



Emotion regulation styles as longitudinal predictors of compulsive exercise: A twelve month prospective study



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ABSTRACT

Exercise can be used as a mood regulator but, in the eating disorder literature, exercise has sometimes been found to be compulsive, detrimental to physical health, and regarded as one maladaptive strategy used to regulate emotions. This study examined longitudinal associations between emotion regulation styles and this compulsive exercise in 572 adolescents who completed measures of compulsive exercise and emotion regulation. Twelve months later they completed measures of compulsive exercise. Compulsive exercise was predicted by Internal Dysfunctional emotion regulation in girls and boys, even after controlling for initial levels of compulsive exercise. Adolescents displaying compulsivity to exercise may require intervention programmes to alter their emotion regulation strategies.

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Exercise is a positive behaviour for all ages, which can provide many benefits, such as mood enhancement and alleviation of anxiety (e.g., [Salmon, 2001](#)). However, for a small percentage of people, exercise can be performed compulsively. Specifically, compulsive exercise is commonly seen in clinical eating disorder patients, and is characterised by a driven urge to exercise, often despite physical injury or illness, and usually performed in a routine-like fashion ([Meyer, Taranis, Goodwin, & Haycraft, 2011](#)). Further to this description, compulsive exercise has been associated with affect regulation in clinical samples ([Bratland-Sanda et al., 2010](#)), which is in line with the generally accepted view of exercise as a functional emotion regulation strategy (e.g., [Thayer, Newman, & McLain, 1994](#)). Indeed, exercise is largely a positive behaviour with widely known psychological and physical benefits, and such exercising within the eating disorder population could also be regarded as functional, as it could potentially alleviate stress ([Hausenblas, Cook, & Chittester, 2008](#)). However, exercise behaviour seen in individuals with eating disorders can often become compulsively motivated ([Davis et al., 1997](#)) and, as such, it poses a significant physical and psychological risk ([Meyer et al., 2011](#)).

[Meyer et al. \(2011\)](#) developed a cognitive behavioural model of compulsive exercise, stipulating several psychological maintaining factors, including eating disorder psychopathology, rigidity, obsessive-compulsiveness, and emotion regulation. The emotion regulation maintenance factor was further separated out into positive and negative reinforcement. Meyer and colleagues noted that an individual who is exercising regularly may continue to do so through the positive reinforcement that they receive from performing exercise (i.e., the positive reinforcement may result from a sense of achievement, a sense of well-being, or the social aspects of exercising, amongst other things). This positive motivator is a common factor in continuing exercise behaviour in the general population ([Biddle, Fox, & Boutcher, 2000](#)). In addition, the model suggested that

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compulsive exercise may be maintained by a process of negative reinforcement, whereby the individual continues to exercise as a result of the removal of aversive stimuli, such as negative emotions. This suggestion is supported by the extant literature highlighting the anxiolytic properties of exercise (e.g., [Biddle et al., 2000](#)).

This process of positive and negative reinforcement motivating the individual to exercise is not on its own problematic, as it is a mechanism that would apply to any behaviour (e.g., [Ferster & Skinner, 1957](#)). However, it is arguably a problem when the individual anticipates the negative reinforcement prior to performing the exercise and, as such, begins to use it as an avoidant coping strategy; in other words, they begin to exercise as a way of avoiding the aversive stimuli (e.g., anxiety) prior to the stimuli even being present. This experiential avoidance of a negative emotion has been regarded as a dysfunctional emotion regulating strategy, which paradoxically could actually lead to a subsequent increase in the negative emotions that are trying to be avoided, as it prevents the individual from learning that the emotion will dissipate gradually by itself (e.g., [Kashdan, Barrios, Forsyth, & Steger, 2006](#)). This process then leads the individual to maintain a compulsive drive to exercise because they fear what may happen if they were to stop exercising ([Meyer et al., 2011](#)).

