



Athletes' selection of nutrition goals in relation to gender, dietary behaviors, and risk of energy deficiency

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Introduction

Proper fueling provides the foundation for ensuring that athletes obtain enough energy to meet performance needs (Beck et al., 2015). However, there are several studies that report athletes, especially endurance runners, who are consistently energy deficient. This low energy availability (LEA) not only impedes the runner's performance but can lead to other detrimental health effects associated with the Female and Male Athlete Triad and Relative Energy Deficiency in Sport (RED-S). These effects include low bone density, amenorrhea (in females), functional hypothalamic hypogonadism (in males), psychological issues, cardiovascular issues, growth and development issues, and more (Mountjoy et al., 2018; Nattiv et al., 2007; Nattiv et al., 2021; Tenforde et al., 2016).

While athletes are popularly known to be cautious and vigilant about their nutrition, maintaining proper fueling and meeting nutrition goals can be difficult tasks with certain intake restrictions (e.g. vegan/vegetarian, gluten-free, low-carbohydrate, and weight-loss diets, or food allergies and intolerances). These diets can sometimes lead an individual to significantly limit or avoid entire food groups, therefore, running the risk of deficiency in certain nutrients if not carefully considered (Burkhart & Pelly, 2016; Deldicque & Francaux, 2015; Nunes et al., 2018).

It is important to understand the dietary habits that athletes practice in order to determine the types of nutrition interventions that would best accommodate their energy needs. Currently, there is limited literature that explores the typical dietary restrictions that athletes follow in terms of food preferences/allergies/intolerances and how these food avoidances may impact their risk of energy deficiency or nutrition goal prioritization.

Purpose

Primary: Describe prioritized nutrition goals selected by male and female NCAA Division I Cross-Country runners during a one-on-one meeting with a sports dietitian

Secondary: Evaluate relationships between prioritized nutrition goals, gender, dietary restrictions, and risk of energy deficiency among the runner sample

Methodology

Participants

INCLUSION CRITERIA

- School: UCLA or Stanford
- Sport: Cross-Country
- Age: Between 18-23y.o.
- Season: Fall/Spring 2015-2018

EXCLUSION CRITERIA

- Participants with diagnosed Eating Disorder
- Runners who provided no written consent to participate

Procedure

Pre-Participation Exam

- Within the first four weeks of each fall [2015-2018] cross-country sports season
- Anthropometrics taken (nearest 1/4 inch and 1/2 pound)
- Baseline Assessment Form

- Sleep habits
- Exercise training
- Dietary restraint
- Pathologic behaviors
- Menstrual function (females only)

Nutrition Goals Survey

- Pre-selected nutrition goals + optional additional goal

15-20 Minute Session with Registered Dietitian

- Individualized nutrition assessment
- Discuss nutrition goals, basic initial nutrition education concerning low energy availability, and dietary recommendations

Statistical Analysis

Descriptive Statistics

- Age, anthropometric measurements, weekly mileage, avg. # of meals/snacks consumed in a day, frequencies without food for >4hrs., reports of dietary restrictions

Independent Samples T-test

- Between groups differences for continuous variables (e.g. frequencies of meals/snacks per day, extended periods without food, reports of dietary restrictions, and demographic data)

Chi-square Analysis

- Relationships between nutrition goals selected x food restrictions/gender, energy deficiency x gender/reports of dietary restrictions

Results

Table 1. Demographic characteristics of the male and female collegiate runners^a

	Male (n=47)	Female (n=63)	p-value	Total ^b (n=110)
Age (years) ^b	19.8 ± 1.2	19.0 ± 1.3	.003*	19.4 ± 1.3
BMI (kg/m ²) ^b	20.9 ± 1.6	20.1 ± 1.5	.005*	20.4 ± 1.6
Height (cm) ^b	179.9 ± 8.2	169.3 ± 7.2	<.001*	173.9 ± 9.2
Weight (kg) ^b	67.8 ± 6.8	57.7 ± 6.4	<.001*	62.1 ± 8.2
Weekly Mileage ^b	68.9 ± 14.2	49.3 ± 9.7	<.001*	57.7 ± 15.2

^aDescriptive statistics illustrating age, anthropometrics, and weekly mileage gathered from elite collegiate cross country and track & field athletes (n = 110) from two separate NCAA Division I sites in their initial 1-on-1 nutrition meeting with a Sports Dietitian during the Spring or Fall semesters between 2015-2018. Missing data for age (14 athletes), height (1 athlete), weight (1 athlete), and BMI (1 athlete).

