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Intentional Weight Gain Strategies in Young Adult Athletic Individuals

Allison D. Sanchez * and D. Enette Larson-Meyer

Department of Human Nutrition, Foods, and Exercise, Virginia Tech, Blacksburg, VA 24061, USA; enette@vt.edu
* Correspondence: allisons21@vt.edu; Tel.: +1-(540)-231-1025; Fax: +1-540-231-3916

Abstract: Athletic individuals may intentionally aim to gain weight, primarily as lean body mass, to improve athletic performance or to better match opponents' size. This study aimed to investigate the self-reported nutrition- and exercise-related behaviors of athletic individuals aiming to gain weight. Cross-sectional data were drawn from an online survey of athletic adults recruited locally, nationally, and internationally. In total, 168 athletic participants (24 ± 5 years; 29% female, 71% male) completed the survey and were actively attempting or had attempted weight gain in the last 12 months to gain muscle mass (87.5%), for aesthetic reasons (66.1%), or to improve athletic performance (63.7%). The most prevalent dietary strategies reported to increase weight gain were consuming more energy than usual (88.0%) from mainly protein foods (83.9%) and using protein powders (67.3%). In total, 9.6% of participants reported using anabolic hormones. The main exercise change was increased resistance training (81.5%). Our results confirm that both male and female athletic individuals intentionally attempt to gain weight. Nutrition and exercise professionals may use the findings to be aware of these common dietary and exercise strategies and to better educate their athletic clients on appropriate methods that are evidence-based and not detrimental to health.

Keywords: caloric surplus; resistance training; protein; lean body mass; nutrition; supplements

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Academic Editor: Jose Lara

Received: 2 December 2024
Revised: 9 February 2025
Accepted: 20 March 2025
Published: 2 April 2025

Citation: Sanchez, A.D.; Larson-Meyer, D.E. Intentional Weight Gain Strategies in Young Adult Athletic Individuals. *Dietetics* **2025**, *4*, 13. https://doi.org/10.3390/dietetics4020013

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1. Introduction

Athletic individuals often utilize intentional weight gain strategies for several reasons, including aesthetic goals, perceived performance improvements such as enhanced strength and power, and the desire to match the size of their opponents [1–3]. Examples include sprinting, discus, shot-put, football, rugby, and ice hockey. In most sports, the desired weight gain is primarily lean body mass (LBM) with limited gain as fat mass (FM) [4]. As the predominant research focus has been on weight loss, even in athletic populations, research investigating intentional weight gain has been overlooked [3].

To promote healthy weight gain, current sports nutrition guidelines recommend a ~500 kcal/day energy surplus [1,2,5] with a range of 300 kcal/day [2,5] to 1000 kcal/day [6]. This moderate energy surplus is thought to promote slow weight gain of ~0.23–0.45 kg/week, which should ensure more LBM and less FM gain [1,3,5]. Before determining the composition of the energy surplus, an athlete needs to be consuming adequate carbohydrate (CHO) (3–12 g/kg/day), high-quality protein (~1.2–2.0 g/kg/day), and an appropriate quantity of dietary fat (≥20% of total daily energy) [1,2,5–8]. Although many athletic individuals believe that increasing protein intake leads to LBM gains, most nutrition experts recommend that the energy surplus comprises mainly CHO and protein [2,5,9,10]. All food groups may still be consumed at mealtimes. However, to increase energy intake the portion sizes of

all food groups may need to be increased and/or energy-dense toppings, such as olive oil, cheese, avocado, nuts, and seeds, should be judiciously incorporated. Because an increased volume of food at meal times may be difficult due to gastrointestinal distress [11], alternative recommendations to incorporate a daily energy surplus include consuming small, frequent meals throughout the day, choosing high-energy beverages, such as whole milk, fruit juices, and smoothies, and choosing energy-dense and nutrient-dense foods [1,5,12].

Rigorous resistance training (RT) is also an important part of the equation for weight gain with the composition desired by athletes. Although overfeeding alone is anabolic [13], previous studies in non-athletes have observed that 33–40% of weight gain is LBM when overfeeding occurs without exercise [14]. Therefore, RT is needed to stimulate muscle tissue growth [1,3–5,12,13] and promote healthy weight gain. There is some thought, however, that aerobic exercise may need to be reduced to maximize LBM gain [4], as it is associated with high-energy expenditure and may compete with the cell signaling pathways that enhance muscle hypertrophy [1].

Little is known about the dietary and exercise practices employed by those intentionally attempting weight gain. Only a few published studies evaluated such weight gain practices by investigating the general eating habits of adolescents and young adults via surveys or questionnaires [15–17], but none, to our knowledge, have been conducted in (or targeted) athletes or other age groups. O'Dea and Rawstorne [17] reported that 27.7% of their study population was attempting weight gain, while Woodruff et al. [16] found that this figure was 9%. When both sexes were surveyed, more male than female respondents desired weight gain [15,16]. Additionally, they found that some individuals resort to unhealthy or possibly dangerous methods when attempting weight gain, such as an increased intake of fried food and excess protein supplements, decreased exercise, and anabolic steroid use [15,17]. Exercise-related behaviors, both aerobic and anaerobic, were either not examined [16] or not examined in detail [15]. Furthermore, none of these studies examined sleep-related behaviors, which may influence healthy weight gain [18–20]. It also appears that participants were not allowed to comment or explain their answers, which may have been helpful in fully understanding their dietary- and exercise-related practices for intentional weight gain. For example, many individuals may not know whether they are increasing CHO or protein or fully address a question about which macronutrient is increasing. Although two studies on military personnel reported the use of dietary supplements, predominantly containing protein, to either promote LBM gain or improve athletic performance [21,22], they did not specifically target weight gain practices.

Understanding the current habits of athletic individuals who desire weight gain may guide practitioners and researchers to design relevant and effective nutrition education and exercise recommendations, which may promote safe and healthy weight gain. Therefore, the aim of this research was to investigate the self-reported dietary intakes and nutrition- and exercise-related behaviors of young adult athletic individuals, engaged in any sport, and actively attempting weight gain.

2. Materials and Methods

2.1. Study Procedures

The study was approved by the Virginia Tech (VT) Institutional Review Board (#23-917) and met the criteria for 'exemption from review', because it utilized survey methodology and the identity of human participants could not readily be ascertained directly or through identifiers linked to the participants. A short paragraph preceded the questionnaire, which explained the study aims and that: (a) participation was voluntary, (b) there were no foreseeable risks, (c) withdrawal from the survey was allowed at any point, (d) responses would be confidential, and (e) survey completion implied consent.

