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Vulnerability to exercise addiction, socio-demographic, behavioral and psychological characteristics of runners at risk for eating disorders

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ABSTRACT

Background: Excessive exercise is frequently associated with eating disorders and may degenerate into exercise addiction. We still don't know whether runners at risk for eating disorders are at risk for exercise addiction. Our aim is to assess: 1) risk for exercise addiction in runners at risk for eating disorders and 2) socio-demographic, behavioral and psychological characteristics distinguishing runners at-risk from not-at-risk for eating disorders.

Methods: We assessed risk for eating disorders and exercise addiction using the SCOFF questionnaire and the Exercise Addiction Inventory personality traits with the Big-Five Inventory Test, socio-demographic data, eating and training habits in a sample of 154 healthy runners.

Results: Twenty five subjects had a score of ≥2 at the SCOFF and were included in the group "at risk for eating disorders". In this group, we found a higher percentage of subjects at risk for exercise addiction ($p = 0.01$) and higher average scores at the Exercise Addiction Inventory ($p = 0.01$) than runners not at risk ($N = 136$). Runners at risk were statistically younger ($p = 0.03$), women ($p = 0.001$), started running to lose weight more often ($p = 0.03$), lost more kilos since affiliation in their running club ($p = 0.04$), and were characterized by neurotic traits using the Big-Five-Inventory Test ($p = 3.10^{-6}$).

Conclusions: Screening for exercise addiction and mood disorders could lead to a more accurate management of runners at risk for eating disorders. Identifying vulnerable individuals will facilitate the prevention of eating disorders and preserve the benefits of sport practice.

1. Introduction

Regular exercise results in physical, psychological and physiological benefits and is widely enjoyed by the majority of the population [1]. Excessive exercise, however, may have negative outcomes when it becomes an all-consuming activity [2]. The boundary where physical activity ends to be beneficial and begins to impair health is a real challenge [2] and there is no real consensus on what constitutes excessive exercise: definitions vary in frequency of hours, definitions of unhealthy preoccupation with exercise, and the feeling of discomfort when unable to exercise [3]. A "craving" for exercise may bring to extreme exercise and generate negative physiological (e.g., overuse injuries) and psychological symptoms (e.g., negative affect when unable to exercise, social deintegration). In these cases, physical well-being, social relations and mental health can be threatened.

Over the last century, there has been an upsurge of interest in the area of mental health of sport practitioners. Eating disorders (ED) have been particularly investigated in athletes, among whom the prevalence is reported to be higher (13.6%) than in general population (up to 5%), although there is still no consensus on prevalence data [4,5].

The relationship between sport practice and disturbed eating behavior is complex [6]. On the one hand, sport practitioners are particularly at risk of developing ED related features because of the specific pressure from within their sport to improve performance that adds to the existing sociocultural pressure to conform to an ideal body shape. Athletes competing in sports that encourage to leanness seem to present more ED related features than others [7]. The diagnosis of ED in athletes is often challenging, ED seem underdiagnosed since they often present subclinical forms [8]. On the other hand, especially in young adulthood, excessive exercise is a prevalent strategy to control calories intake [3] and clinical evidence shows that excessive exercise is a prominent characteristic of many patients suffering from ED [9]. Excessive exercise plays a detrimental role in the pathogenesis and maintenance of ED, especially anorexia nervosa (AN) [10], and is associated with earlier ED onset, more symptoms and relapses, and higher persistence of ED

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behavior [3]. If present, excessive exercise represents one of the last symptoms to subside [9], increases weight loss [11], shortens the time of relapses [9], and may prolong the length of hospitalization [12]. Compulsive exercise contributes to the chronicity of AN. When they occur together, strenuous physical activity and caloric restriction can potentiate each other in the development of severe weight loss by fostering neurochemical changes (increased hypothalamic serotonin metabolism, release of B-opioids, decreased leptin [6]), and appear to maintain both behaviors in a self-perpetuating cycle [13].

Variables explaining how exercises contribute to ED development maintenance and relapse have been searched. Exercise addiction (EA), not the amount of exercise engaged by ED individuals [14], appears to be the mediator of the relationship between exercise and ED [15]. Obligatory attitudes towards exercises seem predictive of ED symptoms [11]. This finding could lead us to ask the reverse question: is ED risk status, in turn, predictive for EA in exercisers? To our knowledge, this question is still unanswered.

Exercise can occasionally evolve into a compulsive behavior or even an addiction [1]. EA (otherwise called obligatory exercise, positive addiction or exercise dependence) is not considered as a nosologic identity in DSM-5 [16] but has the same diagnostic criteria as behavioral addictions [1] applied to sport practice [17]. There is lack of consensus on the actual prevalence of EA, reported from 3% [18] to 42% [19] in a physically active population, depending on the chosen population and diagnostic tools.

ED are the most common comorbidity in EA and approximately 39–48% of people suffering from ED also suffer from EA [20]. Veale distinguished a "primary" from a "secondary" EA to indicate whether physical activity was the final goal or a means to control body weight in the context of an ED.

