

# The Effects of Physical Activity and Serotonin on Depression, Anxiety, Body Image and Mental Health

Sh. Khoshemehry, M. E. Bahram, M. J. Pourvaghar

**Abstract**—Sport has found a special place as an effective phenomenon in all societies of the contemporary world. The relationship between physical activity and exercise with different sciences has provided new fields for human study. The range of issues related to exercise and physical education is such that it requires specialized sciences and special studies. In this article, the psychological and social sections of exercise have been investigated for children and adults. It can be used for anyone in different age groups. Exercise and regular physical movements have a great impact on the mental and social health of the individual in addition to body health. It affects the individual's adaptability in society and his/her personality. Exercise affects the treatment of diseases such as depression, anxiety, stress, body image, and memory. Exercise is a safe haven for young people to achieve the optimum human development in its shelter. The effects of sensorimotor skills on mental actions and mental development are such a way that many psychologists and sports science experts believe these activities should be included in training programs in the first place. Familiarity of students and scholars with different programs and methods of sensorimotor activities not only causes their mental actions; but also increases mental health and vitality, enhances self-confidence and, therefore, mental health.

**Keywords**—Anxiety, mental health, physical activity, serotonin.

## I. INTRODUCTION

**M**ENTAL disorders have a devastating effect on individuals and society. In fact, what is mental health in the mind is a psychiatric concept that considers a person as a patient or healthy, psychologically. According to the World Health Organization (WHO), mental health is a condition of complete physical, mental and social well-being, and not merely the absence of a disease [1]. The dimensions of this definition, namely, complete physical, psychological and social well-being, and not just the absence of illness, interact with each other, and it is not possible to distinguish between these dimensions with a specific boundary. As well, there are usually indicators for physical well-being and even social welfare in many countries, which are reviewed every few years. But in terms of mental health, the complexity and difficulty of defining and evaluating often leads to neglect and ignore this [2]. Mental illness afflicts the person with physical and mental pains and symptoms such as headache and stomach pain, anxiety, frequent waking with difficulty falling asleep, seclusion, confusion and disruption their duties [3].

Epidemiological studies in different countries show that

Sheyda Khoshemehry is with the Ministry of Education, Iran, Islamic Republic Of (e-mail: nabatmodabber@gmail.com).

about 25% of people with mental disorders are recognizable and it is estimated that around 450 million people worldwide suffer from some kind of mental disorder [4].

Researchers' findings in sports show that intense and moderate physical activity has many physical and mental benefits [5]. Exercise is considered as a fundamental pillar of a healthy lifestyle and physical activity is related to mental health, obviously. It can prevent or control various illnesses throughout life as a behavioral pattern [16]. Also, it has clearly been seen that physical activity has a beneficial effect in reducing depression by examining exercise activity and mental health in children and adolescents [16].

In a study conducted by Terjestam et al., they examined the effect of an exercise similar to meditation movements; they found that this exercise had improved self-image and reduced distress and stress [6]. In another study, Parker et al. found that simple psychology and sport interventions reduced the symptoms of depression and anxiety [5]. In another study, it was found that aerobic exercises had a positive effect on the level of physical and mental fitness, and the reduction of physical complaints and depression in the experimental group. It also has reduced the amount of these disorders [3].

Various findings, including McMahon, suggest that physical activity leads to increased self-esteem [3]. Obviously, increasing self-esteem creates a change in the positive direction in the interpersonal relationship and social network of the individual. Such changes are to increase the mental health of humans, because the expansion of the social network, resist the individual's dare against stressful events either directly by finding new friends or indirectly through increasing self-esteem and establishing an interpersonal relationship based on the communication model [7].

## II. BODY IMAGE

Body image is a person's perception of the size and fitness of the body that accompanies the thoughts and feelings of others towards their body [8]. It has a multi-dimensional structure which includes two independent parts: cognitive (estimating body size) and viewpoint (a person's perception and feeling of the body) [8], [9]. Body dissatisfaction is a major concern; because it is associated with psychiatric disorders such as decreased self-esteem, depression, social anxiety, eating disorders, and sexual dysfunction and body deformities diseases [10], [11]. Most of the traditional treatments for physical impairment have been behavioral cognitive and drug therapy [12]. However, due to the time consuming nature, as well as the expense and side effects of these methods, exercise and physical activity have been more

commonly considered today as a treatment alternative [13]. A lot of research has been done on the violation of the body image and its treatment methods.

