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Can`t get enough. Addiction to physical exercises: phenomenon, diagnostic criteria, etiology, therapy and research challenges

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Summary

Regular exercising has many health benefits and is rightly seen as positive, socially acceptable behavior. However, for the same reason, there is a high risk that patients and clinicians may overlook the danger of exercise addiction that causes harm in the somatic, emotional and interpersonal spheres. The current state of knowledge did not allow the inclusion of exercise addiction as a specific category in the current classifications ICD-10, ICD-11 and DSM-5. However, this disorder meets the general criteria for addiction and is therefore included in the canon of behavioral addiction. The purpose of the article is to present knowledge that will help in recognizing and understanding the physiological and psychological mechanisms associated with addiction to physical exercise and will introduce available methods of psychotherapy. The article is of a review nature and presents terminology, recognition criteria, epidemiological data, mechanisms of developing addiction, the most popular tools helpful in screening diagnosis or self-diagnosis and risk factors of developing exercise addiction. The authors also took into account the specific location of exercise addiction in the context of other mental disorders, controversies, inconsistencies in research results, and gaps in scientific data related to the discussed phenomenon. The summary proposes further research development pathways.

Key words: exercise dependence, addictive behavior, eating disorders

Introduction

Due to the proven health benefits of physical activity, only the positive aspects of intensive involvement in exercising were initially emphasized. In the seventies Glesser [1] described a wide spectrum of benefits of exercise addiction in contrast to chemical addictions. He mainly emphasized physiological and psychological aspects related to self-improvement and personality development. He also observed that the cessation of exercise causes withdrawal symptoms that indicate the presence of "positive addiction".

Subsequent studies on the symptoms associated with the sudden deprivation of physical activity emphasized the negative consequences of excessive sports activities, such as anxiety, guilt, irritability, insomnia, and fatigue. Several years later de Coverley Veale [2] introduced a division into primary addiction (not related to other mental disorders) and secondary. Disorders conducive to the appearance of a pattern of exercise abuse include eating disorders (anorexia, orthorexia, bulimia) and bigorexia (muscle dysmorphia) – a form of dysmorphic disorder consisting in dissatisfaction with the appearance of one's body in terms of too small muscularity, which is perceived as thin and requiring training in order to increase muscle mass. The problem of the relationship between eating disorders and exercise addiction is still under investigation because of their frequent comorbidity [3, 4].

The terminology that defines this pathological pattern of behavior is not uniform. The following terms are used interchangeably: exercise addiction, exercise dependence, exercise abuse, and compulsive exercising. The term 'addiction' is considered to be the most appropriate because it includes both the concept of dependence and compulsiveness. People who are affected by this problem most often choose aerobic activities – running, cycling, exercises related to building muscle mass. Training patterns are often stereotyped, held regularly, and due to the increase in exercise tolerance, their duration and intensity can gradually increase. An unplanned break in exercise causes discomfort in both the mental and physical sphere, which is relieved by re-exercising, even against the doctor's recommendations and with awareness of negative health effects [5].

The authors of the article set themselves two main goals. The first was to create a compendium of information useful for professionals who have contact with people addicted to exercise (psychiatrists, psychotherapists, orthopedists, physiotherapists, nutritionists). This is achieved through a summary of the existing knowledge, including information on the terminology used, epidemiology, risk factors, mechanisms of addiction development and criteria for its diagnosis. Screening tools that can assist with initial diagnosis or self-diagnosis are presented and treatment methods are described. Another goal was to place exercise addiction in the context of other mental disorders, and to present controversies, inconsistencies in research results, and gaps in scientific data related to the phenomenon. Finally, further research development paths are proposed in the summary.

The authors reviewed the databases of Academic Search Ultimate, MEDLINE, SocINDEX with Full Text and APA PsycArticles databases. The search used the terms "exercise addiction" or "exercise dependence" or "compulsive exercise" in conjunction with the terms "epidemiology", "risk factors" or "contributing factors" or "predisposing factors" or "icd-11" or "dsm-5" or "symptoms" or "signs" or "characteristics" or "presentation" or "symptomatology" or "diagnosis" or "diagnosing" or "diagnostics" or "assessment" or "screening" or "assessment tools" or "assessment method" or "mechanism" or "therapy" or "treatment" or "intervention". The study included articles with access to their full content, mainly research articles, which appeared after 2000. Sometimes reference was made to review articles, textbooks, including older items, mainly in relation to definitions and diagnostic criteria.

