Performance Enhancement & Health 2 (2013) 30–36

Contents lists available at SciVerse ScienceDirect

Performance Enhancement & Health

journal homepage: www.elsevier.com/locate/peh

Development and validation of the Exercise Dependence and Elite Athletes Scale

Justin McNamara, Marita P. McCabe*

School of Psychology, Deakin University, 221 Burwood Highway, Burwood, Victoria 3125, Australia

ARTICLE INFO

Article history:
Received 2 March 2012
Received in revised form 4 September 2012
Accepted 27 November 2012

Keywords:
Excessive exercise
Measurement
Addiction

ABSTRACT

Aims: Exercise Dependence (EXD) is a clinical condition associated with physical and psychological risks for elite athletes. This paper describes the development and preliminary validation of the Exercise Dependence (EXD) and Elite Athletes Scale (EDEAS).
Method: Study 1 generated 27 preliminary items for the EDEAS based on the perceptions of coaches of elite athletes ($n = 86$). In Study 2, the initial EDEAS was administered to 234 elite athletes and the responses were factor analyzed.
Results: Six factors emerged: Unhealthy Eating Behavior, Conflict and Dissatisfaction, More Training, Withdrawal, Emotional Difficulties, Continuance Behavior. Item-total correlations for individual subscales and internal reliabilities were acceptable (i.e., $\alpha > .60$). The final 24-item EDEAS was validated against an alternative measure of EXD, and was shown to be highly correlated.
Conclusion: The EDEAS shows acceptable preliminary psychometric properties as a measure of EXD among elite athletes.

Despite the positive effects of exercise on physical and psychological health, there is a recognition that exercise can become a problem activity (Hausenblas & Giacobbi, 2004). There is growing awareness that individuals can develop an unhealthy preoccupation and involvement in too much exercise. Various terms have been adopted to describe this situation (Blaydon, Linder, & Kerr, 2004). These terms include Exercise Dependence (EXD) (Veale, 1987), exercise addiction (Hailey & Bailey, 1982), excessive exercise (Ackard, Brehm, & Steffen, 2002), obligatory exercise (Pasman & Thompson, 1988); and exercise abuse (Davis, 2000). EXD is now the most commonly used term to describe an unhealthy involvement and pre-occupation with too much exercise (Allegre, Souville, Therme, & Griffiths, 2006), and, thus, this term will be adopted throughout this paper.

There have been considerable difficulties in conceptualizing EXD, as there is no standard definition of the condition. Recent definitions of EXD have built on the empirical literature and have included behavioral factors (e.g., exercise frequency), psychological factors (e.g., pathological commitment), and/or physiological factors (e.g., tolerance, emotional withdrawal symptoms). Only a few of these factors have been robustly supported by empirical investigations (Allegre et al., 2006).

There have been a number of attempts to develop an adequate measure of EXD. These measures can be categorized as either unidimensional or multidimensional (Hausenblas & Downs, 2002). The first self-report unidimensional questionnaire of EXD to be developed was the Commitment to Running Scale (CRS) (Carmack & Martens, 1979). This was followed by other unidimensional measures including the Negative Addiction Scale (Hailey & Bailey, 1982), the Running Addiction Scale (RAS) and the Obligatory Exercise Questionnaire (OEQ) (Pasman & Thompson, 1988). However, the main criticism of unidimensional scales is that they assess only certain dimensions of EXD and, thus, fail to provide an adequate assessment of the condition (Pierce, 1994). Reviews of the empirical literature suggest that EXD comprises a range of dimensions (Davis, 2000).

Ogden, Veale, and Summers (1997) developed the Exercise Dependence Questionnaire (EDQ) to measure the biomedical and psycho-social dimensions of dependence. Similarly, Hausenblas and Downs (2002) developed the Exercise Dependence Scale (EDS). The EDS is conceptually based on the Diagnostic and Statistical Manual-1V (DSM-IV) criteria for substance dependence. Subscales of the EDS include tolerance, withdrawal effects, continuance, lack of control, reduction in activities, time and intention effects. These recent efforts to develop multidimensional measures have enhanced the assessment of EXD among recreational exercisers.

Multidimensional measures of EXD remain somewhat limited in two important areas. Firstly, measures have included items based on, for example, their use in previous measures of EXD or DSM-IV substance dependency criteria. This process of item selection may not ensure that the items include all dimensions of this condition. Secondly, measures of EXD have failed to adequately assess the condition among specific populations of athletes, such as elite athletes. Previous measures have been aimed at examining EXD among

* Corresponding author. Tel.: +61 3 924 46856.
E-mail address: marita.mccabe@deakin.edu.au (M.P. McCabe).

2211-2669/$ – see front matter © 2013 Published by Elsevier Ltd.
http://dx.doi.org/10.1016/j.peh.2012.11.001

recreational exercisers. Dimensions of EXD may be vastly different for elite athletic performers compared to recreational exercisers.

At present, there is no specific measure for assessing EXD among elite athletes. This is a major gap in the literature, as the rigors associated with elite sport may create significant risk for elite athletes to experience EXD (Pasman & Thompson, 1988). In order to develop a measure of EXD among elite athletes, it is important to firstly identify the dimensions of EXD within this population.

