

Contextual Body Image and Athletes' Disordered Eating: The Contribution of Athletic Body Image to Disordered Eating in High Performance Women Athletes

A. P. (Karin) de Bruin^{1*}, Raoul R. D. Oudejans^{1**}, Frank C. Bakker^{1**} & Liesbeth Woertman^{2***}

¹Research Institute MOVE, VU University, Amsterdam, The Netherlands

²Department of Clinical Psychology, University of Utrecht, The Netherlands Faculty of Human Movement Sciences, VU University, Van der Boechorststraat 9, 1081 BT Amsterdam. Fax: +31205988529. Department of Clinical Psychology, University of Utrecht, Heidelberglaan 1, 3584 CS Utrecht, The Netherlands.

Abstract

The present study investigated the contribution of a contextual body image perspective to understanding disordered eating in high performance women athletes. Because existing questionnaires were not suitable for measuring body image in the contexts of sport and daily life, we developed the 'Contextual Body Image Questionnaire for Athletes' (CBIQA) in which body image is divided into 'appearance', 'muscularity', 'thin-fat self-evaluations' and 'thin-fat perceived opinions of others', in both contexts. In Study 1, the internal validity and reliability of this questionnaire was established in a general, heterogeneous sample of female sport participants and exercisers. In Study 2, the external validity was determined in a sample of 52 high performance women athletes who mainly participated in aesthetic or endurance sports, 19 of which were classified with and 33 without disordered eating. The results of Study 2 showed that both 'thin-fat self' and 'thin-fat opinions of others' in sport made significant unique contributions to explaining eating disorder variance, indicating the important role of athletic body image. In conclusion, the contextual body image approach seems to be a promising framework for a better understanding of athletes' disordered eating. Copyright © 2011 John Wiley & Sons, Ltd and Eating Disorders Association.

Keywords

athletes; body evaluation; body comparisons; body satisfaction; eating disorders

*Correspondence

A. P. (Karin) de Bruin, PhD, Karin de Bruin Sportpsycholoog, Domselaerstraat 112, 1093 MA Amsterdam, the Netherlands.

Tel: +31642485149.

Email: sportpsycholoog@hotmail.com

**Correspondence

F. C. Bakker, PhD, Raoul R. D. Oudejans, PhD, Faculty of Human Movement Sciences, VU University, Van der Boechorststraat 9, 1081 BT Amsterdam. Fax: +31205988529.

E-mail: f.c.bakker@vu.nl; r.oudejans@vu.nl

***Correspondence

Liesbeth Woertman, PhD, Department of Clinical Psychology, University of Utrecht, Heidelberglaan 1, 3584 CS Utrecht, The Netherlands.

E-mail: E.M.Woertman@fss.uu.nl

Published online in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/erv.1112

Introduction

Eating disorders are generally characterized by severe disturbances in eating behaviour as well as in body image (American Psychiatric Association (APA), 1994). The two components of body image that are generally found to be disturbed when eating disorders occur are the perceptual and evaluative component (Gardner, 2001). Both types of body image disturbance are part of the diagnostic criteria for the clinical eating disorders anorexia and bulimia nervosa, as well as for eating disorders not otherwise specified (APA, 1994). Moreover, in a general population body image disturbances may also be classified as a variable risk factor that precedes eating disorders (Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004).

In athletes the relationship between eating disorders and body image appears to be less straightforward than in the general population. On the one hand, and in line with the general findings, body image disturbances seem to contribute to patterns of eating problems in athletes (Berry & Howe, 2000; Byrne & McLean, 2002; Williamson, Netemeyer, Jackman, Anderson, Funsch, & Ralabais, 1995), leading to the claim that a disturbed body image is an absolute criterion of eating disorders in athletes just as it is in non-athletes (Beals & Manore, 1994). On the other hand, according to Sundgot-Borgen (1993), a disturbed body image is merely a relative criterion as it may or may not be part of eating disorder symptomatology in athletes. Even if athletes do not always meet the criteria for clinical or sub-clinical eating disorders, it is still possible that they show very disturbed eating patterns, referred to as disordered eating and reflecting: 'A wide spectrum of harmful and often ineffective eating behaviours used in attempts to lose weight or achieve a lean appearance. The spectrum of behaviours ranges in severity from restricting food intake to bingeing and purging. . . ' (Otis, Drinkwater, Johnson, Loucks, & Wilmore, 1997: p. i).

Several studies reported that certain elite women athletes dieted frequently and used pathogenic weight control methods despite being relatively satisfied with their body (De Bruin, Oudejans, & Bakker, 2007; Hausenblas & Symons-Downs, 2001; Torstveit, Rosenvinge, & Sundgot-Borgen, 2008; Ziegler, Khoo, Sherr, Nelson, Larson, & Drenowski, 1998). Torstveit et al. reported that although competing in leanness sports was associated with more clinical eating disorders, fewer athletes in leanness sports were dissatisfied with

their bodies than in non-leanness sports. A meta-analysis of 34 studies on eating problems in female athletes confirmed that, in athletes, a high drive for thinness was not accompanied by high body dissatisfaction. Moreover, it was suggested that eating problems in athletes may differ from those in non-athletes (Smolak, Murnen, & Ruble, 2000). Ziegler et al. concluded that the dieting behaviours of figure skaters did not appear to be associated with perceptions of being overweight nor with a negative body image, contrary to the general belief that a negative body image and dieting are causally linked. De Bruin et al. found that female gymnasts' dieting behaviours were only moderately related to some but not all aspects of body image, while stronger relationships were found with sport-specific variables such as weight-related coach pressure. Rather than believing that 'thin is beautiful', gymnasts seemed convinced or persuaded that 'thin is going to win' (De Bruin et al., 2007). Other authors also concluded that it is not necessarily body dissatisfaction that drives these athletes towards dieting and pathogenic weight control, but rather the demands of their specific sport (McNulty, Adams, Anderson, & Affenito, 2001; Sundgot-Borgen, 1994; Torstveit et al., 2008).

Body image is a multifaceted, dynamic and reactive concept rather than a stable and consistent trait (Tiggemann, 2001). Individuals have different opinions and feelings about their bodies in different situations. Several studies showed changing perceptions of a person's body in relation to the context in which he or she was situated (e.g. Haimovitz, Lansky, & O'Reilly, 1992; Krane, Waldron, Michalenok, & Stile-Shipley, 2001; Loland, 1999; Russell, 2004). Athletes also seem to measure themselves in relation to the predominant body ideal of their sport, as well as to hegemonic ideals in society at large (Loland, 1999). Four qualitative studies illustrated that elite male and female athletes reported to have multiple body images, namely, an athletic and a social body image (Follo, 2007; Krane et al., 2001; Loland, 1999; Russell, 2004). Athletic body image can be defined as the 'internal image one has of his or her body and the evaluation of that image within an athletic context' (Greenleaf, 2002: p. 64), while the social body image refers to body evaluation in the context of daily life.