One of these studies is Fisher and Thompson's research, which examines the effect of endurance sports on individuals' body image. They stated that endurance exercises had more impact on the physical aspect of the body image and less impact on perceptual and emotional dimensions [14]. Some other studies, such as Scott et al., have focused on the perceptual dimensions of body image, and are less concerned with the role of other sports, as well as their impact on individual's attitudes toward body image [15]. On the other hand, most studies, including Hausenblas and Henry et al., have been considered exercise for 6-12 weeks [16], [17]. Therefore, considering the prevalence of negative attitude and body image defects and the benefits of aerobic exercise, treatment for this problem seems to be necessary with short-term aerobic exercise for at least one month [18].

### III. THE ROLE OF PHYSICAL ACTIVITY ON DEPRESSION IN CHILDREN

The role and effect of physical activity on depression in children and adults have been researched in various studies. One of these recent studies in Norway shows that children with severe and moderate physical activity, as they sweat and their breathing becomes intense and fast, they are less likely to develop depression [19]. In the following, we will discuss the research on the role and effect of physical activity on children's depression.

Children can also be depressed like adults. Estimates indicate that about 5% of children and adolescents suffer from depression. Children with disorders such as learning disorder, behavioral disorders, anxiety, or hyperactivity are at higher risk for depression and other mental disorders. Children, who are experiencing stress in the family or lose one of their family members, also have the same conditions; therefore, it is recommended that children have a lively life and that physical activity and exercise are considered as one of these strategies.

Physical activity may distract the mind and cause a person to get away from reminding the negative memories of the past. Physical activity is an opportunity to increase self-esteem. Physically active children are socially stronger than those participating in limited physical activity. Evidence also suggests that "joking" can help children's emotional and social growth. Therefore, it can be concluded that: Physical activity, sweating from the game, performing childish pranks, which do not pose a danger to the parties and in general, games that require a lot of mobility, not only enhance the body physically and have many benefits to the body, but also helps protect children's psyche from depression and other mental disorders [19].

### IV. THE EFFECTS OF PHYSICAL ACTIVITY ON THE ELDERLY MENTAL HEALTH

Although reaching old age should be considered as one of the most important human advancements, unfortunately, most

people who reach old age suffer from several illnesses and serious health problems including depression, low quality of life, low self-esteem, social isolation and negative emotions such as sadness, anxiety and stress [20], [21].

Depression is one of the most important psychological diseases that are considered by many researchers in the study of mental states. The treatment of depression, and in general psychiatry in the world, is mainly through medication. Caregivers of the elderly have always seen many drugs prescribed for this age group. Of course, the drug plays an important role in psychiatry, but cannot meet all the therapeutic needs of this group. One of the most important, easiest and least costly available approaches, especially for the elderly, is physical activity and exercise, and its anti-depressant effect has attracted a lot of attention [22], [23].

The results of research in this field have shown that physical activity and exercise are one of the most important strategies for maintaining health and reducing mental and physical illness during old age. Also, engaging in regular physical activity is a strong predictor of a good life in old age [24], [23]. Studies have shown that physical activity and exercise reduce the mortality rate of the elderly [25], prevent mental illness such as psychosis, depression and anxiety [26], as well as heart rate and blood pressure adjustment during resting and improved body balance to prevent falls [27].

Eyigor (2008) and their colleagues found that the elderly involved in physical activity and sport had a higher level of social development, self-esteem and higher quality of life and lower depression [28].

The findings of Bahram et al. suggest that Pilates exercise may be a useful tool for helping older people improve their mental health and reduce depression disorder. On the other hand, Pilates exercise is low-cost, low-risk and non-invasive, and is based on performing movements, which are very controlled and calm. Therefore, it seems that the use of this exercise can reduce the negative outcomes of life, and consequently, reduce therapeutic costs and help the successful process of aging and pave the way for improving the quality of life and mental health of the elderly. From the findings of the study, it seems that 8 weeks Pilates training can be effective in treating depression of elderly retired male workers and provide the ground for their recovery. In summary, it can be concluded that exercise and physical activity have a significant effect on reducing depression disorder, improving mental health and happiness in elderly people. Therefore, Pilate's exercises and motor activity can be recommended as a strategy for promoting mental health, happiness, self-esteem, life satisfaction, efficiency, positive mood and reducing mental and psychological stress in elderly people [29]. Although 8-week Pilates training was effective in improving depression in the elderly, it is suggested that similar investigations be conducted in other groups with a different exercising duration, different type of exercise protocol, for clearer evidence on the extent of these effects on the well-being of the elderly. The results of this research can be useful for sports psychologists, occupational therapists, sports physiologists, and also elderly area planners [29].