This suggestion of compulsive exercise being regarded as a maladaptive coping strategy is arguably but one thread in a complex chain of maladaptive behaviours that some adolescents might manifest. The suggestion that compulsive exercise occurs in response to negative affect has been proposed by other research in clinical (e.g., [Penas-Lledo, Vaz Leal, & Waller, 2002](#)) and non-clinical samples (e.g., [De Young & Anderson, 2010](#)). Compulsive exercise has also been directly associated with an avoidance of negative affect ([Meyer & Taranis, 2007](#)), and such avoidance is widely linked with psychological distress, health problems and psychiatric symptomatology ([Endler & Parker, 1990](#)), including eating disorder psychopathology (e.g., [Ghaderi & Scott, 2000](#)).

A recent cross-sectional study of compulsive exercise in adolescents found that compulsive exercise was associated with emotion regulation styles ([Goodwin, Haycraft, & Meyer, 2012](#)). However, it is unknown whether these particular styles can actually lead to the future development of compulsive exercise. Therefore, prospective designs are required to inform prevention strategies for compulsive exercise, which is particularly relevant in this adolescent age group, given that the typical age of onset of eating disorders is in adolescence ([Striegel-Moore & Bulik, 2007](#)).

In summary, emotion regulation has been previously associated with exercise behaviour. However, exercise behaviour can become compulsive in nature, particularly if it is being primarily motivated by a dysfunctional emotion regulation strategy (e.g., avoidance). It remains unclear whether emotion regulation styles predict compulsive exercise over time and therefore, whether or not they play a role in the development of compulsive exercise. Therefore, this study aims to build upon the initial work of [Goodwin et al. \(2012\)](#) and to identify whether there is a specific longitudinal association between emotion regulation styles and compulsive exercise. It is hypothesised that dysfunctional emotion regulation styles will be positively related to compulsive exercise, even after controlling for initial levels of compulsive exercise.

Methods

Participants and procedure

An initial 813 adolescents were recruited from five schools and assessed at baseline (T1). After dropouts from baseline to the 12-month follow-up (T2; dropout $n = 241$), a final sample of 572 adolescents aged 12–14 years old (mean = 13.16 years, $SD = .73$) at T1 was used for this study. The sample comprised boys and girls (boys $n = 252$; girls $n = 320$) and it was predominantly British (98.6% of sample), as well as being ethnically homogenous (“White British” = 95.4%). Self reported height and weight information was converted to Body Mass Index (BMI) values, which were age- and gender-adjusted into BMI z scores ([Child Growth Foundation, 1996](#)). At T1, the BMI z score mean for boys was 0.38 ($SD = 1.51$) and for girls it was 0.10 ($SD = 1.25$). At T2, boys' mean BMI z score mean was 0.27 ($SD = 1.37$) and was 0.04 ($SD = 1.06$) for girls.

Following institutional ethical approval, five schools across the United Kingdom were sent questionnaire packs (including consent forms and parent letters), which were given to all pupils aged within the required age range of the study (12–14 years old at T1). Questionnaires were completed during a regular timetabled class period. All returned questionnaires were assigned a specific identification code in order for them to be matched to the longitudinal follow-up. A follow-up assessment was conducted approximately 12-months later (T2), using the same procedure as at T1.

Measures

For the purposes of this study, background information was collected at T1 on age, gender, nationality, ethnicity and self-reported height and weight, followed by the subsequent validated measures. At T2, similar background information was collected (in order to aid identification of follow-up participants), plus the Compulsive Exercise Test ([Taranis, Touyz, & Meyer, 2011](#)).

Compulsive Exercise Test (CET; Taranis et al., 2011)

The CET assesses compulsive exercise cognitions across five dimensions of: Avoidance and Rule-Driven Behaviour (“I feel extremely guilty if I miss an exercise session”); Weight Control Exercise (“I exercise to burn calories and lose weight”); Mood Improvement (“I feel less anxious after I exercise”); Lack of Exercise Enjoyment (“I find exercise a chore”); and Exercise Rigidity (“I follow a set routine for my exercise”). Responses are provided on a six-point Likert scale ranging from “0 – Never

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