AIM OF THE STUDY

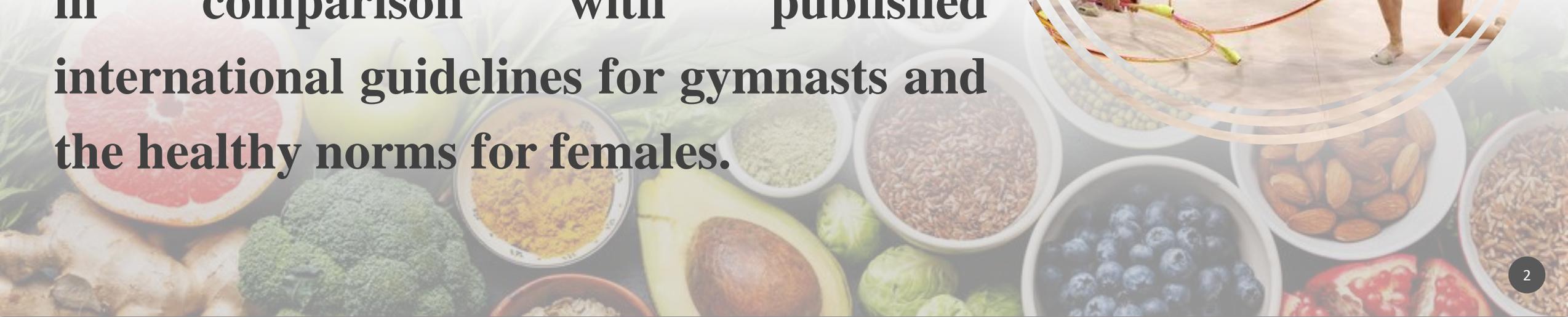The purpose of this study was to assess the body composition and nutrient intake of top level Olympic and elite rhythmic gymnasts from Bulgaria, in comparison with published international guidelines for gymnasts and the healthy norms for females.

METHODS

Participants

21 elite rhythmic gymnasts

from the Bulgarian National Team

- **First National Team** (2016 Olympic bronze medallists, n=5, mean age 24.2 ± 2.7);

- **Second National Team** (2017 World Silver and 2018 World Gold Medallists, n=8, age: 17.8 ± 2.4);

- **Junior National Team** (n=8, mean age 12.6 ± 0.5).

BODY COMPOSITION

The measurements were conducted at the National Centre of Sports Medicine in Sofia, Bulgaria

- Height, weight, circumferences and skinfolds were measured

METHODS

BODY COMPOSITION

BMI and **percentile scores** of height, weight and BMI were computed, by using specialised WHO software.

- **%Body fat** was determined by using Slaughter's (1988) equations for female adolescents and Jackson & Pollock's (1980) equation for women.

- **%Muscle mass** was calculated by using Poortmans et al's (2005) & Lee et al's (2000) equations.

NUTRITIONAL ASSESSMENT

Food frequency questionnaire was applied.

Based on the results, the relative energy needs and energy intake, RPI, RCI, RFI, and the energy contribution of protein, carbohydrates and fat were calculated.

METHODS

WEIGHT MANAGEMENT

1. For how much time before a competition do you follow a strict diet?

2. Which nutrients do you avoid in your diet?

3. What methods do you apply for dehydration?

4. What other methods do you apply to reduce your body weight?

5. Where do you get information on diet and weight management from before a competition?

6. For how many days after a competition do you allow yourself a free nutritional regimen?

STATISTICAL ANALYSES

The statistical analyses were conducted with SPSS Statistics 19 software, using descriptive statistics and One-way ANOVA with the Bonferroni *post hoc* test.

The data is presented as mean ± SD.