2.2. Survey Development

Creating an online survey using QuestionPro (www.virginiatech.questionpro.com; Austin, TX, USA) was chosen to address the research aim due to the potential ability to reach a far larger and more diverse sample size locally, nationally, and internationally. Two experienced Registered Dietitians (RDs) with board certifications in sports dietetics (CSSD) developed the questions by modifying survey questions from previous studies [15–17,21,23] and creating new questions from frequently used sports nutrition textbooks and research studies investigating healthy weight gain in athletes. The initial draft survey was first test-piloted with 10 athletic individuals, three of whom were RDs, and their feedback was incorporated into the survey. To verify content validity, the survey was reviewed by four external experts: two experienced RDs with expertise in intentional weight gain in athletes and two research scientists with expertise in survey methods design (one RD and one university professor). Their feedback was incorporated into the next version of the survey. This survey was re-taken by the same athletic individuals, and additional edits were incorporated to create the final survey version.

The final survey contained 31 questions which included demographic characteristics (9 questions), diet (11 questions), exercise (2 questions), sleep patterns (2 questions), additional weight-gaining strategies (1 question), weight gain attempts (5 questions), and from what source they may have received weight gain advice (1 question) (Supplemental Table S1). Each question contained an 'Other (please specify)' option to allow participants the opportunity to enter a free text response, if their answer was not listed. Height was reported in inches with conversion instructions for American and International units. Weight responses were reported in pounds (lb) with kilogram (kg) conversion instructions. The survey contained no personally identifiable information and took approximately 10 min to complete.

2.3. Survey Distribution and Administration

Participants were recruited through flyers placed at strategic locations in the New River Valley (college and community gyms and fitness and recreational centers) and emailed to athletic clubs and professional listservs and through partnering with the university's Corps of Cadets and national and international sports dietitians and health and fitness professionals, who shared the survey widely and/or posted on social media sites. The survey was accessible by an online link or by scanning a QR code from QuestionPro. Participants completed the survey using either a mobile phone or a computer, and they were not permitted to take the survey more than once from the same device. The survey was available from 18 October 2023 to 31 January 2024. The data were administered, collected, and managed by QuestionPro.

2.4. Participants

We aimed to recruit athletic men and women between 18 and 40 years of age who were currently attempting to gain weight. To be eligible, participants had to be on an athletic team, regularly play a sport or train for an athletic activity like running or cycling, be in the military, or exercise at least four days per week. The questionnaire was designed such that participants who started the survey were not allowed to complete it if they answered 'no' to actively attempting weight gain or 'I only want to stay the same weight but convert some fat into muscle (recomp). We desired a minimum of 100 individuals, which was based on what we thought would be minimally sufficient for addressing the research question in athletic individuals, anticipating that the number of athletic individuals desiring true total body mass (not only LBM) gains would be small, and the number of athletic individuals who would be willing to complete the survey within the desired time frame available for

collection. Participants were offered an opportunity to respond to an email provided at study completion for a one in 10 chance of winning a $25 gift card as compensation for their time; this ensured survey data were not connected with identifying information.

2.5. Data Analysis

Descriptive statistics were used to describe the participants' characteristics and frequency of responses. Data are presented as percentages, mean scores, mean ± standard deviation (SD), and median (range). Participant responses regarding current sport/exercise training, specific macronutrient foods and beverages, advice on weight gain, and other weight gain strategies were transcribed and tallied into common themes. Direct quotes are listed for other (open-ended/please specify) answers for current weight gain attempts, change in exercise habits, participant characteristics, weight gain strategy responses to dietary survey questions, and other weight gain strategies. For 'select all that apply' questions, percentage of responses is reported based on the total number of responses per answer divided by the participants that responded (N = 168 unless otherwise stated).

3. Results

In total, 428 participants initiated the survey with 168 participants completing (Table 1).

Table 1. Participant demographics and characteristics (N = 168).

		***N* (%)**
Sex *	Male	118 (70.7)
	Female	49 (29.3)
Age (y) †		24.2 ± 5.1
Height (cm) †		175.2 ± 9.0
Weight (kg) †		73.5 ± 14.3
BMI (kg/m^2) †		23.8 ± 3.5
Highest level of education	Some high school (no diploma or GED)	0 (0)
	High school graduate (diploma or GED)	11 (6.6)
	Some college courses	54 (32.1)
	Associate degree (two-year college degree)	11 (6.6)
	Bachelor's degree (four-year college degree)	47 (28.0)
	Master's degree	37 (22.0)
	Doctoral degree or equivalent (MD, PhD, PharmD, etc.)	8 (4.8)
Why do you consider yourself an athlete? Select all that apply.	Currently on an athletic team	26 (15.5)
	Train for a sport or athletic activity (running, cycling)	68 (40.5)
	In the military	26 (15.5)
	Have a physically active occupation (job)	26 (15.5)
	Exercise at least 4 days/week	159 (94.6)
	Other (please specify): *military cadets (n = 2), "bodybuilding" (n = 4), and current recreationally competitor (n = 1)*	7 (4.2)
Serving in the military	Air Force	2 (7.7)
	Army	8 (30.8)
	Coast Guard	1 (3.9)
	Marines	1 (3.9)
	Army or Air Force National Guard	1 (3.9)
	Navy	7 (26.9)
	Army or Air Force Reserves	0 (0)
	Other (please specify): *Air Force cadet (n = 4) and Navy cadet (n = 2)*	6 (23.1)

Table 1. *Cont.*

		***N* (%)**
Desired reasons for weight gain (Select all that apply.)	Gain muscle mass	147 (87.5)
	Aesthetic/physical appearance (look better)	111 (66.1)
	Improve athletic performance	107 (63.7)
	Meet weight class sport requirement	12 (7.1)
	Health reasons	42 (25.0)
	Other (please specify):	2 (1.2)
	"meet Navy Reserve Officers' Training Corps (ROTC) weight requirements" (n = 1) and "gain strength" (n = 1)	
Desired weight gain (kg) ‡		4.5 (1.4–31.8)
Previous weight gain attempts	None	51 (30.4)
	1	54 (32.1)
	2	49 (29.2)
	≥3 (please specify the number of times)	14 (8.3)
Successful weight gain attempts	Yes	70 (60.3)
	No	32 (27.6)
	Other (please specify):	14 (12.1)
	continuous effort (n = 2), "one time yes, one time no" (n = 2), "no previous attempts" (n = 1), "I have gained weight. . . but it is slow and I have been stuck" (n = 1), "gained some weight, but never hit my goal" (n = 1), "almost" (n = 1), "successful 1 out of 3" (n = 1), "gained muscle and fat" (n = 1), "gained too much" (n = 1), " gained weight but not where I wanted" (n = 1), "stress or life events. . .derailed my (weight gaining) efforts" (n = 1), and "it was working for awhile but I gave up because I got impatient" (n = 1)	
Previous total weight gain (kg)		6.7 ± 5.2
Sleep per 24 h period (hour/day)		7.1 ± 0.9
Sleep quality	I am never satisfied with my sleep quality	9 (5.4)
	I am rarely satisfied with my sleep quality.	20 (11.9)
	I am sometimes satisfied with my sleep quality.	63 (37.5)
	I am often satisfied with my sleep quality.	68 (40.5)
	I am always satisfied with my sleep quality.	8 (4.8)
	Other (please specify)	0 (0)
Geographic Location	United States (22 states)	161 (95.8)
	Australia	1 (0.6)
	Canada	1 (0.6)
	China	1 (0.6)
	Italy	1 (0.6)
	Puerto Rico	1 (0.6)
	Saudia Arabia	1 (0.6)
	Switzerland	1 (0.6)

* One participant did not answer. † Mean ± standard deviation. ‡ Median (range).

