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Original Research

Prevalence of Exercise Dependence Among High-Intensity Functional Training Practitioners: A Cross-Sectional Analysis

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Abstract

International Journal of Exercise Science 18(4): 206-214, 2025. https://doi.org/10.70252/SRJK8708 The objective was to explore the prevalence of exercise dependence (ED) risk among regular HIFT exercisers. Secondary objectives include exploring the prevalence of injuries within this population and examining the potential association between ED risk and injury prevalence. This cross-sectional study was conducted in a city in southern Brazil and included HIFT practitioners. ED was evaluated using the Exercise Dependence Scale-Revised (EDS-R). The primary outcome was the prevalence of ED risk. The final analysis included 64 HIFT practitioners, of whom the majority were female (n = 35; 54.7%). The mean EDS-R score was 67.6 ± 14.7. A weak positive correlation was found between the duration of HIFT practice (r = 0.312) and weekly training frequency (r = 0.442) with EDS-R scores. Categorically, 25.0% (n = 16) of participants were classified as being at risk for ED, 60.9% (n = 39) as symptomatic non-dependent, and 14.1% (n = 9) as asymptomatic non-dependent. The prevalence of injuries among participants was 32.8% (n = 21). The mean EDS-R score was 71.0 ± 14.4 for participants with a history of injury and 65.9 ± 14.7 for those without a history of injury. The effect size, measured by Cohen's d, was 0.35 (95% CI: -0.19 to 0.89), indicating no significant difference between the two groups. A high prevalence of ED was observed among HIFT practitioners. Raising awareness of the risk of developing this pathological behavior may help in detection of symptoms and the implementation of preventive and interventional strategies.

Keywords: Addiction, injury, physical activity

Introduction

Physical inactivity and a sedentary lifestyle pose significant public health challenges, prompting the World Health Organization (WHO) to set a goal of reducing sedentary behavior by 30% by 2030.[1] For adults aged 18 to 64, the WHO recommends engaging in at least 150 minutes of moderate-intensity physical activity or 75 minutes of vigorous-intensity activity per week, along with muscle-strengthening activities involving major muscle groups on two or more days a week.[2] However, these guidelines do not establish upper limits for the intensity, frequency, or duration of physical activity, which is an important consideration. While insufficient physical activity is a well-recognized concern,[3,4] excessive exercise can also lead to health issues, including exercise dependence (ED).[5] ED, sometimes referred to as a "positive" addiction due to

the benefits of regular physical activity, can nevertheless have detrimental effects when taken to extremes.[6,7] It is characterized by an uncontrollable urge to engage in physical activity, often leading to physiological and psychological distress when exercise is not possible.[8] Szabo et al[9] defined ED as "a morbid pattern of behavior in which the habitually exercising individual loses control over their exercise habits, acts compulsively, and experiences negative consequences for their health, as well as their social and professional life." Although ED is not formally classified as a mental health disorder, it shares many negative social and emotional health impacts similar to those observed in substance use disorders.[10] ED can lead to adverse outcomes such as injuries from overtraining, distress when unable to exercise, compulsivity, loss of control, and conflicts with family, social, and occupational activities.[11-13]

High-Intensity Functional Training (HIFT) has rapidly gained popularity as a multifaceted physical activity practice, known not only as a fitness philosophy but also as a competitive aerobic sport. It integrates various elements, including high-intensity interval training, weightlifting, plyometric and gymnastic exercises, as well as indoor rowing and running.[14,15] HIFT training is designed to be inclusive, accommodating individuals of all fitness levels, from beginners to advanced athletes, who train together.[16] This inclusive approach fosters a socially competitive and supportive environment where participants are encouraged to seek recognition for their progress and performance within the group. However, the intense, performance-driven nature of HIFT has generated concerns that participants may be at an elevated risk of developing exercise dependence (ED) compared to those in other sports. Despite growing interest in this issue, few studies have specifically examined ED prevalence among HIFT practitioners.[14,15,17] These concerns are rooted in the rigorous training environment and the constant push for peak performance that typify HIFT. In fact, data from two studies[15,17] focused on HIFT indicate that approximately 19% of these athletes may be at risk for ED—an incidence higher than what is typically observed in the general population. Additionally, the literature on the prevalence of injuries among HIFT practitioners is highly variable,[18-21] and no study has yet explored the potential relationship between the prevalence of injuries and ED. Given the limited research in this area and the need to establish a foundational understanding, this study adopts an exploratory approach. Thus, the primary objective of this study is to explore the prevalence of ED risk among regular HIFT exercisers. Secondary objectives include exploring the prevalence of injuries within this population and examining the potential association between ED risk and injury prevalence.