Moreover, it was shown that athletes often experienced different levels of body satisfaction in these two contexts (Krane et al., 2001; Loland, 1999; Russell, 2004). Female rugby players, for example, perceived

their body as functional and positive for their sport, while their body satisfaction decreased off the pitch, as their strong, muscular and athletic bodies did not meet the feminine beauty demands of western society (Russell, 2004). Among certain athletes whose bodies generally fit within our socially constructed definitions of femininity and our cultural body ideals, for example, in aesthetic and endurance sports, a 'body satisfaction transiency' in opposite direction is conceivable. These athletes might experience body satisfaction in daily life due to their lean and thin bodies that generally meet western cultural standards (Torstveit *et al.*, 2008), while they might be more negative about their athletic body image due to stricter bodily demands in their sport (De Bruin *et al.*, 2007). If these athletes exhibit some kind of dieting behaviour, then this could be primarily related to body dissatisfaction in the sport context (De Bruin *et al.*, 2007). In a qualitative study on the body attitudes of elite sportsmen, a first indication was found that the desire for weight loss of certain participants indeed seemed to be linked to their identity as elite athletes, not as men (Loland, 1999). The interviewed male ski jumpers were concerned with their weight and with dieting, 'not because they wanted to look good, but to be able to make longer jumps', while they were satisfied with how they looked (Loland, 1999: p. 295).

These studies suggest that for athletes body image can and should be divided into an athletic and a daily life body image especially in relation to eating-related problems. So far this has not been done in quantitative studies. In the present study we took a first step in investigating the differential influences of the athletic and daily life body images on the disordered eating of athletes. The first and main aim was to confirm that it is sensible and useful to take such a more dynamic and contextual perspective on body image in relation to disordered eating. In this respect, we explored differences between and within athletes with and without disordered eating on all dimensions of the daily life and athletic body image. First, we expected that athletes with disordered eating would be more negative on multiple body image aspects than those without disordered eating. Furthermore, we hypothesized that, overall, athletes would have a more positive body image in the context of daily life than in sport, as their lean and thin athletic bodies meet the cultural body ideals. A secondary aim was to gain insight into the degree to which each of the body images would contribute to disordered eating in athletes. In this

respect, we hypothesized that the athletic body image would be the main factor in explaining disordered eating variance. After all, previous studies suggested that the desire for weight loss and subsequent dieting behaviours of men and women athletes seemed to be linked to their identity as elite athletes (De Bruin *et al.*, 2007; Loland, 1999; Follo, 2007). As this was the first quantitative investigation on the influence of body image in different contexts on disordered eating in athletes, we were careful not to formulate more specific hypotheses.

Before we could address our main and secondary aims we needed an instrument to discriminate the athletic and daily life body images. Existing questionnaires were not suitable, because they are developed for the general population, and, more importantly, do not differentiate between body images in daily life and sport (e.g., Garner, 1991). Therefore, in Study 1 we first developed a questionnaire to measure multidimensional body image in daily life and sport and determined the internal validity of this measure in a general, heterogeneous sample of female sport participants and exercisers. In Study 2 we determined its external validity and answered our research questions by examining female high performance athletes from sports in which leanness, low weight or appearance are considered to be of great importance (e.g. aesthetic and endurance sports), who also seem to be at the highest risk for disordered eating (Otis *et al.*, 1997; Sundgot-Borgen & Torstveit, 2004). This sample contained both a group of high performance female athletes with disordered eating (or more severe eating disorders) and a control group without disordered eating.

Study 1

Method

Procedure

Since our aim was to validate the questionnaire, a general heterogeneous sample of athletes and exercisers needed to be included. Therefore, various sport organizations were approached of both high-risk lean/weight-related sports concerning disordered eating (e.g. aesthetic, weight class, endurance sports) and low-risk non-lean sports (e.g. ball sports) (Sherman, Thompson, Dehass, & Wilfert, 2005). In addition, several non-sport fitness centres and dance schools were approached, as well as students of a bachelor

programme for physical education and post-master programme in sport psychology. The participants were approached through their teachers or trainer/coaches who asked the athletes to participate as a control group in a larger study on the effect of sport participation on body image and dieting. They were told that participation was voluntary and strictly anonymous. Data collection occurred before or after class or training for practical reasons. Only one of the thoroughly instructed researchers was present in order to give instructions, answer any questions, and to collect written informed consent of all participants, and their parents if they were under the age of 18. The research design was reviewed and approved by the Ethics Committee of our research institute.

Participants

The general sample of women athletes and exercisers consisted of 152 women participating in various leanness and non-leanness sports, and non-sport fitness activities at (inter)national, regional and recreational level. The sample also included 45 female bachelor students in physical education who participated in leisure-time sports besides their educational sport activities. More specifically, the women participated in aesthetic sports such as gymnastics ($n = 9$), classical or modern dance ($n = 23$) and aerobics ($n = 14$), and in endurance sports such as athletics or skating ($n = 5$). In addition, they participated in weight class sports such as judo, jiu-jitsu, boxing ($n = 8$) and rowing ($n = 23$) as well as in ball sports such as hockey ($n = 7$), baseball, basketball, volleyball ($n = 14$), football ($n = 45$) and racket sports ($n = 4$). Their average age was 23.6 years old ($SD = 9.04$), varying from 13 to 58 years and they spent on average 5.9 hours a week ($SD = 3.95$) on their sport activities.

Materials

Contextual body image questionnaire for athletes (CBIQA). This questionnaire (see Appendix)¹ included 30 questions about the athletes' evaluation of different body image aspects, i.e. appearance, body shape, weight, fat percentage and muscularity, parallel

¹ The instrument was developed in Dutch and translated in English by the first author for the purpose of this manuscript only. The original Dutch version of the questionnaire is available upon request.

to the body image dimensions distinguished by De Bruin et al. (2007), McCreare and Sasse (2000), Ricciardelli and McCabe (2000), and Richards and Marsh (2006). Participants were asked to evaluate these body image aspects in two different contexts; one time for daily life and, subsequently, for sport. Based on the social-comparison theory (Festinger, 1954), the looking-glass self framework (Cooley, 1902) as well as on results of others (Cash, 2000; Loland, 1999), it was argued that body evaluations should be divided into self-evaluations, interpersonal comparisons and social evaluations. Whereas social-comparison theory claims that individuals evaluate or enhance some aspects of the self by taking an external frame of reference through comparing oneself with others, the 'looking glass self' or 'reflected self' refers to our self-feelings about the representation of others' evaluations of certain characteristics they have ascribed to us (Cooley, 1902). Thus, in the questionnaire every body image aspect was measured with three items: (In daily life/concerning my sport), (a) 'I think my [body image aspect] is ...'; (b) 'I think my [...] compared to others is ...' and (c) 'Others think my [...] is ...'. All items were scored on a seven-point Likert-scale with anchored answering categories. Scale scores were obtained by dividing the sum of the item-scores by the total number of items on the scale.

Data analysis

To establish internal validity of the CBIQA, two separate factor analyses were conducted on the 15 daily life body image items and 15 athletic body image items, respectively. The factor analyses were performed by means of principal component method of extraction. The data were considered to be suitable for factor analyses (Kaiser, 1970; 1974 in Pallant, 2005; Tabachnick & Fidell, 2007).

