

WEIGHT MANAGEMENT, NUTRITION AND ENERGY NEEDS FOR GYMNASTICS

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Weight Management

Weight management is the term used for both healthy weight loss and weight gain. Gymnastics includes seven disciplines and each has its own challenges and problems with weight management. Some athletes require building of body mass, muscle and power, while others need strength and flexibility on a small frame. In acrobatic gymnastics, an athlete who had the goal of weight loss as a top or flyer, can then switch to weight gain and muscle building as a base in a pair or group.

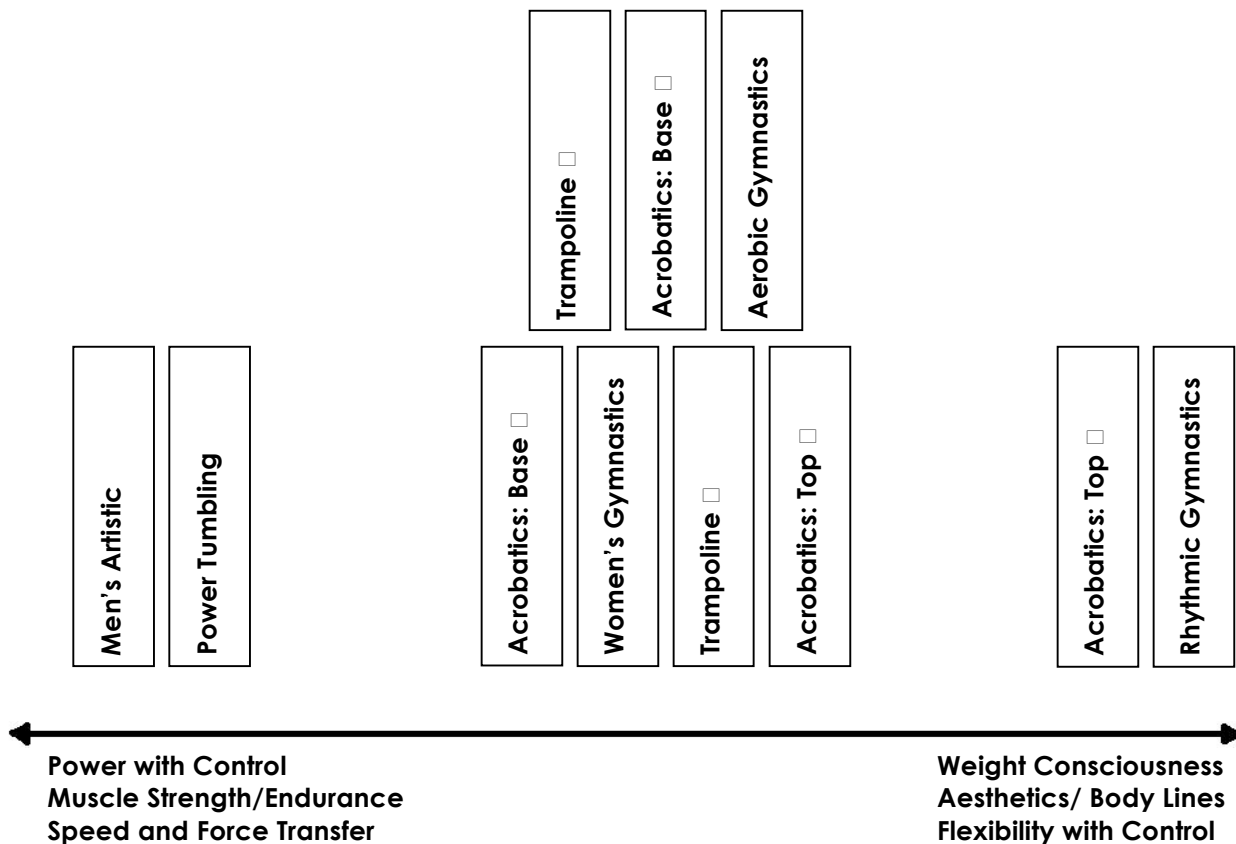
The medical professional treating gymnasts must have a working knowledge of energy needs and expenditure, healthy nutrition, fluid balance, supplements and sports psychology. They also need to be able to recognize and treat (or refer) athletes with disordered eating patterns, clinical eating disorders and the abuse of substances for rapid weight gain or weight loss. Poor weight management practices can lead to serious short and long-term medical complications, increased injury potential and adverse performance implications.