Methods

Participants

This study employed a cross-sectional survey conducted among regular HIFT exercisers from two gyms in Porto Alegre, Brazil. Eligible participants were individuals aged 18 years or older who had been practicing HIFT for at least six months. Participants were excluded if they declined to participate or did not complete the entire Exercise Dependence Scale. This study protocol was previously approved by the Committee of Research Ethics of La Salle University and is aligned with the ethical polices of this journal.[22] Informed consent was obtained from all

participants. Participants were invited to complete the questionnaires in person after their HIFT training sessions.

Protocol

Sociodemographic and Exercise Practice Questionnaires.

This section gathered information on participants' age, sex, reported height and weight, duration of HIFT practice, weekly training frequency, and session duration. It also included questions about injuries, such as occurrence ("Have you ever experienced a musculoskeletal injury related to HIFT practice that was severe enough to cause any restriction or interruption of your training for at least 7 days?"), type, location, treatment, time off from physical activity, recurrence, and self-perception of health. Before administering the survey, we asked participants how long they had been practicing HIFT, and only those who reported at least 6 months of practice were given the questionnaire.

In this study, injuries were defined as any complaints or physical manifestations reported by a participant that were directly attributable to HIFT and were severe enough to necessitate at least seven days of rest from physical activity. Recurrence was defined as the reappearance of an injury of the same type and location after the participant had resumed training.

The Exercise Dependence Scale-Revised (EDS-R), developed by Downs et al,[23] is based on the criteria for dependence disorders, both substance-related and non-substance-related. The EDS-R was translated and adapted for the Brazilian context by Vasconcelos and Alchieri.[24] It is administered using a Likert scale ranging from 1 (Never) to 5 (Always). The scale consists of 21 items, distributed across seven factors, with three items per factor: Tolerance: Refers to the individual's need to increase exercise intensity or duration to achieve the same effect ("I usually increase the duration of my exercises to achieve the desired effects"); Avoidance of Withdrawal Symptoms: Indicates exercising to prevent irritability and/or anxiety ("I exercise to avoid becoming irritated"); Intentionality: Relates to engaging in more exercise than originally planned ("I exercise more than I expected"); Lack of Control: Defined by the inability to reduce exercise volume despite a desire to do so ("I always have to maintain the amount of time I spend exercising"); Time: Represents the significant amount of time dedicated to exercise ("I spend a lot of time exercising"); Reduction in Other Activities: Refers to a decrease in social, occupational, or leisure activities due to exercising ("I choose to exercise rather than spend time with family/friends"); Continuity: Indicates the persistence of exercise even when it is contraindicated ("I exercise even with recurring injuries").[25]

The total EDS-R score is interpreted as a continuous variable, with a minimum score of 21 and a maximum of 105, where higher scores indicate a greater prevalence of exercise dependence symptoms. Participants can also be categorized into three groups based on their scores: At Risk for Exercise Dependence: Participants with average scores above 4 on at least three of the seven factors; Symptomatic Non-Dependent: Participants who score between 3 and 4 on at least three factors or have a mix of scores between 3 and above 4, provided they do not meet the criteria for being at risk for exercise dependence; Asymptomatic Non-Dependent: Participants with

average scores below 3 on at least three factors, provided they do not meet the criteria for the other two categories.

The primary outcome of this study was the prevalence of risk for ED, while the secondary outcome was the prevalence of injuries associated with HIFT practice.

The survey was administered in a paper-based format and, on average, participants required approximately 20 minutes to complete it.

Statistical Analysis

Continuous variables were presented as means ± standard deviation (SD) or as medians with interquartile ranges (IQR), depending on the data distribution. Categorical variables were described using absolute numbers and percentages. For comparisons of continuous variables, we first assessed data distribution using the Shapiro–Wilk test. If the data were normally distributed, we applied the Student's t-test to compare EDS-R scores between sexes, as well as age, BMI, and weekly frequency of training sessions between participants with and without exercise dependence (ED). For non-normally distributed data, we used the Mann–Whitney U test to compare practice duration and training duration between participants with and without ED. For categorical variables, we employed the chi-square test to examine differences in sex distribution, prevalence of injury, and self-perception of health status between participants with and without ED. To explore associations between two continuous variables, we used Pearson's correlation coefficient when both variables were normally distributed, such as age and EDS-R scores or weekly frequency of training sessions and EDS-R scores. For associations involving non-normally distributed data, such as practice duration and EDS-R scores, we used Spearman's correlation coefficient.

A logistic regression model was constructed to explore the relationship between participant characteristics and the risk of exercise dependence (ED). Variables considered biologically plausible predictors of the outcome, including age, sex, and duration of HIFT practice, were selected a priori for inclusion in the model.