RESULTS & DISCUSSION
ANTHROPOMETRIC PARAMETERS

	First National Team (FNT) n=5	Second National Team (SNT) n=8	Junior National Team (JNT) n=8
Age (years)	**24.2** ± 2.7 BC	**17.8** ± 2.4 C	**12.6** ± 0.5
Sports experience (years)	**18.4** ± 1.1 BC	**13.3** ± 2.1 C	**7.3** ± 1.9
Height (cm)	**172.0** ± 4.1 C	**169.1** ± 3.0 C	**155.3** ± 4.4
Weight (kg)	**54.6** ± 2.4 C	**52.4** ± 2.7 C	**38.1** ± 4.3
Ideal weight (kg)	**53.4** ± 3.4 C	**51.4** ± 2.0 C	**37.4** ± 3.7
BMI (kg/cm^2)	**18.5** ± 0.4 C	**18.2** ± 0.6 C	**15.8** ± 1.1
BMI percentile score		**14.2** ± 7.6	**8.7** ± 7.5

B – $p < 0.001$ vs Second National Team; C – $p < 0.001$ vs Junior National Team

RESULTS & DISCUSSION

EQUATION FOR DETERMINING THE IDEAL WEIGHT IN GYMNASTS

Ideal Weight = Height (cm) - 118

RESULTS & DISCUSSION

% BODY FAT AND MUSCLE MASS

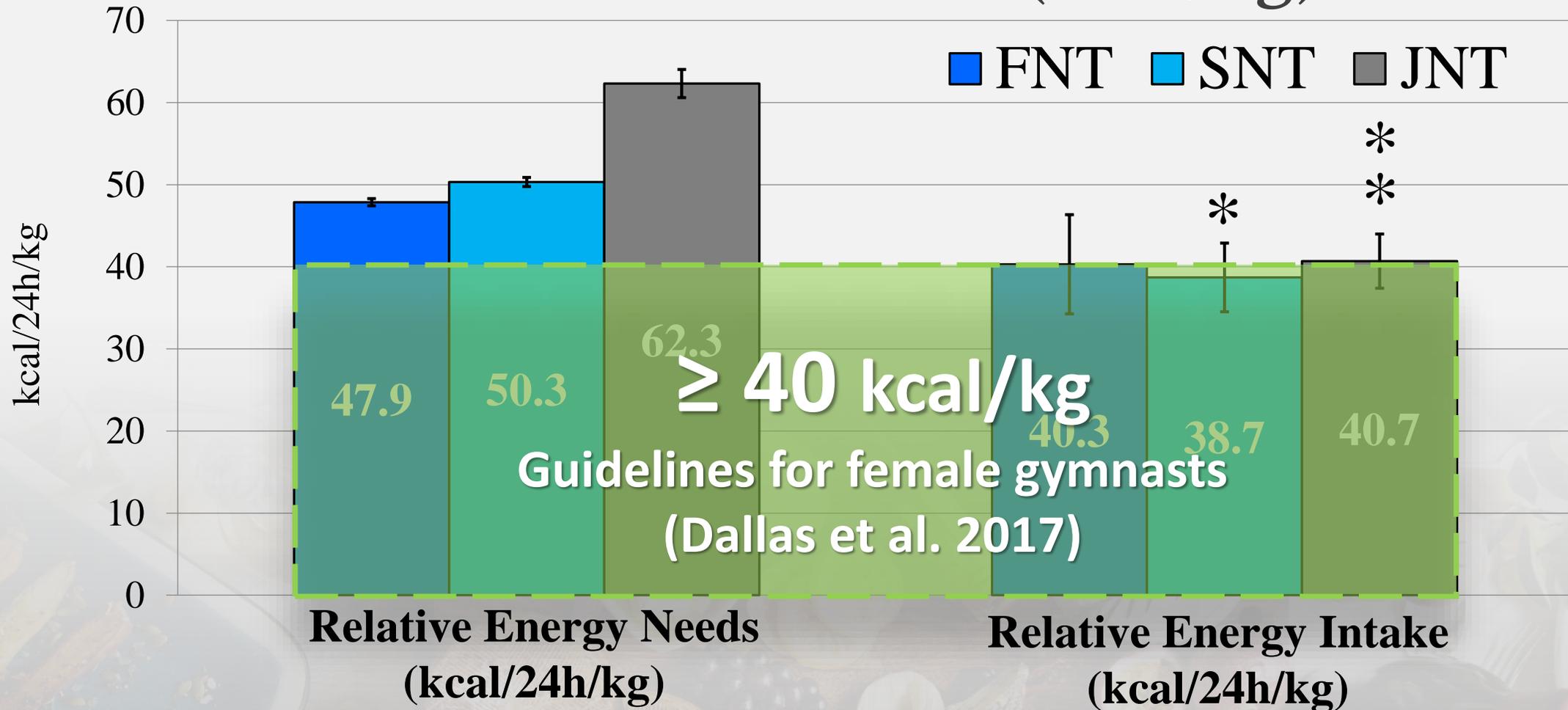|	First National Team (FNT) n=5	Second National Team (SNT) n=8	Junior National Team (JNT) n=8
%BF	13.9 ± 6.8	17.0 ± 5.6	15.6 ± 2.2
percentile score	14.3 ± 21.9	17.3 ± 26.6	4.3 ± 4.9
Effect size vs 50 PRs	1.63 d	1.23 d	9.42 D
Muscle mass (%)	44.0 ± 2.3 bC	40.5 ± 1.2 c	37.6 ± 1.1