Diagnostic criteria and assessments methods

Despite the fact that no binding classification (ICD-11, ICD-10, DSM-5) describes exercise addiction [6], it is included in the canon of behavioral addiction based on diagnostic criteria defining addiction. The pathology of the phenomenon is evidenced by the presence of the process of neuroadaptation (the appearance of withdrawal symptoms and increasing tolerance) and disregard for the negative health consequences of excessive exercise [7].

Criteria for identifying primary exercise addiction proposed by de Coverley Veale [2] include:

1. Preoccupation with exercises that become stereotyped and routine. Focusing on them at the expense of other life activities.
2. The presence of emotional and physical withdrawal symptoms, such as mood swings, irritability, and insomnia. Relief of withdrawal symptoms by further exercise (exercises regulate mood levels).
3. The deterioration in the physical, social and professional functioning resulting from preoccupation with exercises.
4. There are no other disorders explaining the presence of excessive preoccupation with exercise. The goal of weight loss is to improve the quality of exercise.

One of the most commonly used tools for assessing addiction risk is the *Exercise Dependence Scale* (EDS), which is based on the diagnostic criteria of substance dependence (DSM-IV). Test subjects are asked to respond on a scale of 1-6 (where 1 is never and 6 is always) to each of the statements and assess the frequency of behavior over the last three months. The questionnaire consists of 21 items related to DSM-IV addictive behavior diagnostic criteria.

It includes indicators such as:

- increase in tolerance,
- presence of withdrawal symptoms (anxiety, fatigue) and the need to exercise to minimize them,

- extending the duration of the exercise compared to the previously intended one,
- loss of control over the amount and intensity of exercises,
- limiting other life activities by the time spent on training,
- reduction of activity in the social and professional sphere,
- continuing exercises despite the awareness of negative health and social consequences [8].

Other tools that help diagnose exercise addiction include: *Exercise Addiction Inventory* (EAI) [9], *Obligatory Exercise Questionnaire* (OEQ) [10], and *The Exercise Dependence Questionnaire* (EDQ) [11]. It should be remembered that the tools used to assess the degree of addiction are not independent diagnostic methods, they are self-descriptive and must be supplemented with an in-depth interview assessing the motives for involvement in sport, general health and the degree of damage suffered by the individual in various spheres of his life [12].

Prevalence

Attempts to estimate the incidence of exercise addiction are very inconsistent. The divergence of results fluctuates between 0.3% and 77% (runners), which proves the existence of both theoretical and methodological barriers in this field. In specific subpopulations, the risk of addiction to exercise is higher, e.g., among athletes (without a breakdown by type of sport) – up to 32%. Studies using structured clinical history show that there is a tendency to overestimate the risk of addiction in the tools used [7]. Based on the criteria describing addiction in DSM-5, it is estimated that 0.3–0.5% of the general population is at high risk, and among those who exercise systematically this proportion is 1.9–3.2%. The main reasons for the discrepancy of empirical data include ambiguities in classification, inconsistent research results, and various interpretations of the tools (self-descriptive) used to assess the risk of addiction. For example, high scores on the scales of people who are professionally involved in sports often do not indicate the presence of addiction, in the event that a person does not experience damage in personal and social life, and physical activity is part of his daily routine [5, 13].

The conclusions of the meta-analysis of 48 studies using the EAI and EDS regarding the occurrence of addiction depending on the type of sport practiced suggest that individual sports have different addictive strength. EAI identifies a higher percentage of people at risk of addiction to physical exercise among endurance athletes (14.2%), footballers (10.4%), fitness practitioners (8.2%) and those practicing strength disciplines (6.4%). However, the overall frequency of addiction in the entire population of exercisers was 3.0%. Studies using EDS have shown divergent, usually lower, values. EAI and EDS identify different proportions of people at risk of addiction to exercise both in the general population and in certain sports categories. The researchers explain

the heterogeneity of results by differences in the socio-demographic and cultural characteristics of the target populations [14].

No studies have been conducted in Poland to assess the prevalence of exercise addiction.

