

Table S1. Description of questionnaires and scoring/cut-off values used.

	Reference article(s)	Description	Scoring / cut-off values
Low Energy Availability in Females Questionnaire (LEAF-Q)	(1)	The 25-item questionnaire screens for physiological symptoms of low energy availability in females. Composed of questions related to injuries, gastrointestinal- and menstrual function. Initially developed and validated in 18-39 year old endurance athletes (Cronbach's $\alpha = 0.71$).	Total score ≥ 8 has been used as cut-off in various athletic populations. Subscales are described in table S2.
Low Energy Availability in Males Questionnaire (LEAM-Q)	(2)	Development and validation attempted in a study conducted on 18-50 year old elite and sub-elite male athletes from various sports. Initial version of LEAM-Q was composed of questions related to dizziness, gastrointestinal function, thermoregulation at rest, health problems interfering with training or competition plans, well-being and recovery (fatigue, fitness, sleep, recovery, energy levels, sex drive). Only sex drive could distinguish between LEA/REDs cases vs. non-cases.	Scoring currently limited to sex drive, based on four questions related to sex drive in general and frequency of morning erections (see table S2).
Eating Disorder Examination – Questionnaire Short (EDE-QS)	(3, 4)	Short version (12 items) of the Eating Disorder Examination Questionnaire (EDE-Q) (5). The scale asks about how often in the past 7 days symptoms or feelings were experienced. Has been shown to have good psychometric properties and perform similarly to EDE-Q.	A cut-off score of 15 has been applied in both athletic and non-athletic populations.
Exercise Addiction Inventory (EAI)	(6)	Six-item questionnaire based on a 5-point likert scale where statements are rated from 'Strongly disagree' to 'Strongly agree'. Compared to other available instruments, EAI is thought to be most appropriate for early detection of exercise addiction in athletic populations (7-9) and has been used in recent studies on REDs (10).	Score ≥ 24 indicates a risk of exercise addiction, 13-23 some symptoms, and 6-12 no symptoms.
Muscle Dysmorphic Disorder Inventory (MDDI)	(11)	Consists of 13 items addressing drive for size, appearance intolerance, and functional impairment, and serves as a screening tool for muscularity concerns and muscle dysmorphia. Based on a 5-point likert scale, ranging from 'Never' to 'Always'. This instrument has mostly been used in research on bodybuilders, power- and olympic lifters, and gym-goers (12, 13).	A cut-off score of 39 has been used to discriminate between those at risk of muscle dysmorphia vs not.

Table S2. Description of the LEAF-Q and LEAM-Q subscale/categories.

Questionnaire	Subscales	Description, incl. cut-offs (if available)
LEAF-Q (1)	Injury	Two multiple-choice questions regarding number and duration of absences from training or competition in the last year (12-months) due to injuries fall under the scoring. Subscore cut-off: ≥ 2
	Gastrointestinal function	Four multiple-choice questions regarding gastrointestinal discomfort not related to menstruation, stools and bowel movements frequency fall under the scoring. Subscore cut-off: ≥ 2
	Menstrual function and contraceptive use	Fourteen multiple-choice questions regarding menstrual function/history and contraceptive use fall under the scoring. Subscore cut-off: ≥ 4
Categories derived from LEAM-Q (2)		Validated cut-offs currently lacking for LEAM-Q.
	Dizziness	Two multiple-choice questions: 1) Do you feel dizzy when you rise quickly? 2) Do you experience problems with vision?
	Gastrointestinal function	Four multiple-choice questions that resemble the gastrointestinal questions in LEAF-Q.
	Thermoregulation at rest	Two multiple-choice questions: 1) Are you very cold even when you are normally dressed? 2) Do you dress more warmly than your companions regardless of the weather?
	Health problems interfering with training or competition plans <i>(Females in the present study did not answer those questions)</i>	Three fill in the blanks questions about number of acute and overload injuries, and breaks taken due to injuries in the past six months. One multiple choice question on how many days in a row, at the most, the athlete had been absent from training/competition or not able to perform optimally due to i) acute injury, ii) overload injury and iii) illness during the past six months.
	Fatigue	Five statements with multiple choice options: 1) I feel tired from work/school, 2) I feel overtired, 3) I'm unable to concentrate well, 4) I feel lethargic, 5) I put off making decisions.
	Fitness	Seven statements with multiple choice options: 1) Parts of my body are aching, 2) My muscles feel stiff or tense during training, 3) I have muscle pain after performance, 4) I feel vulnerable to injuries, 5) I have a headache, 6) I feel physically exhausted, 7) I feel strong and am making good progress with my strength training.
	Sleep	Five statements with multiple choice options: 1) I get enough sleep, 2) I fall asleep satisfied and relaxed, 3) I wake up well rested, 4) I sleep restlessly, 5) My sleep is easily interrupted.
Recovery	Four statements with multiple choice options: 1) I recover well physically, 2) I'm in good physical shape, 3) I feel I am achieving the progress in training and competition that I deserve, 4) My body feels strong.	

