

REVIEW

Exercise addiction – cases, possible indicators and open questions

DEPRESSION / PERFORMANCE / RECOVERY / RED-S / SPORTS AND SOCIETY / SPORTS NUTRITION



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Abstract

While addictive disorders involving substances are well researched, the field of behavioral addictions, including exercise addiction, is in its infancy. Although exercise addiction is not yet recognized as a psychiatric disorder, evidence for the burden it imposes has gained attention in the last decade. Characterised by a rigid exercise schedule, the prioritization of exercise over one's own health, family and professional life, and mental wellbeing, and extreme distress when exercise is halted, the phenomenon shares many features with substance use disorders. While prevalence is thought to be low, affecting one in every 1000 exercisers, current research suggests that the symptoms are extremely burdensome, and may often be accompanied by other psychiatric disorders. It is no longer thought to be the case that only endurance athletes are at risk. While disease history and neural substrates are still to be clarified, there are a number of indicators which may help clinicians and sports physicians identify a possible case of

exercise addiction.

Zusammenfassung

Substanzgebundene Suchterkrankungen sind gut recherchiert; im Gegensatz dazu ist die Forschung hinsichtlich Verhaltenssüchte, unter anderem auch Bewegungssucht, noch nicht etabliert. Bewegungssucht wurde noch nicht als psychische Störung eingestuft, die belastenden Symptome haben allerdings in den letzten zehn Jahren viel Aufmerksamkeit generiert. Die Symptome ähneln denjenigen von substanzgebundenen Süchten; ein rigides Konsummuster, die Vernachlässigung von Familie, Beruf und der eigenen Gesundheit, und ein starkes psychisches Leid, wenn die Aktivität oder die Bewegung unterbrochen werden muss. Die Prävalenz ist gemäss Einschätzungen gering; vermutlich ist jede tausendste sporttreibende Person betroffen. Jedoch sind die Symptome für den Betroffenen schwerwiegend, und andere psychische Störungen sind häufig vorhanden. Es wird nicht mehr angenommen, dass nur Ausdauerathleten betroffen sein können. Der Krankheitsverlauf und die neuronalen Substrate bleiben noch ungeklärt. Es gibt jedoch verschiedene Hinweise, welche für Mediziner und Sportärzte bei der Identifikation einer möglichen Bewegungssucht von Nutzen sein können.

Introduction

Substance use disorders impose a large disease burden globally. In 2016, addiction to alcohol and drugs was responsible for 131 million Disability Adjusted Life Years (DALYS) [1]; this is more than half as many as for all forms of cancer in 2015 [2], and over eight times as many as for major depressive disorders in 2010 [3]. These quantifiable harms arise from the fact that substance use disorders have clear and measurable physical health effects. By contrast, quantifying the harm caused by behavioral addictions is still a topic of discussion [4], as the harms resulting from these disorders are not solely, or even chiefly, physical, but more psychological (e.g., inability to concentrate) or even social (e.g., neglecting familial relationships) in nature.

In recent decades, behavioral addictions have been receiving increasing attention as potentially important burdens on human health. As noted by Thibaut (2017): "...there is no habit which provides reward that cannot become excessive, compulsive, and sometimes life-endangering." [5] While gambling is the most well-known form of behavioral addiction, and the only one to date listed in the DSM-5 as a non-substance related disorder, activities such as shopping, internet use and exercise have also been the focus of research [6].

Exercise addiction – symptoms and prevalence

Exercise has drawn much attention as a potential form of behavioral addiction in the past 20 years, as cross-sectional questionnaires have built on early case studies reporting individuals who exercise to the point of extreme illness, breaking bones, and beyond [7]. These case studies list self-reported symptoms such as a compelling urge to exercise for a certain amount of time each day [8], severe negative affect when this is not possible [9], suicidal ideation [10], continuance despite a recognition of the unhealthy role of exercise on physical health and mental wellbeing [11], and the neglect of professional and social responsibilities [12]. For example, Griffiths (1997) reports on the case of a young woman who ends her

relationship, leaves an exam early, and trains through severe pain to pursue her athletic hobby [13]; - Spieker (1996) reports on a pregnant woman running despite a femoral stress fracture, and suffering depressive symptoms when forced to stop [14]; and Kotbagi and colleagues (2014) present the case of a male cyclist who changes his job and suffers severe problems in his marriage due to his prioritizing training to the virtual exclusion of all else [15]. These symptoms resemble the classic substance use disorder symptoms described in the DSM-5, prompting researchers to discuss exercise in terms of a behavioral addiction.