## V. THE ROLE OF SEROTONIN AND THE EFFECTS OF PILATES EXERCISE ON MENTAL HEALTH

The effect of Pilates exercise on reducing depression and improving mental health in the elderly can be attributed to the role of serotonin. Because imbalance in serotonin levels may affect the mood in a way that leads to depression and affects the social and mental function associated with quality of life [30]. Exercise is one of the strategies that increases production of serotonin [31], [32], which naturally increases the level of consciousness and general mood of the individual and gives the person a greater sense of energy and happiness for doing daily living tasks [33]. McAuley et al. reported a significant improvement after Pilates exercises [34]. The results of the study showed that Pilate's exercises can improve and reduce depression in elderly workers. This improvement can be attributed to the effects of exercise on cognitive function. Because exercise results in a change in the level of transcription of a number of known genes associated with neuronal activity, synaptic building, and the construction of neurotransmitters that are important in the process of memory processing and depression reduction [29]. On the other hand, regular physical activity, as a necessity for a healthy lifestyle, affects the central nervous system (CNS) and modulates the adaptation of the hippocampus, which plays a significant role in learning and memory. Exercise directly affects the structure and function of the brain [33]. Increasing the breathing capacity in Pilate's exercises leads to improved brain blood flow, improved oxygen and glucose utilization in the brain, accelerates the transfer of biochemical substances and enhances the antioxidant activity of the blood for rapid release of free radicals and leads to improved mood and reduce severity of depression [31]. It has also been reported that physical activity and exercise can affect neuro-protective processes and brain flexion and have a positive effect on cognition and behavior, which have an important role in recovery of the depression process [29].

## VI. PHYSICAL ACTIVITY, DIABETES AND CONCLUSIONS

Physical illness can cause feelings of sadness, fear, panic, anxiety or anger due to insecurity, inability to control affairs and feelings of loneliness [35]. Diabetes mellitus is one of the diseases that endanger the health of many people in the community. Studies have shown that obesity and immobility are associated with an increased risk of type 2 diabetes [36].

Regular physical activity reduces the risk of type 2 diabetes and improves blood glucose control in these individuals [37].

The American Diabetes Association (ACA) in 2002 recommended aerobic exercise 50-80% of maximum aerobic capacity three to four times a week for 30-60 minutes. Physical activity increases the amount of basic metabolism, improves blood circulation throughout the body, utilizes excess calories and, by secreting endorphins, improves mood [38].

Coronary heart disease, stroke, peripheral vascular disease and ocular and renal complications are complications of diabetes [39], [40].

It can be concluded that exercise has a positive effect on the mental health of healthy people and patients. Selected aerobic exercises have a significant effect on body signs, anxiety, insomnia, and type 2 diabetic patients. Studies have shown that 20% to 40% of diabetics are depressed and exercise has a positive effect on mood and is associated with depression symptoms. Studies have shown that depression is associated with a decrease in physical activity, and depressed people are physically immobile, and have lower physical fitness levels than normal people [40]. Therefore, depressed people may be less likely to support physical fitness counseling.

Overall, it can be concluded that exercise has a positive effect on the mental health of healthy people and patients. Physical activity is associated with mental health and quality of life such as mood, anxiety and depression, self-perception and mental health. Although the exact process of changes in exercise is not well known in mental health, the value of exercise is clear to promote health. The benefits of physical activity in improving the mental health of diabetic patients may be related to the effects of aerobic training on the structure and muscle biochemistry and maximum oxygen consumption and as a result of desired changes (such as increased oxidase enzyme and increased capillary density), and thus, improve the process carrying out the glucose, the amount of insulin resistance in the cells is reduced. In essence, in this situation, aerobic training can often reduce the level of insulin in the rest of the blood and reduce insulin production during glucose tolerance testing, which indicates both improved insulin sensitivity and better control of the disease in type 2 diabetic patients [40]. On the other hand, one of the theoretical models of psychosocial changes related to exercise (relief or relaxation) is probably the activation of the central nervous system and endorphin secretion. Peirce states in 1999 that physical activity increases the amount of basic metabolism, improves blood circulation throughout the body, utilizes excess calories and, by secreting endorphins, increases mood [38]. Overall, according to Vickers in 2006, who believed that people with diabetes usually had depression and depression prevented them from engaging in physical activity, it appears that the duration of physical activity of diabetics should be higher and the type of activity it is better to include more frenetic activities such as water sports in their program [41].

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