ED and EA seem to share measurable personality characteristics [21] like neuroticism (elevated stress reactivity resulting in the frequent experience of negative emotions) [22,23], perfectionism (tendency to set and pursue unrealistically high standards, despite the occurrence of adverse consequences) [23], rigidity (inflexible attitudes and rules) [9] and obsessive-compulsiveness (doubting, checking, and need for symmetry and exactness) [23,10]. Psychological morbidity is higher in EA with ED than in primary EA in terms of anxiety, insomnia, social dysfunction, depression, self-esteem, weight dissatisfaction and weight fluctuations [24]. The comorbidity between EA and ED exposes to the organic consequences of ED (i.e. gastrointestinal symptoms, amenorrhea, low sexual appetite, infertility, poor sleep, skin complications, hypothermia, bradycardia, orthostatic hypotension, arrhythmias, ECG abnormalities, muscular weakness, hypothyroidism, hematological complications, dehydration, osteopenia and osteoporosis with heightened fracture risk [5]) in addition to those of overtraining (repeated soft tissue injuries and stress fractures, pressure-sores, gastrointestinal blood loss and anemia, myocardial infarction and death [1].

1.1. Aim of the study

We already know that EA represents a risk factor for ED [3,10] and that ED represents a risk factor for excessive exercise [3], but we still don't know if exercisers at risk for ED are, in turn, more at risk for EA than non-ED exercisers. Because of the potential consequences of the comorbidity between EA and ED, and the relevant association reported between long distance running and ED [12], it is important to find what socio-demographic, behavioral and psychological profile is associated with an increased risk for ED in people who regularly practice the activity of running. Previous research screened for ED by means of proxy measures of ED behavior [15]. Other studies included body parameters in the screening panel for ED, which are not reliable in athletes and sport practitioners because many forms of ED are subclinical and BMI reduction is often absent [13]. Others adopted screening tools that are too long and uncomfortable to fill and interpret [25]. On the other hand, semi-structured interviews are hard to effectuate outside health centers because they need dedicated interviewers and time availability of participants. A combination of two short, rapid and sensitive tools to screen for ED and EA has not been exploited yet involving a loss of chances to find reliable results in a rapid and reproducible way. In our study, we thus innovatively chose for our purpose the SCOFF (Sick, Control, One stone, Fat, Food) questionnaire [26], and the EAI (Exercise Addiction Inventory): accurate and reliable instruments for detection of individuals at risk respectively for ED [27] and EA [18].

We conducted our study on a population of runners with the aim of answering the following questions: 1) Is there an increased prevalence of EA in runners at risk for ED? 2) Are there socio-demographic, behavioral and psychological characteristics that distinguish runners at risk for ED from those who are not? Our first hypothesis is that the group of runners at risk for ED has a significantly higher percentage of subjects at risk for EA than the group not at risk for ED. This hypothesis aims at extending previous research on the association between ED and excessive involvement in physical activity [19]. Our second hypothesis is that there are significant differences in dietary patterns and personality traits between the two groups. This research may pave the way to a more accurate screening of subject at risk in a preventive view.

2. Methods

2.1. Study design and population

We realized a cross-section comparison study on a community of urban runners, having as a common approach the practice of running as a lifestyle rather than a performance. Runners were recruited by open solicitation of volunteers from local, non-competitive, free joining running groups with one scheduled training per week. Inclusion criteria were: practice of running for more than 1 h a week. Excluded subjects were younger than 18 and not speaking French.

2.2. Survey questionnaire

A survey questionnaire was designed on the online survey software SurveyMonkey®. Invitations to participate to our study, containing the web link to the questionnaire, were posted on the local running groups' social network pages (Facebook®, Twitter®). The survey was open for 3 months between 1st of October to 31st of December 2016. To ensure confidentiality, we did not record any identifying data. Questionnaires were strictly anonymous. All subjects participated voluntarily in the study. The local ethical committee approved this study.

We assessed risk for ED by means of the French validated form [27] of the SCOFF questionnaire [26], a five-question screening tool concerning eating habits and attitudes towards weight and body shape. A threshold of 2 positive answers has been proposed to raise a suspicion of an existing ED [28]. Sensitivity is of 94.6% and specificity of 94.8% for the French version, with a positive predictive value of 65% and a negative predictive value of 99% [27]. Eating behavior was further explored by several questions regarding dietary styles (if, since when and what kind of diet they were going on) and whether the practice of running was started to lose weight.

We assessed the risk for exercise addiction using the French translation of Exercise Addiction Inventory (EAI) [18,25]. EAI uses a summed score of all items on a 5-point Likert scale, and distinguishes between persons at risk for exercise addiction (i.e. scores of 24 or more), those who show some symptoms (i.e. scores between 13 and 23) and those with no symptom of addiction (i.e. scores between 0 and 12) [29]. Internal reliability and content, concurrent and construct validity are very good for EAI [18]. Our assessment protocol for excessive exercise also included questions regarding duration, frequency, and lifetime exercise status.

Personality profile was assessed with the French validated version [30] of the Big-Five Inventory Test (BFI-Fr) [31], that uses 45 phrases to evaluate on a 5-point Likert scale, based on the prototypical markers