More recent cross-sectional data have established that a number of exercising individuals appear to suffer psychiatric distress linked to their habits, but feel unable to stop. These studies indicate that men are more frequently affected

[16,17], but the initially posited notion that only endurance athletes are affected does not appear to hold true, with evidence for a comparable prevalence in team sports [18].

Conservative prevalence estimates suggest that every 1'000th exercising individual displays marked symptoms of exercise addiction, while every 10'000th may require some form of psychiatric treatment [19]. Symptoms of exercise addiction occur with most frequency in individuals with eating disorders; indeed, it has been suggested by some researchers that exercise addiction is only observable in individuals with eating disorders [20]. Exercise (at a level deemed to be damaging to health) is used by between 39% [21] and 45% [22] of this population to accelerate weight loss or purge calories consumed. However, there is now robust evidence that individuals without any symptoms of eating disorders also suffer from exercise addiction; several studies have specifically excluded those with eating disorders from their samples, and have still found symptoms of exercise addiction [23-25]. The terms "primary" and "secondary" exercise addiction have been used to distinguish between those who exercise excessively because they find (or found) exercise to be highly rewarding, and those who exercise excessively in order to achieve some other goal, respectively [26]. It has been suggested that the primary form of exercise addiction may more closely resemble substance use disorders, while the secondary form may be more akin to a compulsion [27]. Consequently, individuals with eating disorders may be said to suffer from secondary exercise addiction. Whether a distinction will be made between primary exercise addiction as a behavioral addiction, and secondary exercise addiction as a symptom or symptom cluster, remains to be determined.

Psychiatric profile

A small number of studies have addressed other psychiatric disorders which present in individuals affected by exercise addiction. These studies suggest that those at risk for exercise addiction also suffer from symptoms of anxiety [28], depression [29], and other addictive disorders [30,31]. At this stage, results must be interpreted with caution; the majority of these studies are based on self-report questionnaires, rather than clinical diagnoses, and so can be viewed as indicating avenues for more detailed study. It is also interesting to note that while, at this stage, these studies provide no indication about whether other disorders may cause, or result from, exercise addiction [32], they could also provide first insights into the course of exercise addiction. For example, individuals reporting exercise addiction also report symptoms of depression and anxiety when obliged to stop exercising [9,33]. The antidepressant effects of exercise are well-documented, and around the time that the concept of exercise addiction was emerging, authors were suggesting that it might be a form of self-medication for severe depression [34]. A study of ultramarathon

runners identified rates of 20% for depressive symptoms and risk of exercise addiction, separately [35]. High levels of narcissism have also been found to predict risk of exercise addiction [36]. Additionally, as Bamber and colleagues note, "... studies of negative affect have tended to focus on psychological responses to exercise withdrawal; there has been little attention paid to whether psychological disturbance and distress are generally characteristic of exercise dependence." [37]

In spite of the fact that over 100 cross-sectional studies have addressed the phenomenon of exercise addiction [38], the evidence for its inclusion in the DSM is still considered insufficient. This is due in part to the fact that simple questionnaire studies do not provide detailed information about the psychiatric status of affected individuals; as a result, the above-mentioned issues about the course and causes of this phenomenon, and the psychiatric profile of those at risk, remain to be clarified. However, the questionnaires currently employed to assess risk for exercise addiction also vary. While some, such as the Exercise Addiction Inventory (6 questions, *Table 1*), are brief, with rather vague questions [39], others, such as the Exercise Dependence Scale (21 questions, *Table 2*) emphasize the negative consequences of exercise habits in more detail [40]. This variability has led not only to varying prevalence estimates [41] but also to the need for a careful interpretation of the values that individuals ascribe to the statements in these questionnaires [42]. For example, professional athletes, or those who take their exercise activities very seriously, may well increase their training volume over time, feel uncomfortable if they miss a training session, and make certain sacrifices for their training; however, these facts do not impose a psychological burden on them, or indicate behavior that is incompatible with normal living. As with other behavioral addictions, the behavior itself is not unhealthy per se [43], and in the case of exercise, may indeed be a key part of human wellbeing. In considering the point at which this habit becomes an addiction, it is therefore essential to ascertain whether burdensome negative consequences are present, and whether these cause psychological and, potentially, physical suffering.