Daily or frequent weight measurement is not a reliable or accurate way to follow the athlete's energy balance or fitness. It is an especially stressful activity for the athlete and can encourage unhealthy eating behaviors and fluid management. Serial skin-fold measurements for body fat and measurements of muscle strength and endurance are the best way to monitor weight and strength changes and should be done by a medical professional. The weight management plan should be developed with the guidance of a sports nutritionist or dietician, with assistance from the athlete, parents, doctor and coach.

Energy Needs and Expenditure

The athlete's energy needs and expenditure depend upon the gymnastics discipline and sometimes the specific role of the athlete in that discipline. Gymnasts are seeking the correct balance between power and weight-consciousness.

Most gymnasts can be classified as power athletes where the goal is to maximize muscle power and strength through gymnastics-specific resistance training and repetition. High protein diets or supplements have not been shown to be helpful in resistance training. The best results are with proper refueling and recovery with protein and carbohydrate before and after workout. They require adequate energy intake to enhance muscle building. This includes a high carbohydrate-rich diet for energy and protein and nutrient-rich foods to provide the raw materials for building and maintaining muscle. The diet should vary with training frequency, intensity, and duration. If these eating patterns are maintained during periods of rest, less intense training, or upon retirement, it can lead to weight gain and even obesity in a short period of time.



Some are more weight-conscious for performance advantage or for aesthetic reasons. Energy needs and expenditure tend to be lower as their focus is more on skill and agility rather than power. Their eating strategies will include smaller, more frequent meals, low fat, low glycemic foods and high fiber. This should give them a more even energy level and should vary with training. These athletes are at high risk of disordered eating and clinical eating disorders.

Nutrition

The ideal diet for all gymnasts, regardless of discipline or position is one that is high in carbohydrates, moderate in protein and low in fats. The amounts and types of these nutrients will vary by energy needs, training schedule and whether the athlete's goal is weight or muscle gain, weight or body fat loss or simply weight maintenance and muscle recovery. In general, more frequent, small meals or snacks will provide a more steady energy source that can enhance training, performance, recovery and both weight loss or weight gain goals.

Carbohydrates or Carbs are the most efficient sources of energy or fuel for recovery of the muscle fuel called "glycogen." Daily intake should match training requirements and recovery needs. Some carbs have a high or moderate glycemic index like sugars, fruit juices, most breads and potatoes. They are converted to glucose and glycogen easily and provide quick recovery but short-lived. Low glycemic carbohydrates like some oat bran and whole wheat breads or pasta and some legumes can give a slower rise in blood glucose and hence a smaller insulin rise. It is helpful to those trying to manage weight but is not as effective in muscle glycogen recovery.

Proteins are made up of amino acids and are important for new muscle, hormone and enzyme manufacture as well as existing tissue healing and maintenance. Most gymnasts have a diet filled with protein-rich foods and do not require supplementation. Excessive protein intake has not been shown to be helpful to training or performance and can be harmful to those with decreased kidney function. It has been shown that a pre- or post exercise "recovery snack" rich in protein and carbohydrate can enhance protein recovery. The only gymnasts who may have difficulty with protein intake, balance and retention are those who severely restrict energy intake or have diets lacking variety.

Fats need to be a part of a healthy diet just like carbs and protein, but the gymnast needs to educate themselves about the different types of fats found in foods and their own daily dietary target. Saturated fats in foods like cheese, ice cream, whole milk, butter and chocolate can raise cholesterol and should be limited to no more than 7% of your total calories. Trans fats are liquid fats that are hydrogenated to make a solid fat and can act like saturated fats raising cholesterol. These are present on processed snack foods and baked goods, stick margarine and some fast foods. Mono and Polyunsaturated fats are a healthier ways to fill your dietary need for fats. A diet high in fat is especially difficult for the gymnast because each

gram of fat (9 kCAL/ gram) provides over twice as many calories as the same amount of carbohydrate or protein (4 kCAL/ gram).