Results

The factor analysis of the 15 daily life body image items revealed the presence of four components with eigenvalues exceeding 1, explaining 79.4% of the total variance (see Table 1), while the analysis of athletic body image revealed the presence of three components, explaining 76.7% of the total variance (see Table 2). With the subsequent oblimin analyses, four identical factors were distinguished in both contexts allowing a

Table 1 Oblimin pattern matrix for the 15 daily life body image items ($n = 152$)

Factors	Thin-fat dimension		Appearance	Muscularity
	Self-evaluations	Others' opinions		
Appearance [†]			.889	
Appearance [‡]			.854	
Appearance [§]			.916	
Shape [†]	.760			
Shape [‡]	.782			
Shape [§]		-.664		
Muscle [†]				.901
Muscle [‡]				.901
Muscle [§]				.861
Weight [†]	.850			
Weight [‡]	.869			
Weight [§]		-.936		
Fat [†]	.873			
Fat [‡]	.820			
Fat [§]		-.819		
Reliability (α)	.93	.83	.89	.86
Mean (<i>SD</i>)	4.43 (.59)	4.05 (.45)	5.01 (.93)	3.97 (.67)

Note: Shape[§] has the lowest loading. As weight and fat percentage can be measured objectively, the perceived opinion of others on weight and fat will be clearer than on shape.

[†]Own perception. [‡]Own perception compared to others.

[§]Perceived opinion of others.

Table 2 Oblimin pattern matrix for the 15 athletic body image items ($n = 152$)

Factors	Thin-fat dimension		Appearance	Muscularity
	Self-evaluations	Others' opinions		
Appearance ^a			.955	
Appearance ^b			.943	
Appearance ^c			.937	
Shape ^a	.934			
Shape ^b	.885			
Shape ^c		-.534		
Muscle ^a				.901
Muscle ^b				.949
Muscle ^c				.846
Weight ^a	.915			
Weight ^b	.821			
Weight ^c		-.925		
Fat ^a	.902			
Fat ^b	.850			
Fat ^c		-.975		
Reliability (α)	.95	.87	.94	.88
Mean (<i>SD</i>)	4.39 (.67)	4.10 (.49)	4.66 (.96)	3.76 (.62)

Note:

^aOwn perception. ^bOwn perception compared to others.

^cPerceived opinion of others.

good comparison between body evaluation in daily life and sport: (1) 'Appearance'; (2) 'muscularity'; (3) 'self-evaluations of shape/weight/fat' (items a, b), from now on abbreviated as 'thin-fat self' and (4) 'perceived opinions of others on shape/weight/fat' (items c), from now on referred to as 'thin-fat others'. Concerning sport, the interpretation of the four factors tended to be somewhat less clear; the results pointed towards a somewhat stronger correspondence between the athlete's own opinion and the perceived opinions of others regarding the thin-fat dimension. Cronbach's alphas of the scales ranged from .83 to .95.

Discussion

In conclusion, the results showed that the internal validity and reliability of the Contextual Body Image Questionnaire for Athletes seem to be quite satisfactory. Further investigation should establish the internal validity and consistency of this questionnaire in other samples as well as its external validity. Study 2 starts with executing these additional validation procedures in a more specific sample of high performance women athletes with and without disordered eating. Additionally, the contribution of a contextual body image perspective to understanding disordered eating in athletes was investigated.

Study 2

Method

Procedure

Since our aim was to include high performance women athletes with disordered eating, first, qualified psychologists were requested to ask for the participation of women athletes competing on (inter)national levels with disordered eating with whom they were currently working. In addition, these professionals were also asked to provide suitable controls without disordered eating who were individually matched by sport type, level of participation and age group. In this way, 12 participants with disordered eating and 12 matched participants without disordered eating were found who were willing to participate. Second, to increase the number of participants, we got access to 28 aesthetic athletes from synchronized swimming and several disciplines of gymnastics through their coach and team physician. All athletes were asked by their coach, physician, dietician or psychologist to

participate in a study on eating habits and body image in sport. They were told that participation was voluntary and strictly anonymous; all women athletes, except one, were willing to participate in the study. Next, the women who agreed to participate were contacted in person by the researcher(s) who gave the participants an oral and written explanation of the purpose of the study. It was explained that they could resign from the study at any time without any consequences. Additionally, the possibility of consulting a psychologist after participation was explicitly mentioned, in case the women had any questions or needed professional support. Participants were asked to answer candidly and privately. They completed the questionnaires either in the presence of the researcher(s) ($n = 24$) or at home ($n = 28$). We checked if these different ways of completing the questionnaire was in any way associated with differences in relevant background characteristics (e.g. BMI, age, eating disorder symptomatology), and no such differences were found. All participants handed in a signed informed consent, as well as the requested written parental permission if they were under the age of 18. To guarantee the participants' anonymity, the questionnaire was separated from the informed consent(s). The research design was approved by the Ethics Committee of our research institute.

Participants

The participants of Study 2 were 52 highly competitive women athletes between 11 and 27 years of age, participating on (inter)national level in various sports in which leanness, low weight and/or appearance are considered to be important. Their average age was 19.1 years old ($SD = 3.54$) and they spent on average 14.9 hours a week ($SD = 7.24$) on their sport. More specifically, the sample included 28 aesthetic athletes from (rhythmic/acrobatic) gymnastics and synchronized swimming, in which the subjective evaluation by judges of competitive or artistic performance is the most important aspect (Sundgot-Borgen & Torstveit, 2004). In addition, 18 women participated in endurance sports in which the main focus is on aerobic endurance training, such as middle and long distance running, swimming or long distance speed skating. Six women competed in other sports (e.g. tennis) that are typically characterized as non-lean sports but increasingly regarded as sports in which athletes are also expected to resemble a lean, athletic body ideal due to

the increase of revealing sport attire and media exposure (Sherman et al., 2005).

All 52 participants took part in a diagnostic screening. The categorization of the participants was based on the criteria for disordered eating proposed by Nagel, Black, Leverenz, and Coster (2000). Nagel et al. presented an overview in which the official criteria to diagnose the various eating disorders (APA, 1994) were linked to certain scores on several questions of the Eating Disorder Examination Questionnaire (EDE-Q) and questions about amenorrhoea, BMI and current fat percentage (see Materials section). In addition, they distinguished disordered eating including a category of symptomatic individuals who show fewer symptoms or less severe symptoms than individuals with anorexia nervosa, bulimia nervosa or eating disorders not otherwise specified (Mintz & O'Halloran, 2000; Nagel et al., 2000). They proposed that subjects with disordered eating meet two of the major criteria: Amenorrhoea, low BMI or low body fat, purging methods, and (objective or subjective) bulimic episodes, in addition to two of the following minor criteria: Fear of weight gain, feelings of fatness, maintained low weight and increased importance of weight/shape (Nagel et al., 2000). If participants in the present study did not meet these criteria, they were placed in the control group without disordered eating. For the first group of 24 matched participants, a 100 per cent correspondence existed between our diagnostic screening and the clinical classifications of the professionals. In the second group of 28 aesthetic athletes, seven athletes were diagnosed as suffering from disordered eating. In total, the sample of Study 2 consisted of 19 athletes with disordered eating and 33 participants without disordered eating.