Development and mechanisms of addiction

Contemporary knowledge about behavioral addictions assumes the existence of a common, biopsychosocial basis, where the interaction of biological factors, psychological factors and the social environment causes the emergence and consolidation of maladaptive activities [15]. Involvement in addictive behaviors may result in consequences common to all types of addiction, such as activation of the reward system, as well as specific costs for each of them [16]. The concepts of exercise addiction that developed over time sought explanations in the physiological and neurohormonal mechanisms specific to situations of high physical effort and psychological mechanisms focusing on relieving tension or regulating emotions, which also explain the mechanisms of other activity addictions. The most general division of hypotheses explaining the mechanisms of the emergence and maintenance of exercise addiction is based on two main perspectives: neurobiological and psychosocial [17]. Below, in chronological order, the most common, well-established concepts explaining the mechanisms behind the development and maintenance of exercise addiction are presented.

A neurobiological perspective

The oldest, most popular and most controversial hypothesis explaining the physiological basis of addiction is the beta-endorphin hypothesis, which assumes that the feeling of euphoria, appearing after intense physical effort, is caused by an increase in the level of endogenous opiates. Due to the growing tolerance, it is necessary to increase the intensity of training in order to maintain the desired level of well-being. The endorphin hypothesis is supported by facts such as perceived pleasure at the end of exercise, increase in pain threshold and the presence of withdrawal symptoms, which may be reduced after administration of opiate antagonists [18, 19]. However, in the conducted tests the level of beta-endorphins in plasma was determined, which due to their chemical structure do not cross the blood-brain barrier, which means that fluctuations in their level do not affect such significant changes in well-being. Among other things, for this reason, subsequent attempts to explain the phenomenon concerned the role of met-enkephalin and dynorphin in the development of tolerance [20]; however, hypotheses regarding the role of these endogenous opiates are still incomplete.

Another attempt to explain the physiological mechanism concerns the lower reactivity of the sympathetic system, which is the result of intensive and regular training resulting in an increase in tolerance to catecholamines (adrenaline and noradrenaline).

In this way, a feeling of lack of energy and discomfort arises, which disappears only after repeated exercises, leading to the consolidation of the habit [21].

Another concept is the thermoregulation hypothesis, according to which elevated body temperature (typically after exercise) is accompanied by a feeling of relaxation and a reduction in anxiety levels. Due to increasing tolerance, it is necessary to gradually increase the frequency of exercise to achieve a relaxing effect [22]. Despite many studies aimed at explaining the physiological basis of addiction, there is a lack of a coherent concept describing the physiological mechanism of its formation.

Psychosocial perspective

When analyzing exercise addiction from the perspective of the Cognitive Appraisal Hypothesis (CAH) concept, it is assumed that physical activity is a form of coping with stress, just like sex or alcohol [23]. If the repertoire of remedial strategies is too narrow, it can be used excessively, disrupting everyday functioning in the personal and professional sphere. Intensive physical activity is a socially acceptable activity, which means that a person experiencing addiction can easily rationalize the problem as an effective, healthy stress management strategy and not see the need for treatment. It is only when the exercise rhythm is interrupted that it shows a loss of control over the tension release mechanism, and negative feelings such as irritability, anxiety, guilt and lethargy appear. With increasing tolerance, there is a loss of control over the amount of exercise, which can lead to neglect in the personal, professional or social sphere, which is the source of further problems, which triggers the vicious circle mechanism. Lack of alternative ways of dealing with difficulties causes solidifying of the pattern of coping with tension [24].

Intensive workouts play an important role in regulating mood. Both immediately after training and in the long run, exercises improve the emotional functioning of a physically active person by generating a positive mood. Exercise after leaving training becomes an antidote to irritability, anxiety, and guilt caused by abandoning exercise. It is noted, however, that this effect is temporary due to increasing tolerance, which affects the need to constantly increase the time and intensity of training to alleviate the worsening of withdrawal symptoms. Relief caused by renewed physical activity deepens and strengthens addiction mechanisms [25]. In some situations, additional aggravating factors influence the mood. Research suggests that people who practice sports professionally more often experience anxiety and depressive symptoms due to pressure on their performance compared to amateurs. Anxiety and depressive symptoms are present in the course of addiction, while causal relationships related to the regulation of emotions still require further exploration [26].