Figure 1 demonstrates the participant completion flow chart.

Figures 2–4 demonstrate the percentage of participant responses to the survey questions inquiring about current weight gain attempts, any source of advice, and changes to exercise habits to promote weight gain, respectively.

Mean ± SD responses = 1.38 ± 0.67. Other (open-ended/please specify) answers included a continuous 3-year attempt to gain weight (n = 1), "not concerned with my actual weight but always wanting to maintain and/or build muscle" (n = 1), and "would like to but material is the problem" (n = 1).

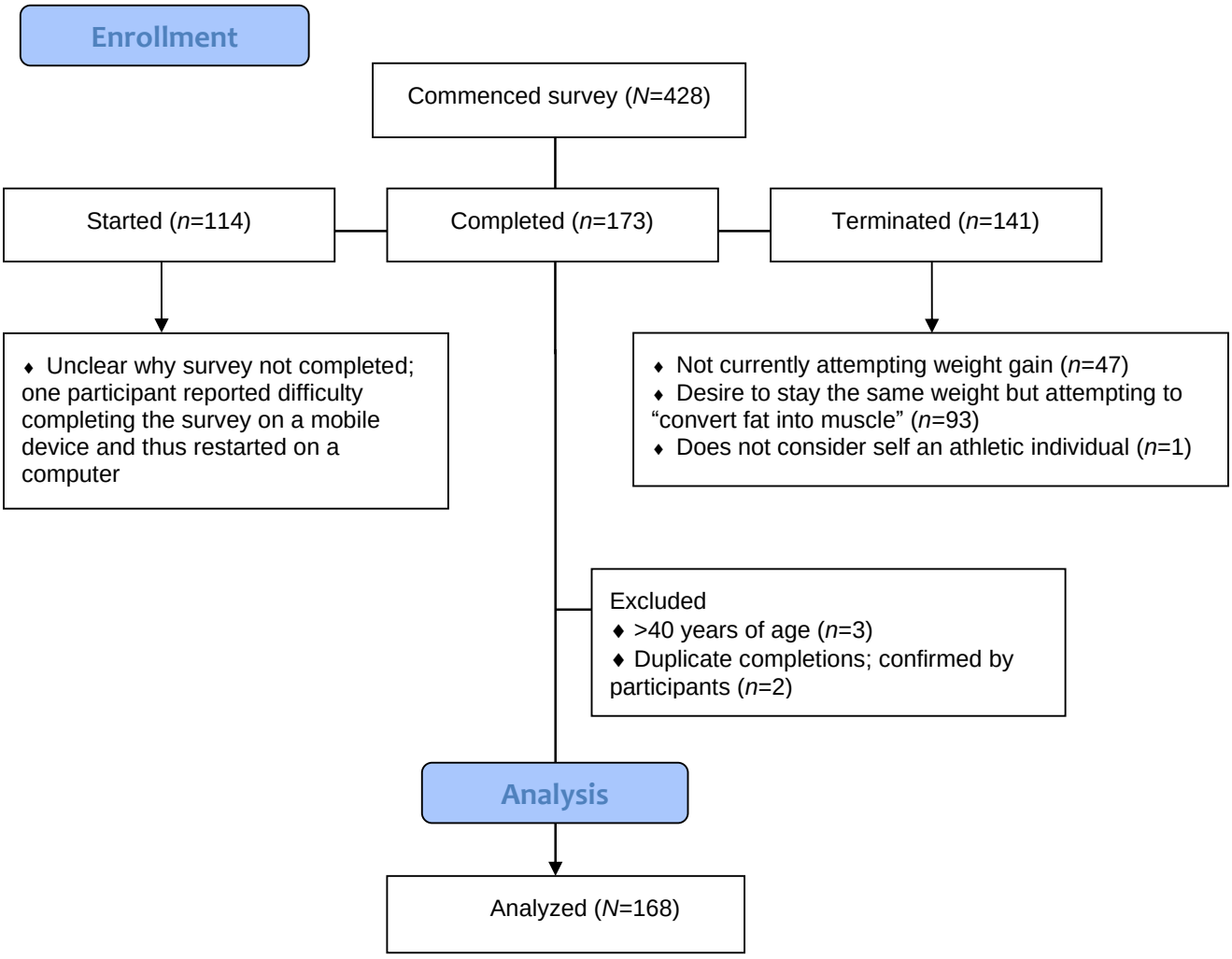


Figure 1. Participant completion flow chart.

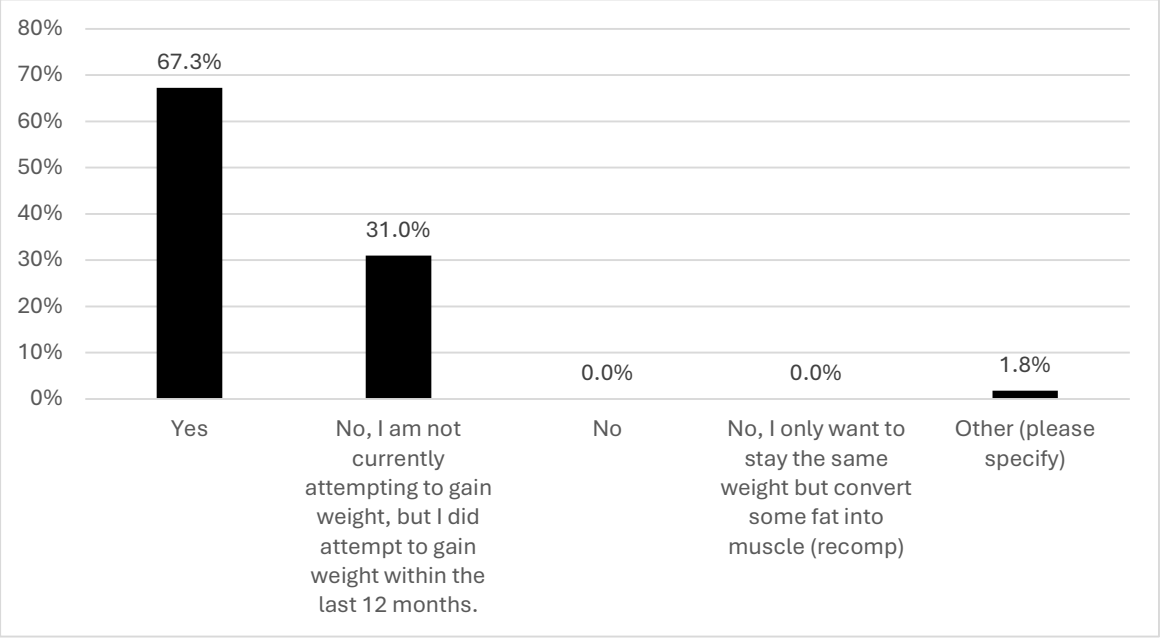


Figure 2. Percentage of participant responses to current weight gain attempts (N = 168).