Energy levels	Four statements with multiple choice options: 1) I feel very energetic in general, 2) I feel invigorated for training sessions and ready to perform well, 3) I feel happy and on top of my life outside sport, 4) I feel down and less happy than I used to feel or would like to feel.
Sex drive Scoring shown in red based on available scoring key from Lundy B et al. (2); “Low sex drive is identified when 2 or more is scored on A1 OR 2 or more is scored on B1 AND 2 or more is scored on B1 and 1 or more on B2”	Four statements: A1) I would rate my sex drive as [high(0)/moderate(1)/low(2)/I don't have much interest in sex(3)], A2) Over the last month I would rate my sex drive as [stronger than usual(0)/about the same(0)/a little less than usual(1)/much less than usual(2)], B1) Morning erections over the last month; [5-7 per week(0)/3-4 a week(0)/1-2 a week(1)/Rarely or never (2)], B2) Compared to what you would consider normal for you is this [more often(0)/about the same(0)/a little less often(1)/much less often(2)].

LEAF-Q: Low Energy Availability in Females Questionnaire, LEAM-Q: Low Energy Availability in Males Questionnaire, REDs: Relative Energy Deficiency in Sport.

References (Tables S1 and S2)

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Table S3. Distribution of female and male participants between sport groups. Frequencies, n(%) shown for all participants and based on high vs. low total LEAF-Q score for females.

Females			
	All (n=56)	Total LEAF-Q ≥8 (n=26)	Total LEAF-Q <8 (n=30)
Aesthetic	8 (14.3)	5 (19.2)	3 (10.0)
Ball	24 (42.9)	13 (50.0)	11 (36.7)
Endurance	14 (25.0)	6 (23.1)	8 (26.7)
Power	3 (5.4)	0 (0)	3 (10.0)
Weight-class	7 (12.5)	2 (7.7)	5 (16.7)
Males			
	All (n=27)		
Aesthetic	4 (14.8)		
Ball	7 (25.9)		
Endurance	8 (29.6)		
Power	4 (14.8)		
Weight-class	4 (14.8)		

Aesthetic: ballroom-dancing, gymnastics, figure skating, ballet; Ball: football, handball, basketball, volleyball, badminton, table tennis; Endurance: middle to long distance running, swimming, cycling, triathlon; Power: Sprinting, throwing and jumping events, alpine skiing; Weight-class: Powerlifting, olympic lifting, wrestling, judo, taekwondo, karate, Brazilian jiu jitsu. LEAF-Q: Low Energy Availability in Females Questionnaire.

Table S4. Number of years participants had trained and competed at the current level. Data shown as frequencies n(%) for female and male participants and based on high vs. low total LEAF-Q score for females.

Females			
	All (n=56)	Total LEAF-Q ≥8 (n=26)	Total LEAF-Q <8 (n=30)
>5 years	23 (41.1%)	11 (42.3%)	12 (40.0%)
3-5 years	13 (23.2%)	6 (23.1%)	7 (23.3%)
1-3 years	19 (33.9%)	9 (34.6%)	10 (33.3%)
<1 year	1 (1.8%)	0	1 (3.3%)
Males			
	All (n=27)		
>5 years	12 (44.4%)		
3-5 years	5 (18.5%)		
1-3 years	7 (25.9%)		
<1 years	3 (11.1%)		

Low Energy Availability in Females Questionnaire.