Considering depressive symptoms and social mechanisms, Li et al. [27] found that students with diagnosed exercise addiction have lower self-esteem, a small social network, and often have accompanying symptoms of low mood and decreased energy. These results suggest that exercise addiction can cause an increase in negative

mood and increased social isolation of students. The limitation of the cross-sectional study is the inability to assess causality and therefore it is not possible to determine whether the negative mood led to exercise addiction or was the result of addiction. Moreover, it is unclear whether social isolation is caused by a negative mood or low self-satisfaction, or from other circumstances in students' lives. Undoubtedly, these are important psychological factors for engaging in compulsive and addictive exercises.

Problematic exercise, like any addiction, develops over time, giving the possibility of therapeutic interference that can help a person who is not yet aware of the consequences and the size of his problem. Distinguishing between addiction phases can be helpful in assessing the differences between recreational exercise and exercise addiction. Table 1 describes the stages of addiction development. Each phase describes three areas: a person's motivation to exercise at a specific stage, the negative consequences of training, and control of exercise frequency [28].

Table 1. **Phases of exercise addiction development (based on [28])**

	Phase one: recreational exercise	Phase two: risky exercise	Phase three: problematic exercise	Phase four: exercise addiction
Exercise motivation	Improving, maintaining or strengthening one's condition.	Mood regulation, self-esteem improvement. At this stage, biological mechanisms of exercise dependence may be triggered depending on the severity of the risk factors.	Improving mood and removing withdrawal symptoms.	Mainly avoiding withdrawal symptoms. The experience of pleasure is small.
Negative consequences of training	Injuries resulting directly from the exercise itself (e.g., muscle pain, sprained ankle).	Still the direct effects of effort are physical injuries.	Secondary, negative consequences of training mostly on the interpersonal level. Training style may change: stop training with a group to train alone.	Growing direct and secondary consequences, leading to neglect of relationships and daily duties.
Exercise frequency control	Exercise according to the schedule.	Periodic loss of control over behavior, workouts are longer and more intense than intended.	Organizing time based on a training plan that is becoming more and more rigid.	The frequency and intensity of exercise is so high that it becomes the main area of life.

Addiction risk factors

Researchers are looking for conditions conducive to the development of addiction in socio-demographic, biological and psychological factors. The current state of knowledge does not allow for clear answers, not only about the mechanism of the disorder, but also about protective resources and risk factors [16]. The quantity and quality of longitudinal studies still do not provide a complete answer regarding the causal relationship between compulsive exercise and the coexistence of other addictions, mental disorders and eating disorders.

Research shows that those involved in professional sports and sports students are particularly vulnerable to exercise addiction. Positive correlations were also observed between young age, male gender and high frequency of exercise [24].

Biological susceptibility to the formation of addiction to exercise is considered in terms of the genetic susceptibility of the reward system. Animal studies demonstrated neurochemical and morphological adaptation in the reward pathways and the hippocampus that are characteristic for drug addiction [29]. Research looking for the genetic basis of addiction, common to chemical and functional addictions, highlights the existence of common molecular mechanisms for drug addiction and compulsive running [30].

Factors related to the neurobiological background are, among others, individual temperamental characteristics. Novelty seeking and harm avoidance are features whose extreme severity may be significant in the image of addiction and have a genetic basis – just like neuroticism and extraversion, which are the features of the Big Five model most biologically determined [31].

Studies looking for the relationship between compulsive exercise and personality traits emphasize the positive correlation between high levels of neuroticism (assuming worse coping with stress) [3, 32, 33], extraversion (correlating with high activity, search for sensations) and such features as egocentrism, competitiveness, and skeptical attitude towards others [33]. Studies on the relationship between personality traits in the Big Five model and physical activity addiction do not provide an unambiguous answer to the question about the addict's personality profile. The diversity of the studied groups and the goals set by the researchers, and the different methodological approaches significantly hinder the creation of a coherent model of personality determinants of compulsive exercising [34].

Studies carried out so far indicate that exercise addiction coexists with other addictive behaviors. Analysis of behavioral addiction among adolescents showed that excessive, harmful exercise correlated with compulsive buying, Internet addiction, workaholism and gambling [35]. According to Sussman et al. [36], 15% of people addicted to exercise are also addicted to nicotine, alcohol and drugs. This study is not confirmed by Szabo et al. [37], who suggest that substance dependence and the risk of addiction to physical exercise are not related to each other, and exercise-dependent people show the healthiest profile related to the prevalence of smoking.