Materials

In addition to the CBIQA, participants were also asked to complete various related body image measures for establishing external validity. First, participants marked their appearance, body shape, weight, fat percentage, and muscularity evaluations on corresponding *Visual Analogue Scales* (VAS) of ten centimetre each (see Brown, 2006). Second, participants completed relevant items about body (dis)satisfaction with appearance, body shape (defined as leanness and not as proportionality), weight, fat percentage and muscularity derived from the *Body Image and Body Change Inventory*

(Ricciardelli & McCabe, 2000), and the *Body Areas Subscale* of the *Multidimensional Body-Self Relations Questionnaire* (MBSRQ; Cash, 2000) which were measured on a 7-point scale in the present study. In addition, the *Somatomorphic Matrix* (Gruber, Pope, Borowiecki, & Cohane, 2000) was delivered to the participants in paper and pencil format (see Cafri, Roehrig, & Thompson, 2004). This contour drawing scale test acknowledges the importance of measuring body image perception with separate axes for fat and muscularity. Besides choosing a female figure that best represented their actual body, participants were also asked to choose the image they themselves perceived as ideal, in the present study divided into daily life and sport, as well as the perceived ideal of others in both contexts: A discrepancy between actual and ideal images reflects body dissatisfaction with muscularity and/or fat (Gruber et al., 2000). Moreover, the following materials were included.

Background characteristics. The questionnaire contained questions about demographic characteristics, sport participation and several eating disorder-related variables. First, participants reported their age, height, current and ideal weight for sport and daily life, as well as their current and desired fat percentage. Because measuring body composition by the researcher(s) was too confronting for some athletes, especially those with disordered eating, we asked the participants to provide recent objective measures of height, weight and fat percentage that were collected by their physician, dietician or any other medical staff member. With these figures, BMI was calculated, as well as the relative discrepancy scores for weight and fat percentage. Relative weight discrepancy was computed by subtracting the current weight from the desired weight divided by the current weight, multiplied by 100 (De Bruin et al., 2007). Relative fat percentage discrepancy was calculated by simply subtracting the current fat percentage from the desired fat percentage. Second, several questions about sport participation were asked, such as sport type, level of participation (i.e. international, national), starting age of sport participation, and number of hours weekly spent on training and competition. Finally, the questionnaire consisted of various eating disorder-related questions about amenorrhoea (the number of months without menstrual periods) and eating disorder history. In addition, the attitude towards food was measured on a seven-point

Likert-scale running from 1 (*extremely tense*) to 7 (*extremely relaxed*), with the following item: 'How do you feel towards food?' that is recommended as a screening question for disordered eating (Torstveit, 2004: p. 89).

Eating disorder examination questionnaire (EDE-Q). The EDE-Q (Fairburn & Beglin, 1994; Dutch version: van Furth, 2000) is derived from the Eating Disorder Examination (EDE), which is an investigator-based interview to diagnose eating disorders (Cooper, Cooper, & Fairburn, 1994). The EDE and EDE-Q are highly correlated for many of the behavioural and attitudinal eating disorder features (Fairburn & Beglin, 1994; Mond, Hay, Rogers, Owen, & Beumont, 2004; Wilfley, Schwartz, Spurrell, & Fairburn, 1997). EDE-Q is known for its good validity and reliability (Luce & Crowther, 1999; Mond et al., 2004). In the present study, the EDE-Q was used to classify the participants' disordered eating according to the subject classification system of Nagel et al. (2000). In addition, the average EDE-Q total score was computed, following the general scoring instructions (Jansen, 2000).

Data analysis

Similar factor analyses and reliability analyses were conducted as in Study 1. In factor analysis smaller samples are permitted when critical values for factor loadings are taken into account depending on the actual sample size (Tabachnick & Fidell, 2007). Subsequently, in Study 2 only items with loadings of .722 or higher should be considered (Stevens, 1996). Moreover, for establishing external validity, Pearson's correlation analysis was used to establish the relationships between the items and scales of the CBIQA with corresponding VAS-scores, existing body (dis)satisfaction items and discrepancy scores of the Somatomorphic Matrix. Whereas higher correlations with the VAS-scores and the related body image items were expected, lower correlations were expected with the Matrix which measures body size appraisals rather than body evaluation.

To compare the subgroups of athletes with and without disordered eating on several background characteristics (see Table 3) and body image components (see Table 4), several χ^2 analyses and non-parametric Mann-Whitney *U* tests were computed. In addition, Wilcoxon Signed Rank Tests were performed

Table 3 Differences between athletes with (DE+) and without disordered eating (DE-) on average background variables, mean scores (standard deviation)

	DE+ (n = 19)	DE- (n = 33)
Current age (in years)	18.89 (3.40)	19.21 (3.67)
Starting age sport (in years)	9.00 (4.27)	8.36 (4.09)
Training hours	12.91 (6.15)	16.09 (7.64)
Height (in metres)	1.68 (.09)	1.68 (.09)
Weight (in kilograms)	58.64 (11.67)	57.49 (9.98)
BMI (kg/m ²)	20.69 (2.89)	20.23 (2.23)
Fat (in percentages) [†]	20.29 (5.97)	20.96 (4.09)
Weight discrepancy sport [†]	-6.97 (4.54)	-3.74 (3.75)
Weight discrepancy daily life [†]	-2.88 (4.38)	-2.45 (3.18)
Fat discrepancy [†]	-3.51 (1.36)	-2.97 (1.12)
Age first menstrual period	12.22 (2.88)	12.42 (3.56)
Amenorrhoea (in months)	5.15 (5.72)	1.73 (.94)*
Attitude towards food [‡]	2.84 (1.26)	4.41(1.43)*
EDE-Q total score [§]	3.12 (1.20)	.98 (.94)*

[†] In percentages. [‡] Scale (1–7) running from 1 (extremely tense) to 7 (extremely relaxed). [§] Scale (0–6) running from 0 (never or not at all) to 6 (everyday or clearly). * $p < .05$.

for the whole sample and for the subgroups of athletes with and without disordered eating, separately (also see Table 4) to investigate if athletic and daily life body images significantly differ from each other by testing within-group differences between daily life and sport for the four pairs of body image components.

Finally, Spearman Rank Order Correlations were used to determine the most relevant relationships of the EDE total score with the body image subscales of the CBIQA (see Table 5). In addition, regression analyses

were conducted to explore which body image aspect would best explain disordered eating (see Table 6) while controlling for actual body composition (Tabachnick & Fidell, 2007). All test assumptions were addressed.

Results

The results of the factor analysis for daily body image were rather similar to the results in Study 1. Subsequently, four identical scales for daily life and sport were constructed in order to be able to compare the athletes' body evaluations in these contexts. In the sample of 52 women athletes, the internal consistency of the scales ranged from .79 to .93, inspiring our confidence in using these scales in Study 2. For establishing external validity, correlations between the items and scales of the CBIQA with several external body image measures were conducted. Pearson's correlations between the body image items and corresponding VAS-scores ranged from $r = .44$ to $r = .83$, $ps < .001$. Pearson's correlations between the constructed body image scales with the existing body (dis)satisfaction items and the discrepancy scores of the Somatomorphic Matrix were all significant and ranged from $r = .28$ to $r = .81$, $ps < .05$, except for the correlation between muscularity in sport and the Matrix muscle discrepancy score, $r = .112$, $p = ns$, as expected. We concluded that adequate external validity was demonstrated. In conclusion, the validation results provided us with sufficient indications for effectively using the CBIQA for answering our research questions.

