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# Exercise addiction: A study of eating disorder symptoms, quality of life, personality traits and attachment styles



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## ABSTRACT

Exercise addiction is characterized by excessive exercise patterns with potential negative consequences such as overuse injuries. The aim of this study was to compare eating disorder symptoms, quality of life, personality traits and attachments styles in exercisers with and without indications of exercise addiction. A case-control study with 121 exercisers was conducted. The exercisers were categorized into an addiction group ( $n=41$ ) or a control group ( $n=80$ ) on the basis of their responses to the Exercise Addiction Inventory. The participants completed the Eating Disorder Inventory 2, the Short-Form 36, the NEO Personality Inventory Revised and the Adult Attachment Scale. The addiction group scored higher on eating disorder symptoms, especially on perfectionism but not as high as eating disorder populations. The characteristic personality traits in the addiction group were high levels of excitement-seeking and achievement striving whereas scores on straightforwardness and compliance were lower than in the exercise control group. The addiction group reported more bodily pain and injuries. This study supports the hypothesis that exercise addiction is separate to an eating disorder, but shares some of the concerns of body and performance. It is driven by a striving for high goals and excitement which results in pain and injuries from overuse.

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## 1. Introduction

In the 1970s exercise addiction was considered a “positive addiction” because of its physiological and psychological benefits such as relaxation, euphoria and satisfaction (Glasser, 1976; Carmack and Martens, 1979). Later studies have focused on the phenomenon as harmful due to obsessively increasing exercise amounts, overuse injuries, interference with work and family, and inability to reduce exercise amounts (Seheult, 1995; Griffiths, 1997; Adams, 2009; Adams and Kirkby, 1998; Berczik et al., 2012).

Brown has developed a theoretical model of the concepts of behavioral addictions (Brown, 1993). It includes the components of *salience* (the activity becomes the most important thing in the person's life), *conflicts* (between the addicted person and others around), *mood modification* (a coping strategy to regulate emotions), *tolerance* (increasing amounts of the activity is required to achieve effect), *withdrawal symptoms* (unpleasant feelings occur when the activity is reduced), and *loss of control* (inability to limit

time given to the activity) (Brown, 1997). Griffiths has applied these components to behaviors such as exercise and gambling (Griffiths, 1996; Griffiths, 1997). The Exercise Addiction Inventory (EAI) (Terry et al., 2004) is based on these components and has shown good psychometric properties (Mónok et al., 2012; Terry et al., 2004; Griffiths et al., 2005; Lichtenstein et al., 2012). The EAI has found 3% being at risk of exercise addiction in a mixed sport sample of sport science students (involved in team sports) and psychology students (participating in aerobics or gym) (Terry et al., 2004). The EAI showed an exercise addiction prevalence of 6.9% in sport science students and 3.6% among exercisers in fitness centers (Szabo and Griffiths, 2007). In a general Italian student sample 8.5% were at risk of exercise addiction (Villega et al., 2011) and 5.8% in a Danish mixed sport sample (fitness and football) (Lichtenstein et al., 2012). The prevalence of exercise addiction in the general population is 0.5% based on the EAI (Mónok et al., 2012).

In the identification of exercise addiction it is important to distinguish between exercise addiction that is secondary to an eating disorder and primary exercise addiction where the exercise is an end in itself (Veale, 1987; Veale, 1995). Veale has proposed diagnostic criteria for the condition of primary exercise addiction to make it possible to establish prevention and intervention if

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exercise is continued in spite of illness and injury. But yet exercise addiction is not accepted in the diagnostic systems (Diagnostic and Statistical Manual of Mental Disorders Fifth Edition; DSM-5) (American Psychiatric Association, 2013), and it is uncertain if exercise addiction exists in the absence of an eating disorder. Bamber and colleagues found that women with both eating disorder and secondary exercise addiction had significantly higher scores on anxiety, social dysfunction, and depression than the group with primary exercise addiction and the healthy control group (Bamber et al., 2000). Further, women with primary exercise addiction did not differ from controls on indicators of psychological morbidity. These results argue against that primary exercise addiction is a pathological syndrome. Opposite to this Blaydon et al. (2002) found a high prevalence of primary exercise addiction in competing triathletes (52%) who displayed low scores on eating disorder symptoms. Psychopathology in this group was not measured, but the athletes trained excessively (more 20 h/week) though they had a wish to do less. In a student population Zmijewski and Howard (2003) found a strong association between exercise addiction and eating disorder pathology, supporting the idea of secondary exercise addiction. But a large part of the participants had symptoms of exercise addiction without disordered eating attitudes, suggesting that primary exercise addiction does exist, but again the relationship to dysfunction or distress is unclear. We wanted to contribute to this discussion by comparing eating disorder symptoms and Body Mass Index in an exercise addiction population and an exercise control group.

Physical activity is known to enhance quality of life, but excessive exercise might lead to health problems due to negative consequences of overtraining. Therefore it is relevant to investigate if distress is related to primary exercise addiction by assessing life quality parameters such as physical, social and mental functioning. The few studies that have focused on health related quality of life in exercise addiction found no significant impact on quality of life (Antunes et al., 2006; Modolo et al., 2011). But these studies used the Negative Addiction Scale (Hailey and Bailey, 1982) which was developed to estimate running addiction and has no cut-off. This instrument was applied to 17 adventure racers (Antunes et al., 2006) and to a mixed sport sample of swimmers, body builders, basketball players etc. A generic exercise addiction tool has not been used to assess the relationship between exercise addiction and quality of life parameters. Further the pain and restrictions from overuse injuries could influence on the perceived quality of life.