“Junk Food,” Processed Foods and Eating Out are a particular challenge to the gymnast because dietary options, especially when traveling, are often limited. These types of foods tend to be low in nutrients while high in fats, free sugars and salt. While packaged foods will often have a nutrition label, many dining establishments will not have this information available.

Supplements can include vitamins, minerals, anti-oxidants, protein, amino acids, trace elements, carnitine, pyruvate, ribose, creatine, caffeine and bicarbonate. Gymnasts with a healthy and varied diet receive all of the **vitamins, minerals and anti-oxidants** needed for health and training so supplementation is seldom needed or helpful unless an athlete has a dietary or religious restriction.

Protein supplements have not been shown to be helpful in meeting energy needs or building muscle. **Protein-carbohydrate snacks or bars** can be helpful in protein and glycogen recovery and whole proteins are better than individual **amino acids**. Some **trace elements** and joint supplements **glucosamine, chondroitin and MSM** have not been shown to be helpful in healthy athletes but are helpful in older athletes or those with arthritis. There are no independent studies that show an increase in energy by taking **carnitine, pyruvate and ribose** despite claims by vendors.

Creatine can increase the amount of high energy creatine phosphate in muscle as well as muscle mass. It is not believed to be harmful in recommended doses and may be helpful in muscle recovery between workouts, but only in the highest level athletes.

Eating Disorders

Anorexia Nervosa and Bulimia- These conditions largely affect young adolescent women, with 15 to 19 years old making up 40% of all cases. Approximately 90% of people with anorexia are female. It is a combination of disordered eating patterns, distorted body image, and may include periods of binge eating or purging (*Bulimia-self-induced vomiting or use of laxatives or diuretics*) in a vain attempt to stay thin. It is actually a psychiatric disorder and needs to be diagnosed and treated by professionals.

Anorexia and bulimia in gymnasts- Gymnastics is an aesthetic and athletic sport so there is sometimes pressure from coaches, judges and

teammates to “not get fat” or to stay lean because they believe it will keep them competitive and enhance performance. The facts show that these strategies can have the opposite effect and lead the athlete into unhealthy eating patterns or even anorexia and bulimia. This can make the athlete less able to withstand the rigueur of training and prone for electrolyte imbalances, cardiac arrhythmias, malnutrition, and injury due to low energy effort.

Female Athlete Triad- when an athlete has the combination of 1) an eating disorder, 2) amenorrhea (no periods or menses) or oligomenorrhea (rare periods or menses), and 3) decreased bone mineral density (osteoporosis or osteopenia). This syndrome is seen in females participating in gymnastics because it often emphasizes leanness or low body weight. Men and women normally gain bone mass and store calcium in bone until it peaks at age 25. Any loss of bone at such a young age is potentially devastating to the young athlete now and into the future.

Food Addiction- Many athletes have not learned healthy coping skills for competitive and interpersonal stress and pressures. They eat even when they are not hungry as a way to “feel better.” They will snack when under stress or during times of distraction like when watching television or doing school work. This can develop into a food addiction in later life so it is important for the athlete to learn “life skills” and healthy eating patterns.

Exercise Addiction- Exercise and gymnastics training is usually a healthy behavior that promotes wellness and good performance. It is possible to become addicted to physical activity and engage in compulsive, excessive exercise that is extreme in frequency and both psychologically and psychosocially impairing. It is usually combined with a significant eating disorder and requires professional psychiatric and nutritional care.

Obesity vs Overweight- Clinical obesity is rarely a concern in the gymnast except in rare cases that have a strong genetic predisposition and disordered eating patterns. There are athletes that may be over their “ideal body weight” for their age and maturation. Studies and practical experience has shown that regular measurement and focus on weight is not helpful to accomplish the coach’s or doctor’s goal of weight management; in fact, it leads to disordered and unhealthy eating and behaviors. The most effective strategy is to focus on nutrition education, healthy eating patterns and performance goals.

