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REVIEW ARTICLE

Overview of Exercise Addiction - Early Detection for Early Intervention

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ABSTRACT

Exercise has been proven to have many significant positive physical, mental and social effects. It makes our body healthier, reduces stress levels and improves relationships with others. However, not much is known about the negative effects of exercise as the benefits of exercise are more visible. In excess, some people who could develop one of the substantial negative effects of exercise called exercise addiction. The complications of exercise addiction can be seen in the form of injuries, stress, anxiety and social relationship problems. Early detection of a person with high risk of exercise addiction can prevent its complications by instituting an early intervention. This review aims to examine the available literature on exercise addiction as well as to elicit available psychometric tools that can be used to detect exercise addiction.

INTRODUCTION

Similar to many other developing countries, there has been an increase in awareness among Malaysians of the importance of a healthy lifestyle, due to the heavy promotion of its benefits. In WHO's Global Action Plan (2018) for physical activity, a minimum of 150 minutes of moderate-intensity exercise or 75 minutes of high-intensity exercise per week is recommended for adults aged 18 to 64 years in order to maintain physical and mental health. As a result, exercise has emerged as a popular and even trendy pastime. The National Health and Morbidity Survey (NHMS) 2019 showed a steep increase in physical activity among the Malaysian population, to 74.9% from 64.3% in 2011 and 64.5% in 2015. Nik Nasir et al. (2022) showed that the prevalence of active Malaysians was 66%. Many Malaysians devote much of their time to exercise, and some, to the point of addiction.

An electronic search of available literature was conducted using ResearchGate, Google Scholar and Scopus. The following keywords were used: Exercise, Addiction, Dependency and Screening from year 1994 to 2023 for the available literature on exercise addiction. Further searches for psychometric exercise addiction screening tools were made using the keywords X, Y and Z. A total of 132 articles were found. Thirty-two articles were included and synthesized in this review.

Exercise Addiction and its Complications

American Psychiatric Association (APA) (2022) defines addiction as a biopsychosocial disorder characterized by a state of psychological and/or physical dependence on a persistent and intense urge to use a drug or engage in behavior that produces natural reward, despite substantial harm and other negative consequences. Exercise is a repetitive behavior and it may develop into an addiction. People exercise for a healthy lifestyle, but may then find themselves unable to stop, even though their exercising has caused injury and disruption to their social lives, leading to psychological problems. This is a manifestation of exercise addiction. Exercise and sports can positively impact physical and mental health, but only when performed in moderation.

The rewarding effect of exercise can increase the intention effect. Satisfaction and pleasure-seeking can cause a person to do more than intended (Dishman & O'Connor, 2009). This can lead to over-exercising, thereby using time that was supposed to be used for other things. Consequently, it may result in a lack of self-control. Unable to reduce the amount of stimulation required to achieve satisfaction, the addict will develop a persistent craving or be unable to cut down or control the amount and intensity of the exercise.

The outcome of addiction can be evaluated in its influence on time and other social activities. Time will be prioritized for exercise by sacrificing or ignoring other needs. A great deal of time will be spent on activities necessary to obtain the desired effect. In the context of exercise, this is shown as exercise satisfaction, at the expense of social, occupational, or recreational needs (De La Vega et al., 2016). Such behavior can lead to problems in relationships, especially with family and friends. Excessive exercise can also interrupt formal work due to the loss of concentration and fatigue. An exercise addict will continue to exercise excessively, despite knowing that it is harmful to him. Feeling unwell or sustaining injuries is not a good enough reason to stop him from continuing to exercise and in rare instances, this addiction might lead to death.

Injuries happen when people overexercise and fail to take heed of the warning signs that their bodies have reached their limits. An addict may continue to exercise despite their injuries, as seen in cases of stress fracture and joint problems among the elderly. Jones et al. (1994) stated that the risk of injury increases substantially with the amount of exercise. This is supported by Overgaard et al. (2015), with the additional finding that there is no optimal dose for exercise to prevent injury. Therefore, as a safety precaution, a person should not exercise beyond their limit and must take safety measures while exercising.

Social relationships can also be impaired by exercise addiction. A person who is addicted to exercise would devote most of their time to their exercises, thus neglecting all other activities. This could mean sacrificing their social needs to the point of jeopardizing their relationships with family and friends, their work, or their studies (Derevensky, 2019). Their thoughts would always be focused on exercise instead of their work or other, more pressing needs.