b – $p < 0.01$ vs Second National Team;
c – $p < 0.01$ vs Junior National Team; C – $p < 0.001$ vs Junior National Team
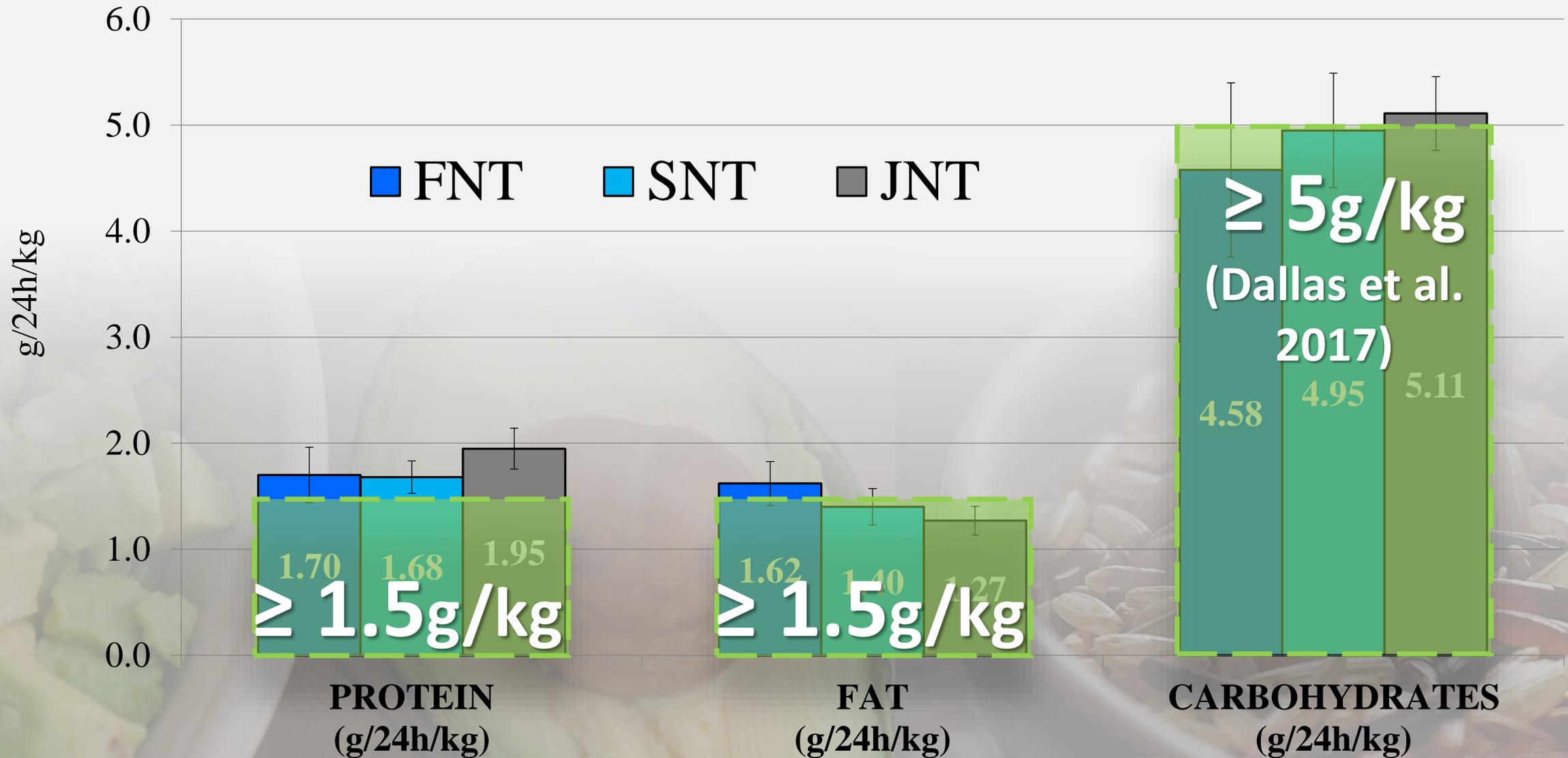d – $p < 0.05$ vs 50th percentile; D – $p < 0.001$ vs 50th percentile

