Body Image 10 (2013) 399–405

Contents lists available at SciVerse ScienceDirect

Body Image

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

Factor structure of the Eating Disorder Examination Questionnaire (EDE-Q) in male and female college athletes

Alison M. Darcy[a], Kristina K. Hardy[b,c], Ross D. Crosby[d], James Lock[a], Rebecka Peebles[e,*]

[a] Child and Adolescent Psychiatry, Stanford University School of Medicine, Department of Psychiatry and Behavioral Sciences, 401 Quarry Road, Stanford, CA 94305, United States
[b] Neuropsychology Division, Children's National Medical Center, Department of Pediatrics, The George Washington University School of Medicine, Washington, DC, United States
[c] Neuropsychology Division, Children's National Medical Center, Department of Psychiatry & Behavioral Science, The George Washington University School of Medicine, Washington, DC, United States
[d] Neuropsychiatric Research Institute, Fargo, ND, United States
[e] The Craig Dalsimer Division of Adolescent Medicine, The Children's Hospital of Philadelphia, Perelman School of Medicine at The University of Pennsylvania, Philadelphia, PA 19104, United States

ARTICLE INFO

Article history:
Received 25 July 2012
Received in revised form 25 January 2013
Accepted 28 January 2013

Keywords:
Eating disorders
Athletes
Assessment
Eating Disorders
Examination-Questionnaire
Gender

ABSTRACT

The study explored the psychometric properties of the Eating Disorder Examination Questionnaire (EDE-Q) among 1637 university students. Participants were divided into male ($n = 432$) and female ($n = 544$) competitive athletes, and male ($n = 229$) and female ($n = 429$) comparison groups comprised of individuals who had not engaged in competitive sports for at least one year. All groups were subjected to confirmatory factor analysis (CFA) to test the fit of the published factor structure in this population, and then exploratory FA (EFA). A three-factor solution was the best fit for three out of four groups, with a two-factor solution providing best fit for the male comparison group. The first factor for all groups resembled a combined Shape and Weight Concern subscale. The factor structure among male and female competitive athletes was remarkably similar; however, non-competitive athletic/low activity males appear qualitatively different from other groups.

Introduction

The Eating Disorder Examination (EDE) structured clinical interview has long been considered the measure of choice in eating disorders (ED) research (Wilson, 1993). It is a well-validated and reliable instrument (Fairburn & Cooper, 1993) with published norms for many clinical and non-clinical groups (e.g., Byrne, Allen, Lampard, Dove, & Fursland, 2010; Fairburn & Cooper, 1993; Wade, Byrne, & Bryant-Waugh, 2008). A self-report questionnaire version of the measure exists with many studies demonstrating its internal reliablility (e.g., Luce & Crowther, 1999; Peterson et al., 2007) and temporal stabilitity (Mond, Hay, Rodgers, Owen, & Beumont, 2004). The EDE-Questionnaire (EDE-Q) is based on the same four-subscale structure as the EDE, which were chosen on "rational rather than empirical grounds" on the basis of conceptual similarity of content (Mond et al., 2004). Many studies have compared the EDE and the EDE-Q, generally finding support for its convergent validity among clinical and community samples (Binford, Le Grange, & Jellar, 2005; Grilo, Masheb, & Wilson, 2001; Mond et al., 2004; Passi, Bryson, & Lock, 2002; Wilfley, Schwartz, Spurrell, & Fairburn, 1997; Wolk, Loeb, & Walsh, 2005) with the exception of ratings of objective binge eating episodes, which tend to be overestimated on the EDE-Q among clinical samples (Bohn, Doll, Cooper, O'Connor, Palmer, & Fairburn, 2008; Wolk et al., 2005). The EDE-Q is increasingly being used in eating disorders research as both an outcome measure and as a descriptive adjunct (Anderson & Williamson, 2002). In addition, Mond and colleagues have investigated and acknowledged its acceptability as a screening instrument in prospective epidemiologic research (Mond et al., 2004). Despite its wide application, there is not yet a consensus on the factor structure of the EDE-Q in clinical or community samples (Peterson et al., 2007).

There have been four studies investigating the factor structure of the EDE and the EDE-Q. Using principal components analysis with varimax rotation, Mannucci, Rica, Di Bernardo, Moretti, Cabras, and Rotella (1997) found support for a two-component structure of the EDE among obese men ($n = 23$) and women ($n = 92$). Eating, Weight

* Corresponding author. Present address: The Craig Dalsimer Division of Adolescent Medicine, The Children's Hospital of Philadelphia, Perelman School of Medicine at The University of Pennsylvania, 11 NW Room 19, 34th and Civic Center Boulevard, Philadelphia, PA 19104, United States. Tel.: +1 215 590 6864; fax: +1 215 590 4708.
E-mail addresses: peeblesr@email.chop.edu, cheekc@email.chop.edu (R. Peebles).

1740-1445/$ – see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.bodyim.2013.01.008

Concern, and Shape Concern comprised the first component, and Restraint comprised the second. Wade et al. (2008) conducted an exploratory factor analysis (EFA) of the child version of the EDE (with non-orthogonal Promax rotation) among 699 female 12–15 year old twin sets resulting in an unstable factor structure (twin set A resulted in a 5 factor structure and twin set B resulted in 4 factor structure). However, the first factor was comprised of 8 items from the Shape and Weight Concern subscales and accounted for over 40% of the variance for both groups (Wade et al., 2008).

