-90-R questionnaire, the psychological dimensions such as somatization, obsessive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid and psychotics measured before and after a fatigue protocol. The subjective effort level was assessed during exercise by using Borg's scale for rating of perceived exertion. The protocol continued until the subjects reached a heart rate of 85% HR max or perceived the exercise as very hard on the Borg's scale. In this research, paired t-test was used for comparison of mental dimensions before and after fatigue protocol.

Results and discussions: Findings indicated that fatigue decreased somatization, depression, anxiety and paranoid of subjects. There was no significant difference in obsessive, interpersonal sensitivity, hostility, phobic anxiety and psychotics before and after fatigue protocol. Also, in all factors the global severity index was decreased after fatigue, except interpersonal sensitivity and psychotics factors.

Conclusion: The results support that even one bout exercise improves mental health. On the other hand the psychological benefits of exercise are not limited to long-term exercise.

* **Corresponding author at**: Zohreh Meshkati, Assistant Professor. School of Sport Sciences, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran. **E-mail:** zmeshkati@gmail.com **Tel:** 98 913 535 41 35

Introduction

The facts show that mentally and physically stressful situations occur frequently throughout our lives and enhance of the capacity to respond to these stresses is essential for better life. Exercise improves mental health and well-being, reduces depression and anxiety and enhances cognitive functioning. Although exercise seems to improve the quality of life of those living with mental health problems, its value is less attended by mental health centers (Callaghan, 2004; Morgan &O' Connor, 1988). A World Health Report (2000) shows that depression is a significant mental health problem afflicting people living in all member states. Geddes et al. (2006) state that exercise has limited effectiveness in the treatment of depression. Grant (2000) state that exercise is consistently associated with positive effect, mood and psychological well-being (Geddes et al, 2006). In a narrative review of the effect of exercise on psychological health, Weyerer & Kupfer (1994) examined data from observational studies as well as controlled trials. The authors concluded that exercise improved psychological health, in some cases better than counseling alone, even when controlling for unspecified sociodemographic and health-related confounding variables (Weyerer and Kupfer, 1994). Most of the researches focus on the positive impacts of physical activity and exercise on depression ,anxiety , stress, anger, well-being, confidence, self-esteem, sleep-quality, mood and mental health (D' Silva, 2002; Biddle, 2001; Dilorenzo et al, 1999; North et al, 1990; Greist et al, 1979).

Although the improvements in mental health with physical activity have been well documented, the effects of single bout of exercise on it have not been studied extensively. The claim that exercises improves mental health and has a long history. The narrative reviews reviewed by North et al. (1990) provide evidence for the benefits of exercise on depression but these derived mainly from anecdotal observations. The meta-analytic review, however, supported the anecdotal observations. The effect of acute exercise (single exercise session) was different than for an exercise program, but both were effective antidepressants (Callaghan, 2004). Several narrative and meta-analytic reviews have been conducted in this area such as Calfas and Taylor (1994) with adolescents, McDonald and Hodgdon (1991), Petruzzello et al. (1991) and Taylor (2000). Evidence is convincing that exercise can be useful in treating and avoiding depressive illnesses, and can be used as a means of reducing stress and anxiety on a daily basis. In addition, there are some researches show that a single bout of activity can improve mood and sleep quality and that people who are more active are much more likely to rate themselves and their sense of mental well-being more positively (Fox, 1999;Youngstedt et al, 1997). On the other hand, unfortunately an active lifestyle and regular exercise seldom is observed in plan of the Iranian‘s community. Obviously, the lack of facilities and time is the most important reasons for not participating in sport (Momenan et al, 2011; Kazemi et al, 2011). Therefore, the aim of this study was to investigate that if a single bout of exercise can improve the mental health in young adults?

Materials and Methods

Twenty-one healthy male participants (age 21.25 ± 1.95 years old; weight 66.44 ± 10.89 kg; height 1.75 ± 0.07 m) agreed to take part in the study. They selected randomly among male university students lived in Isfahan province. None of the participants were included in the study if they reported a history of cardiovascular and respiratory disorders, diabetes, systemic inflammatory diseases, lower limb injury within last year and alcohol/drug abuse. Participants were required to perform no vigorous exercise in the one week prior to testing. Informed consent was obtained from all participants.