Consistent with this aim, Study 1 aimed to identify the dimensions of EXD exhibited by elite athletes in order to generate a pool of items for inclusion in a measure of EXD, the Exercise Dependence among Elite Athletes Scale (EDEAS). One strategy of obtaining an independent but accurate measure of the dimensions of EXD is to examine the views of those closest to elite athletes with EXD, rather than the athletes themselves. This strategy overcomes issues relating to sample selection. In addition, it becomes a rather circular process if elite athletes identify the characteristics of EXD and then these dimensions are confirmed as comprising EXD in a group of elite athletes. Sports coaches spend a great deal of time with elite athletes, supervising and observing their training and performance. It was decided to ask coaches to specify characteristics found in elite athletes with EXD, and to independently specify those characteristics found in elite athletes who were committed to their sport but not EXD. This allowed a separation to be made between the characteristics of highly achieving athletes who are not EXD, and those who demonstrate EXD. In this way, the unique aspects of EXD (as opposed to commitment to sporting performance) could be identified.

Study 2 aimed to analyze the properties of the final version of the EDEAS developed in Study 1. The reliability and validity of the EDEAS was also evaluated.

1. Study 1: item development

1.1. Method

1.1.1. Participants

Participants were 90 coaches of elite athletes. There were 55 male and 35 female coaches. The age range was 32–64 years of age ($M = 38.30$). The participants represented 24 different sports, including athletics ($n = 12$), Australian rules football (8), hockey (6), golf (6), soccer (5), tennis (5), triathlon (4), swimming (4), gymnastics (4), rowing (4), volleyball (3), cycling (3), basketball (3), baseball (2), squash (2), waterpolo (2), diving (2), orienteering (1), canoeing/kayak (1), aerobics (1), cricket (1), rugby union (1), archery (1), and equestrian (1). Years of coaching experience ranged from 2 to 34 ($M = 15.94$). Thirty-three participants were employed by the Australian Institute of Sport, whereas 62 participants coached at State Institutes and Academies of Sport in Australia. There were 58 head coaches and 32 assistant coaches.

1.1.2. Materials

Participants received a package that included demographic questions and two checklists.

1.1.2.1. Demographic and coaching-related information. Demographic questions were included to obtain information regarding coaches' age and sex. Open-ended questions were included to assess coaching related information, including sport coached (e.g., tennis, volleyball), sporting organization (e.g., Australian Institute of Sport, Victorian Institute of Sport), coaching position (e.g., head coach, assistant coach), and years of coaching experience.

1.1.2.2. Coaches' perceptions regarding the dimensions of EXD among elite athletes. A checklist assessed coaches' perceptions of the dimensions of EXD among elite athletes. The checklist contained 31 dimensions or symptoms that may comprise EXD (see Table 1). The dimensions included in the checklist were based on theoretical and empirical research published in referenced journal articles that related to EXD (e.g., Ackard et al., 2002; Allegre et al., 2006). Fifteen 'new' dimensions were also included in the checklist. These 'new' dimensions have recently been hypothesized to be associated with EXD, but have received no empirical investigation among athletes categorized as EXD (Bamber, Cockerill, Rodgers, & Carroll, 2000).

Coaches were not provided with an operational definition of EXD prior to completing the checklist, as it was deemed that this information would bias responses. Instead, coaches were required to reflect on their experiences of coaching an elite athlete who experienced EXD. Those who had not coached an athlete with the condition were required to state this on the checklist, and their responses were not analyzed. Coaches were asked to place a tick beside the characteristics that they would use to describe one of their elite athletes who was exercise dependent (or an excessive exerciser). Coaches were also requested to list any other characteristics of EXP not included in the checklist.

1.1.2.3. Coaches' perceptions regarding the characteristics of elite athletes who are committed exercisers (as opposed to exercise dependent). A checklist assessed coaches' perceptions of the dimensions of committed exercise among elite athletes. The checklist contained the same dimensions or symptoms included in the checklist used to assess coaches' perceptions of EXD. Coaches were also requested to list any other characteristics that were not included in the checklist that they would use to describe a committed exerciser.

1.1.3. Procedure

Ethics approval for the study was obtained from the University Ethics Committee. Participation in the study was limited to coaches who were currently coaching an elite athlete. An elite athlete was defined as an individual who was competing in international or state level competitions. Participants could be involved in coaching male or female elite athletes in any sport, and they could be junior, adult or disabled elite athletes.

Participants were mailed demographic questions, the two checklists and information about the study. The measures took the participants approximately 10 min to complete. Participants returned the anonymous questionnaire via reply paid mail. The response rate was 57.33%, with 90 questionnaires being returned from the 150 that were sent out. There was no reimbursement to participants for the completion of the questionnaire.

1.2. Results

1.2.1. Checklist responses

Responses for each item on the EXD and committed exerciser checklist were totaled. Two criteria were adopted to determine whether an item was endorsed as an important dimension by the coaches. Firstly, an item had to be endorsed by at least 20% of the participants on the EXD checklist. Secondly, responses to an item had to display a 3:1 ratio of responses between the EXD and committed exercise checklists. In other words, for every three participants who endorsed a specific item on the EXD checklist, no more than one participant could endorse that item on the committed exercise checklist. The criteria were located in the statistical literature relating to relative risk and were used to inform us on an objective standard for inclusion of the items as demonstrating EXD (Cohen, 1977). Both inclusion criteria had to be met for the item to be considered endorsed by coaches. A breakdown of responses provided by the coaches is provided in Table 1.