RESULTS & DISCUSSION

ENERGY INTAKE (kcal/kg)

Legend: FNT, SNT, JNT

Relative Energy Needs (kcal/24h/kg): FNT 47.9, SNT 50.3, JNT 62.3

Relative Energy Intake (kcal/24h/kg): FNT 40.3, SNT 38.7*, JNT 40.7**

≥ 40 kcal/kg
Guidelines for female gymnasts
(Dallas et al. 2017)

* - p < 0.05 vs REN ** - p < 0.01 vs REN

RESULTS & DISCUSSION

Results & Discussion

Protein – E%

Legend: FNT (blue), SNT (light blue), JNT (grey)

- FNT: 17.4%
- SNT: 17.6% *
- JNT: 19.4% **

15%
(Dallas et al. 2017)
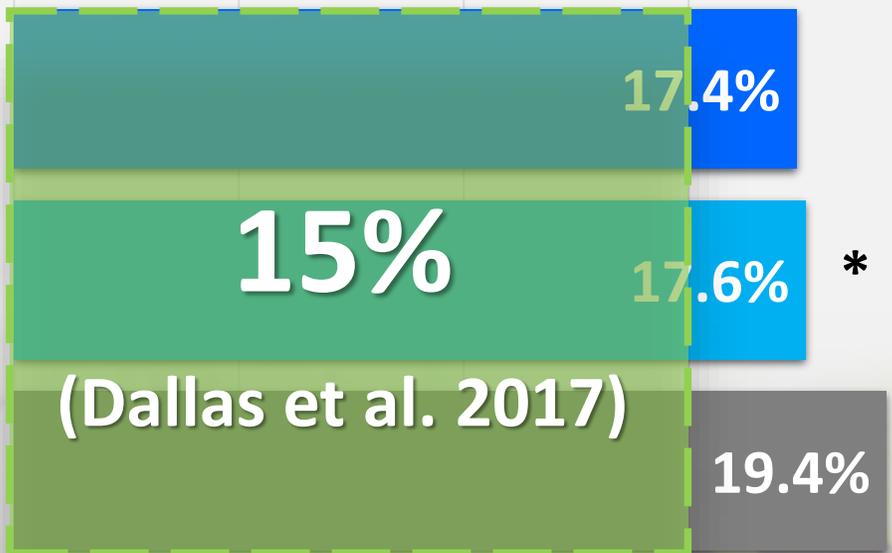
0%   5%   10%   15%   20%

