JAŃCZYK, Natalia, JANKOWSKA, Marlena, BARAN, Karolina, WINKOWSKA, Alicja, MĘDRYSA, Karolina, POKRZEPA, Jakub Jan, PRESAK, Michał, BLECHARZ, Gabriela, SZWECH, Julia and POGRANICZNY, Mikołaj. The Art of Eating: Nourishing Instincts and Balancing Intuitive Eating. Quality in Sport. 2025;38:58248. eISSN 2450-3118.
https://doi.org/10.12775/QS.2025.38.58248
https://apcz.umk.pl/QS/article/view/58248

The journal has been 20 points in the Ministry of Higher Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Higher Education and Science of 05.01.2024. No. 32553.
Has a Journal's Unique Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).
Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 r. Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398.
Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 26.01.2025. Revised: 12.02.2025. Accepted: 12.02.2025 Published: 12.02.2025.

The Art of Eating: Nourishing Instincts and Balancing Intuitive Eating – a literature review

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Keywords: Athletic performance, nutrition, macronutrients, micronutrients, glucose spikes, carbohydrate intake, protein intake, sports nutrition, endurance sports, strength training, combat sports, dietary requirements, intuitive eating, mental health, recovery, energy consumption/spending.

Abstrakt: Praca ta bada kluczową rolę odżywiania w nauce o dyscyplinach sportowych. Interakcja między podstawową wiedzą o odżywianiu – taką, jaką znamy w nauce – a ewoluującym trendem tzw. *intuitive eating* (tłumaczone na: intuicyjnego jedzenia) jest poddana analizie. Omówiona jest fundamentalna ważność makroskładników (węglowodanów, białek i tłuszczów), jak i mikroskładników, które są niebywale ważne w procesie dostarczania energii, a zatem zasilania treningów atletów. Wspomniana jest również rola regeneracji i zapobiegania kontuzjom. Krótką wzmiankę poświęcono kontrolowaniu tzw. *glucose spikes* (tłumaczone na: skoków glukozy), a także na podkreślenie specyficznych wymagań żywieniowych w różnych dyscyplinach sportowych. Praca ta syntetyzuje wiedzę na temat zasad, korzyści i możliwości wyzwań związanych z *intuitive eating* w odniesieniu do potrzeb sportowców. Artykuł podkreśla holistyczne podejście, łącząc to co naukowy świat ma do zaoferowania, z tym co indywidualistyczne podejście *intuitive eating* ma do zaoferowania w dążeniu do osiągnięcia szczytowych wyników sportowych oraz dobrego samopoczucia psychicznego.

Abstract: This dissertation explores the crucial role of nutrition in optimising athletic performance. It examines the interplay between foundational nutritional knowledge – as we know it in science – and the evolving trend of so-called *intuitive eating*. The fundamental importance of macronutrients (carbohydrates, proteins, and fats) and micronutrients for fuelling training, as well as promoting recovery and preventing injury, is discussed. The topic of controlling glucose spikes is briefly touched upon, and understanding the specific nutritional requirements of various sports is emphasised. The dissertation synthesises knowledge of principles, benefits and potential challenges of *intuitive eating* with athletes' needs. Ultimately, this work highlights a holistic approach, amalgamating both what the scientific world has to offer and the individualistic liberation that *intuitive eating* has to offer for achieving peak athletic performance and psychological well-being.

The Art of Eating

Nourishing Instincts and Balancing Intuitive Eating

1. Introduction

A. Background

Randomly coming across a very powerful sentence can make you realise how important something is. Here, actually, it is the intersection of two common sayings regarding eating. That is: 'We are what we eat' and 'You do not put any fuel into a Ferrari'. Both were used by a famous American swimmer, Cody Miller (an individual bronze medal in breaststroke and a gold medal in the men's 4 × 100-metre medley relay with an Olympic record at the Rio de Janeiro Olympics 2016) while talking about how important nutrition for high-level athletes is.[1]

Precisely, this made me realise that nutrition is extremely important for everybody, everywhere, but especially for those high-performing athletes, which Cody ironically compares to Ferraris (one of the best cars from the best cars). They need to be ready for a high-intensity training plan, which involves day and night, all day long, work on preparing the mind and body to the best of their abilities. Eating well does not only give those superhumans strength and power to exceed their training sessions but also, crucially, to quickly recover after those high-demanding meetings.

In recent years, a trend emerged of something called *intuitive eating*, which we all probably have heard about from somewhere. There are, however, people claiming that this sort of eating pattern is not suitable for all individuals, including those struggling with eating disorders (ED) and sportsmen and women.[2]

Intuitive eating encourages people to listen to their body's natural hunger and fullness signals rather than following external diet rules or restrictions.[3] It promotes a healthy

[1] Cody Miller's recorded and posted advice on USA Swimming, 'TrueSport | Cody Miller Shares Nutrition Advice', https://www.facebook.com/USAswimming/videos/truesport-cody-miller-shares-nutrition-advice/258427708259068/ and the information on Cody: https://en.wikipedia.org/wiki/Cody_Miller.
[2] Harvard T. H. Chan School of Public Health, The Nutrition Source Website, *Intuitive Eating* (last reviewed November 2023), https://nutritionsource.hsph.harvard.edu/intuitive-eating/.
[3] Evelyn Tribole and Elyse Resch, Intuitive Eating: A Revolutionary Program that Works (St. Martin's Press, 2003) 20-30.

relationship with food by allowing individuals to eat freely based on their own physiological needs, ultimately fostering a better sense of self-awareness and self-care.[4]

In terms of nutrition, there are so many factors that need to be taken into consideration that some claim *intuitive eating* for athletes may lead to serious malnutrition and, in the long term, to a rapid or steady decrease in performance.