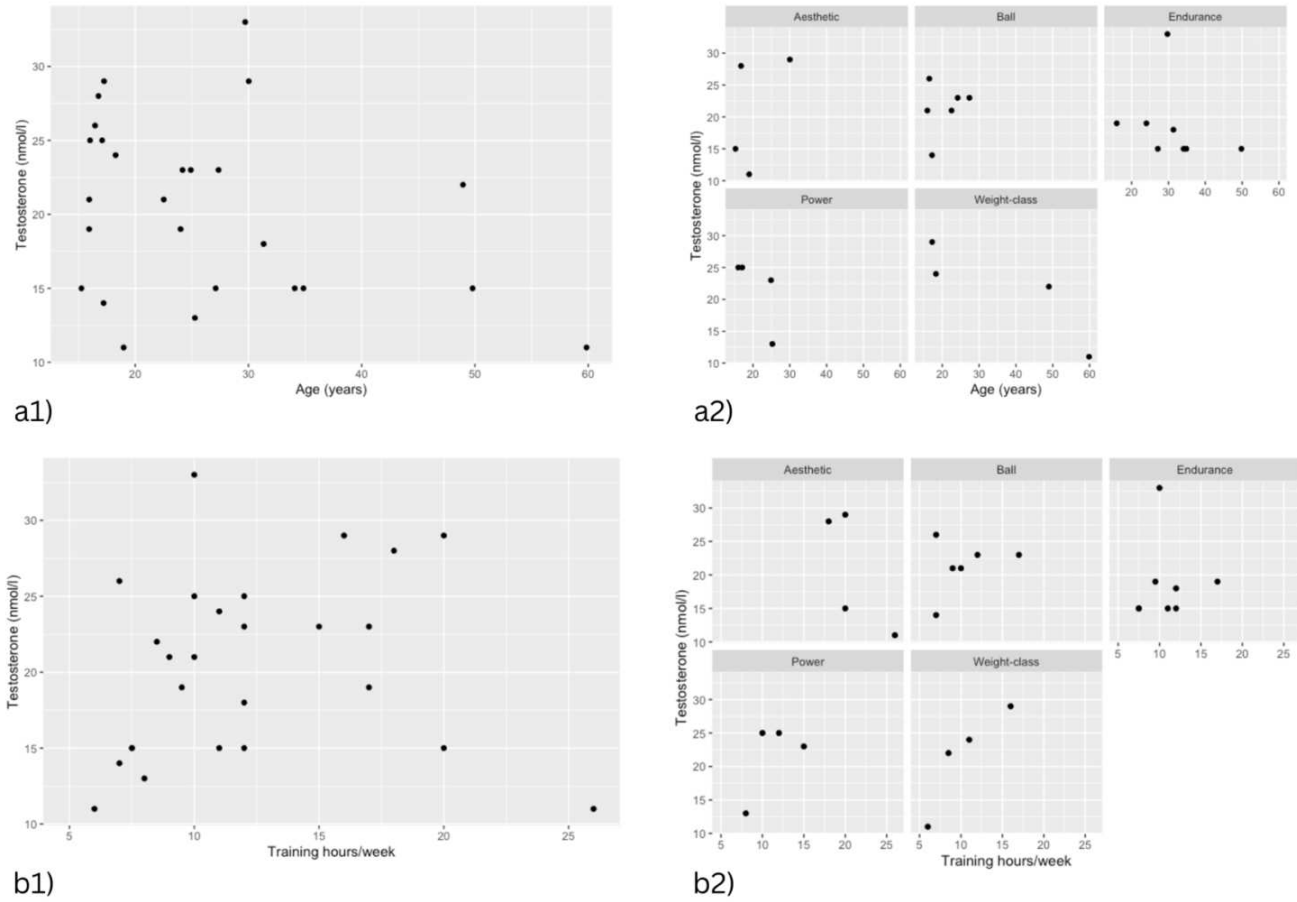


Figure S1. Distribution of serum testosterone levels in relation to age (a1) and self reported training hours (b1). Distribution within sport groups are presented in a2-b2.

On how many of the past 7 days....

1. Have you been deliberately trying to limit the amount of food you eat to influence your weight or shape (whether or not you have succeeded)?
2. Have you gone for long periods of time (e.g., 8 or more waking hours) without eating anything at all in order to influence your weight or shape?
3. Has thinking about food, eating or calories made it very difficult to concentrate on things you are interested in?
4. Has thinking about your weight or shape made it very difficult to concentrate on things you are interested in?
5. Have you had a definite fear that you might gain weight?
6. Have you had a strong desire to lose weight?
7. Have you tried to control your weight or shape by making yourself sick (vomit) or taking laxatives?
8. Have you exercised in a driven or compulsive way as a means of controlling your weight, shape or body fat, or to burn off calories?
9. Have you had a sense of having lost control over your eating (at the time you were eating)?
10. On how many of these days (i.e. days on which you had a sense of having lost control over your eating) did you eat what other people would regard as unusually large amount of food in one go?