Table 4 Mean scores (standard deviation) on body image scales for DE+, DE- and total sample

	DE+ (n = 19)	DE- (n = 33)	Total sample (n = 52)
Daily life			
Appearance*	4.03 (.96)	5.07 (.85)**	4.69 (1.02)**
Muscularity	3.96 (.74)**	4.27 (.64)	4.15 (.69)**
Thin-fat self-evaluations ^{†,‡,*}	4.82 (.97)	4.25 (.50)**	4.46 (.75)**
Thin-fat perceived opinion others [§]	3.85 (.84)**	3.83 (.47)**	3.84 (.62)**
Sport			
Appearance*	3.72 (1.16)	4.77 (.85)**	4.38 (1.09)**
Muscularity*	4.85 (.87)**	4.35 (.64)	4.54 (.77)**
Thin-fat self-evaluations ^{†,‡,*}	5.06 (.93)	4.57 (.67)**	4.74 (.81)**
Thin-fat perceived opinion others [§]	4.18 (1.06)**	4.14 (.56)**	4.14 (.79)**

Note: Differences between DE+ and DE- were tested with Mann Whitney U-Tests, and Wilcoxon signed ranks tests were used for within-group differences on daily life and sport body image components. When the Wilcoxon tests were computed for the sample without the athletes who participated in other than aesthetic and endurance sports, the tests results were similar to the ones in this table.

* Own perception. ** Own perception compared to others. † Perceived opinion of others. ‡ $p < .05$ in Mann Whitney U-Tests testing differences between DE+ and DE-. § $p < .05$ in Wilcoxon signed ranks tests, testing contextual differences between pairs of body image components in DE+, DE- and the whole sample, respectively.

Table 5 Spearman rank order correlations between EDE-Q total score and contextual body image

	Daily life				Sport			
	Appearance	Muscularity	Thin-fat self	Thin-fat others	Appearance	Muscularity	Thin-fat self	Thin-fat others
Daily life								
Appearance		.27	-.40**	-.11	.77**	-.32*	-.42**	-.21
Muscularity			-.13	.11	.28*	-.06	-.09	.05
Thin-fat self				.60**	-.40**	.67**	.79**	.58**
Thin-fat others					-.05	.43*	.54**	.76**
Sport								
Appearance						-.30*	-.47**	-.23
Muscularity							.72**	.58**
Thin-fat self								.74**
Thin-fat others								
EDE-Q	-.47**	-.04	.52**	.12	-.51**	.42**	.61**	.18

* $p < .05$. ** $p < .01$.

The purpose of Study 2 was to investigate whether it is useful to apply a contextual body image perspective by exploring differences between daily life and sport body images in relation to disordered eating, and, subsequently, to gain insight into the degree to which each of the body images contributes to disordered eating in athletes. First, the two subgroups of athletes with disordered eating ($n = 19$) and without disordered eating ($n = 33$) were compared on several background variables. In this respect, no significant differences were found on sport type, $\chi^2(2, N = 52) = 4.365, p = ns$, and level of participation, $\chi^2(2, N = 52) = 3.597, p = ns$. As can be seen from Table 3, no significant differences were found on age, starting age of sport participation, average age of the first menstrual period, total training hours, height, weight, BMI, current fat percentage and relative discrepancy scores for weight and fat percentage either, with Z -values ranging from -1.80 to $-.05$, $ps = ns$. The discrepancy between current and desired

weight for sport tended to be somewhat higher for the athletes with disordered eating but this did not reach the significance level of $.05$ ($Z = -1.80, p = .072$). Significant differences were found for amenorrhoea, $Z = -2.98, p < .01$, the attitude towards food, $Z = -5.07, p < .001$, as well as the total score of the EDE-Q, $Z = -3.44, p < .01$. Athletes with disordered eating reported more amenorrhoea, they were significantly more tense towards food and scored significantly higher on eating disorder symptomatology than the control group without disordered eating, inspiring confidence in our classification.

Subsequently, differences between and within athletes with and without disordered eating on all dimensions of the daily life and athletic body image were explored. Table 4 shows the average scores of the two subgroups on the body image scales and the results of the group comparisons. As expected, athletes with disordered eating were generally more negative on

Table 6 Summary of standard multiple regression for predicting disordered eating

	B	$SE B$	β	Sig.	Part	SP^2 †
Daily life appearance	.42	.78	.08	.591	.047	.00
Daily life thin-fat self	-2.08	1.12	-.30	.070	-.162	.03
Daily life thin-fat others	-1.48	1.25	-.17	.245	-.103	.01
Sport appearance	-.23	.21	-.17	.278	-.096	.01
Sport thin-fat self	-4.85	1.15	-.75	.000*	-.366	.13
Sport thin-fat others	4.09	1.18	.57	.001*	.302	.09

Note: This regression analysis was conducted with transformed variables. When negatively skewed variables (e.g. daily life thin-fat self) are manipulated, the interpretation reverses the original scale, with lower scores now implying perceiving oneself as too fat and higher scores as too thin. Subsequently, the minus sign for daily life thin-fat self indicates a relationship with EDE-Q in the opposite direction of that with positively skewed variable daily life thin-fat others.

† Squared semi-partial or Part correlation coefficients. * $p < .05$.

multiple body image aspects than athletes without disordered eating in both contexts. More specifically, in daily life, athletes with disordered eating were more negative about their appearance, $Z = -3.42$, $p < .01$, and had more negative thin-fat self-evaluations, $Z = -2.76$, $p < .01$, but no differences were found on thin-fat others ($p = .67$). Regarding athletic body image, significant differences were found on appearance, muscularity, and thin-fat self, $Z = -3.00$, $p < .01$, $Z = -2.54$, $p < .05$, $Z = -2.52$, $p < .05$, respectively, suggesting that athletes with disordered eating were also more negative about their appearance, muscularity, and thin/fatness in sport than athletes without disordered eating. No significant differences were found on thin-fat others ($p = .43$).

In addition, within-group differences were explored by comparing the athletic body image components with those in daily life. We hypothesized that the high performance women athletes would have a more negative athletic body image. The results of the Wilcoxon rank tests for all 52 participants revealed significant differences for all four pairs of body image components, $Z_s > -2.24$, $p_s < .05$. In line with our hypothesis, more positive ranks were found for the appearance pair, indicating lower scores for perceived appearance in sport than in daily life, while more negative ranks were found for the other pairs, pointing towards higher (read: more negative) scores on the other body components in sport. Within the subgroup of athletes without disordered eating, Wilcoxon rank tests showed significant differences suggesting a more negative athletic body image, $Z_s > -2.36$, $p_s < .05$, except for muscularity, $Z = -.61$, $p = .54$. For athletes with disordered eating, significant results were found for muscularity, $Z = -2.65$, $p < .01$, in addition to a non-significant trend for appearance, $Z = -1.95$, $p = .052$, indicating that they were more negative about their muscularity in sport and tended to be more negative about their appearance in sport. Moreover, for thin-fat others, significantly higher (read: more negative) scores in sport than in daily life were found, $Z = -2.44$, $p < .05$, but not for thin-fat self, $Z = -1.40$, $p = .16$.

