

Smoking Addiction and Exercise

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To Cite This Chapter:

Bilgic, A. (2025). Smoking addiction and exercise. In F. Alincak (Ed.), *Current studies in sports science* (pp. 121–132). ISRES Publishing.

Introduction

While addiction has long proliferated as a personality disorder, in recent years it has begun to be recognized as a brain disease. Research shows that many neurochemical and neurophysiological changes that lead to addiction occur in the brain. Although many things in life can become addictive, some categories have a higher potential for freedom; These include leftovers and cigarettes. According to Egger and Rauterberg, addiction means wanting everything very much and being dependent on it, expecting power and help from it. In foreign sources, addiction is defined with the terms “addiction” and “dependence”; The inability to stop repeating a certain behavior is explained as the substance retention and control system (Egger,1996). Cigarette, which is made by wrapping tobacco leaves in a thin paper, is a substance that is consumed by inhaling the smoke after burning. The active ingredient is a dark liquid called nicotine. Nicotine increases the release of epinephrine, norepinephrine and serotonin in the brain; Additionally, withdrawal symptoms occur if not taken for 90 to 120 minutes. Before 1492, indigenous people in the Americas produced tobacco for religious rituals and medicinal purposes. It is thought that cigarettes reached Europe from America through Spanish sailors in the 18th century. Nowadays, addiction disease, which is extremely important for individuals and public health, is becoming more and more common and affects people of all ages. As research shows how serious cigarette addiction is, it is a situation that should not be ignored. According to research conducted by the World Health Organization in 2021, 1.5 billion people worldwide smoke. Every year, 8 million people die from smoking-related diseases, and smoking ranks first among preventable causes of death. Additionally, WHO predicts that smoking-related deaths may double in the next 8 years. In Turkey, according to 2019 data of TÜİK, 55.5% of the population consists of people who currently use tobacco or have used it before. It is stated that approximately 80 thousand people die every year in the country due to diseases related to tobacco use.

Aim of the Study

The purpose of this study is to reveal the relationship between cigarette addiction and exercise.

Effects of smoking on individuals

Occlusive diseases of the brain, heart and leg vessels are closely related to smoking. Coronary diseases are 4 times more common and aortic aneurysm is 5 times more common in smokers. 95% of Buerger's disease is caused by smoking. Smoking causes vasoconstriction, arteriosclerosis, hypertension and increased blood clotting tendency. Additionally, brain hemorrhages increase significantly due to smoking. 25% of myocardial infarctions are related to smoking, and the risk of infarction increases in direct proportion to the number of cigarettes smoked (Emri,1994).

When smoking is combined with other risk factors (cholesterol, excess lipids, hypertension, diabetes, birth control pills), the danger increases even more and the risk of heart diseases increases. Especially women who smoke and use birth control pills have a 30 times higher risk of myocardial infarction than women who do not smoke and use pills (Candan,1984). Smoking is an important factor that increases the risk of lung cancer. This risk varies depending on the individual's smoking duration, age of onset, number of cigarettes smoked per day, and the amount of tar in the cigarette (Book on Cancer Education in Schools,). Nicotine and tar settle in the lungs, causing narrowing of the airways and difficulty breathing. Therefore, there is a close relationship between chronic lung diseases and smoking. Conditions such as bronchitis and emphysema, with reduced respiratory capacity and shortness of breath, are 75% associated with smoking. Individuals who smoke generally have increased cough and phlegm. Additionally, babies whose parents smoke have a higher risk of pneumonia and bronchial asthma(Kasatura,1998). Leukoplakia is frequently seen on the lips and mouth in smokers. These changes may pose a risk of cancer in the future. An increase in the number of esophageal cancer cases is observed in those who consume alcohol along with smoking. The damaging effect of smoking on the lower gastric valve mechanism causes frequent air swallowing. Stomach and duodenal ulcers increase in proportion to cigarette consumption. The healing process of ulcers takes longer and the risk of recurrence increases. Additionally, ulcerative colitis is more common in smokers, while Crohn's disease is twice as common in smokers. The risk of developing gallstones also increases in smokers (Somantı,1997). Smoking negatively affects the oxygen intake and blood supply of all tissues and organs, causing systemic damage. This situation disrupts the functions of the body's immune system and weakens body resistance. As a result, the defense mechanism weakens and the susceptibility to infections increases (Emr,1994). In smokers, there is a decrease in bone mineral density and therefore an increased risk of fracture. Bone mineral density of people who smoke a pack of cigarettes a day decreases by 2% every 10 years. It is stated that this effect is dose-related, that is, the duration of smoking is more important than the number of cigarettes smoked (Beyazova, 2000). According to the National Cancer Institute, 250 of the thousands of chemicals found in cigarettes have harmful effects and cause 69 different types of cancer. The majority of these cancers are seen in elderly individuals. The most common types of cancer caused

by smoking include:

Lung Cancer: More than 80 percent of lung cancer-related deaths are attributed to smoking.