Protein %

Animal vs Plant-based
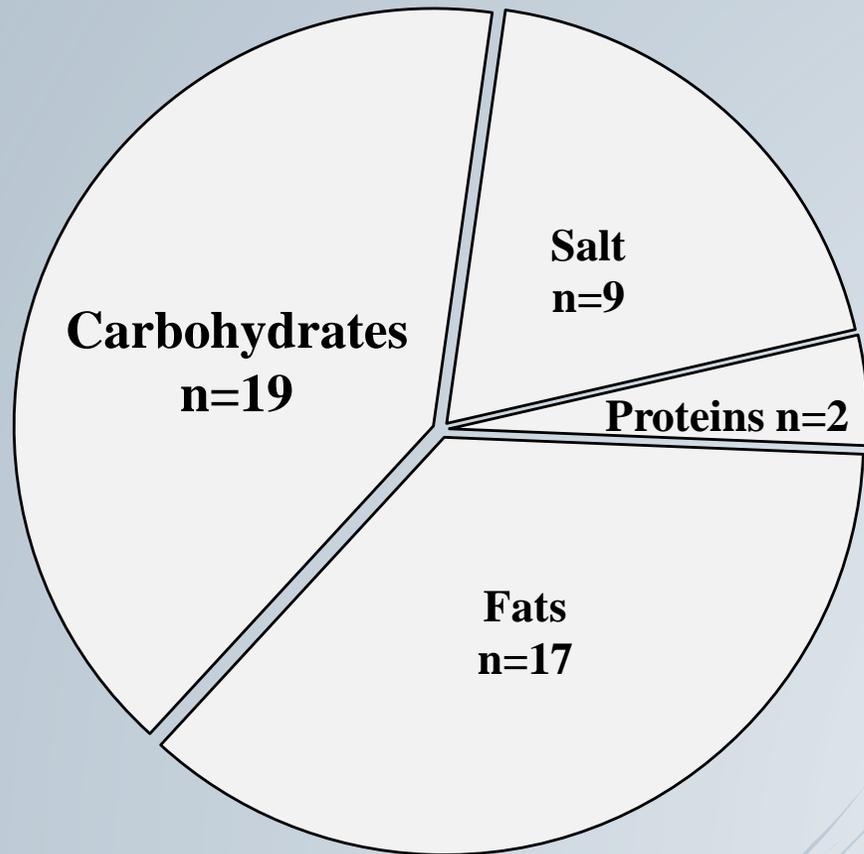
FNT: 62.8% / 37.2%