Finally, analyses were conducted to gain insight into the degree to which each of the body images contributed to disordered eating in the athletes. Table 5 shows the correlations between EDE-Q total score and the body image subscales of the CBIQA. Significant correlations were found with daily life

appearance, $r = -.47$, $p < .01$ and daily life thin-fat self, $r = .52$, $p < .01$, indicating relationships between more eating disorder symptomatology and evaluating oneself as less beautiful and more fat in daily life, respectively. For sport, significant relationships were established with appearance, $r = -.51$, $p < .01$, muscularity, $r = .42$, $p < .01$ and thin-fat self, $r = .61$, $p < .01$. In sum, significant and strong relationships were found between the total EDE-Q score with appearance in sport, and with thin-fat self-evaluations in both daily life and sport, while significant moderate relationships were found for the remaining above-mentioned variables.

In Table 6 the results of the standard multiple regression analysis are presented with contextual body image as a predictor of eating disorder symptomatology, measured by the EDE-Q total score. Separate regression analyses showed that daily life body image components explained 43.6%, while athletic body image components explained 63%. In both contexts, significant unique contributions were found for appearance, thin-fat self and thin-fat others. When combining these results into one regression analysis, the included body image variables together explained 68.1% of EDE-Q variance and reached statistical significance, $F(6,42) = 14.975$, $p < .0005$. The adjusted R^2 value was .64. No significant effect was found for BMI and fat percentage, $F(2,37) = .565$, $p = .57$. From Table 6, it can be seen that the largest beta value was $-.75$ for thin-fat self in sport. Besides thin-fat self in sport, thin-fat others in sport also significantly contributed to disordered eating variance. Part correlation coefficients were $-.37$ and $-.30$, respectively, indicating unique contributions of 14 and 9% to the explanation of EDE-Q variance. Thin-fat self in daily life contributed 3% to the equation, but did not reach the significance level of $p < .05$.

Discussion

The purpose of the present study was to gain insight into the role of body image in athletes' disordered eating by taking into account the body image sensitivity to different contexts. Because existing questionnaires were not suitable for measuring the body image of athletes in different contexts, the CBIQA was developed. The present results showed that its validity and reliability appeared to be quite satisfactory. The outcomes of the factor analyses in Study 2 were quite similar to those in the general sample in Study 1,

implicating that it seems quite common to divide athletes' body image into the dimensions appearance, muscularity, and thin/fatness. Although athletes' self-evaluations often equal the perceived opinions of others on thin/fatness, particularly in sport, the results also seemed to illustrate that these could also be treated as two different components, which was already suggested by others (Cash, 2000; Loland, 1999). Future research should include larger samples to investigate whether these findings could be replicated and generalized to other samples (e.g. male athletes, non-athletes, in other countries of origin).

In the present study it was demonstrated that high performance women athletes with disordered eating were significantly more negative about multiple body image components in both contexts than athletes without disordered eating. This is in agreement with the fact that a negative body image is a very potent, well-supported risk factor (Jacobi *et al.*, 2004). Women athletes with disordered eating perceived themselves as fatter than women athletes without disordered eating, yet they did not significantly differ on actual weight characteristics. In addition, although the impact of perceived weight-related opinions of significant others for body image and dieting was clearly evidenced in the present study, as well as in other studies (e.g. Berry & Howe, 2000; Sundgot-Borgen, 1993), in the present study, athletes with disordered eating did not perceive significantly more negative opinions of others either. Nevertheless, they might somehow be more attentive or sensitive to these opinions and weight-related pressures, and subsequently, might have internalized prevailing body ideals to a greater extent. This should be further investigated in future studies, including phenomena such as competitive thinness, and attributing success and failure to issues such as weight, shape or appearance that could be of crucial influence.

Another important framework in this respect is that of social comparison theory (Festinger, 1954). Recently, research has turned to the concept of body comparisons as a mediator between socio-cultural pressures to be thin and body dissatisfaction (van den Berg *et al.*, 2007). Two types of body comparisons seemed highly relevant: Upwards comparisons with better-off individuals, in this case women who meet socio-cultural ideals of attractiveness, which typically leads to negative consequences, and downward comparisons with worse-off persons who do not meet this beauty ideal, which may lead to the opposite (van den Berg *et al.*, 2007).

Following the 'Big Fish Little Pond Effect' (Marsh, 1998), when high performance women athletes compare their thin and lean bodies to that of other average usually worse-off women in daily life more positive body perceptions would be the result. Jansen, Smeets, Martijn, and Nederkoorn (2006) showed that there appears to be a lack of self-serving bias in patients with eating disorders, as they are typically looking at the positive body aspects of others while focusing on the negative body aspects of themselves. This would implicate that athletes with disordered eating who are more dissatisfied about their body in both contexts, disregard opportunities for downward comparisons in daily life while using upward comparisons in sport. Future studies should further explore athletes' body comparisons in daily life and sport, and possible differences between athletes with and without disordered eating in this respect.

The present results also showed that women athletes perceive themselves differently in sport than in daily life. As expected, they appeared to have a more negative athletic body image than daily life body image, although it should also be noted that this was more pronounced for athletes without disordered eating. These results seem to be in agreement with the concept of 'body satisfaction transiency', referring to dynamic and contextual views on body image that athletes often experience different levels of body satisfaction in sport and daily life (Krane *et al.*, 2001; Loland, 1999; Russell, 2004). While previous qualitative studies in so called 'masculine sport types' such as rugby found that women athletes' body satisfaction decreased off the pitch (Follo, 2007; Russell, 2004), we on the other hand came across women athletes who were more positive about their body in daily life than in sport. These differences are likely driven by sport type in relation to cultural beliefs. From a socio-cultural perspective, the athletes in the present study participated in (aesthetic and endurance) sports in which leanness and low weight are considered to be important. Hence, their bodies are representatives of our cultural body ideals and fit within our socially constructed definitions of beauty and femininity (Krane *et al.*, 2001; Loland, 1999; Russell, 2004). In leanness sports, however, women athletes need to struggle to fulfil the stricter bodily demands of their sports culture. Indeed, the present results indicted that while in daily life the perceived opinions of others were towards too thin, in sport the opinions of others were towards too fat, which parallels

the direction of the self-evaluations of the athletes in the successive contexts. Furthermore, it is also known that women are more critical about themselves in situations where their bodies have greater exposure or when they are in body-focused situations (Haimovitz *et al.*, 1992; Tiggemann, 2001), which might be more prevalent in sport, particularly in aesthetic and endurance sports. Not surprisingly, most high performance women athletes in the present study seemed to have a more negative athletic body image than daily life body image.

Moreover, the results showed that the athletic body image strongly contributed to eating disorder symptomatology. More specifically, the athletes' self-evaluations about shape, weight and fat percentage and the perceived opinions of others on these aspects appeared to be only significant factors uniquely explaining 14 and 9% of the EDE-Q variance, respectively. These results support the idea that athletes seem to be specifically driven towards dieting and pathogenic weight control due to the demands of their specific sport and beliefs that 'thin is going to win' (De Bruin *et al.*, 2007; McNulty *et al.*, 2001; Sundgot-Borgen, 1994; Torstveit *et al.*, 2008). It seems as if most athletes have a functional orientation towards their bodies and interpret their bodies, and subsequent dieting behaviours as tools for successful performance (Loland, 1999; Russell, 2004). On the other hand, although these athletic body image components were the only significant factors in the regression model, their contributions turned out to be rather limited. Moreover, thin-fat self-evaluations in daily life also seemed to contribute to the equation although it did not reach significance. When high correlations exist between two independent variables, much shared variance is statistically removed when they are both included in the model. Even though the condition of multicollinearity was met in the present study, the non-significant results of daily life body image components might also have been caused by the overlap between independent variables in the model and subsequent large standard errors (Pallant, 2005; Tabachnick & Fidell, 2007). Subsequently, daily life influences in athletes' disordered eating cannot be excluded with our current research design. Future research should further explore body images in sport and daily life, particularly in athletes with disordered eating.

