



(Supplemental Digital Content 1)

The LEAF-Q

A questionnaire for female athletes

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The low energy availability in females questionnaire (LEAF –Q), focuses on physiological symptoms of insufficient energy intake. The following pages contain questions regarding injuries, gastrointestinal and reproductive function. We appreciate you taking the time to fill out the LEAF-Q and the reply will be treated as confidential.

Name: \_\_\_\_\_

Address: \_\_\_\_\_

E-mail: \_\_\_\_\_

Cell phone: \_\_\_\_\_

Sport: \_\_\_\_\_

• How old were you when you began to specialize in your sport?: \_\_\_\_\_ age

• What level of athlete are you?

Club ☐

National team ☐

Professional ☐

Other ☐

• Are you a full-time athlete? Yes ☐ No ☐

• If not, what occupation do you have beside your sport?

Full time job ☐

Part time job ☐

Student ☐

Other ☐

• What is your maximal oxygen consumption ( $\text{Vo}_2\text{max}$ )?

\_\_\_\_\_ ml/kg/min or

\_\_\_\_\_ l/min

I do not know/I have never measured it ☐

- Your best results at World Championship, Olympic Games or World Cup?
  - 1<sup>st</sup> to 3<sup>rd</sup> place ☐
  - 4<sup>th</sup> to 6<sup>th</sup> place ☐
  - 7<sup>th</sup> to 10<sup>th</sup> place ☐
  - 11<sup>th</sup> place or lower ☐
  - I have never competed at this level ☐
  - I don't remember ☐

- Your normal amount of training in the preparation or basic period (not competition) on **average per month**:

\_\_\_\_\_ hours/month

- Age: \_\_\_\_\_ (years)
- Height: \_\_\_\_\_ (cm)
- Present weight: \_\_\_\_\_ (kg)
- Your highest weight with your present height: \_\_\_\_\_ (kg)

- Your lowest weight with your present height: \_\_\_\_\_ (kg)

Commented [AM1]: Used to calculate weight fluctuation.

- What is your preferred body weight during competition? \_\_\_\_\_ (kg)
- What is your body fat percentage (if it has been measured)? \_\_\_\_\_ (%)
- Chronic illness (e.g. diabetes, Crohn's Disease)?  
Yes ☐ No ☐
- If yes, which one (s)?

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- Food allergy or intolerance (e.g. nut allergy, celiac disease, lactose intolerance)?  
Yes ☐ No ☐
  - If yes, which one (s)?
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## 1. Injuries

Mark the response that most accurately describes your situation

**A:** Have you had absences from your training, or participation in competitions during the last year due to injuries?

☐ No, not at all ☐ Yes, once or twice ☐ Yes, three or four times ☐ Yes, five times or more

**A1:** If yes, for how many days absence from training or participation in competition due to injuries have you had in the last year?

☐ 1-7 days ☐ 8-14 days ☐ 15-21 days ☐ 22 days or more

**A2.1:** If yes, have you had a bone stress injury? Yes ☐ No ☐

If yes, specify how many \_\_\_\_\_

Specify the location(s): femoral neck ☐ total hip ☐ sacrum ☐ pelvis ☐ other site(s) ☐

**A2.2:** If yes, have you had other types over load injuries? Yes ☐ No ☐

If yes, specify how many and location? \_\_\_\_\_

**A2.3:** If yes, have you had an acute injury? Yes ☐ No ☐

If yes, specify how many and location? \_\_\_\_\_

**Commented [AM2]:** A: No = 0, Yes, 1-2 = 1, Yes, 3-4 = 2, Yes, 5 or more = 3

A1: 1-7 = 1, 8-14 = 2, 15-21 = 3, 22 or more = 4

A score  $\geq 2$  is associated with low BMD (Melin et al., 2014; Rogers et al., 2022)

A2.1: yes = 1, No = 0

If location specified as femoral neck or total hip, sacrum, or pelvis = 2, if other site = 1