In this research, the one of tools was the SCL-90-R psychological profile. By this questionnaire, the psychological factors such as somatization, obsessive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid and psychotics are measured. In this research we named these dimensions as mental dimensions. Also global severity index (GSI) measured. This index is the best indicator for assistance of each dimension of SCL-90-R as an abbreviation study. It's important to say that the questionnaire of first stage assessed their mood dimensions from one week ago and the questionnaire of second stage (after fatigue protocol) assessed actually mood dimensions, both of questionnaires had appropriate reliability and validity (Aramfard, 2006). A fatigue protocol developed by Nardone et al. (1997) was used in the present study. Generalized fatigue was induced by performing exercise on a treadmill. In first stage, participants answered to SCL-90-R questionnaire then they were placed on treadmill and walked. Race and gradient of treadmill increased based on progressive and arranged program in several phase during the fatigue

protocol (Nardone et al, 1997). Participants wore a heart rate meter during the entire duration of the exercise. The subjective effort level was assessed during exercise by using Borg's scale for rating of perceived exertion (Borg, 1982). The protocol continued until the subjects reached a heart rate of 85% $_{HR}$ max or perceived the exercise as very hard on the Borg's scale (Vuillermeand Hintzy, 2007). After completion of fatigue protocol as they feel fatigue, was asked them to complete SCL-90-R questionnaire again. In this research, paired t-test was used for comparison of mental dimensions before and after fatigue protocol. All effects were considered as significant at $p \leq 0.05$.

Results and Discussions

Table 1 shows the mean, SD and GSI of mental dimensions, before and after fatigue protocol.

Table1. Mean, SD and GSI of psychological factors before and after fatigue protocol

Dimensions	Pre-fatigue			Post-fatigue		
	mean	SD*	GSI**	mean	SD	GSI
Somatization	4.42	4.69	0.05	2.57	2.82	0.03
Obsessive	7.57	6.88	0.01	5.5761	5.33	0.06
Interpersonal sensitivity	3.95	4.30	0.04	4.66	5.37	0.05
Depression	6.95	6.43	0.08	4.61	4.95	0.05
Anxiety	3.57	4.45	0.04	2.47	2.94	0.03
Hostility	2.85	3.02	0.03	1.76	3.04	0.02
phobic anxiety	1.04	1.85	0.01	0.85	1.35	0.01
Paranoid	6.47	4.41	0.07	4.19	3.35	0.05
Psychotics	4.28	5.32	0.05	5.32	4.00	0.06

Standard Deviation*
Global Severity Index**

Also table 2 demonstrates the comparison of mental dimensions, before and after fatigue protocol.

Table2. Compare of psychological factors before and after fatigue protocol

	Mean	T	df	Sig.
somatization	1.8	2.70	20	0.01*
obsessive	1.95	1.71	20	0.10
interpersonal sensitivity	0.71	0.75	20	0.46
depression	2.33	2.62	20	0.02*
Anxiety	1.10	2.10	20	0.04*
Hostility	1.10	2.02	20	0.06
phobic anxiety	0.19	0.61	20	0.55
Paranoid	2.29	3.07	20	0.01*
psychotics	1.10	1.34	20	0.19

* Significant at $p \leq 0.05$

The results showed that there was a significant difference in somatization, depression, anxiety and paranoid before and after fatigue protocol. It means that fatigue decreased somatization (t=2.70; p=0.01), depression (t=2.62; p=0.02), anxiety (t=2.10; p=0.04) and paranoid (t=3.07; p=0.01) of subjects. There was no significant differences in obsessive (t=1.71;

p=0.10), interpersonal sensitivity (t=0.75; p=0.46), hostility (t=2.02; p=0.06), phobic anxiety (t=0.61; p=0.55) and psychotics (t=1.34; p=0.16) before and after fatigue protocol. Also, in all factors the GSI decreased after fatigue except interpersonal sensitivity and psychotics factors.