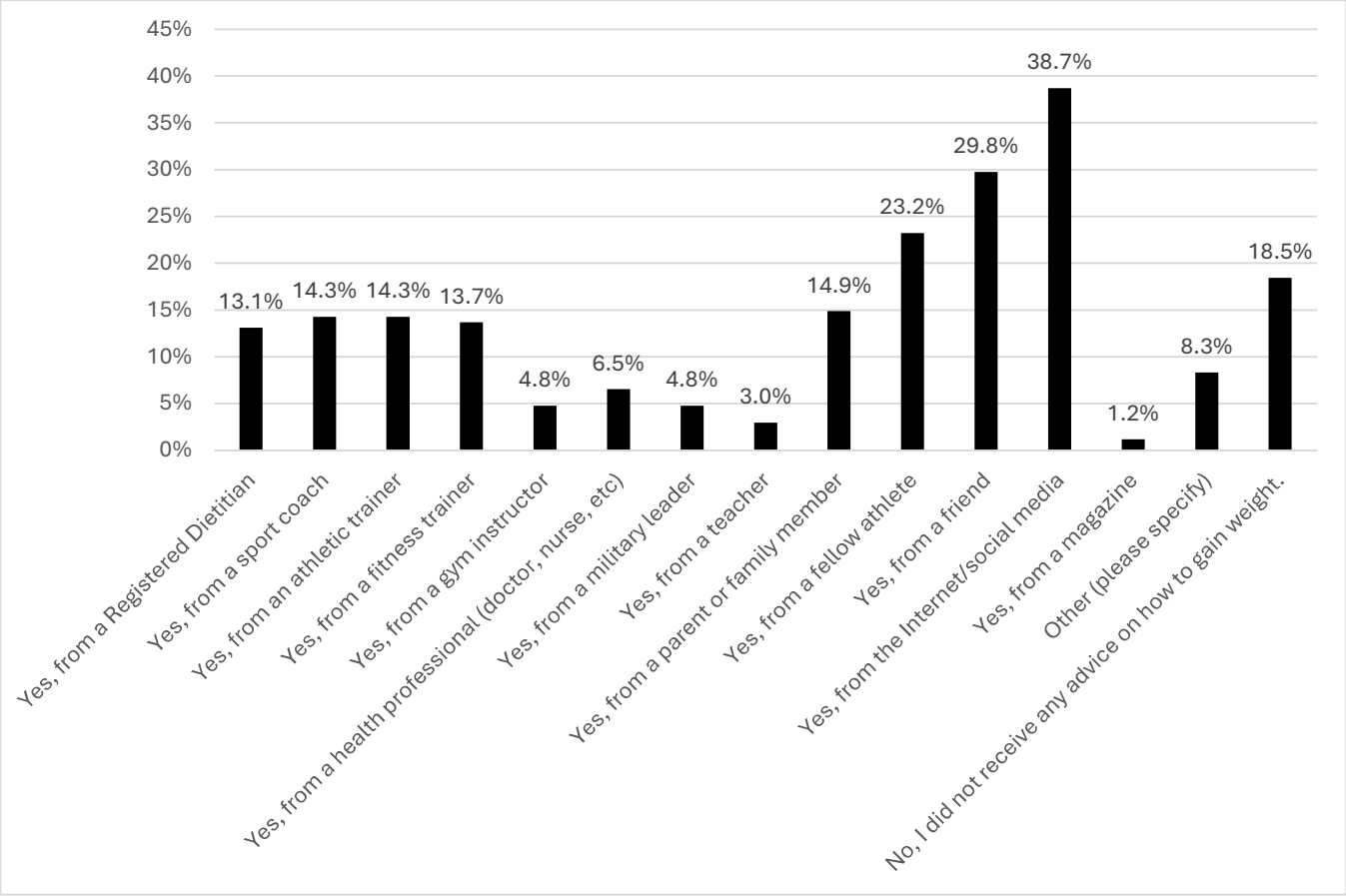


Figure 3. Percentage of participant responses to the question, "Did you receive any advice on how to gain weight?" (N = 168).

Participants were allowed to select all responses that applied. Mean ± SD responses = 8.74 ± 4.34. Other (open-ended/please specify) answers included scientific research, articles, and conferences (n = 5), social media (n = 2), coach (n = 2), personal knowledge from being a nutrition or exercise professional (n = 2), personal experience (n = 2), coach and RD (n = 1), and college classes in nutrition, health, and/or exercise (n = 2).

Mean ± SD responses = 4.11 ± 2.83. Other (open-ended/please specify) answers included "increased aerobic activity (I find it stimulates appetite and slows the rate of body fat gain); increased resistance training (15-30 min "feeder" sessions utilizing low intensity single joint movements to drive blood into muscle tissue" (n = 1) and "decreased yoga and increased hypertrophy-focused weight training" (n = 1).

Table 2 summarizes participants' current sport/exercise training, while Table 3 summarizes weight gain strategy responses to dietary survey questions.