Compulsive exercise often occurs with other disorders related to nutrition, body image and obsessive-compulsive features [32, 38]. The nature of the activities associated with the compulsory training and its repetition present in the image of exercise addiction prompted the search for relationships with obsessive-compulsive disorder (OCD), as confirmed by research. Tests rated OCD symptomatology higher in people over-exercising than in those training without addiction. There is a clear need to conduct further research on the relationship between these disorders [39, 40].

A meta-analysis of the prevalence of exercise addiction in people diagnosed with eating disorders showed that exercise addiction occurs in this group more than three and a half times more often [41]. A study of people practicing sport (running), which identified a group of exercisers at risk of eating disorders showed that it is characterized by a higher percentage of people with the characteristics of addiction in the style of exercise. Young women predominated in it, the motivation for exercise was weight loss, and personality characteristics were dominated by a high level of neuroticism [3].

Despite the fact that compulsive exercising is most often treated as secondary to eating-related disorders, prospective studies [42] show that compulsive features of exercise were the best predictors of eating disorders. Among the observed group, eating disorders and exercise addiction occurred independently or were related to each other. The authors emphasize that compulsive exercising can be an important marker in the diagnosis of eating disorders, especially in men. Differences related to gender and the picture of both disorders were shown in the research by Cunningham et al. [43], where men and women are equally at risk of developing compulsive exercising, but in men it is more primary and more addictive, while in women it is more often secondary and associated with obsessive-compulsive features.

Orthorexia is a disorder characterized by excessive control over the quality of food consumed. People who exercise regularly show a higher incidence of orthorexia because of awareness of the importance of nutrition in physical fitness. This group of people regularly engaged in sports has become a population at risk of its occurrence. Studies conducted so far show a positive correlation between endurance sports and orthorexia [44, 45]. Research by Rudolph [4] regarding the co-occurrence of exercise dependency and orthorexia included 1008 active exercisers who assessed the presence of addiction using EAI and eating habits by completing *Düsseldorfer Orthorexie Scales* (DOS). EAI results estimated that 10.2% of participants showed symptoms of addiction, while orthorexia symptoms were present in 3.4%. Both disorders occurred in 2.3% of the entire study group. Interestingly, a higher correlation index for both disorders was observed among women. Frequent co-occurrence of orthorexia and compulsive exercising is also confirmed by other studies [46] emphasizing the importance of strong, internal motivation that can be coercive.

The desire to improve one's physical form and figure often results from narcissistic personality traits [32] and a high level of perfectionism. Studies emphasize considerable perfectionism both in people with eating disorders and those addicted to

exercise, including those who have both disorders. Researchers point out the need to investigate the two-way relationship between compulsive exercise and eating disorders to determine causation [47].

Studies confirm the relationship between compulsive exercising not only with specific personality traits but also with self-esteem and disturbed body image [48-50]. Muscle dysmorphia (sometimes called "bigorexia") is a variant of body dysmorphic disorder, described in DSM-5 as part of the obsessive-compulsive spectrum. The condition is characterized by beliefs of insufficient muscle mass and commitment to excessive muscle building, by weight lifting and the use of anabolic steroids. Athletes with muscle dysmorphia often have low fat but an increased body mass index and disordered eating habits. Due to the great pressure in achieving the intended goal of body building, exercising in this group may have the characteristics of addictive behavior [51]. This is confirmed by studies comparing men with the diagnosis of bigorexia and anorexia, where the compulsion of exercise clearly appears, which seems to be secondary to body image disorders. Men with muscle dysmorphia and anorexia nervosa showed symptomatic similarities in the area of disturbed body image, eating disorders and excessive exercise pattern [52].

Treatment

Due to the specificity of the disorder, associated with frequent injuries or overload, people addicted to exercise often seek help in the field of sports medicine, especially from physiotherapists, who should be worried by a negative attitude to limiting exercise or continuing it despite contraindications. It depends on their knowledge and vigilance whether the patient confronts the problem and receives specialist assistance. Early identification of the disorder can enable rapid management before compulsive exercise leads to eating disorders or somatic complications associated with excessive exercising [32, 53].