A2.2: yes = 1, No = 0

A2.3: yes = 0, No = 0

## 2. Gastro intestinal function

**A:** Do you feel gaseous or bloated in the abdomen, also when you do not have your period?

☐ Yes, several times a day ☐ Yes, several times a week

☐ Yes, once or twice a week or more seldom ☐ Rarely or never

**B:** Do you get cramps or stomach ache which cannot be related to your menstruation?

☐ Yes, several times a day ☐ Yes, several times a week

☐ Yes, once or twice a week or more seldom ☐ Rarely or never

**C:** How often do you have bowel movements on average?

☐ Several times a day ☐ Once a day ☐ Every second day

☐ Twice a week ☐ Once a week or more rarely

**D:** How would you describe your normal stool?

☐ Normal (soft) ☐ Diarrhoea-like (watery) ☐ Hard and dry

Comments regarding gastrointestinal function: \_\_\_\_\_

**Commented [AM3]:** A: Rarely or never = 0, 1-2/week = 1, Yes, several times a week = 2, Yes several times a day = 3

B: Rarely or never = 0, 1-2/week = 1, Yes, several times a week = 2, Yes several times a day = 3

C: Once a day = 0, Several times a day = 1, Every second day = 2, Twice a week = 3, Once a week or more rarely = 4

D: Normal = 0, Diarrhea = 1, Hard and Dry = 2

GI-Score  $\geq 2$  associated to low A (Melin et al., 2014), but not associated with low RMR (Rogers et al., 2022). GI score strongly associated to DE in both male and female athletes with DE.

## 3. Menstrual function and use of contraceptives

## 3.1 Contraceptives

Mark the response that most accurately describes your situation

A: Do you use oral contraceptives?

☐ Yes
                         
 ☐ No

A1: If yes, why do you use oral contraceptives?

☐ Contraception
                         
 ☐ Reduction of menstruation pains
                         
 ☐ Reduction of bleeding

☐ To regulate the menstrual cycle in relation to performances etc..

☐ Otherwise menstruation stops

☐ Other \_\_\_\_\_

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A2: If no, have you used oral contraceptives earlier?

☐ Yes
                         
 ☐ No

A2:1 If yes, when and for how long? \_\_\_\_\_

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B: Do you use any other kind of hormonal contraceptives? (e.g. hormonal implant or coil)

☐ Yes
                         
 ☐ No

B1: If yes, what kind?

☐ Hormonal patches
                         
 ☐ Hormonal ring
                         
 ☐ Hormonal coil
                         
 ☐ Hormonal implant
                         
 ☐ Other

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Commented [AM4]: A: Otherwise menstruation stops =1

If hormonal contraceptive use, the rest of the MD items should not be scored unless you are interested in earlier primary and secondary FHA.

In the latest study, I have used the Rogers validation in multiple sport disciplines: LEAF-Q total score  $\geq 8$  and injury score  $\geq 2$  for those using hormonal contraceptive, and LEAF-Q total score  $\geq 8$  and injury score  $\geq 2$  and MD score  $\geq 4$  for those not using hormonal contraceptive to categorize athletes with symptoms of LEA.

MD variable cannot be scored if subjects are <15 years

## 3.2 Menstrual function

Mark the response that most accurately describes your situation

A: How old were you when you had your first period?

☐ 11 years or younger    ☐ 12-14 years    ☐ 15 years or older    ☐ I don't remember

☐ I have never menstruated (If you have answered "I have never menstruated" there are no further questions to answer)

**Commented [AM5]:** A: 11 years=0, 12-14 years =0, 15 years =1, I do not remember=0, I have never =8

B: Did your first menstruation come naturally (by itself)?

☐ Yes    ☐ No    ☐ I don't remember

**Commented [AM6]:** Yes=0, No=2, I do not remember=1

B1: If no, what kind of treatment was used to start your menstrual cycle?

☐ Hormonal treatment    ☐ Weight gain  
☐ Reduced amount of exercise    ☐ Other

**Commented [AM7]:** C: Yes=0, No=1, I do not know=1

C1: If yes, when was your last period?