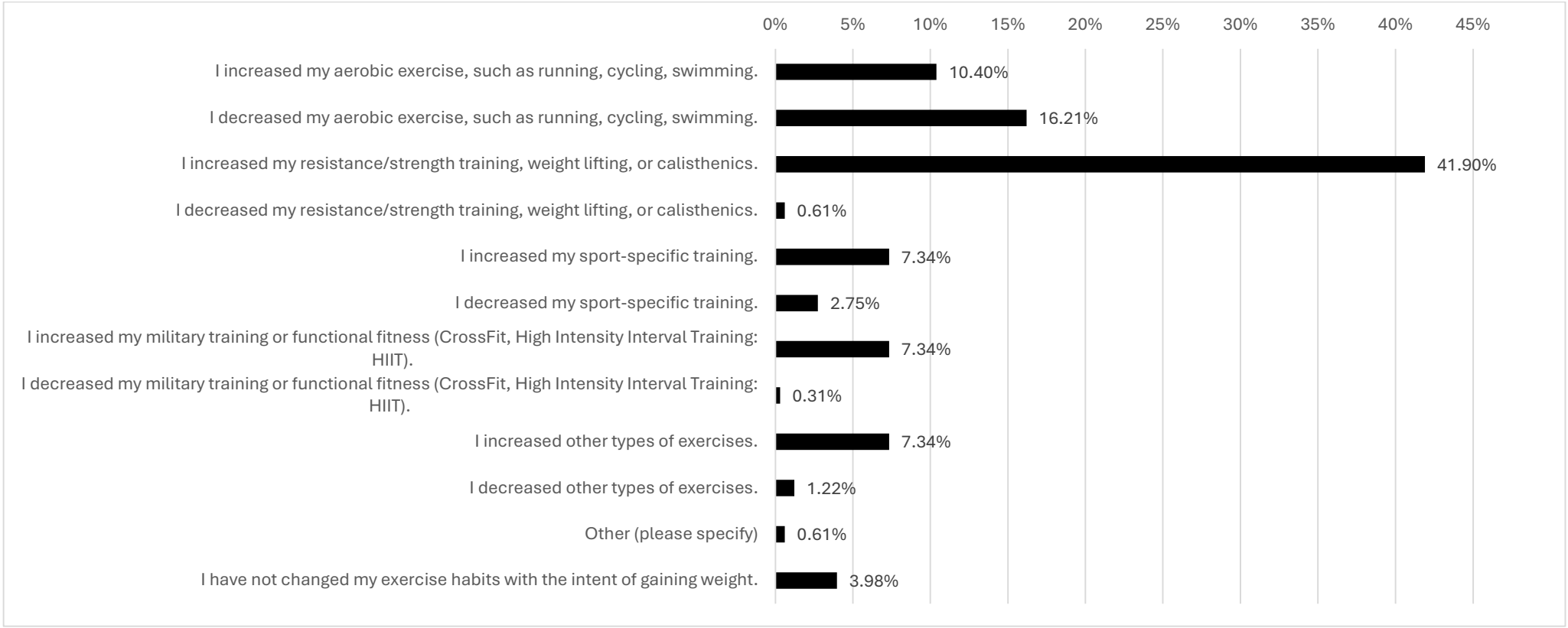


Figure 4. Percentage of participant responses to the statement, "Please select all that apply if your exercise habits changed to promote weight gain." (N = 168).

Table 2. Current sport/exercise training as reported by participants (*N* = 168).

		***N* (%)**
Team sport(s)	Soccer (*n* = 8) Bobsled (*n* = 1) Basketball and softball (*n* = 1) Cricket (*n* = 1) American football (*n* = 2) Lacrosse (*n* = 1) Cheerleading (*n* = 1) Cross country running and track and field events (*n* = 3) Rugby (*n* = 1) Ping pong (*n* = 1) Swimming (*n* = 3) Water polo (*n* = 1)	24 (14.3)
Individual sport(s) or athletic activity(ies) †	Running (*n* = 9) Military physical fitness test and specific events (*n* = 8) Rock climbing (*n* = 2) Bodybuilding (*n* = 6) Brazilian Jiu Jitsu (*n* = 3) CrossFit (*n* = 2) Karate (*n* = 1) Golf (*n* = 1) Powerlifting (*n* = 2) Resistance training, baseball, and softball (*n* = 1) Marathons and Ironman (*n* = 1) Running and cycling (*n* = 1) Track and field (*n* = 1) Rugged Maniac Race (*n* = 1) Weightlifting (*n* = 2) Running, tennis, and soccer (*n* = 1) Wrestling and weightlifting (*n* = 1) Soccer and running (*n* = 1) Swimming (*n* = 2) Golf (*n* = 1) Basketball and wrestling (*n* = 1)	52 (31.0)
Recreational training ‡	Swimming, snowboarding, and wrestling (*n* = 1) Running (*n* = 2) Rock climbing (*n* = 3) Weightlifting (*n* = 9) Strength training, run, walk on incline, and row (*n* = 1) Powerlifting, hiking, snowboarding, and surfing (*n* = 1) Hiking, climbing, rowing, and running (*n* = 1) Hight intensity interval training, weight training, and soccer (*n* = 1) Powerlifting (*n* = 1) Mountaineering, hiking, weight training, and cardio (*n* = 1) Flag football and weightlifting (*n* = 1) Mountain biking and marathon running (*n* = 1) Running, cycling, military physical fitness test, recreational swimming, weightlifting (*n* = 1) Rugby, dance, and running (*n* = 1) Cycling, mountain biking, and soccer (*n* = 1) Weightlifting, yoga, metcon, and hiking (*n* = 1) Military physical fitness test and training (*n* = 3) Weightlifting and cardio (*n* = 1) Boxing (*n* = 1) Weightlifting, cardio, and gymnastics (*n* = 1) Weightlifting, plyometrics, and cardio (*n* = 1) CrossFit, running, and Spartan race (*n* = 1) Running and rock climbing (*n* = 1)	37 (22.0)
I am not currently training for a specific sport or athletic activity; however, I exercise at least 4 days/week.		58 (34.5)

Table 2. *Cont.*

		***N* (%)**
Other (pleasespecify)	Marathon and strength training (*n* = 1) Powerlifting (*n* = 1) Military physical fitness test and personal exercise (*n* = 1) Military physical fitness test (*n* = 1)	4 (2.4)

Participants were allowed to select and specify all categories that applied. † Participant selected category but did not specify training (*n* = 4). ‡ Participant selected category but did not specify training (*n* = 1).

Table 3. Weight gain strategy responses to dietary survey questions (*N* = 168).