Physiologic Weight Management

Glycemic Index and Weight Loss- There has been recent focus on the glycemic index (GI) of foods and their effect on insulin production. Foods that have a high glycemic index will lead to a faster rise in serum glucose and hence a greater insulin response. This is actually helpful for glycogen and glucose recovery after endurance exercise. Whole grain products and more complex starches and carbohydrates have a lower glycemic index and provide a steady source for serum glucose. The theory is that if one wants to lose weight, one should avoid high GI foods, especially in combination with high caloric foods such as fats.

Dieting and Binge Eating- All dieting strategies that involve severe energy and nutrient deprivation are ineffective, unhealthy and usually result in long term weight gain after a temporary loss of weight. Binge eating or "eating in secret" may be signs of an eating disorder. Physiologic weight management or healthy (gradual) weight loss eating plans for athletes will focus on: portion control, choosing the right kinds of food, multiple small meals, limiting snacks (unless part of the eating plan) and avoiding large meals before bedtime.

Exercise and Weight Loss/Gain- Any plan to gain or lose weight is much more effective when dietary modification is combined with an exercise or training plan. *Weight loss or gain goals should be less than 1 to 1.5% of body weight per week* and not started at a time of increased training or competition. The most effective **weight loss strategy** is to develop a healthy eating plan that will meet the athlete's energy needs (usually with lower GI foods) and then subtract calories to lead to a 1 to 1.5% weight loss per week. **Weight gain strategy** is similar but it includes a healthy eating plan that will meet the athlete's energy needs (usually with higher GI foods) and then add calories to lead to a 1 to 1.5% weight gain per week.

Psychology- This plays a critical role in the training of the gymnast, both in the gym, and at the training (dining) table. Some studies have reported that a high percentage of gymnasts have been told by at least one coach that they were too heavy and most tried unhealthy eating strategies. Young athletes are very impressionable, especially to coaches and other authority figures. They may try to lose weight in order to please that person or gain approval. A focus on limiting food and weight measurement can have a significant negative effect on the athlete's health, psyche, relationships and performance. Many believe it is more effective to educate the athlete and parents on nutrition and healthy eating and to expect the athlete to maintain a healthy weight that allows consistent performance.

Abuse of Substances

Weight Loss: Anti-Obesity and Diet Pills- These products work by three mechanisms: appetite suppression, increased metabolism and blocking absorption of nutrients. The problem with the first two mechanisms are that many of the drugs that have this action are stimulants or amphetamine-derived and are strictly prohibited by WADA and FIG. There have been "diet pills" in the past that led to serious medical conditions such as heart attack, stroke, hypertension and pulmonary hypertension. Orlistat is a medication that may decrease dietary fat absorption by blocking fat breakdown. Fiber supplements, such as *glucomannan* and *guar gum* may inhibit digestion and lower caloric absorption but their effect is difficult to quantify so the athlete can not create a healthy physiologic weight loss plan.

Weight Loss: Diuretics and Laxatives- These unhealthy and unwise methods of weight loss are more commonly abused by athletes in sports that have competition weight classifications. Diuretics are a prohibited substance for several reasons including fluid and electrolyte imbalances as well as the potential as a masking agent. Laxatives can cause malabsorption of nutrients and fluid loss as well. The fluid and electrolyte losses can make the athlete more at risk for heat illness and dehydration.

Weight Gain: Anabolic Steroids- Athletes who are trying to gain weight and muscle mass must avoid anabolic steroids as these are banned substances and can lead to serious, long-term health problems. These include high blood pressure, heart disease, heart attack or sudden cardiac death, acne, baldness, liver damage, infertility, testicular atrophy or shrinkage, premature physeal closure or stunted growth, aggression, manic behavior, mood disorders, psychosis, depression and suicide.