Instructions: using the scale provided below, please complete the following questions as honestly as possible. The questions refer to current exercise beliefs and behaviors that have occurred in the past 3 months. Please place your answer in the blank space provided after each statement.

- | | | | | | |
|-------|---|---|---|---|--------|
| 1 | 2 | 3 | 4 | 5 | 6 |
| Never | | | | | Always |
1. I exercise to avoid feeling irritable. _____
 2. I exercise despite recurring physical problems. _____
 3. I continually increase my exercise intensity to achieve the desired effects/benefits. _____
 4. I am unable to reduce how long I exercise. _____
 5. I would rather exercise than spend time with family/friends. _____
 6. I spend a lot of time exercising. _____
 7. I exercise longer than I intend. _____
 8. I exercise to avoid feeling anxious. _____
 9. I exercise when injured. _____
 10. I continually increase my exercise frequency to achieve the desired effects/benefits. _____
 11. I am unable to reduce how often I exercise. _____
 12. I think about exercise when I should be concentrating on school/work. _____
 13. I spend most of my free time exercising. _____
 14. I exercise longer than I expect. _____
 15. I exercise to avoid feeling tense. _____
 16. I exercise despite persistent physical problems. _____
 17. I continually increase my exercise duration to achieve the desired effects/benefits. _____
 18. I am unable to reduce how intense I exercise. _____
 19. I choose to exercise so that I can get out of spending time with family/friends. _____
 20. A great deal of my time is spent exercising. _____
 21. I exercise longer than I plan. _____

Table 2: Exercise Dependence Scale

Neural substrates

A further gap in the field of research into exercise addiction is the fact that almost no studies have examined whether neural activity in this population differs from non-addicted individuals, as is the case with other substance use disorders. A small number of studies have used imaging techniques to determine which areas of the brain may be responsible for the pleasurable feelings induced by exercise. In their review of the literature, Cheval and colleagues (2018) report that studies examining neural responses to exercise image stimuli using MRI found increased activity in certain reward-related regions of the brain, although not in the nucleus accumbens [44]. However, of the groups examined, none were recruited on the basis of exercise addiction scores. To date, only one study has assessed neural activity individuals with exercise addiction. Huang and colleagues (2019) demonstrated that, compared to non-addicted individuals, those at risk for exercise addiction showed inhibited responses to visual stimuli, in particular to non-exercise images [45]. While interesting, these findings shed little light on the rewarding or addictive nature of exercise, as the brain regions examined are at most only tangentially implicated in human reward processing.

Overtraining

Finally, research to date has focused primarily on the psychiatric aspects of exercise as an addictive disorder. This is justified to some degree, as the components of compulsion and psychiatric and emotional distress, which are hallmarks of addictive disorders, fall within the realm of psychiatric research and categorization. However, unlike certain other behavioral addictions, such as gambling or internet use, exercise addiction is likely to result in physiological damage as well. While the treatment of exercise-related injuries is the domain of sports medicine, a better understanding of the concept of exercise addiction may be a valuable cornerstone in current approaches to overuse injuries, and the overtraining syndrome [46]. Exercise addiction may precipitate these physiological issues, or exacerbate them, and if this underlying psychological factor is completely ignored, the patient's recovery will be compromised. Conversely, overtraining may lead to a level of exhaustion which depletes psychological reserves, and consequently the affected individual reports some of the mentally burdensome symptoms which characterize exercise addiction [47]. Individuals presenting with complaints relating to overuse and overtraining may benefit from being asked a few brief questions concerning their exercise habits, even (perhaps especially) if they are not high-level athletes; key issues to address are summarized below.

Practical implications

While research into exercise addiction is in an early stage, and clinical approaches are in their infancy, it is still possible to make a number of statements, based on the literature, which may be useful to clinicians who confront suspected cases. The following indicators may be cause to ask more specifically about exercise habits, employ a simple screening tool, such as the Exercise Dependence Scale, or consider referral to a psychiatrist or psychologist:

- The individual reports a strict exercise regime that they do not (or very rarely) deviate from.
- Exercise patterns and volume are not, or only slightly, reduced by illness or injury.
- Exercise is not enjoyed or pursued with passion, but “must” be done.
- Symptoms of depression, anxiety or disordered eating are present, or have been in the patient’s history.
- The individual has unrealistic goals for, and/or expectations of, themselves.
- Factors such as participation in professional sports or competition do not adequately explain the exercise behavior and symptoms experienced.

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