Effect sizes were calculated to assess the practical significance of the findings. Cohen's d was used to interpret differences between groups, where values of 0.2, 0.5, and 0.8 are typically considered to represent small, medium, and large effects, respectively.

We did not perform an a priori power analysis due to the exploratory nature of this study and the lack of robust preliminary data on the specific prevalence of exercise dependence among HIFT practitioners, which limited our ability to accurately estimate the required sample size. All statistical analyses were conducted using SPSS software, version 20.0.

Results

Eighty HIFT practitioners were initially included in the study, but 16 were excluded for the following reasons: being under 18 years old (n = 1), practicing HIFT for less than 6 months (*n* =

11), and incomplete EDS-R responses (n = 4). Consequently, 64 participants were included in the final analysis. The average age (Shapiro-Wilk 0.988; p-value 0.775) of the participants was 34.7 ± 7.5 years. On average, participants reported practicing HIFT (Shapiro-Wilk 0.840; p-value < 0.001) for 36.0 months (IQR: 12.0 - 57.0) and engaged in activities 5.0 ± 1.1 days per week (Shapiro-Wilk 0.982; p-value 0.492). The majority of the participants were female (n = 35; 54.7%).

Table 1. Characteristics of HIFT practitioners according to the presence of exercise dependence.

Variables	Without ED (n = 48)	With ED (n = 16)	Cohen's d	CI 95%
Age, years	34.8 ± 6.8	34.4 ± 9.7	-0.06	-0.63-0.51
Sex, female	28 (58.3)	9 (43.8)		
BMI	25.3 ± 3.4	26.6 ± 3.2	0.37	-0.20-0.95
Practice duration, months	30.0 (12.0 - 48.0)	36.0 (12.0 - 105.0)	0.73	0.13-1.32
Weekly frequency, days	4.8 ± 1.1	5.6 ± 0.8	0.77	0.17-1.36
Training duration, hours	1.0 (1.0 - 1.0)	1.0 (1.0 - 1.0)	0.24	-0.32-0.82
History of injury	13 (27.1)	8 (50.0)		
Self-perception of health status				
Excellent	11 (22.9)	11 (68.8)		
Very good	23 (47.9)	3 (18.8)		
Good	14 (29.2)	2 (12.5)		

ED, exercise dependence; BMI, body mass index. Categorical variables presented in n (%). Continuous variables presented as mean ± standard deviation or median (interquartile range).

The overall EDS-R score (Shapiro-Wilk 0.982; p-value 0.494) was 67.6 ± 14.7. There were no significant differences in EDS-R scores between female and male participants (females: 66.1 ± 15.7; males: 69.4 ± 13.4; Cohen's d = 0.22; CI 95% -0.28, 0.72). Additionally, no significant correlation was found between participants' age and their EDS-R scores (r = 0.043; CI 95% -0.21, 0.29). However, a weak positive correlation was observed between the duration of HIFT practice and EDS-R scores (r = 0.312; CI 95% 0.07, 0.52), as well as between the weekly frequency of HIFT sessions and EDS-R scores (r = 0.442; CI 95% 0.22, 0.62).

In the categorical assessment, 25.0% (n = 16) of the participants were classified as being at risk for ED, 60.9% (n = 39) were classified as symptomatic non-dependent, and 14.1% (n = 9) were classified as asymptomatic non-dependent. Table 1 provides a detailed breakdown of the sample characteristics based on ED risk. It was notable that 68.8% of participants at risk for ED rated their health status as excellent, whereas only 22.9% of participants without ED risk considered their health status to be excellent.

In the logistic regression model, adjusted for age and sex, the length of time practicing HIFT was significantly associated with an increased risk of ED (OR 1.021; 95% CI 1.003 - 1.039).

The prevalence of injury among participants was 32.8% (n = 21). Muscle injuries were the most commonly reported injury type (n = 14; 21.9%), followed by joint pain (n = 6; 9.4%), sprains (n = 4; 6.3%), and dislocations (n = 2; 3.1%). The lower back (n = 7; 10.9%) and shoulder (n = 6; 9.4%) were the most frequently affected body regions. The mean EDS-R score was 71.0 ± 14.4 for participants with a history of injury and 65.9 ± 14.7 for those without a history of injury. The effect size, measured by Cohen's d, was 0.35 (95% CI: -0.19 to 0.89), indicating no significant difference between the two groups.

Discussion

This exploratory study aimed to examine the prevalence of ED risk among regular HIFT exercisers, explore the prevalence of injuries within this population, and investigate the potential association between ED risk and injury occurrence. Our findings indicate that 25.0% of participants were at risk for ED, with those exercising more frequently and for longer durations tending to show higher ED risk. The prevalence of injury among participants was 32.8%, but no notable differences were observed between ED risk and injury prevalence.