SNT: 57.0% / 43.0%
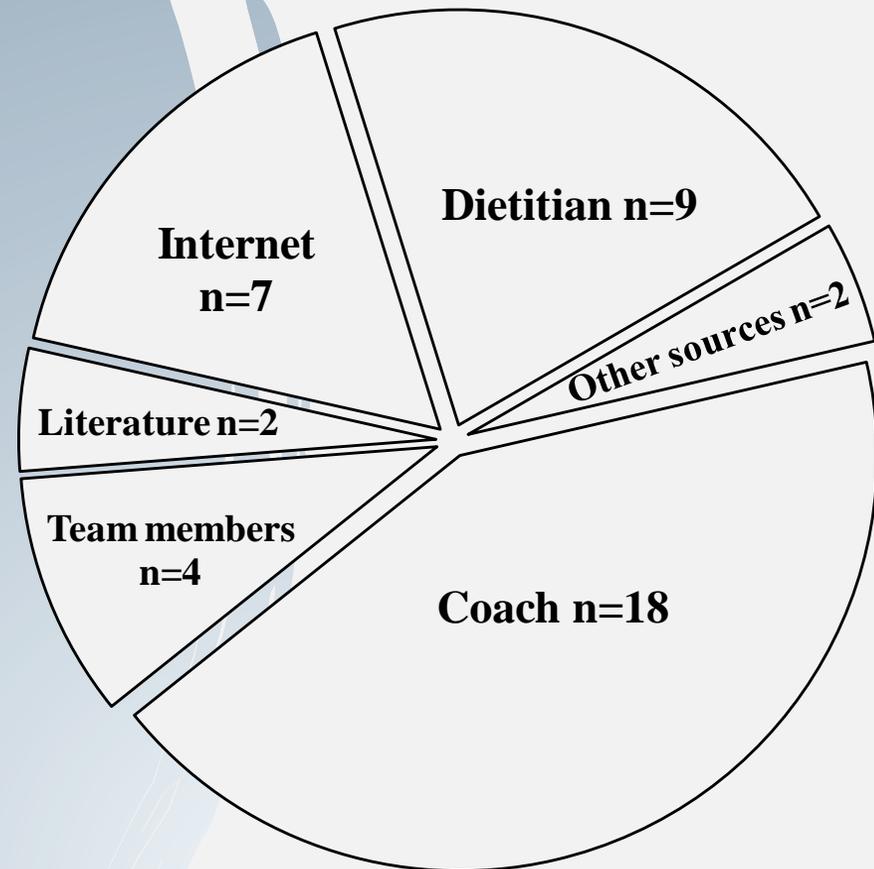
JNT: 59.9% / 40.1%
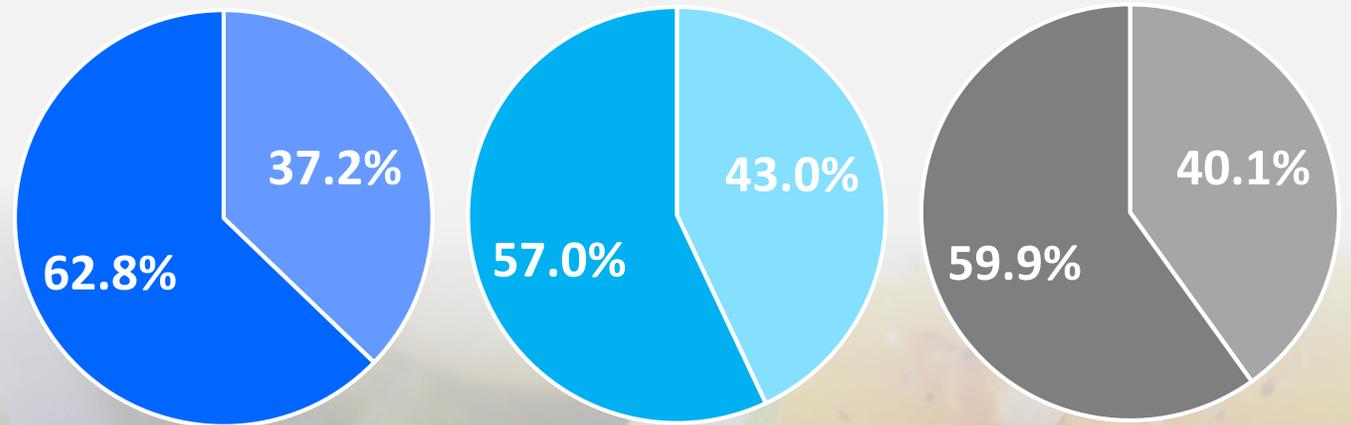
* - p < 0.01 vs the Guidelines; ** - p < 0.001 vs the Guidelines

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RESULTS & DISCUSSION

Which nutrients do you avoid in your diet?

Where do you get information on diet and weight management from?

Conclusions

When identifying the **ideal weight** of rhythmic gymnasts, coaches should take into account not only the body image and sports-related criteria, but also the recommended health-related norms for body composition in women.

Rhythmic gymnasts should maintain their ideal weight without diverging greatly from the recommended nutritional guidelines.

THANK YOU

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