Limitations of the present study were its sample size and constitution. With larger samples, sample size requirements of statistical analyses would be met more

easily (Tabachnick & Fidell, 2007). Unfortunately, the number of Dutch high performance athletes is not that extensive. In addition, high performance sport in the Netherlands is organized privately and decentralized instead of in college universities or high schools, therefore, athletes are less accessible for research, particularly women athletes suffering from disordered eating who want to come forward for this study. Besides 12 high performance women athletes with disordered eating and their 12 matched controls receiving sport psychological treatment or dietician support, we needed to extend the sample with a group of at-risk athletes who were not professionally diagnosed in advance. Following this procedure could have resulted in the possibility of false negatives in our control group. Yet, the 25% of high performance women aesthetic athletes in the present study who were classified as suffering from disordered eating seem comparable to the numbers found in similar samples (Sundgot-Borgen, 1993; Sundgot-Borgen & Torstveit, 2004). Moreover, the 100% match between the clinical classification of the professionals and our own disordered eating screening results inspires confidence in the appropriateness and reliability of our diagnostic screening procedure.

In conclusion, the present findings of situational effects in body dissatisfaction should not lead to underestimating the role of personal factors in body satisfaction (Tiggemann, 2001). Subjective body evaluation most likely has both stable and dynamic components (Haimovitz *et al.*, 1992; Tiggemann, 2001). High correlations between situations or contexts indicate that there is cross-situational consistency which points towards a more general level of body esteem characteristic of the individual (Tiggemann, 2001). This seems particularly applicable to the athletes with disordered eating as they were more negative about their body in daily life and sport, and showed more congruence between the contexts than athletes without disordered eating. In sum, the contextual body image approach seems to be a promising framework for obtaining a better understanding of eating disorder symptomatology in athletes. At least 64% of the variance was explained by the relevant body image components from daily life and sport. Further investigation needs to take into account dynamic and contextual body image changes. It should also focus more closely on why certain athletes develop a more negative body image and how this could be prevented.

Acknowledgements

We would like to acknowledge Vivian van Schijndel and Marja Leijenhorst (master students) for their valuable research input; the sport psychology colleagues who

allowed me to recruit their clients; the women athletes who were willing to come forward and participated in this study; and Ron A. Thompson and Roberta Trattner Sherman for their support and editorial contributions to this manuscript.

References

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders (4th ed.)*, PSM IV. Washington: American Psychiatric Association.
- Beals, K. A., & Manore, M. M. (1994). The prevalence and consequences of subclinical eating disorders in female athletes. *International Journal of Sport Nutrition*, 4, 175–195.
- van den Berg, P., Paxton, S. J., Keery, H., Wall, M., Guo, J., & Neumark-Sztainer, D. (2007). Body dissatisfaction and body comparison with media images in males and females. *Body Image*, 4, 257–268.
- Berry, T. R., & Howe, B. L. (2000). Risk factors for disordered eating in female university athletes. *Journal of Sport Behavior*, 23, 207–219.
- Brown, J. D. (2006). Male body image: testosterone's response to body comparisons. *Dissertation Psychology*, Texas A & M University.
- Byrne, S., & McLean, N. (2002). Elite athletes: Effects of the pressure to be thin. *Journal of Science and Medicine in Sport*, 5, 80–94.
- Cafri, G., Roehrig, M., & Thompson, J. K. (2004). Reliability assessment of the somatomorphic matrix. *International Journal of Eating Disorders*, 35, 597–600.
- Cash, T. F. (2000). User's Manual for the Multidimensional Body-Self Relations Questionnaire (MBSRQ, 3rd revision). Available at www.body-images.com.
- Cooley, C. H. (1902). *Human Nature and the Social Order*. New York: Scribner's.
- Cooper, Z., Cooper, P. J., & Fairburn, C. G. (1994). The validity of the eating disorder examination and its subscales. *British Journal of Psychiatry*, 154, 807–812.
- De Bruin, A. P. (Karin), Oudejans, R. R. D., & Bakker, F. C. (2007). Dieting and body image in aesthetic sports: A comparison of Dutch female gymnasts and non-aesthetic sport participants. *Psychology of Sport and Exercise*, 8, 507–520.
- Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders*, 16, 363–370.
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7, 117–140.
- Follo, G. (2007). The social and sporting body: Women in rugby and martial arts perceiving their body. *Abstracts of the 3rd Annual 2007 The Drake Conference*, Cleveland State University.
- van Furth, E. F. (2000). *Nederlandse vertaling van de EDE-Q [Dutch translation of EDE-Q]* (Unpublished manuscript). Leidschendam: Robert-Fleury Stichting.
- Garner, D. M. (1991). *Eating disorder inventory—2 professional manual*. Psychological assessment resources. Florida: Odessa.
- Gardner, R. M. (2001). Assessment of body image disturbance in children and adolescents. In J. K. Thompson & L. Smolak (Eds.), *Body image, eating disorders and obesity in youth: Assessment, prevention and treatment* (pp. 193–213). Washington, DC: American Psychological Association.
- Greenleaf, C. (2002). Athletic body image: Exploratory interviews with former female competitive athletes. *Women in Sport and Physical Activity Journal*, 11, 63–88.
- Gruber, A. J., Pope, H. G., Borowiecki, J. J., & Cohane, G. (2000). The development of the somatomorphic matrix: A bi-axial instrument for measuring body image in men and women. In K. Norton, T. Olds, & J. Kollman (Eds.), *Kinanthropometry VI* (pp. 217–231). Adelaide: International Society for the Advancement of Kinanthropometry.
- Haimovitz, D., Lansky, L. M., & O'Reilly, P. (1992). Fluctuations in body satisfaction across situations. *International Journal of Eating Disorders*, 13, 77–84.
- Hausenblas, H. A., & Symons Downs, D. (2001). Comparison of body image between athletes and nonathletes: A meta-analytic review. *Journal of Applied Sport Psychology*, 13, 323–339.
- Jacobi, C., Hayward, C., de Zwaan, M., Kraemer, H. C., & Agras, W. S. (2004). Coming to terms with risk factors for eating disorders: Application of risk terminology and suggestions for a general taxonomy. *Psychological Bulletin*, 130, 19–65.
- Jansen, A. (2000). *Dutch translation of the eating disorder examination*. Lisse: Swets & Zeitlinger.
- Jansen, A., Smeets, T., Martijn, C., & Nederkoorn, C. (2006). I see what you see: The lack of a self-serving body image bias in eating disorders. *British Journal of Clinical Psychology*, 45, 123–135.
- Krane, V., Waldron, J. J., Michalenok, J., & Stiles-ShIPLEY, J. (2001). Body image concerns in female exercisers and athletes: A feminine culture studies perspective. *Women in Sport and Physical Activity Journal*, 10, 17–54.
- Loland, N. W. (1999). Some contradictions and tensions in elite sportsmen's attitudes towards their bodies. *International Review for the Sociology of Sport*, 34, 291–302.
- Luce, K. H., & Crowther, J. H. (1999). The reliability of the Eating Disorder Examination Questionnaire. *International Journal of Eating Disorders*, 25, 349–351.
- Marsh, H. W. (1998). Age and gender effects in physical self-concepts for adolescent elite athletes and nonathletes: A multicohort-multioccasion design. *Journal of Sport & Exercise Psychology*, 20, 237–259.
- McCreary, D. R., & Sasse, D. K. (2000). Exploring the drive for muscularity in adolescent boys and girls. *Journal of American College Health*, 48, 297–304.
- McNulty, K. Y., Adams, C. A., Anderson, J. M., & Affenito, S. G. (2001). Development and validation of a screening tool for disordered eating in female athletes. *Journal of the American Dietetic Association*, 101, 886–892.
- Mintz, L. B., & O'Halloran, M. S. (2000). The eating attitudes test: Validation with DSM-IV eating disorder criteria. *Journal of Personality Assessment*, 74, 489–503.
- Mond, J. M., Hay, P. J., Rogers, B., Owen, C., & Beumont, P. J. (2004). Validity of eating disorder examination questionnaire in screening for eating disorders in community samples. *Behaviour Research and Therapy*, 42, 551–567.
- Nagel, D. L., Black, D. R., Leverenz, L. K., & Coster, D. C. (2000). Evaluation of a screening test for female college athletes with eating disorders and disordered eating. *Journal of Athletic Training*, 35, 431–440.
- Ottis, C. L., Drinkwater, B., Johnson, M. M. D., Loucks, A., & Wilmore, J. (1997). American College of Sports Medicine position stand: The female athlete triad. *Medicine and Science in Sports and Exercise*, 29, i–xi.
- Pallant, J. (2005). *SPSS. Survival manual. A step by step guide to data analysis using SPSS version 12 (2nd ed.)*. Maidenhead: Open University Press.
- Richards, G. E., & Marsh, H. W. (2006). *Physical Self-concept as an important outcome in physical education classes: Evaluation of the usefulness in physical education of three Physical Self-Concept Measures utilizing a database of Australian and Israeli Students*. The