Psychologically, an exercise addict would yearn for a certain level of intensity, length of time, or frequency in their exercise to obtain satisfaction (Samadzadeh et al., 2011). Problems arise when these targets are not achieved, for example during illness or when work or family matters prevent them from exercising. Problems also occur when these desired levels are so high that they become difficult to achieve. A characteristic of exercise addiction is the satisfaction of achieving the exercise target. Therefore, when they fall short, satisfaction fails to be achieved because the addict has developed a tolerance for satiety. Consequently, this can lead to psychological problems, such as stress and anxiety.

Exercise addiction can present with or without a combination of other behavioral or mental health problems. Various studies have shown the correlation between exercise addiction and other behavioral issues or addiction to other things, such as tobacco, alcohol, illicit drugs, eating, gambling, the Internet, love, sex, work, or shopping (Szabo et al., 2017). A study by Sussman et al. (2011) showed that 15% of exercise addicts were also dependent on alcohol, cigarettes, or illegal drugs, while 25% might have other addictions. Exercise addiction also positively correlates with body dysmorphic disorder (BDD) (Trott et al., 2021). Eating disorders, for instance, are shown to correlate with exercise addiction. With the concurrence of other behavioral problems such as eating disorders, an exercise addict is likely to suffer extreme weight loss on top of poor health. A comparative metaanalysis by Levit et al., (2018) showed that the prevalence of exercise addiction among those with eating disorders was three times higher than among those without eating disorders.

Prevalence of Exercise Addiction

Obsessive passion and dedication to exercise can be considered strong predictors of exercise addiction. It can, therefore, be presumed that the prevalence of exercise addiction is different in different categories of people. A study by Szabo et al. (2015) showed that between 7% and 42% of the athletic population were exercise addicts and around 3% of non-competitive leisure exercisers were addicted to exercise. The high variation seen among athletes depends on the type of sport involved, seen higher. Lichtenstein et al. (2018) also conducted a study on the prevalence of exercise addiction in different groups of respondents. The study showed that the prevalence rate of exercise addiction among school athletes was 4%, among fitness attendees it was 8% and among people with eating disorders, the rate was 21%. Another study by Trott et al. (2021) obtained a similar finding of 5.5% among university students and 8.1% among general exercisers. In a separate study, Corazza et al. (2019) revealed a high prevalence of exercise addiction among athletes (e.g., runners, and triathletes). Furthermore, Szabo et al. (2017) showed that the prevalence of exercise addiction among regular exercisers was 10.3%. In Asia, only Korea has conducted a study to ascertain the prevalence of the high risk of addiction to exercise. A total of 15.4% out of the 408 respondents in their sample had a high risk of exercise addiction (Shin & You, 2015).

Pathophysiology of Exercise Addiction

Exercise addiction has been a subject of worldwide debate among scholars. There are no specific guidelines or criteria to diagnose exercise addiction. The American Psychiatric Association (APA) recognizes only gambling as a behavioral addiction at this moment, which is classified under 'Substance-Related and Addictive Disorders'. Although there is no clear organic substance involved in behavioral addiction, the effect is similar to the effect of substance addiction. This is pathologically explained using the reward and relief pathways, which can be seen in both behavioral addiction and substance abuse (Dishman et al., 2009).

Exercise increases the release of opiatelike substances, such as beta-endorphins. Leuenberger (2006) believed that this hormone induces happiness by creating a reward pathway in the brain and reducing pain. The person will develop a feeling that is best described as satisfaction, a state of sheer joy, euphoria, inner harmony, limitless energy, feelings of well-being, and a reduced perception of pain. From the psychological aspect, exercise relieves stress. People who use physical activity to alleviate their stress will have trouble refraining from their exercise routines. They turn to exercise to avoid their stress instead of addressing the source of the stress. Antunes et al. (2016) found that exercise addicts experienced withdrawal symptoms when they stopped exercising, especially in the form of mood changes. Additionally, it was found that their beta-endorphin levels dropped when they stopped exercising. It is this euphoria-seeking and stress-relieving behavior through exercise that can lead to addiction. The endorphins released by exercise influence the dopamine reward system in a way that is similar in effect to substances such as cocaine. Robison et al. (2018) and Paungmali et al. (2018) showed that aerobic exercise could reduce cocaine-seeking behavior. It is, therefore, suggested that exercise can allay the withdrawal effects of cocaine. This is supported by Wang et al. (2014) who showed that exercise could effectively treat substance abuse.