To explore and explain the profiles of primary exercise addiction, personality traits have been assessed. The findings differ but traits such as perfectionism (Hagan and Hausenblas, 2003), anxiety, obsessive compulsiveness, and narcissism (Spano, 2001) are associated to exercise addiction while extraversion has shown both to be elevated in exercise addiction (Hausenblas and Giacobbi, 2004) or insignificant compared to non-addicted (Mathers and Walker, 1999). Personality traits can be described by the five-factor model (Digman, 1990). This model of personality is a trait approach to the conceptualization of personality developed from factor analysis. The model can be used to predict life behavior and thereby provide information about future outcomes in terms of diagnoses and interventions (Hartman, 2006). The five factors are: Neuroticism (sensitive/nervous vs. secure/confident), Extraversion (outgoing/energetic vs. solitary/reserved), Openness (inventive/curious vs. consistent/cautious), Agreeableness (friendly/compassionate vs. cold/unkind), and Conscientiousness (efficient/organized vs. easy-going/careless). This model has been used to describe personality types of other behavioral addictions such as compulsive buying (Mueller et al., 2010) or eating disorders (MacLaren and Best, 2009) who both display high Neuroticism scores. A study of the five factor personality profiles

of pathologic gambling showed significantly decreased scores on Extraversion and Conscientiousness which was similar to obsessive compulsive disorder (Hwang et al., 2012). Knowledge of specific personality traits could be useful in the identification of risk factors for exercise addiction, but a detailed personality profile based on the five-factor model does not yet exist for exercise addiction.

Attachment patterns have been shown to influence a wide range of bio-psycho-social phenomena, including social functioning, coping and, psychological well-being, and have thus become an important aspect of health-related research (Ravitz et al., 2010). Attachment styles can be categorized as secure or insecure (pre-occupied, fearful and dismissive) (Bartholomew and Horowitz, 1991). Studies of eating disorders amongst athletes find that insecure attachment styles influence athletes' eating pathology (Shanmugam et al., 2012), but attachment styles associated with primary exercise addiction have not been investigated. If exercisers with addiction display insecure attachment styles this should be taken into account in models of risk factors of exercise addiction and in treatment interventions.

The aim of this study was to assess psychological characteristics and health-related dysfunction or distress in an exercise addiction group compared to a non-addicted exercise control group, with a focus on eating disorder symptoms, quality of life, personality traits and attachment styles. We hypothesized that both groups displayed low scores on eating disorder symptoms which could indicate that exercise addiction can appear in the absence of an eating disorder. Further, we expected that exercise addiction would be associated with health-related impairments due to overuse, and that specific personality and attachment traits would predict exercise addiction.

## 2. Method

### 2.1. Measures

This case-control study included an exercise addiction group and a non-addicted exercise control group. Participants answered an online survey with questions on age, height, weight, types of exercise performed on a regular basis, exercise frequency (hours of week) and sports injuries: have your exercise lead to an overload injury? Have your exercise lead to an acute injury? Have you had an injury which prevented you from working? (Answers no/yes). Exercise was defined as a physical activity which is planned, structured and repetitive. The respondents then answered five more online questionnaires, as described below. It took on average 60 min to complete the questionnaires, and the internet design prevented missing data. The participants were offered a gift card to a sport shop for participation (150 DKK). The data collection was completed between October 2011 and October 2012.

The Exercise Addiction Inventory (EAI) (Terry et al., 2004; Griffiths et al., 2005) was used to define exercise addiction and to categorize the exercisers in the addiction or control group. The EAI is a short screening tool consisting of six questions based upon six general components of addiction described by Griffiths (Griffiths, 1996; Griffiths, 1997). The responses are rated on a 5-point Likert scale. A sum-score is calculated (range 6–30 points), where a score  $\geq 24$  indicates exercise addiction. The Eating Disorder Inventory version 2 (EDI-2) (Garner et al., 1983; Garner, 1991) was used to screen for eating disorder symptoms. The EDI-2 is useful to identify psychological traits associated with anorexia nervosa and bulimia nervosa. The EDI-2 is valid across cultures and Danish norms exist (Clausen et al., 2009). It consists of 91 self-report items which are rated on a 6-point scale ranging from 'always' to 'never'. These responses are then transformed to values ranging from 0 to 3. The EDI comprises 11 subscales: drive for thinness, bulimia, body dissatisfaction, ineffectiveness, perfectionism, interpersonal distrust, interoceptive awareness, maturity fears, asceticism, impulse regulation and, social insecurity. The higher the scale score, the greater the manifestation of the trait.

The generic self-report Short-Form 36 (SF-36) (Ware and Sherbourne, 1992) was used to assess health-related quality of life. Self report of quality of life is found to be a good predictor of illness and wellbeing. Negative estimation of own health is related to an increased risk of development of illness and death. The SF-36 is used world-wide and has been translated in more than 50 countries (Kosinski et al., 2000; McHorney et al., 1993). It consists of 36 questions relating to 8 sub-scales distributed on two components: physical health (PCS) and mental health (MCS). The physical health sub-scales are: physical functioning (PF), role physical (RP),

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