The prevalence of ED observed in our sample of regular HIFT exercisers is relatively high compared to findings from prior studies using validated instruments. A systematic review of 34 studies reported ED prevalence ranging from 0.3% to 42%, with the highest estimates—42% among regular exercisers and 29.6% in the general population—originating from studies that did not employ validated questionnaires.[26] In contrast, studies using validated tools typically found ED prevalence rates between 3% and 7%. Among HIFT practitioners, three other studies have investigated exercise dependence or addiction, reporting prevalence rates ranging from 5.0% to 19.8%.[14,15,17] Concerns have been raised that this group may have a higher prevalence of ED due to their intense dedication to exercise and persistent focus on peak performance.[17] Indeed, with the exception of the study by Lichtenstein and Jensen,[14] which found only a 5.0% prevalence of exercise addiction among HIFT practitioners in Denmark, the other studies,[15,17] including our own, have reported a higher prevalence of ED compared to regular practitioners of other physical activities.[26] The discrepancy in results, particularly in the study by Lichtenstein and Jensen,[14] may be attributed to the use of different assessment tools—the Exercise Addiction Inventory was used in their study, rather than the EDS-R. Additionally, variations in sample size, cultural differences, and study location (Lichtenstein and Jensen's study included participants from rural areas) may also account for the differences in prevalence rates observed across these studies.

Our findings align with previous studies that suggest a correlation between high-frequency exercise and years of practice with the development of ED.[17,27-29] A study by Kostorz et al[30] analyzing martial arts and combat sports practitioners found that individuals with more than five years of experience scored higher on the "time" factor of the ED scale. Additionally, in a study by Wågan et al[29] involving gym users, a greater number of weekly exercise hours was associated with higher ED scale scores, with those exercising more than nine hours per week

showing significantly higher ED scores. These studies suggest that increasing the number of days and hours dedicated to exercise is associated with a higher risk of ED. These findings highlight the importance of monitoring exercise behavior, particularly among individuals aiming to increase their activity levels. Researchers and practitioners should consider strategies to promote balanced exercise habits, including education on the risks of overtraining and fostering a healthy relationship with exercise. Moreover, fitness professionals should establish interdisciplinary networks, including licensed psychologists and physicians. This collaboration is vital to ensure that individuals showing potential signs of ED can be referred for appropriate evaluation and treatment when their needs exceed the scope of practice of fitness professionals.

Regarding the prevalence of injuries, the independent samples t-test comparing ED scores between participants with and without a history of injury showed no statistically significant difference between the groups. However, the effect size, measured by Cohen's *d*, was 0.35, indicating a small to moderate effect size. This suggests that, despite the lack of statistical significance, the observed trend may still have clinical or practical importance. This finding underscores the potential value of further research with larger sample sizes to more accurately explore the relationship between injury history and ED. The injury prevalence in our study (32.8%), as well as the most commonly affected locations (lumbar region and shoulder), were consistent with those reported in previous studies.[18-21]

An interesting finding was the association between ED and self-perceived excellent health. Previous research has shown that health perception can change as individuals regularly engage in HIFT.[31] Similar to how practitioners with ED may underestimate the severity of injuries and neglect necessary recovery periods, our data suggest that these individuals may also overestimate their overall health status. This overestimation could stem from psychological mechanisms, such as a heightened focus on physical fitness as a proxy for overall health, potentially overshadowing other health dimensions like mental well-being or injury prevention. Practitioners should be aware of these tendencies and encourage a holistic view of health that includes both physical and mental dimensions.

This study has several limitations. First, the scale used is a screening tool designed to identify individuals at risk for ED rather than providing a definitive diagnosis. The cross-sectional design is another limitation, as it does not allow for the investigation of causal relationships between variables. Additionally, the fact that data were collected from only two gyms in one region of a single country significantly restricts the generalizability of the findings to other populations. Furthermore, we did not assess eating disorders, despite the well-documented association between eating disorders and ED. Finally, a post-hoc power analysis revealed that the achieved statistical power for the comparison between groups was 25.4% (Cohen's $d = 0.35$). To achieve a power of 80% and 90% in future studies, approximately 197 and 263 participants per group, respectively, would be required.

We identified a high prevalence of ED among regular HIFT exercisers, contributing to the expansion of current knowledge about ED, particularly in this specific population. Raising awareness about the risk of developing this pathological behavior among practitioners can

facilitate early detection of symptoms and support the implementation of effective preventive and interventional measures.

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