Mouth and Throat Cancer: Harmful substances found in smoke can contribute to the development of cancer in the mouth and throat.

Kidney Cancer: Individuals who smoke have twice the risk of developing kidney cancer compared to non-smokers.

Stomach Cancer: It is stated that approximately 20 percent of stomach cancers occur due to the effects of chemicals from cigarettes.

Liver Cancer: Even though smoking does not come into direct contact with the liver, it can cause cancer development in this organ.

The American Cancer Society states that cigarette smoke causes nearly half (48.5%) of deaths from 12 different types of cancer, including the cancers mentioned above (Centers For Disease Control, 2004). Moreover, classical studies demonstrate covalent binding processes of carcinogens or reactive electrophilic metabolites with cellular macromolecules (including DNA). Although nicotine is an addictive substance, it is not considered a direct carcinogen. However, by creating and maintaining addiction, it exposes smokers to long-term exposure to tobacco smoke, which increases their risk of cancer (Maier, 2011). Smokers breathe in a mixture containing carcinogenic and toxic substances with every breath. Tobacco smoke contains more than 7,000 chemicals, at least 69 of which can cause cancer (U.S. Department of Health and Human Services, 2006).

There is strong evidence that smokers generally have higher amounts of DNA adducts in their lungs and other tissues than in non-smokers. Although many of these adducts have not yet been fully identified, several studies have identified specific carcinogenic DNA adducts in the tissues of smokers. If DNA adducts and their metabolites produced by tobacco smoke can escape repair systems and become persistent; DNA polymerase enzymes may cause an incorrect nucleotide to be placed opposite this insert. This may lead to incorrect coding and therefore genetic mutations during DNA replication (Global Initiative for Chronic Obstructive Lung Disease, 2013). Some components or metabolites of tobacco smoke can directly bind to cellular receptors, activating protein kinases, growth receptors, and other pathways, which may contribute to carcinogenesis. Additionally, cigarette smoke contains substances that can lead to inflammation; this may lead to increased pneumocyte proliferation, nuclear factor-kappa B (NF- κ B) activation, and tumor development. Number of cigarettes smoked per day, cotinine measurements in biological samples, and other indicators of smoke exposure still play an important role in estimating total smoke exposure and population risk (Chen, 2011). In conclusion, smoking appears to increase the risk of lung adenocarcinoma. It can be said that the increased risk of adenocarcinoma is due to changes in cigarette design and composition

since the 1950s. Although it is difficult to determine which design changes contributed to this increase, there is strong evidence that filters and increased levels of tobacco-specific nitrosamines played a role. Additionally, the observed decline in squamous cell carcinoma parallels the decreasing prevalence of smoking (CDC,2012).

Causes of Smoking Addiction

There are many factors that affect smoking. Studies show that variables such as low socioeconomic level, frequency of smoking among peers during adolescence, social and cultural differences, presence of smoking individuals in the family, low level of parental monitoring and low academic achievement affect this situation. These risk factors are especially relevant during adolescence for both boys and girls to start smoking. However, in some cases, these factors are observed to have a greater impact on girls than on boys. For example, smoking among female students can be associated with gaining popularity through peer influence and the desire to be included in the group. Additionally, some girls may use cigarettes to control weight.

Nicotine is known to play a critical role in cigarette addiction. However, it is emphasized that behavioral, psychological, environmental and social factors are also effective in cigarette addiction. A typical smoker inhales approximately 200 doses of nicotine when he smokes a pack of cigarettes a day, inhaling each cigarette an average of ten times. No other drug is consumed with such high frequency. This conditioning and the effect of nicotine make addiction inevitable. A user who smokes a pack of cigarettes a day will receive a total of 1 million nicotine doses for 14 years. This constantly recurring situation causes withdrawal symptoms to appear rapidly and addiction to develop (WHO, 2010). Behavioral factors include habits such as smoking after meals, smoking with coffee, smoking while driving or talking on the phone. Over time, individuals may associate many activities with smoking, making this situation indispensable. In addition, the act of moving a cigarette from hand to mouth, called “hand habit”, has a more reinforcing feature in women than in men(Jha et al,2006). Smokers believe that smoking has a calming effect. The fact that withdrawal symptoms disappear by smoking the last cigarette before going to bed and smoking the first cigarette the next day reinforces the idea that cigarettes have a calming function. According to Jarvis, smokers think that they are treating themselves with cigarettes because they have experienced this process thousands of times.