Conclusion

The present study investigated mental responses to a single bout exercise in healthy subjects .many studies tested the effects of a period of exercise on mental health, but in present essay the positive effects have been observed in a single bout. The results show that depression, anxiety, somatization and paranoid factors had immediate reduction in participants. Declining of depression after exercise is agree with the research of Geddes et al. (2003), Dilorenzo et al. (1999), D'Silva (2002), Greist et al. (1979), Lane (2001), Wong et al. (2006), Weinstein et al. (2010). Increase blood flow to the brain after a single bout exercise cause to enhance chemicals known as endorphins. This may partially explain why exercise offers protection to depression and is effective as a treatment intervention. Also North et al. (1990) reviewed the results of narrative and meta-analytic reviews investigating the effect of exercise on depression. In this review exercise is suggested to improve depression by changing peoples' daily routine, increasing their interactions with others, helping them loss weights, participant in outdoor recreation and master difficult physical and psychological challenges (North et al, 1990).

On the other hand the benefits of exercise are not limited to decrease depression, in this study anxiety follow this pattern too. This is agreeing with some researches (North et al, 1990; Tehrani et al, 2003;Petruzzello et al, 1991; Salmon, 2001).There are several views that seek to explain the beneficial effects of exercise on anxiety. One view suggests that exercise raises body temperature and reduces muscle tension similar to the effect of having a warm bath that called thermogenic hypothesis (Raglinand Morgan, 1985). Another view suggests that exercise stimulates activity in the sympathetic nervous system, adrenaline levels are increased and this has an arousing effect. When the sympathetic nervous system is activated, it provides a catalyst for parasympathetic nervous system activity, acetylcholine is released and this has a calming effect. This is known as the Opponents Process Model (Solomon, 1980). Exercise is also thought to distract people from stressful events thereby reducing the anxiety provoking impact of these events (Bakre and Morgan, 1978). Dilorenzo et al. (1999) investigated the effects of exercise on self-reports of depression, anxiety and self-concept and aerobic fitness, heart rate and maximum oxygen uptake. Eighty-two participants aged between 18 and 39 were randomly allocated to a 12-week program of bicycle ergometry or a control condition and followed up 12 months later. At the end of the program and at follow-up participants allocated to the exercise program had more positive changes in all outcomes than the control participants (Dilorenzo et al, 1999).

Nichol and Marie (2006) in a study conclude that 10 and 30 minutes of cycling improves mood, and personal characteristics seem to moderate somatic-related mood states. In this study we find that somatization factor significantly reduced after exercise. This maybe because for the increase heart rate, flow of blood and warming the muscles and cause less tension (Nichol and Marie, 2006). We need to encourage discussion about the mind body links and how exercise and the associated changes in the body relating to fitness and strength influence how we think and feel the somato psychic response. Most of us are familiar with the psychosomatic response how out thoughts and feelings affect our body .by understanding these links our knowledge of how exercises can seriously impact on mental health will become evident (Donaghi, 2007).

We also find that paranoid dimension declined after exercise. Fogarty et al. (2004) find that exercise is especially important in patients with schizophrenia –a kind of paranoid disease_ since these patients are already vulnerable to obesity and also because of the additional risk of weight gain associated with antipsychotic treatment, especially with the atypical antipsychotics. Patients suffering from schizophrenia who participated in a 3-month physical conditioning program showed improvements in their health (Fogarty et al, 2004).

On the basis above, it can be concluded that even one bout exercise improves mental health. Though it is suggested that in order to control psychological consequences accruing from tensions of daily life, Individuals be encouraged to do exercise in specific conditions. Also, the permanent effects of benefits of single bout exercise can be assessed in future studies.

References

[1] Aramfard M.2006. Effectiveness of graphical program on psychological profile of participants of achievement training courses in Isfahan. Thesis in Science, Islamic Azad University of Khorasgan- Isfahan.

[2] Biddle SJH.2001. Emotion, mood and physical activity. In: Physical activity and psychological well-being. Eds, SJH Biddle, KR Fox, SH Boutcher. London, Routledge, pp. 63-87.