Weight Gain: Hormone Supplements or Prohormones such as *Androstenedione* and *Norandrostenedione* have not been shown to be effective in enhancing muscle mass or strength. They will however result in negative health consequences as well as positive drug tests. **Herbal supplements** may claim to increase naturally occurring testosterone such as *Chrysin*; *Gamma-Oryzanol*; *Indole-3-Carbinol*; *Mummio*; *SawPalmetto*; *Smilax*; *Tribulis Terrestris*; and *Yohimbine*. This has never been proven to be true in humans and may have serious health side-effects.

RECOMMENDATIONS FOR WEIGHT MANAGEMENT IN GYMNASTICS*

1. Physicians who care for young athletes should have knowledge of healthy weight-gain and weight-loss methods. They should understand minimal recommended weight, normal growth curves, and body composition measurements and be willing to educate athletes, families, coaches, athletic trainers, school administrators, and state and national organizations when appropriate. Physicians should understand that all athletes are unique and each athlete must be evaluated individually.
2. All physical examinations of young athletes should include a weight history and a history of eating patterns, hydration practices, eating disorders, heat illness, and other factors that may influence heat illness or weight control.
3. Physicians should be able to recognize early signs and symptoms of an eating disorder and obtain appropriate medical, psychological, and nutritional consultation for young athletes with these symptoms.
4. Nutritional needs for growth and development must be placed above athletic considerations. Fluid or food deprivation should never be allowed. There is no substitute for a healthy diet consisting of a variety of foods from all food groups with enough energy (calories) to support growth, daily physical activities, and sports activities. Daily caloric intake for most athletes should consist of a minimum of 8400 kJ (2000 kcal). Athletes need to consume enough fluids to maintain euhydration. Physicians should engage the services of a registered dietitian familiar with athletes to help with weight-control issues.
5. If body fat is too low, it may result in suboptimal performance. All athletes should consume enough energy (calories) and nutrients to meet their energy requirements.
6. A program for the purpose of gaining or losing weight should (a) be started early to permit a gradual weight gain or loss over a realistic time period, (b) permit a change of 1.5% or less of one's body weight per week, (c) permit the loss of weight to be fat loss and the gain of weight to be muscle mass, (d) be coupled with an appropriate training program (both strength and conditioning), and (e) incorporate a well-balanced diet with adequate energy (calories), carbohydrates, protein, and fat. After athletes obtain their desired weight, they should be encouraged to maintain a constant weight and avoid fluctuations of weight.
7. Any athlete who loses a significant amount of fluid during sports participation should rehydrate before their next training or competition session. Fluids should be available, and the drinking of such should be encouraged at all practices and competitions.
8. Weight loss accomplished by over exercising; using rubber suits, steam baths, or saunas; prolonged fasting; fluid reduction; vomiting; or using anorexic drugs, laxatives, diuretics, diet pills, insulin, stimulants, nutritional supplements, or other legal or illegal drugs and/or nicotine should be prohibited at all ages.
9. Athletes who need to gain weight should consult their physician for resources on healthy weight gain and referral to a registered dietitian. They should be discouraged from gaining excessive weight, which may impair performance,

increase the likelihood of heat illness, and increase the risk of developing complications from obesity.

10. **Ergogenic aids and non-therapeutic use of supplements for weight management should be prohibited. Athletes who are trying to gain weight and muscle mass must avoid anabolic steroids as these are banned substances and can lead to serious, long-term health problems. These include high blood pressure, heart disease, heart attack or sudden cardiac death, acne, baldness, liver damage, infertility, testicular atrophy or shrinkage of testicles, premature physcal closure or stunted growth, aggression, manic behavior, mood disorders, depression and suicide.**
11. **Specific care should be taken if athletes are using protein supplements if they have any impairment in kidney function. While several studies have shown that some protein supplementation can be safe, excessive protein may lead to excessive gas, dehydration and impaired kidney function.**
12. **Young athletes should be involved in a total athletic program that includes acquisition of athletic skills and improvement in speed, flexibility, strength, and physical conditioning while maintaining good nutrition and normal hydration. This should be done under the supervision of a coach who stresses a positive attitude, character building, teamwork and safety.**

**Adapted from AAP Comm. on Sports Med. & Fitness "Promotion of healthy weight-control practices in young athletes". Pediatrics 2005 Dec;116(6):1557-64.*

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