Psychological causes of smoking addiction

Many theories examine mental factors in starting to smoke. According to these theories, some beliefs and thoughts are associated with smoking. There are common beliefs that smoking is used for joy, pleasure, calming and self-confidence. Social motivations may also influence smoking; These motivations aim to connect with other individuals, adapt, increase self-confidence, and facilitate social situations (Brown, 2011). It has been shown

that having friends who smoke, especially in early and middle adolescence, is highly associated with smoking behavior in later years. In a more specific study, it was reported that 64% of smokers had most of their friends smoking (Allen, 2008). In this context, smoking is seen as a tool to help fit in with social groups. Additionally, smoking may facilitate social interaction for students, reduce social anxiety, and help individuals shape their social environments (Stromberg et al., 2007). Smoking has been shown to help initiate conversations with friends or strangers, function to reduce problems, and facilitate communication with potential romantics (Brown, 2011). Research highlights the belief that smoking may reduce stress and be associated with self-esteem. Other studies show that our emotional thoughts, such as the belief that “smoking is enjoyable,” have an impact on smoking behavior. Public order is a factor that influences individuals’ thoughts about smoking; A person’s relationships with his immediate environment contribute to the development of beliefs and behaviors. Studies show that parental smoking doubles the likelihood of children smoking (Bal, 2019). Parents’ attitudes towards smoking are also an important factor affecting children’s behavior. Additionally, the smoking behavior of a person’s family members and friends has also been determined to have an impact on cigarette use. According to a study conducted in the USA, individuals who are prone to problems, have low school success, do not participate in school sports, use alcohol and drugs, and have low self-confidence are more likely to smoke. In short, the attitudes of the social environment in which a person lives are reflected in the attitudes of children (Bal,2019).

Yazıcı and Sahin(2005) state that smokers develop a positive or negative perception of cigarettes through social and mental learning. It was found that individuals in the preparation stage received higher scores than those in the pre-contemplation and thinking stage (Bardak, 2016). Another psychological reason for smoking is the concept of self-efficacy. According to Bandura (1982), self-efficacy is a necessary quality in the development of self-confident behavior. Additionally, another psychological reason for smoking is perceived stress level. This factor, which is used without questioning in daily life, has an important place in every aspect of human life.

Exercise, Physical Activity, Sports Performance

Although the terms “physical activity” and “exercise” are often used interchangeably, there are distinct differences between these terms in the field of kinesiology. Physical activity refers to all the energy expended by movement and is any body movement produced by skeletal muscles that results in energy expenditure above resting level (Thivel, 2018). This definition includes household and outdoor chores, occupational activities, walking, cycling, shopping, sports, planned exercises, and other activities of daily living (Kruk, 2019). The term “exercise” is used to describe regular, repetitive and planned physical activities that aim to improve or maintain physical fitness (Rogers,2010). Examples include brisk walking, cycling, aerobics and competitive sports. Physical activity can

be examined under four main headings in terms of improving physical fitness: strength, endurance, balance and flexibility. To evaluate any physical activity, it is important to consider the components of frequency, duration and intensity (Kruk, 2019).

Frequency, refers to how often an activity is done and is measured in weekly sessions.

Duration is the time frame in which the activity takes place and is usually expressed in minutes.

Intensity describes the amount of energy a person expends during activity and is generally divided into three levels: mild, moderate, and vigorous.

The intensity of physical activity is evaluated based on the metabolic equivalent (MET) of each activity. 1 MET is the amount of energy spent at rest. The MET value indicates the ratio of the metabolic rate of an activity to the resting metabolic rate. For example, running is considered 7 METs and rest is considered 1 MET; In this case, running requires 7 times more energy than resting. Light activities are considered below 3 METs, 3-6 METs are considered moderate intensity, and over 6 METs are considered vigorous intensity (WHO, 2010).