Over the past 7 days....

11. Has your weight or shape influenced how you think about (judge) yourself as a person?
12. How dissatisfied have you been with your weight or shape?



Figure S2. Frequency of responses to items on the Eating Disorder Examination – Questionnaire Short (EDE-QS). Participants (n=83) rated the first 10 items on a 4-point scale from '0 days' to '6-7 days' (score 0-3) and last two items on a scale from 'Not at all' to 'Markedly' (score 0-3). Score ≥ 15 indicates a risk of eating disorders

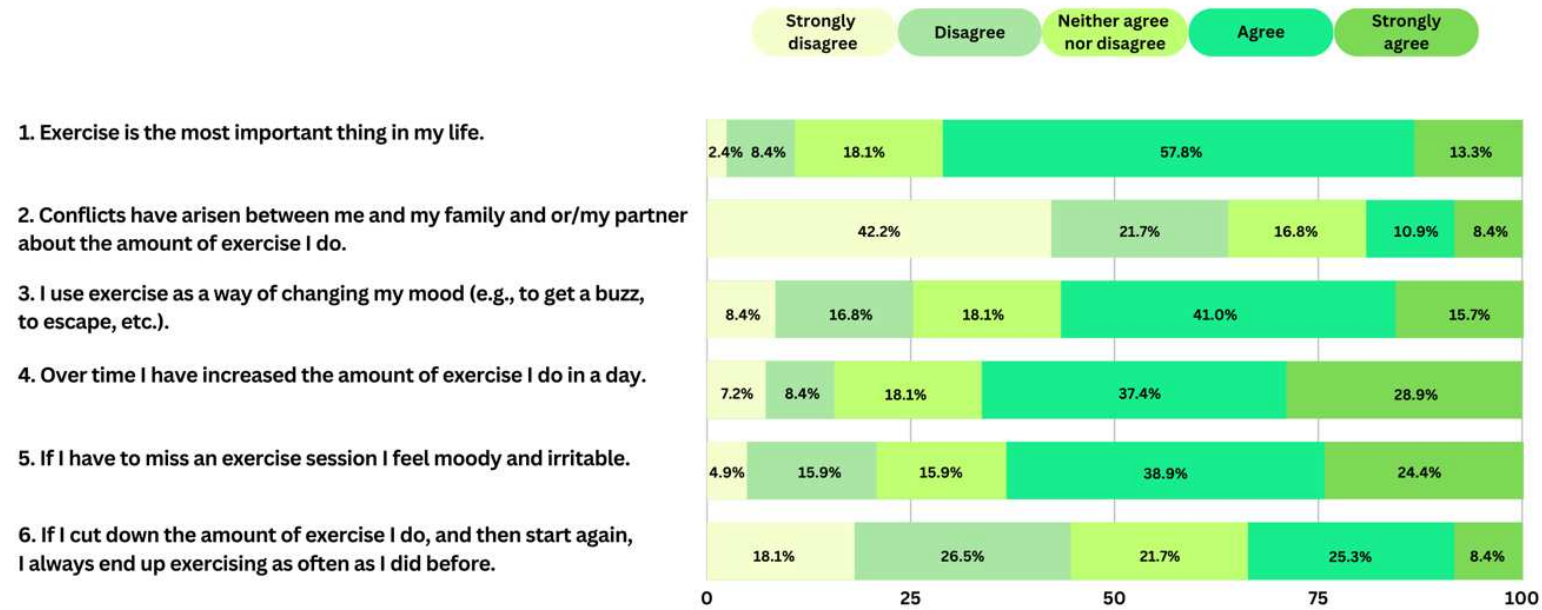


Figure S3. Frequency of responses to statements on the Exercise Addiction Inventory (EAI). Participants (n=83) rated each statement on a 5-point scale from 'Strongly disagree' to 'Strongly agree' (score 1-5). Score ≥ 24 indicates a risk of exercise addiction, 13-23 some symptoms, and 6-12 no symptoms



Figure S4. Frequency of responses to statements on the Muscle Dysmorphic Disorder Inventory (MDDI). Participants (n=83) rated each statement on a 5-point scale from 'Never' to 'Always' (score 1-5). Score ≥ 39 indicates a risk of muscle dysmorphia.