		***N* (%)**
Are you consuming more energy than usual? *	Yes	147 (88.0)
	No	15 (9.0)
	Other (please specify): *"I don't measure my daily Calorie intake" (n = 1), "Yes and no-based on budget it was difficult to maintain caloric intake while managing the cost" (n = 1), "While I do want to gain weight, my main goal is to gain more muscle to lift heavier. I haven't been strictly counting calories, however, I have been overloading my protein intake" (n = 1), "likely yes, but I don't track closely" (n = 1), and "I am trying to, but the cost is hard" (n = 1)*	5 (3.0)
Which of the following are you doing? (Select all that apply.)	Eat more than 3 times a day	96 (57.1)
	Eat larger portions	102 (60.7)
	Choose energy-dense foods	92 (54.8)
	Choose foods with high protein	123 (73.2)
	Choose energy-dense beverages	58 (34.5)
	Incorporate more energy-dense and/or high protein commercially available products	37 (22.0)
	Use of energy-dense condiments	28 (16.7)
	Other (please specify): *"I am on a macro plan" (n = 1), "Mostly just consuming more protein with each meal and not watching what I eat as much. If I want a snack, I eat" (n = 1), "Macronutrient tracking, food logging, eat roughly 0.8 to 1.0 g protein per lb bodyweight per day" (n = 1), and "Participate in a weight gain study where I was given daily snacks high in protein" (n = 1)*	4 (2.4)
Protein intake increased	Yes	141 (83.9)
	No	17 (10.1)
	Other (please specify): *"I aim for 8–1.2 g of protein per pound of bodyweight. I add in additional calories* via *increased carbohydrate/fat intake, and sometimes the food choices I make (while attempting weight gain) result in increased protein" (n = 1)*	1 (0.6)
	Unsure	9 (5.4)
Carbohydrate intake increased *	Yes	106 (63.5)
	No	31 (18.6)
	Other (please specify)	0 (0)
	Unsure	30 (18.0)
Dietary fat intake increased *	Yes	55 (32.9)
	No	69 (41.3)
	Other (please specify)	0 (0)
	Unsure	43 (25.8)
Dietary supplements (Select all that apply.)	Protein powder	113 (67.3)
	Mass gainer	10 (6.0)
	Creatine	69 (41.1)
	Amino acids (branched chain amino acids, essential amino acids, or a specific amino acid)	26 (15.5)
	HMB (hydroxymethylbutyrate)	2 (1.2)
	Omega-3 fatty acids	24 (14.3)
	Other (please specify): *"recovery greens, probiotic, multivitamin, carnitine" (n = 1), "L carnitine" (n = 1), "THC" (n = 1), "collagen" (n = 2), "turmeric" (n = 1), "turmeric and magnesium" (n = 1), "multivitamin/mineral" (n = 1), "hydration/electrolyte powder" (n = 1), and "iron" (n = 1)*	10 (6.0)
	I am not using (did not use) dietary supplements.	27 (16.1)

Table 3. *Cont.*

		***N* (%)**
Anabolic steroids (Select all that apply.) **	Testosterone	6 (3.8)
	Growth hormone	3 (1.9)
	Other (please specify): *"primobolan, anavar" (n = 2), anavar (n = 1), "drostanolone enanthate" (n = 1), "primobolan, nandrolone phenylpropionate, masteron, and anavar" (n = 1), and "drostanolone and nandrolone" (n = 1)*	6 (3.8)
	I am not using (did not use) anabolic steroids.	142 (90.5)
Appetite stimulants (Select all that apply.) ***	Cannabis products, such as THC	5 (3.1)
	Prescribed medications	0 (0)
	Other (please specify): *no appetite stimulants were specified (n = 1)*	1 (0.6)
	I am not using (did not use) appetite stimulants.	155 (96.3)

* Participant responses (*n* = 167). ** Participant responses (*n* = 157). *** Participant responses (*n* = 161).

Table 4 summarizes other weight gaining strategies as reported by participants, which were related to diet, exercise, sleep, weighing themselves, tracking their energy or macronutrient intake, which also included weighing foods, and stress management.

Table 4. Other weight gain strategies as reported by participants (*N* = 64).

Other Weight Gaining Strategies	***N***
Diet	28
"Consuming food or protein shakes before/after physical activity"	
"Meal prepping"	
"Cut down on a fair amount of sugars and instead when I'm looking for something sweet I eat a protein option"	
"Adding more ingredients to my meals to make them more calorie dense. Ingredients naturally higher in calories that are still easy to consume"	
"Eat as much as I can"	
"Eating Chick-fil-A and McDonald's helped"	
"Carbohydrate + protein snack before bed, like chocolate milk, pb&j sandwich + milk, Greek yogurt + granola, protein shake"	
"Increasing protein intake"	
"Eating bigger meals seems to be doing the trick. Can't confidently say if I'm gaining muscle or fat but I have put on about 10 lbs so far"	
"Protein powder and creatine"	
"Eating a lot"	
"I drink more sugary drinks and I always snack. I eat until I am full"	
"Eat the healthy foods, not processed foods like fast food or greasy foods"	
"Creatine"	
"Making sure to eat before drinking coffee (I'm not hungry after drinking coffee). More frequent meals/extra snacks"	
"A false sense of weight gain came from creatine pulling additional water into muscles. I gained nearly 10 lbs of water weight and 5 lbs of muscle mass over 2 months in the summer"	
"Caloric surplus. Roughly 1 g of protein per pound of bodyweight"	
"Eat more snacks"	
"Eating snacks before bed and eating earlier in the day"	
"Instead of buying the 'diet' version of foods (sugar free, fat free, etc.), I bought the regular"	
"36-48 h water fasting to reset body, keep insulin sensitivity, and allow body to use carbs more efficiently"	
"In general, just finding ways to put down calorically dense foods. I made shakes of peanut butter, oatmeal, and protein powder every night in a blender"	
"Chicken and rice, two big meals a day"	
"Juicing fresh fruits"	
"Consistent maintainable diet"	
"Blending foods to make homemade 'mass gainer shakes' blending calories are easier to consume. An example would be whey protein, peanut butter, oats, banana, honey"	
"More mindful of my water intake"	
"Eat more than I exercise, be in a dietary/calorie surplus"	

Table 4. *Cont.*

Other Weight Gaining Strategies	*N*
Exercise	12
"Progressive overloading my resistance training"	
"Hypertrophy training program"	
"I began to focus on volume in my exercises instead of strength. My workouts began to change for 3–5 sets of 8–12 and 8 exercises instead of 3–5 sets of 5 reps for 4–5 exercises"	
"Deadlifting consistently has always helped me put a lot of mass on"	
"Lifting heavy weight"	
"Less running and more lifting to stay physically active"	
"Focused more on lower body training"	
"Slight increase in powerlifting intensity/specificity"	
"Lifting heavier weights and running less distance, faster shorter runs"	
"Less walking"	
"Working out more often"	
"Being consistent at the gym"	
Increased sleep	13
"More mindful of my sleep habits"	
"Focus on sleep and sleep quality"	
"I try to sleep more. But this usually does not happen"	
"I tried to get more sleep"	
"Resting time, and sleeping"	
"I tried my best to get more sleep"	
"Sleeping more"	
"Getting a lot of sleep when possible"	
"Sleeping as much as I can"	
"More sleep"	
"I tried to get better rest (i.e., better/more sleep)"	
"Lots of sleep"	
"Trying to get more sleep every night to promote muscle building"	
Tracking weight changes	3
"Looked at my weight once to twice a week to see if I was making progress and weighing myself at consistent times"	
"Weigh myself a couple times a week (fasted in the morning)"	
"Daily recording of body weight to observe trends"	
Tracking diet intake	5
"Tracking calories using the Carbon app to figure out exactly how much I needed to eat and to gain weight in a way that was sustainable and healthy"	
"In the past I've tracked macros"	
"Tracking food intake with a food scale and MyFitnessPal"	
"Counting my calories and keeping track of my current macros"	
"Talking to a sports nutrition expert to tailor my diet routine, weighing food until I kind of dialed things in"	
Stress management	2
"Reducing mental stress"	
"Stress management"	
Other	1
Sauna	

Participants reported increasing their protein intake by consumption of whole foods, shakes, bars, powder, and/or a combination of these (Table 5).