The start of therapy should be preceded by a thorough psychological diagnosis that makes it possible to distinguish primary addiction from other mental disorders in the course of which excessive, maladaptive physical activity occurs (OCD, eating disorders, bigorexia). Assessment and treatment should take into account the different stages of development of exercise addiction. The most commonly used therapeutic interventions include motivational dialogue [54] and various forms of behavioral and cognitive psychotherapy, but there is still a lack of knowledge about their effectiveness [55, 56]. The goal of the therapy is to create awareness of the mechanism of the onset of the disorder by restructuring the unadapted beliefs about exercises and to expand the spectrum of alternative, non-damaging stress coping mechanisms. The effect is to recognize addiction mechanisms, thereby reducing the rigidity of routine exercise and regaining control over behavior [13].

According to Adams et al. [57], interventions in the cognitive and behavioral sphere should include:

(1) Accepting the need to obtain the support and participate in therapy.
(2) Observing how addiction interferes with communication with significant people.
(3) Recognizing your reactions: a strong fear of losing control, helplessness and, as a consequence, compulsive behavior that reveals these emotions.
(4) The application of individualized approaches depending on the patient's psychopathology. The common denominator of strategies for therapeutic interventions includes:
   – Identification and termination of compulsive behavior through individual psychotherapy.
   – Patient's involvement in therapy and understanding of its importance and health benefits.
   – Enabling the patient to develop strategies to regain self-control.
   – Understanding the organization of the structure of defense mechanisms and attempts to cope with addiction.
   – Increasing tolerance to the feeling of exercise compulsion by modifying the defense mechanisms, understanding their maladaptive role and acquiring appropriate skills to manage the behavior.
   – The ability to recognize and avoid "triggers" of compulsive behavior.
   – Changing behavior related to coping with difficult situations and improving the support system.

In addition to impacts on the cognitive sphere through exploration and changes in mental patterns, behavioral reinforcements are used, e.g., rewarding for reducing the intensity or duration of exercise [55]. Setting goals in the SMART (specific, measurable, achievable, results-focused, and timely) model can help in regaining control over one's behavior [58]. Abstinence from exercise is not a required therapy goal. Because moderate physical activity is considered a healthy habit, it would be optimal to return to moderate exercise that one does not lose control over. In some cases, a new form of training may be recommended, e.g., a runner becomes a swimmer [28].

Hausenbach et al. [13] also emphasize the importance of re-learning to read body signals, such as pain and fatigue, to distinguish between adequate and excessive physical exertion. For competitive athletes, it should be recognized that intensive training is required to achieve success in sport, but fatigue due to excessive activity leads to a decrease in performance. In this case, the interdisciplinary cooperation of a psychologist, trainer, physiotherapist and dietitian would give the best results in the process of creating a new, healthy exercise regimen [13].

Summary

Exercise addiction meets the general criteria of behavioral addiction, but there is still a lack of sufficiently well-grounded information to identify this disorder as a specific,

independent construct in the current WHO (ICD) or APA (DSM) classifications. Based on the general concepts of addiction, diagnostic criteria, symptoms and the course of addiction development have been described. Available screening tools were also presented to assess the severity of addiction, which are not independent diagnostic methods, but accompanied by in-depth interviews can be successfully used in clinical work. In Poland, there have been no studies aimed at estimating the prevalence of exercise addiction in the general population or in groups of people who are known to be more vulnerable to its development, e.g., athletes. In the era of increasing opportunities to reach potential respondents (e.g., through online research), this challenge becomes more feasible.

There is no coherent concept regarding the etiology of the disorder. The concepts developed so far focus on distinct mechanisms related to physiological or psychological responses, which are not mutually exclusive but not complementary either. Subsequent studies reveal more complex relationships between risk, protective, neurobiological and psychological factors in the development of addiction. This indicates the need to take into account in further research multivariate models of dependence, which have a chance to bring researchers closer to an accurate description of the phenomenon of exercise addiction.

There are still doubts about the independence/primordiality and interrelationships of exercise addiction and other disorders, especially eating, body image, and OCD. In addition to the aforementioned implications of the inability to separate exercise addiction in the ICD and DSM, this situation may have a negative impact on clinical practice. In our opinion, it is important to conduct prospective research to determine the mutual relations (primary, secondary, independence) of addiction to exercise and other mental disorders. In practice, this translates into the possibility of proposing optimal treatment, setting the main goals and priorities of therapy.

In relation to therapeutic activities, the methods used in the first place are those proven in the treatment of other behavioral addictions, such as cognitive-behavioral therapy or motivational dialogue adapted to a specific addiction object. It is a rational approach whose effects are still not known enough. This is another area of research that requires a prospective approach.

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