



## Drug, nicotine, and alcohol use among exercisers: Does substance addiction co-occur with exercise addiction? ☆, ☆ ☆



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### ABSTRACT

**Background:** Scholastic works suggest that those at risk for exercise addiction are also often addicted to illicit drugs, nicotine, and/or alcohol, but empirical evidence is lacking.

**Aims:** The aim of the present work was to examine the co-occurrence of illicit drug, nicotine, and alcohol use frequency (prevalence of users) and severity (level of problem in users) among exercisers classified at three levels of risk for exercise addiction: (i) asymptomatic, (ii) symptomatic, and (iii) at-risk.

**Methods:** A sample of 538 regular exercisers were surveyed via the Qualtrics research platform. They completed the (i) Drug Use Disorder Identification Test, (ii) Fagerström Test for Nicotine Dependence, (iii) Alcohol Use Disorder Identification Test, and (iv) Exercise Addiction Inventory.

**Results:** A large proportion ( $n = 59$ ; 10.97%) of the sample was found to be at risk for exercise addiction. The proportion of drug and alcohol users among these participants did not differ from the rest of the sample. However, the incidence of nicotine consumption was lowest among them. The severity of problematic substance use did not differ across the groups.

**Conclusions:** These findings suggest that substance addiction and the risk for exercise addiction are unrelated. In fact, those at risk for exercise addiction exhibited the healthiest profile related to the prevalence of smoking.

Exercise addiction is described as a psychological dysfunction in which the exercising individual loses control over the exercise behaviour; acts compulsively, exhibits dependence, and experiences negative life consequences (Szabo, Griffiths, & Demetrovics, 2016). At this time, diagnosed cases of exercise addiction do not exist, because there are no official diagnostic criteria for it. Although often classified as a behavioural addiction (Egorov & Szabo, 2013), the DSM-5 in its subsection of “Non-substance-related disorders” in the category of “Substance-related and Addictive Disorders” only includes “gambling disorder” as a form of behavioural addiction (American Psychiatric Association, 2013). Scholars working in the area of exercise addiction have typically adapted the DSM criteria for substance dependence (Hausenblas & Downs, 2002a, b), or use the components model of addictions (Griffiths, 2005) as the theoretical underpinning for their work. The components model of addiction comprises six criteria which are claimed to be present in all substance and behavioural addictions (Griffiths, 2005). The Exercise Addiction Inventory (Terry, Szabo, &

Griffiths, 2004), a scale for assessing exercise addiction, was conceptualized on the basis of the components model.

Co-occurrence of addictions is supported by many studies (Cook, 1987) indicating that those who are addicted to one behaviour or substance tend to be addicted to several behaviours or substances at the same time (Di Nicola et al., 2015; Konkoly Thege, Hodgins, & Wild, 2016; Sussman et al., 2014). It has been reported that exercise addiction might co-occur with other behavioural addictions, such as compulsive buying (Lejoyeux, Avril, Richoux, Embouazza, & Nivoli, 2008; Müller, Loeber, Söchtig, Te Wildt, & De Zwaan, 2015; Villella et al., 2011). In two empirical studies (Müller et al., 2015; Villella et al., 2011) an association was made on the basis of statistically significant positive correlations between the two behavioural addictions, which in the former emerged to be stronger in women than in men, but still yielding only about 15% of shared variance, while in the latter its value was low  $\rho = 0.14$ . In the study by Villella et al. (2011) examining 2853 young participants (aged 13–20 years) also reported statistically significant

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correlations between the risk for exercise addiction and internet addiction, pathological gambling, and work addiction. However, the values of these correlations ranged between  $\rho = 0.21$  and  $\rho = 0.26$  indicating a low proportion of shared variance between the measures. Instead of correlations, Lejoyeux et al. (2008) demonstrated that the rate of those affected by compulsive buying was higher among exercisers classified to be at-risk for exercise addiction (63%) than in those who were not at-risk (38%). However, the prevalence of exercise addiction was very high in this study (42%), which sheds doubt on the assessment tool used to diagnose exercise addiction. Further, in a later study, the authors failed to replicate their earlier findings on the relationship between the risk for exercise addiction and compulsive buying (Lejoyeux, Guillot, Chalvin, Petit, & Lequen, 2012).

It is generally agreed by those in the exercise addiction field that up to about 3% of the exercising population may be risk for exercise addiction (Mónok et al., 2012), but the rate can be higher, perhaps because of interpretation issues, in elite athletes (Szabo, Griffiths, de la Vega, Mervó, & Demetrovics, 2015). Hausenblas and Downs (2002a) found no differences in addiction scores for age, gender, or type of exercise. This was also replicated in a recent study (Mayolas-Pi et al., 2017). Furthermore, the prevalence rate does not appear to differ between team and individual exercises (Lichtenstein, Larsen, Christiansen, Støvring, & Bredahl, 2014). However, Griffiths et al. (2015) suggest that cultural and gender differences may affect the results of these studies. Furthermore, exercise frequency is strongly associated with the risk for exercise addiction (Terry et al., 2004).