The first factor analysis of the EDE-Q was of the Dutch version of the measure by Pennings and Wojciechowski (2004) among a group of women with anorexia nervosa (AN) and healthy controls. The authors found that a one-factor solution provided best fit for the data. Peterson and colleagues (Peterson et al., 2007) investigated the factor structure of the EDE-Q among 203 females with BN symptoms using principal components analysis with Promax rotation. The data indicated a 4 component solution was the best fit, with the first component consisting of most of the Shape and Weight Concern items, the second component loosely fitting the Eating Concern Factor, the third comprising four items from the Restraint subscale, and importance of weight and shape comprising the fourth component. Thus, each investigation has supported differing structures, with the exception that Weight and Shape Concern tends to cluster together. Unfortunately, most of these studies had insufficent numbers to allow for conducting a confirmatory factor analysis (CFA), the only procedure that can specifically answer whether a given model (i.e., the published 4-factor structure) is a good fit or not.

One recent study (Byrne et al., 2010) investigated 5 differing factor structures described in the literature to directly compare their goodness of fit. Byrne and colleagues found that none of the tested EDE models provided a good fit to their data from ED ($n = 158$); treatment seeking obese ($n = 170$) and non-ED community-based ($n = 329$) participants, with the exception of a brief one-factor model consistent with the findings of Wade and colleagues. The authors interpreted this finding as being related to the fact that both were clinical samples. Since it was an assessment of previously published structures, this study did not include an exploratory factor analysis (EFA). In spite of the lack of consensus of psychometric properties among community samples, the EDE-Q is one of the most widely used instruments in the field of ED and is used as a screening instrument among groups considered high risk for ED.

Both male and female elite athletes can be considered at an elevated risk for developing EDs. Between 15 and 78% of female elite athletes demonstrate disordered eating (Byrne & McLean, 2001), which, alongside menstrual irregularity and osteoporosis, comprises an area of specific health detriment known as the Female Athlete Triad. Young adult males participating in athletic activities, especially those that include specific requirements to "make weight" (e.g., wrestling), may be at risk for developing EDs (Braun, Sunday, Huang, & Halm, 1999). Given the potential utility of the instrument in screening studies and as an outcome measure, it is imperative that the psychometric properties of the EDE-Q be evaluated among high-risk groups such as university-aged athletes, and that norms be available for these groups. Furthermore, virtually nothing is known about the factor structure of the EDE or the EDE-Q in males.

This study aimed to explore the factor structure of the EDE-Q among a large group of competitive athletic men and women, as well as a comparison group of men and women to establish the contribution of competitive athleticism. We aimed to evaluate comprehensively the factor structure by first conducting a CFA, and then an EFA, using procedures designed to specifically test for the appropriate number of factors that should be extracted from the data. Given previous findings, we hypothesized that shape and weight concern would load on the same factor.

Method

Participants and recruitment

Participants ($n = 1637$) were aged 18–26 and affiliated with one of ten top-ranked National College Athletics Association (NCAA) schools in the United States. Participants were recruited via a popular social networking website and invited to complete an online survey examining their athletic participation, eating behaviors, and health. Interested participants gave consent online and completed an online survey consisting of a total of 295 questions. Participants only completed questions that were relevant to them based on involvement with specific sports and could skip non-relevant questions. The survey took approximately 30 min to complete. This study was conducted in compliance with the Stanford University Panel on Medical Research in Human Subjects and the NCAA.

Measures

The Eating Disorders Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008) is a 28-item self-report measure of eating disorder psychopathology based on the EDE interview (Fairburn & Cooper, 1993). The EDE-Q asks participants to rate on a 0–6 scale the frequency or severity of core symptoms and related psychopathological behaviors and beliefs over the past 28 days. The measure comprises four subscales: Restraint, Eating Concern, Shape Concern, and Weight Concern. Participants were asked to complete the EDE-Q as part of the larger survey.

Data Analysis

Given that the psychometric properties of the measure among athletes are unknown, confirmatory factor analysis (CFA) estimated by robust maximum likelihood method (MLM; Bentler, 1995; Satorra & Bentler, 1994) was used to assess the fit of the published four-factor model of the EDE-Q representing the subscales Restraint; Eating Concern; Shape Concern and Weight Concern. Analyses were conducted separately for male competitive athletes ($n = 432$); and female competitive athletes ($n = 544$); and male ($n = 229$) and female ($n = 429$) comparison groups, using LISREL 8.8. A multiple imputation (MI) procedure was used to handle missing data.

Preliminary diagnostics indicated that multivariate distribution of the data was non-normal. Given the moderate size of each group, the MLM method was chosen over the more popular maximum likelihood (ML), or alternative non-normal equivalent, the Weight Least Squares (WLS) method, as it is a better behaved estimator across different levels of non-normality, model complexity, and sample size (Brown, 2006).

Several widely used models of goodness-of-fit were employed. Due to violations of normality, the Satorra–Bentler scaled chi-square test statistic was employed (Satorra & Bentler, 1994). Other indicators of good fit included Bentler's Comparative Fit Index (CFI) and Tucker–Lewis Index (TLI; Tucker & Lewis, 1973) with values of ≥ 0.96 indicative of good fit (Hu & Bentler, 1999). Finally, standardized residuals and modification indices were examined to indicate the presence of areas of localized stress and provide overall interpretability of the usefulness of the model (Brown, 2006). Standardized residuals greater than 2.58 are indicative of significant under-estimation (in the case of positive values) or over-estimation (in the case of negative values). Modification Indices can be conceptualized as the point difference in the chi-square statistic with 1 degree of freedom if the parameter was freely estimated. Thus, good fitting models should produce modification indexes that are small, with indexes >3.84 indicative of a model that could be significantly improved ($p < .05$) (Brown, 2006).