Light activities include activities such as sleeping, watching television, light housework, walking at a low tempo, and writing. Moderate activity increases heart rate to 64-76% of maximum (Warburton, 2007). Such activities include dancing, leisurely cycling, volleyball, and gardening. Violent physical activities, on the other hand, work large muscle groups, increasing the heart rate to 77-93% of maximum and causing a significant increase in respiratory rate. Examples of such activities include running, brisk cycling, weight lifting, and basketball (Kruk, 2009). Sports performance is defined as the sum of mental and physical activities that an individual achieves during sports activities and can be improved by regular training (Dinç, 2019). Nowadays, with the increasing number of individuals doing sports, sports performance and the parameters related to this performance are becoming increasingly important. While performance is generally considered as a short-term and limited aspect of behavior, it can also be described as an action towards the accomplishment of a specific job (Tiryaki, 1991).

Additionally, performance; It is defined as a concept that includes the biomechanical, physiological and psychological elements necessary for physical activity. In this context, the athlete's biomotoric, physiological and psychological performance level is concretely described (Kuter, 1997). Factors affecting athletic performance are quite diverse and these factors can be divided into two groups: internal and external. Both groups can positively or negatively affect athletes' performance. Intrinsic Factors are elements that are present in the genetics of the organism and that change over time and are unlikely to be affected by external factors or at all. These factors include age, anatomical structure, gender, special nervous system, locomotor system, metabolism level, organ and energy systems and nerve-muscle conduction rate. External Factors, on the other hand, are factors that are not related to the genetic structure of the organism and can have a greater impact than

internal factors. These factors include economic situation, positive or negative feedback from commentators, audience pressure, rest intervals, training programs, injuries, athlete's sexual life, family factors, social life, climatic conditions, time difference, weather and sleep quality. Many external factors can be changed and directed by certain methods under appropriate conditions (Bayraktar, 2009).

Effects of Smoking Addiction on Exercise and Sports Performance

Various factors such as a person's innate genetic characteristics, muscle fibril structure, exercise type and level, exercise model, age and smoking duration can affect aerobic capacity due to the effect of smoking. Smokers are more intolerant to exercise and finish exercise in a shorter time. Non-smokers can maintain a maximal level of exercise for longer than smokers (Özer, 2001). The negative effect of smoking on exercise performance is less seen in young individuals with high aerobic capacity. Smoking generally reduces the performance of individuals. It was determined that especially those who smoked at least 15 cigarettes a day in the last year had more difficulty in low-level activity than non-smokers. Smokers stop exercising earlier than non-smokers due to reasons such as fatigue, exhaustion, shortness of breath and leg pain (Gordon, 1987).

In a study conducted on individuals who smoked 3 cigarettes per hour in the last five hours, maximal oxygen consumption, oxygen pulse, heart rate volume and anaerobic threshold values were found to be low. Additionally, lower maximum heart rate has been observed in smokers. At maximal exercise level, these people finish the exercise in a shorter time. Research shows that nicotine affects body weight by changing body energy balance (Laustiola, 1991). Nicotine increases resting energy expenditure (Özer, 2001). There is a significant difference in oxygen consumption between smokers and non-smokers; smokers have lower oxygen consumption values (Klaue, 1983).

Under the influence of smoking, the use of carbohydrate stores decreases during exercise and at rest, which leads to less consumption of glycogen in the muscles. Research shows that smoking reduces maximal respiratory capacity, reduces the oxygen capacity of the blood, and this negatively affects sports performance. When a cigarette is smoked, 10% of the red blood cells degenerate and the amount of oxygen taken into the lungs decreases. This causes decreased performance and rapid accumulation of lactic acid in the bloodstream, leading to fatigue. In such a situation, the athlete's heart has to pump more blood to the tissues, which causes blood pressure to rise and, as a result, sports performance decreases. According to the study of Cooper et al., performance is inversely proportional to daily cigarette consumption and duration of smoking habit, and the response to training is worse in smokers (Akgün, 1986). As a result, while maximal respiratory capacity increases in individuals who train regularly, one of the negative effects of smoking over time is a decrease in respiratory capacity. In this context, it is understood that smoking seriously impairs sports performance (Akgün, 1986).