The risk for exercise addiction has also been studied in relation to co-occurrence with substance addictions. A study with undergraduates reported that the risk for exercise addiction was significantly related to drinking alcohol and alcohol-related problems (Martin, Martens, Serrao, & Rocha, 2008). However, the findings were based on statistically significant but rather meaningless correlations accounting for < 5% shared variance between the risk for exercise addictions and alcohol use and related problems. Furthermore, the authors showed that only three out of the eight subscales assessing the risk for exercise addiction were consistently related alcohol use and related problems. Another correlational investigation reported negative findings concerning the association between the risk for exercise addiction and alcohol use disorder (Müller et al., 2015). This finding was also confirmed by Lejoyeux et al. (2008) who reported that there was no difference in the prevalence of alcohol consumption between those at-risk and not at-risk for exercise addiction. This was further confirmed in later research in which, however, the severity of the reliance on alcohol was greater in the former group as compared to the latter (Lejoyeux et al., 2012). This finding is important because it highlights that both the frequency of use (prevalence) and severity (level of problem in users) aspects of substance use need to be evaluated when investigating the co-occurrence of various addictions. With regard to co-occurrence of the risk for exercise addiction and nicotine use, Lejoyeux et al. (2008) found that nicotine dependence did not differ in those at-risk and at no risk for exercise addiction, but the cigarette smokers in the former group smoked less than those in the latter group. In the later study, the authors confirmed their earlier findings. However, the prevalence of users and non-users was not reported.

To the best of these authors' knowledge, the association between the level of risk for exercise addiction and illicit drug use has not been studied to date. However, exercisers who use stimulants for performance enhancement might become hooked on them (Freimuth, Moniz, & Kim, 2011). Based on a comprehensive systematic review, Sussman, Lisha, and Griffiths (2011) reported that 15% of those at-risk for exercise addiction may have co-occurring drug, nicotine, and alcohol addictions. In their review, the authors did not locate any study with a sample size of at least 500 participants that found co-occurrence of the risk for exercise addiction with other addictions. Consequently, they urged further research in this area.

Considering that research investigating the co-occurrence between

the risk for exercise addiction and substance addictions (i) is often correlational in nature, (ii) examines limited substances, and (iii) typically examines only one dimension (i.e., prevalence, or severity), as well as the lack of research examining the association between exercise and illicit drug use, the present study was designed to address these gaps in the literature. Therefore, the current work examines both the frequency (prevalence) and the severity (level of problem in users) of three groups of chemical substances that are potentially addictive (i.e., illicit drugs, nicotine, and alcohol) in a heterogeneous group of regular exercisers grouped a posteriori on the basis of their level of risk for exercise addiction as: (i) asymptomatic, (ii) symptomatic, and (iii) at risk for exercise addiction. Based on the findings from past research and reviews, this cross-sectional study examines Sussman et al.'s (2011) hypothesis that: "... 15% of exercise addicts are also addicted to smoking, alcohol, or illicit drugs..." (p. 12).

## 1. Method

### 1.1. Participants

The research was conducted with ethical approval obtained from a large university's Research Ethics Committee of the Faculty of Education and Psychology at ELTE Eötvös Loránd University. Participants were recruited from various English social media by targeting groups interested in topics connected to sports, exercise and/or physical activities where interested readers were directed to an online survey ran with the Qualtrics software (Qualtrics, 2017). The criteria for participation included: participation in regular sports or exercise, the form of which was specifically named, the participant was aged 18 years or over, and that she or he consented to participation. Within a three-month interval, 538 participants meeting these criteria completed fully the online survey. The age of the participants ranged from 18 to 72 years and the average age was 27.45 years (SD = 8.21). They reported taking part in 42 different types of exercise, with a mean frequency of 3.65 occasions per week (SD = 2.50), for an average of 1.24 h each time (SD = 0.87). There were more female (n = 348; 64.7%) than male (n = 190; 35.3%) participants in the sample and the majority of them participated in individual sports (n = 428; 79.6%). The sample was divided in three groups based on their level of risk for exercise addiction (see Materials section below): (i) "asymptomatic" (n = 39), (ii) "symptomatic" (n = 440), and (iii) "at-risk" (n = 59).

### 1.2. Materials

A demographics questionnaire was used to collect data concerning age, gender, type of sport, frequency of exercise, and duration of exercise. The Exercise Addiction Inventory (EAI; Terry et al., 2004) was used to assess the level of risk for exercise addiction. This scale is based on the components model of addiction (Griffiths, 2005) and assesses six common symptoms of addiction: salience, conflict, mood modification, tolerance, withdrawal symptoms, and relapse on a 5-point Likert scale ranging from: 1 = "strongly disagree" to 5 = "strongly agree" (with total scores of between 6 and 30). Risk levels for exercise addiction are: 6–12 = asymptomatic, 13–23 symptomatic, and 24 or above = at-risk. The scale has good psychometric properties (Terry et al., 2004), and the internal consistency (Cronbach  $\alpha$ ) in the current sample was acceptable ( $\alpha = 0.71$ ).

The Drug Use Disorders Identification Test (DUDIT; Berman, Bergman, Palmstierna, & Schlyter, 2003; Hildebrand & Noteborn, 2015) was used to determine the risk level of drug consumption in those participants who admitted using leisure drugs during the past year, and also identified by its name(s) the drug(s) that they have used. The DUDIT is an 11-item scale. Total scores range between 0 and 44 and the higher scores reflect greater drug-related problems. The cut-off score for drug-related problems is 2 for women and 6 for men, while a score of 25 or above is an index of drug dependence for both genders (Berman

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