- Australian Association for Research in Education, Papers 2005.
- Ricciardelli, L. A., & McCabe, M. P. (2000). *Psychometric evaluation of the body image and body change inventory: An assessment instrument for adolescent boys and girls* (Unpublished manuscript). Melbourne: Deakin University.
- Russell, K. M. (2004). On versus off the pitch: The transiency of body satisfaction among female rugby players, cricketers, and netballers. *Sex Roles, 9* /10, 561–574.
- Sherman, R. T., DeHass, D., Thompson, R. A., & Wilfert, M. (2005). NCAA coaches survey: The role of the coach in identifying and managing athletes with disordered eating. *Eating Disorders: The Journal of Treatment and Prevention, 13*, 447–466.
- Smolak, L., Murnen, S. K., & Ruble, A. E. (2000). Female athletes and eating problems: A meta-analysis. *International Journal of Eating Disorders, 27*, 371–380.
- Stevens, J. (1996). *Applied multivariate statistics for the social sciences*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Sundgot-Borgen, J. (1993). Prevalence of eating disorders in elite female athletes. *International Journal of Sports Nutrition, 3*, 29–40.
- Sundgot-Borgen, J. (1994). Risk and trigger factors for the development of eating disorders in female elite athletes. *Medicine and Science in Sports and Exercise, 26*, 414–419.
- Sundgot-Borgen, J., & Torstveit, M. K. (2004). Prevalence of eating disorders in elite athletes is higher than in the general population. *Clinical Journal of Sport Medicine, 14*, 25–32.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (4th ed.). Needham Heights, MA: Allyn & Bacon.
- Tiggemann, M. (2001). Persons x situation interactions in body dissatisfaction. *International Journal of Eating Disorders, 29*, 65–70.
- Torstveit, M. K. (2004). The female athlete triad in Norwegian elite athletes and non-athletic controls. Identification and prevalence of disordered eating, menstrual dysfunction and osteoporosis. *Dissertation from the Norwegian University of Sport and Physical Education*.
- Torstveit, M. K., Rosenvinge, J. H., & Sundgot-Borgen, J. (2008). Prevalence of eating disorders and the predictive power of risk factor models in female elite athletes: A controlled study. *Scandinavian Journal of Medicine & Science in Sports, 18*, 108–118.
- Wilfley, D. E., Schwartz, E. B., Spurrell, E. B., & Fairburn, C. G. (1997). Assessing the specific psychopathology of binge eating disorder patients: Interview or self-report? *Behaviour Research and Therapy, 35*, 1151–1159.
- Williamson, D. A., Netemeyer, R. G., Jackman, L. P., Anderson, D. A., Funsch, C. L., & Ralabais, J. Y. (1995). Structural equation modeling of risk factors for the development of eating disorder symptoms in female athletes. *International Journal of Eating Disorders, 17*, 387–393.
- Ziegler, P. J., Khoo, C. S., Sherr, B., Nelson, J. A., Larson, W. M., & Drenowski, A. (1998). Body image and dieting behaviors among elite figure skaters. *International Journal of Eating Disorders, 24*, 421–427.

Appendix 1: Contextual Body Image Questionnaire for Athletes (CBIQA)

The next questions deal with how satisfied you are with your body and your appearance. There are no true or false answers. Do not think too long about your answers and do not skip any questions.

	In daily life, ... or Concerning my sport, ...	Very ugly	Ugly	Somewhat Ugly	Neither, ugly, nor beautiful	Somewhat Beautiful	Beautiful	Very beautiful
a	I think my appearance is:*	1	2	3	4	5	6	7
b	I think my appearance compared to others is:	1	2	3	4	5	6	7
c	others think my appearance is:	1	2	3	4	5	6	7
	In daily life, ... or Concerning my sport, ...	Much too thin	Too thin	Somewhat too thin	Neither too thin, nor too fat	Somewhat too fat	Too fat	Much too fat
a	I think my body shape is:	1	2	3	4	5	6	7
b	I think my body shape compared to others is:	1	2	3	4	5	6	7
c	others think my body shape is:	1	2	3	4	5	6	7
	In daily life, ... or Concerning my sport, ...	Much too unmuscular	Too unmuscular	Somewhat unmuscular	Neither too unmuscular, nor too muscular	Somewhat too muscular	Too muscular	Much too muscular
a	I think the muscularity of my body is:	1	2	3	4	5	6	7
b	I think the muscularity of my body compared to others is:	1	2	3	4	5	6	7
c	others think the muscularity of my body is:	1	2	3	4	5	6	7
	In daily life, ... or Concerning my sport, ...	Much too low	Too low	Somewhat too low	Neither too low, nor too high	Somewhat too high	Too high	Much too high
a	I think my body weight is:	1	2	3	4	5	6	7
a	I think my fat percentage is:	1	2	3	4	5	6	7
b	I think my body weight compared to others is:	1	2	3	4	5	6	7
b	I think my fat percentage compared to others is:	1	2	3	4	5	6	7
c	others think my body weight is:	1	2	3	4	5	6	7
c	others think my fat percentage is:	1	2	3	4	5	6	7

a, own perception; b, own perception compared to others; c, perceived opinion of others.

*The original Dutch verb 'vinden' refers to both to think and to feel.