Table 5. Reported protein source to increase daily protein intake (*N* = 129) *.

Protein Source	*N*
Whole foods	50
Powder	1
Shakes	6
Combination (whole foods, bars, shakes, or powder)	14
Combination (whole foods and powder)	31
Combination (whole foods and shakes)	22
Combination (powder and bars)	2
Combination (powder and shake)	1

* Participants reported nonspecific responses: "200 g per day. I record it in MyFitness Pal to make sure I am hitting 200 g per day. I did not do this before" (*n* = 1) and "added protein at breakfast and lunch" (*n* = 1).

Foods included chicken, red meat, fish, pork, turkey, legumes, nut butter (peanut, almond), nuts (peanuts, cashews, mixed), peanut-based products, animal dairy products (milk, cheese, cottage cheese, yogurt, Greek yogurt), soy milk, fast food chicken nuggets, hummus, eggs, tofu, and tempeh. Several participants reported choosing foods, such as tortillas, bread, pasta, and pancake mix, that they termed "high protein". Most participants who reported using protein shakes did not clarify if they were freshly or commercially made. Some participants reported requesting double portions of meat at different food establishments.

Participants reported increasing their CHO intake by consuming the following foods and beverages: bread, pasta, rice (white and brown), French fries, oatmeal, juice, fruit, cereal, pancakes, French toast, pizza, potatoes (white and sweet), ice cream, sports drinks, trail mixes, granola bars, chips, tortillas (flour and corn), vegetables with higher CHO, coconut water, crackers, candy, desserts, chocolate milk, muffins, bagels, honey, fig bars, rice cakes, cookies, couscous, cream of rice, and yogurt. Lastly, participants reported increasing their dietary fat intake via the following: nuts (peanuts, pistachios, almonds, mixed), avocado, cheese, butter, nut butters (peanut, almond), full-fat dairy, olive oil, dressings, sauces, eggs, cheese, fried food, guacamole, olives, bacon, ice cream, peanut-based foods, chia seeds, fatty fish, mayonnaise, fattier meats (thighs and beef), fattier cooking methods (using oil and butter), sour cream, French fries, coconut oil, dark chocolate, yogurt, and milk shakes.

4. Discussion

The aim of this study was to examine the dietary- and exercise-related behaviors of athletic younger adults who were currently actively attempting weight gain or had attempted to do so in the last 12 months. Of the 168 participants (71% men, 29% women) who completed the online survey, desire to gain muscle mass (87.5%) and aesthetic/physical appearance (66.1%) were the two main reasons for wanting to gain weight. More than half of the participants (67.3%) reported using a protein supplement to promote weight gain instead of using only whole foods.

As Slater and colleagues [13] highlighted the controversy over whether an energy surplus is needed to maximize LBM gains, most of our participants (88.0%) reported consuming more energy than usual in their attempt to gain weight. O'Dea and Rawstorne [17] and Minnick et al. [15] observed similar findings; their participants reported consuming more food overall as the main dietary strategy to promote weight gain. Furthermore, 83.9% of participants reported increasing protein intake in our study, which was similarly reported in previous studies [15,17]. As expected, increases in CHO were also observed, with 63.5% reporting increased CHO intake, followed by 32.9% who increased fat intake. Although we did not include a question examining why participants may prioritize one macronutrient over another, the mainstream belief is that more protein is needed to max-

imize LBM gains [24], and CHO and dietary fat may cause FM gain [9,25]. However, Kleiner [4] suggested in the 1990s that CHO may be the important substrate, which is what is stated in several well-known sports nutrition books [2,5] and backed up by a study by Bartels and colleagues [26] and a recent study from our lab [27]. This is because CHO is thought to enhance net protein synthesis and minimize protein degradation, provided that daily protein intake is met.

In addition to high protein consumption, some potentially less healthy behaviors were reported, including the following: (1) excessive protein intakes, such as choosing double meat portions, consuming large meat portions at mealtimes, prioritizing meat as the main part of the meal, having a meat-based diet, and increasing egg intake to four eggs at meal time; (2) adding protein powder to multiple foods and beverages throughout the day, such as cereal, oatmeal, and milk, and using two to three times the recommended dose at one sitting, and (3) incorporating fried foods, such as fried chicken and fried eggs. These reported behaviors may lead to adverse effects, such as increased serum cholesterol, particularly in those genetically predisposed, as well as decreased performance due to prioritizing protein over CHO [28]. Furthermore, adequate protein may be attained through whole foods alone [15].

An additional reported less healthy behavior was the increased consumption of "junk" foods, such as pizza, ice cream, sugary beverages, desserts, candy, muffins, cookies, chips, and French fries. These foods tend to be devoid of beneficial nutrients, including dietary fiber, vitamins, minerals, and antioxidants, and contain high amounts of saturated fat and simple sugar, which may promote FM gain or lead to adverse health effects, such as an increase in serum cholesterol, low-density lipoprotein, triglycerides, fasting blood glucose, and blood pressure [29]. Furthermore, one participant specified choosing chicken and rice over salad; all three foods may be included for a healthy, balanced diet, and an athletic individual need not entirely remove vegetables to promote healthy weight gain.

In total, 90.4% of participants reported using dietary supplements, which agrees with other studies [21,30]. The main reported dietary supplements used by athletic individuals to promote healthy weight gain were protein powders (67.3%) and creatine (41.1%), which are generally considered safe and effective [31,32]. However, the risk of contamination and dangerous added substances, such as pro-hormones, are possible, especially in products that are not third-party certified [33]. Alarmingly, 9.6% of participants reported using anabolic hormones, mainly steroids, to enhance healthy weight gain, which was also reported by O'Dea and Rawstorne [17]. Athletes may resort to anabolic steroid use to improve their athletic performance, pressure to make weight in weight-class sports, muscle dysmorphia, etc. [34]. Although the potential negative effects associated with anabolic steroids, including cardiovascular complications, gynecomastia, hypogonadism, liver damage, and aggressive behavior [34–36], have been documented for decades [37], nutrition and exercise professionals need to be aware that anabolic steroid use may still be prevalent and be prepared to educate athletes on not only the risks, but also to deter their use of potentially dangerous or banned substances. Strict regulatory testing and penalties may assist in decreasing their use, as ultimately, athletes using anabolic steroids have an unfair advantage in the competition. This finding highlights the significant need for safe and sustainable strategies for gaining weight. The reader is referred to a recent review of anabolic steroids for an in-depth discussion on their use in sports [34]. There is a chance that the use of anabolic steroids was used more frequently than reported (even though the survey was anonymous) or that athletes mistook a supplement promoted as a testosterone booster as an anabolic steroid product. Interestingly, only 3.7% of participants reported using cannabis products as appetite stimulants, which have yet to be adequately investigated in athletic individuals [38].