0-4 weeks ago (=0), 1-2 months ago (=1), 3-4 months ago (=2), 5-6 months ago (=3), 12 months ago or more (=4)

**Also C6:** If "No" or "I do not remember", when did you have your last period?

1-2 months ago (=0), 3-4 months ago (=1), 5-6 months ago (=2), more than 6 months ago (=3), 12 months ago or more (=4)

C2: If yes, are your periods regular? (Every 28<sup>th</sup> to 34<sup>th</sup> day)
☐ Yes, most of the time=0

☐ No, mostly not=1

C3: If yes, for how many days do you normally bleed?

☐ 1-2 days=1    ☐ 3-4 days=0    ☐ 5-6 days=0    ☐ 7-8 days=0    ☐ 9 days or more=0

**C4:** If yes, have you ever had problems with heavy menstrual bleeding?

☐ Yes=0    ☐ No=0

**C5:** If yes, how many periods have you had during the last year?

☐ 12 or more=0    ☐ 9-11=1    ☐ 6-8=2    ☐ 3-5=3    ☐ 0-2=4

☐ Yes, most of the time    ☐ No, mostly not

C: Do you have normal menstruation?

☐ Yes    ☐ No (go to question C6)    ☐ I don't know (go to question C6)

C1: If yes, when was your last period?

☐ 0-4 weeks ago    ☐ 1-2 months ago    ☐ 3-4 months ago    ☐ 5-6 months ago    ☐ more than 6 months ago  
☐ 12 months ago or more
C2: If yes, are your periods regular? (Every 28<sup>th</sup> to 34<sup>th</sup> day)
☐ Yes, most of the time    ☐ No, mostly not

C3: If yes, for how many days do you normally bleed?

☐ 1-2 days    ☐ 3-4 days    ☐ 5-6 days    ☐ 7-8 days    ☐ 9 days or more

C4: If yes, have you ever had problems with heavy menstrual bleeding?

☐ Yes    ☐ No

C5: If yes, how many periods have you had during the last year?

☐ 12 or more    ☐ 9-11    ☐ 6-8    ☐ 3-5    ☐ 0-2

To categorize:

**Primary FHA 3.2.** A: I have never menstruated for climbers >15 years.

**Secondary FHA 3.2.** C: Do you have normal menstruation?

Yes + C.1: If yes, when was your last period?

3-4 months ago or 5-6 months ago or 12 months ago or more (severe) and/or C5 How many periods have you had the last year? 6-8 (secondary indicator) or 3-5 or 0-2

Or

**C6:** If "No" or "I do not remember", when did you have your last period?

3-4 months ago or 5-6 months ago or more than 6 months ago, or 12 months ago or more (severe)

## 3.2 Menstrual function

Mark the response that most accurately describes your situation

C6: If no or "I don't remember", when did you have your last period?

- ☐ 1-2 months ago      ☐ 3-4 months ago      ☐ 5-6 months ago  
☐ more than 6 months ago      ☐ 12 months ago or more  
☐ I'm pregnant and therefore do not

D: Have your periods ever stopped for 3 consecutive months or longer (besides pregnancy)?

- ☐ No, never      ☐ Yes, it has happened before      ☐ Yes, that's the situation now

E: Do you experience that your menstruation changes when you increase your exercise intensity, frequency or duration?

- ☐ Yes      ☐ No

E1: If yes, how? (Check one or more options)

- ☐ I bleed less      ☐ I bleed fewer days      ☐ My menstruations stops  
☐ I bleed more      ☐ I bleed more days

**Commented [AM8]:** C6: 1-2 months ago =0, 3-4 months=1, 5-6 months=2, more than 6 months ago=3, more than 12 months ago = 4  
Pregnancy=0

D: No, never=0, Ye, before=1, Yes, now=2

E: Yes=1, No=0

E1: all but I bled more and I bleed more days generates =1

A MD score  $\geq 4$  is associated with clinically verified oligomenorrhea and FHA (Melin et al., 2014, Roger et al, 2021). However, I normally do not use the scores but use Pri FHA (late menarche), C1=3-4 months ago or more and/or C5: 6-8 bleedings/year or less and/or C6 (3-4 months or longer) to categorize MD.