^bValues depicted as mean ± standard deviation (SD)

*Independent samples t-test

Table 2. Dietary Behavior/Restriction Patterns^a of the Male and Female Runners

	Male	Female	p-value	Total = 110 athletes
Meals/day ^a	3.1 ± 0.5	2.8 ± 0.5	.010*	3.0 ± 0.5
Snacks/day ^a	2.3 ± 1.1	2.7 ± 1.0	.075	2.5 ± 1.0
>4hrs Without Food ^{b,c}	12 (26.1)	16 (26.2)	.987	28 (26.2)
Dietary Restrictions ^d	7 (14.9)	21 (33.3)	.028*	28 (25.5)
Food Avoidance ^{e,f} (Intolerances/Preferences)	7 (14.9)	17 (27.0)	.129	24 (21.8)
Dairy				8 (7.3)
Fats/Sweets				5 (4.5)
Gluten-Free (Non-Celiac)				3 (2.7)
Meat				6 (5.5)
Seafood				3 (2.7)
Vegan/Vegetarian				1 (0.9)
Other				7 (6.4)
Food Avoidance (Allergies) ^{e,f}	1 (2.1)	4 (6.3)	.293	5 (4.5)
Dairy				1 (0.9)
Gluten-Free (Celiac)				2 (1.8)
Nuts				3 (2.7)

^aMean ± SD, Independent samples t-test

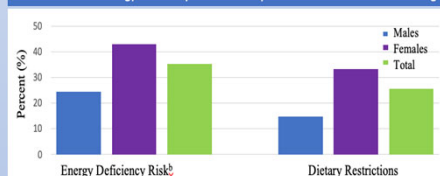
^b>4hrs without food^c = "Long periods per day without eating" from initial assessment survey

^cn (%), Chi-square test

^d"Dietary Restrictions" = avoidance of any food whether for allergy, intolerance, or preference. Numbers may reflect multiple reasons for dietary restrictions from one participant (e.g. one athlete may prefer not to eat seafood although not allergic but may also present with a dairy allergy).

^e"Food allergies" = a reaction an individual experiences in response to a certain protein (e.g., casein, gluten, ARA b, l, etc.) found within a food. Numbers may reflect multiple food restrictions from a single participant (i.e. one athlete reported with a nut and a dairy allergy).

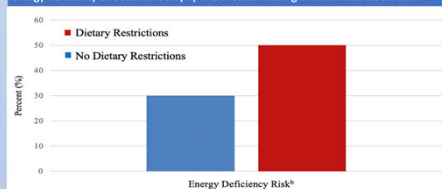
Figure 1. Proportion of males and females reporting dietary restrictions and meet criteria for risk of energy deficiency as assessed by the one-on-one dietitian meeting^a



^aChi-square test, p < .05, indicating significant difference between genders among Energy Deficiency Risk (males = 14.9%; females = 33.3%) and Dietary Restrictions (males = 14.9%; females = 33.3%).

^bn = missing data for 2 participants

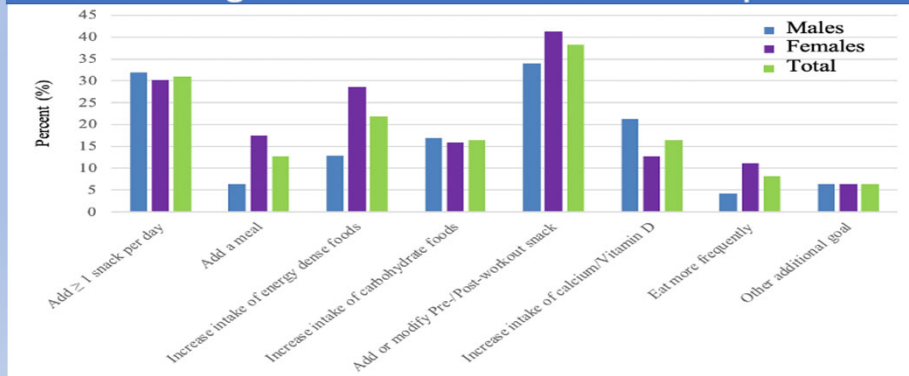
Figure 2. Proportion of athletes reporting dietary restrictions who met criteria for risk for energy deficiency as determined by Sports Dietitian during 1-on-1 initial assessment^a



^aChi-square test, p = .056, indicating trend toward significant difference in energy deficiency risk between reports with (50%) or without dietary restrictions (30%).

^bn = missing data for 2 participants

Figure 3. Frequency of goals selected by male and female athletes during the initial 1-on-1 session with Sports RD^a



^a Chi-square test, p < .05, indicating one significant difference between genders among nutrition goal selection of "increase intake of energy dense foods" (males = 12.8%, females = 28.6%).

Conclusions

- Presence of dietary restrictions may be considered as a contributing factor to energy deficiency risk—even independent of disordered eating behaviors
- Females presented with increased risk of energy deficiency which may be a result of a combination of higher reports of dietary restrictions as well fewer meals consumed in a day compared to males
- A known risk of energy deficiency was not associated with the selection of any specific nutrition goals
- Nutrition interventions geared toward reducing risk of energy deficiency may benefit from an added focus on behavioral changes as well as support from mental health practitioners for those who present with disordered eating habits
- Suggestion to evaluate dietary recalls to consider the sources of the bulk of calories



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For more information

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