In agreement with current nutrition and exercise recommendations [1,4] and other research studies [15,17], the top two exercise habit changes to promote weight gain, as reported by participants in this study, were increased resistance/strength training, weightlifting, or calisthenics and decreased aerobic exercise, such as running, cycling, swimming (Figure 4). This finding suggests that athletic individuals are somewhat knowledgeable regarding the correct exercise behaviors to promote healthy weight gain. However, it is also interesting that 81.5% reported increasing any type of RT to promote weight gain. This may imply that participants had actively engaged in this behavior before our study. As expected, the top three sources of advice to gain weight included the Internet/social media, a friend, and a fellow athlete (Figure 3). Although these sources may be reputable, they may also potentially direct the athlete towards unhealthy or dangerous practices that are not evidence-based. Furthermore, only 13.1% of participants reported seeking advice from an RD, which may suggest that either athletic individuals do not know how to access the services of an RD or have the means to do so, or that using the previously mentioned top sources is more feasible or comfortable.

In total. 7.7% of participants reported aiming to increase sleep as an additional weight gain strategy (Table 4), and the average reported sleep per 24 h period was seven hours (Table 1), which is in line with the lower range of current recommendations [20]. However, 26.2% of participants reported sleeping less than seven hours per 24 h period, with 3.0% of participants averaging five hours per night. Similarly, in a sleep habits study of 628 athletes across 29 sports teams at Standford University, Mah and colleagues [39] observed that 39.1% of athletes slept less than seven hours on weekdays. Mysliwiec and colleagues [40] also reported that 41.8% of 725 active duty military members reported sleeping $\leq$ five hours per night. Insufficient sleep may be detrimental to protein synthesis pathways [19] and hinder physical and mental athletic performance [18,41]. Practitioners need to educate athletic individuals intentionally attempting healthy weight gain on the importance of adequate sleep per night for optimal outcomes.

It is assumed that only men desire healthy weight gain, as often muscularity is a male body ideal [15]. However, in our study, 49 women reported actively attempting weight gain. This observation agrees with previous studies [15,16], who also reported that their female participants were interested in weight gain. Accordingly, women need to be included in future research studies examining healthy weight gain to better understand any sex differences, such as body composition, hormonal profile, or responses to dietary- and exercise-related interventions, with the ultimate goal of advancing athletic performance and health of both men and women.

Strengths and Limitations

Our study's strengths include using an online survey platform to reach a large population of athletic individuals, as evident by our national and international reach (Table 1). Another strength is our survey development methodology, which consulted eight RDs and two survey design experts. Our study's limitation also includes using online survey data, which rely on self-reporting and honesty and may be prone to bias. A second limitation is that we did not include questions regarding targeting a specific energy surplus or vegetarian/vegan status. Understanding how much of an energy surplus participants were aiming for may have aided in better understanding if high (i.e., ~1000 kcal) vs. low- (~250 kcal) energy surpluses were being attempted and by which type of demographic. As recommended by Aragon and Schoenfeld [10], more experienced athletes should employ a lower energy surplus to prevent large gains in FM. Furthermore, it may have been valuable to understand how many participants followed vegetarian or vegan diets, which could be the reason for their difficulty in gaining healthy weight, as these diets tend to be lower in

energy and protein [42]. Another limitation is that our study depends on cross-sectional data. It would be essential to incorporate a longitudinal approach to strengthen the findings and provide more robust conclusions. Though our study recognizes that male and female participants engage in weight gain practices, a limitation includes examining potential differences in motivations and strategies related to sex. Also, though not analyzing athletes in combat sports or weightlifting could be considered a limitation, the intent of this study was to evaluate intentional weight gain across all sports and athletic activities. Lastly, another limitation of our study is that 54.8% of participants reported earning a bachelor's degree or higher, which may be reflective of the university community in which the study was conducted and the reason for the healthier dietary, exercise, and sleep behaviors that were reported, as well as the correct identification of foods containing either protein, CHO, or fat.

Future research should investigate healthy weight gain strategies in athletic individuals from all demographics and educational backgrounds in a larger sample size, as nutrition, exercise, and health professionals need to be aware of their nutrition misinformation and possibly risky behaviors. Further exploration of why athletic individuals prioritize increasing protein intake over CHO intake and using dietary supplements over whole foods may assist in the development of nutrition education initiatives to improve health and athletic performance. Additionally, further editing our questionnaire into a validated and reliable tool to assess weight gain practices in athletic populations is important for advancing knowledge in the area. Future research should include longitudinal studies to examine if intentional weight gain practices change over time. Furthermore, there is a dire need for future randomized controlled trials to investigate intentional weight gain in athletes and better explore the effects of nutrition, exercise, and sleep. Athletic individuals deserve evidence-based nutrition and exercise recommendations that are relevant and applicable.

5. Conclusions

Our results demonstrate that both male and female athletic individuals intentionally attempt to gain weight for similar goals of increasing LBM, improving physical appearance, and improving athletic performance. Top weight gain strategies reported were consuming more energy from protein-rich foods, using dietary supplements containing protein, and increasing RT-type workouts. Nutrition and exercise professionals may use the findings in this study to be aware of the common dietary and exercise strategies and to better educate their athletic clients on appropriate methods that are evidence-based and not potentially detrimental to health.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/dietetics4020013/s1, Table S1: Intentional weight gain in athletic individuals survey.

Author Contributions: Conceptualization, A.D.S. and D.E.L.-M.; methodology, A.D.S. and D.E.L.-M.; software, A.D.S.; validation, A.D.S. and D.E.L.-M.; formal analysis, A.D.S.; investigation, A.D.S. and D.E.L.-M.; data curation, A.D.S.; project administration: A.D.S.; resources, A.D.S.; writing—original draft preparation, A.D.S.; writing—review and editing, A.D.S. and D.E.L.-M.; visualization, A.D.S. and D.E.L.-M.; supervision, D.E.L.-M.; funding acquisition, D.E.L.-M. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki. Ethical review and approval were waived for this study by the Institutional Review Board of Virginia Tech (VT) (#23-917, 25 September 2023) due to using survey methodology, and the

identity of human participants could not readily be ascertained directly or through identifiers linked to the participants.

Informed Consent Statement: Survey completion implied informed consent.

Data Availability Statement: Data supporting reported results can be found at https://figshare.com/s/5b97c78e46c879add7c5 (accessed on 19 March 2025).

Conflicts of Interest: The views and information presented are those of the authors and do not represent the official position of the U.S. Army Medical Center of Excellence, the U.S. Army Training and Doctrine Command, or the Department of the Army, Department of Defense, or U.S. Government. The results of the study are presented clearly, honestly, and without fabrication, falsification, or inappropriate data manipulation.

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