Screening for Exercise Addiction

Screening for warning signs is a proactive way to identify people who are at risk of addiction so that early intervention can be applied to prevent unnecessary complications. A good and validated tool that can screen psychometrically needs to be employed for early detection of the addiction. Two common screening methods have been validated and are now widely used to evaluate the risk of exercise addiction. They are the Exercise Dependence Scale 21 (EDS-21) and the Exercise Addiction Inventory (EAI). The EDS-21 has 21 items while the EAI has 6 items. The EDS-21 has been translated and validated in eleven different languages (French, Hungarian, Korean, Danish, Swedish, Italian, Spanish, Estonia, German, Chinese and Greek) (Szabo et al., 2013; Sicilia & González-Cutre, 2011; Müller et al., 2013; Shin & You, 2015; Yang et al., 2021). Both tools were developed based on the substance addiction domain in DSM IV (2000). The EDS-21 covers all domains of addiction, consisting of tolerance, withdrawal, intention effect, lack of control, time, reduction of other activities and continuance (Hausenblas & Downs, 2002). Both are accepted as tools for screening exercise dependency levels. The exercise dependency level can be used as a guide to screen for exercise addiction.

Both tools used a dependency scale that was developed based on multiple domains that can fall under substance addiction. For example, under tolerance, the person needs to increase the amount of exercise in order to achieve the desired effect. The person also needs to have more stimulation to achieve the same effect. Withdrawal is a domain that can be easily assessed and evaluated. A person with an addiction will show organic symptoms once the behavior is stopped, as found by Antunes et al. (2016). The addict will display signs resembling withdrawal symptoms, such as anxiety, fatigue and insomnia.

In EDS21, all these domains can be reflected in the 21 questions. The questions refer to current exercise beliefs and behaviors that have occurred in the past 3 months (Hausenblas & Downs, 2002). EDS-21 requires approximately 5 minutes to complete. The level of dependencies will be assessed from the analysis of the result. Responses on a Likert scale anchored at the extremes with never (1) and always (6). The total of mean score will be calculated for every domain. EDS-21 already

	Domain with mean 5 or 6 score	Domain with mean 3 or more score	Domain with mean 2 or less score
At-Risk For Exercise Dependence	3 or more domain	-	-
Nondependent-Symptomatic	Less than 3 domains	3 or more domain	-
Nondependent-Asymptomatic	Less than 3 domains	Less than 3 domains	-

Table 1: Exercise Dependence Scale 21 Scoring.

have its SPSS Syntax that can automatically compute the total and subscale mean scores. The result will be in 3 outcomes that are atrisk for exercise dependence, nondependentsymptomatic, and nondependentasymptomatic.

For EAI, it only uses 6 questions with a Likert scale to cover all the addiction domains (Terry et al., 2004). The total scores are calculated and used to reflect the level of exercise dependencies. The result is either atrisk of exercise dependencies or no exercise dependencies as shown in Table 1. The person with the result of at-risk for exercise addiction from both psychometric tools needs to be referred to an addiction specialist for further evaluation. This questionnaire is used only as a screening method and not as confirmatory. Therefore, it is preferable to use EAI as a simpler screening tool compared to EDS-21 which is more complicated.

Mónok et al. in 2012, compared both tools using a total of 474 leisure exercisers and showed a good fit in Confirmatory Factor Analysis (CFA) for both tools. The results were CFI = 0.971, TLI = 0.952, and RMSEA = 0.052 for EAI and CFI = 0.938, TLI = 0.922; RMSEA = 0.049. The correlation between the two tools was high (r = 0.79). A similar result was seen in a study by Granziol et al. in 2021 with a total of 1011 athletes showed both instruments revealed good fit in indexes, even across genders. The study also shows that EDS21 was much better than EAI as the CFAs on EAI scores showed some violations of measurement invariance across the competition level ($\Delta CFI=$ 0.03; $\Delta RMSEA = 0.02$). On the contrary, CFAs on EDS21 scores did not show invariance violations across the competition level (Δ CFI= <0.01; Δ RMSEA= < 0.01). Therefore, both tools are good psychometric tools for screening of exercise dependency but EDS21 can be consider more reliable compared to EAI.

With the availability of psychometric assessments to detect the risk of exercise addiction, we can nip the problem in the bud and address it early enough to avoid severe consequences. Treatments, such as psychotherapy and psychoeducation, can be useful to help an addict. Screening can be performed in high-risk groups, such as athletes and patients with other behavioral problems.

CONCLUSION

This narrative review shows that exercise addiction can have a negative influence on a person physical, mental, and social health. Exercise addiction was rarely heard of in the past, but with the growing number of exercise enthusiasts in Malaysia, this could become a real problem. The earlier intervention can prevent permanent problems and improve the outcome. The availability of psychometric tools can help in detecting patients with a high risk of exercise addiction. Most of the data regarding exercise addiction are from the Western population. There is no local data regarding psychometric tools for exercise addiction screening that can be explored in future studies.

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CONFLICT INTEREST

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