[3] Borg GA.1982a. Psychophysical bases of perceived exertion. Med Sci Sports Exerc, 14: 377-81.
[4] Calfas KJ, Taylor WC.1994. Effects of physical activity on psychological variables in adolescents. Pediatric Exercise Sci, 6 (4): 406–23.
[5] Callaghan.2004. Exercise: a neglected intervention in mental health care? Journal of Psychiatric and Mental Health Nursing, 11: 476-83.
[6] Dilorenzo TM, Bargman EP, Stucky-Ropp R, Brassington GS, French PA &Lafontaine T .1999. Long-term effects of aerobic exercise on psychological outcomes. Preventive Medicine, 28: 75-85.
[7] Donaghi ME.2007 .Exercise can seriously improve your mental health: Fact or fiction? European Journal of Physiotherapy, 9(2): 76-88.
[8] D' Silva B.2002. This Sporting Life. The Observer Magazine, 29thSeptember, 77-8.
[9] Fox RK.1999. The influence of physical activity on mental well-being. Public Health Nutr, 2(3A): 411-8.
[10] Geddes J, Butler R, Hatcher S.2006. Depressive disorders. Clinical Evidence, 9: 1034-57.
[11] Greist J, Klein M, Eischens R, Faris J, Gurman A. & Morgan W.1979. Running as a treatment for depression. Comprehensive Psychiatry, 20: 41–54.
[12] Kazemi A, Ardebili HA, Nekui N. 2011. Patterns of physical activity among adolescent girls and factors affecting it. The journal of Qazvin University of medical sciences, 15(1): 39-47.
[13] Lane A. 2001. Relationships between perceptions of performance expectation and mood among distance runner: The moderating effect of depressed mood. Journal of science and medicine in sport, 1(4): 116-28.
[14] McDonald DG, Hodgdon JA. 1991. Psychological effects of aerobic fitness training. Springer-Verlag .London.
[15] Momenan AA, Delshad M, Mirmiran P, Ghanbarian A, Safarkhani M, Azizi F. 2011. Rates of physical inactivity and associated factors in Tehranian adults. Iranian journal of endocrinology and metabolism, 13(5): 493-503.
[16] Morgan WP, O' Connor PJ. 1988. Exercise and mental health. In: Exercise Adherence: Its Impact on Public Health. Ed, RK Dishman. Human Kinetic Books, Champaign. IL, pp. 91-121.
[17] Nardone A, Tarantola J, Giordano A, Schieppati M. 1997. Fatigue effects on body balance. Electroencephalography and clinical Neurophysilogy, 105: 309-20.
[18] North TC, McCullagh P, Tran ZV. 1990. Effect of exercise on depression. In: Exercise and Sport Sciences Reviews. Eds, KP Pandolf, JO Holloszy. Williams &Wilkins, Baltimore, pp. 379–415.
[19] Petruzzello SJ, Landers DM, Hatfield BD, Kubitz KA, Salazar W. 1991. A meta-analysis on the anxiety- reducing effects of acute and chronic exercise. Outcomes and mechanisms Sports Medicine, 11 (3): 143–82.
[20] Raglin JS, Morgan WP. 1985. Influence of vigorous exercise on mood state. Behavior Therapist, 8: 179–83.
[21] Salmon P. 2001. Effects of physical exercise on anxiety, depression and sensitivity to stress: A unifying theory. Clinical psychology review, 21: 33-61.
[22] Salmon P. 2001. Effects of physical exercise on anxiety, depression and sensitivity to stress: A unifying theory. Clinical psychology review, 21: 33-61.
[23] Tehrani AHH, Shojaei M, Daneshfar A. 2003. Effects of exercise training on mental disorders in male cured addicts. European journal of experimental biology, 3(1): 42-46.
[24] Vuillerme N, Hintzy F. 2007. Effects of a 200 w-15 min cycling exercise on postural control during quiet standing in healthy young adults. Euro J ApplPhysiol, 100 (2): 169-75.
[25] Weinstein AA, Deuster PA, Fransis JL, Bidling CH, Kop WJ. 2010. The role of depression in short-term mood and fatigue responses to acute exercise. International journal of behavior and medicine, 17: 51-7.
[26] Weyerer S, Kupfer B. 1994. Physical exercise and psychological health. Sports Medicine, 17: 108-9.
[27] Wong RSK, Thung JS, Willy P. 2006. Mood and performance in young Malaysian karateka. Journal of sport science and medicine, 1: 54-9.
[28] World Health Organization. 2000. The World Health Report 2000: Health Systems: Improving Performance. WHO, Geneva.
[29] Youngstedt SD, O'Connor PJ, Dishman RK. 1997. The effects of acute exercise on sleep. A quantitative synthesis Sleep, 20 (3): 203–14.