The Relationship Between Smoking and Exercise

The individual acquires various genetic characteristics at birth. In addition to these innate genetic factors, factors such as muscle structures, variety and intensity of exercises, age, gender and smoking duration determine the aerobic capacities of individuals. Individuals who consume nicotine have difficulty exercising and are less resistant to physical activities. They also tend to quit the exercise they started before completing it. Non-smokers can maintain maximum activities for longer periods of time than smokers (Özer,2001). Physical tests are crucial for football players. Along with tactical preparation and mental status, they evaluate athletic performance. Physical preparation is also a method of injury prevention. Moreover, the correct physical preparation of an athlete is closely linked to achieving desired performance. Physical tests assess the player's status, and based on them, the coach will know whether they can rely on the player in competition or even during training (Cağdanlıoğlu, Biçer and Vural, 2021). The negative effects of smoking on exercise performance are less common in young individuals with high aerobic capacity (Klausen,1983). Research shows that smoking leads to a decrease in individuals' performance capacity (Perkins,1991). It has been stated that individuals who smoke fifteen cigarettes a day for a year have difficulty exercising, even at low intensity, compared to non-smokers. During exercise, they tend to quit earlier than expected due to complaints such as fatigue, difficulty breathing, exhaustion, and pain in the legs and upper extremities (Gordon,1987).

Another study found that individuals who smoked three cigarettes within five hours had very low maximum oxygen consumption, oxygen uptake, pulse levels, heart stroke volume and anaerobic threshold levels. When comparing smokers and non-smokers, low heart rate and difficulties in reaching maximum exercise level are observed, and early quitting is also common. In addition, it has been determined that the chemicals in cigarette smoke negatively affect body weight by disrupting the energy balance in the body (Nadel,1961). Nicotine increases energy consumption in individuals at rest. Significant differences in oxygen consumption are observed between smokers and non-smokers; Smokers generally have lower oxygen consumption levels. Cigarette addiction minimizes the use of carbohydrate stores both during exercise and at rest, resulting in lower utilization of glycogen levels in the muscles (Ferannini,1983).

Research shows that smoking reduces maximum respiratory capacity, lowers blood oxygen levels and negatively affects athletic performance. Smoking causes 10% of red blood cells to degenerate. This leads to lower oxygen levels in the air taken into the lungs and a decrease in performance. As a result, symptoms of fatigue occur with the rapid accumulation of lactic acid in the blood. In such a situation, athletes are forced to pump more blood to the tissues, causing blood pressure to rise; Therefore, sports performance also decreases. One study stated that performance was inversely proportional to daily smoking and duration of smoking habit, and that smokers had worse training responses. As a result, maximum respiratory capacity increases in individuals who train regularly.

One of the negative effects of smoking over time is the decrease in respiratory capacity. As can be seen, smoking negatively affects the vitality and health provided by sports (Akgün,1986).

Effects of Exercise on Smoking

There are studies examining the benefits of exercise in quitting smoking and reducing the harmful effects of smoking. It has been observed that the desire to smoke decreases in individuals who smoke and participate in physical activity for 5 minutes. However, no decrease in this desire was observed in individuals who were inactive or only did light exercises. It has also been found that the desire created by a lit cigarette decreases (Turkish Cancer Research and Control Association, 2000).

There has been no research on how much exercise individuals should do to quit smoking, reduce its harmful effects, or eliminate the desire to smoke. The following points can be taken into consideration when including physical activity in programs to reduce the desire to smoke:

- + Individuals who aim to quit smoking can participate in 1-2 week exercise programs.
- + These exercise programs should be combined with treatment methods to eliminate the desire to smoke.
- + The starting level of exercises should start from the lowest level and smokers should be guided by an expert (Allen, 2008).

The effect of physical activity on quitting smoking or reducing the desire to smoke is promising. Previous research has shown a relationship between smoking habits and exercise in adults. For example, a study observed a 44% decrease in smoking rates among students who engaged in physical activity in the first 3 years of high school. In another study, while the probability of smoking for students interested in more than one sport was 3%, the probability of smoking for those interested in only two or fewer sports was found to be 22%. These results provide findings supporting that individuals who engage in physical activity are less likely to smoke. Therapy sessions or social support may be provided for quitting smoking; Physical activity programs may also be effective among these aids (Stormberg, 2007). One issue that needs to be clarified is whether physical activity directly affects the likelihood of smoking or whether the reduction in smoking rate is due to another factor of physical activity. However, it should be clearly stated that unconsciously increasing physical activity may negatively affect the positive results obtained (Dinç,2019).

Conclusion

As a result, in various studies, it is estimated that different types of exercises and physical activities have a reducing effect on smoking addiction and the physiological factors that cause the feeling of smoking, and that more detailed explanations will be provided on exercise and smoking addiction with new research in the future.

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