B. Research question

In this article, the research question of the main interest will be how *intuitive eating* can be placed within the context of a proper and well-balanced diet guaranteeing the well-fed body of an athlete. There are a lot of side issues that will also be considered alongside, which could have been seen in the analysis above and below.

C. Purpose and scope

The purpose of this article is to facilitate all the athletes out there in the best possible way to be properly nourished. Nurturing one's needs with all those training sessions, trying to maintain some social life and having some time for hobbies and passions must be highly exhausting. Combining medical knowledge with the field of sports disciplines may give invaluable insight to all those in desperate need of staying on top of their form.

It is also necessary to contradict and discharge the myths surrounding the concept of *intuitive eating* in the eyes of medicine so that future mistakes are avoided at all times. An additional benefit serves the fact that everything that is researched and put into the question in this article may also be relevant for a normal person – wanting to excel in their fitness class or trying to lose or gain some weight.

D. Structure of the essay

Having regard to all of the above, in this article, we will first delve into different aspects of the impact of nutrition on professional athletes and what they need to be paying attention to when choosing their foods and diet (**Section 2**). Next, we will address the advantages and problems that are inherently attached to the approach of *intuitive eating* in the context of sportsmen and women (**Section 3**). Finally, we will summarise all the raised issues in the conclusion (**Section 4**).

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[4] Evelyn Tribole and Elyse Resch, Intuitive Eating: A Revolutionary Program that Works (St. Martin's Press, 2003) 20-30.

2. Fuelling the Fire: The Crucial Role of Nutrition in Athletic Performance

A. Nutritional foundations

It is of crucial importance that we have the foundational knowledge about food composition before diving into any other aspects of this research. It is impossible to grasp all the other concepts without having been assimilated with the basics. That is why we will first look into the macronutrients – what those are, how they influence the body, overall significance, etc. This will be followed by the same analysis with regard to micronutrients. Lastly, we will consider the vitality of calorie intake in our diets as we often hear about the prominence of calories – especially when trying to lose weight (*calorie deficit*). We will try to establish whether the right amount of calories should really be that absorbing in the lives of sportsmen and women.

i. Macronutrients and their importance

Macronutrients are the primary nutritional components that provide energy and are essential for the body's well-being and functionality. They consist of carbohydrates, proteins, and fats, which probably most of us have heard of. Each of them plays a distinct role in our daily lives and in the context of sport – athletic performance.

Firstly, carbohydrates serve as the body's immediate energy source – particularly during high-intensity exercise.[5] Their name is a synthesis of two words – *carbo,* which is detached from carbon and *hydrate,* as in for water as hydrogen and oxygen are their ingredients in the same proportions as H_2O. [6] Athletes should generally aim for 6-10 grams of carbohydrates per kilogram of body weight each day to optimise training and performance.[7] This is a dose prescribed for those with 1-3 hours of training per day.[8] However, just before an important meeting, when the commitment becomes extreme and amounts to more than 4/5 hours per day, such dosage must be increased to 8-12 grams per kilogram of body weight.[9] This is supported

[5] Jie Kang, *Nutrition and metabolism in sports, exercise and health* (2nd edition., Taylor and Francis, 2018, p 22.
[6] Ibid, p 23.
[7] Travis D. Thomas et al., 'Nutrition and Athletic Performance' [2016] Medicine & Science in Sports & Exercise 48(3), 6, p 550.
[8] Ibid.
[9] Ibid.

and may be found in medical studies conducted by Travis D. Thomas et al. in their work titled 'Nutrition and Athletic Performance'

In relation to carbohydrates, there needs to be mentioned *fibre* as it is a class made out of polysaccharides and, to be precise, consists of cellulose, hemicelluloses, pectins, gums, and mucilages as well as the non-carbohydrate lignin.[10] There are two forms of fibres – soluble and insoluble. The former are responsible for a delay in stomach emptying (which means keeping your body satisfied for longer and can, therefore, prevent unwanted hunger). Such soluble fibres are to be found inside the plant cells and to translate into foods such as 'oats, apples, beans, barley, carrots, citrus, fruits, seaweed'.[11] These bring little to no energy to the body, but it is nevertheless worth implementing them into our diets as they can prevent body gain and otherwise stimulate a well-balanced diet.

Secondly, proteins, which in the diet world are also widely known, are crucial for muscle repair and growth and the feeling of being full. The former makes these macronutrients vital for athletes undergoing resistance training or intensive endurance activities – needing to recuperate as quickly as possible. A distinction has been made between *complete* and *incomplete* proteins.[12] The former are rich in amino acids (containing essential nine of them) that humans need in sufficient amounts, and they come from animal-sourced produce.[13] In comparison, plant sources of protein (except soybean) are considered low-quality or otherwise known as *incomplete proteins* as they lack those essential and adequate amounts of amino acids (one or more depending on the source).[14] The current data, as indicated by Thomas and the others in their work 'Nutrition and Athletic Performance', recommends that athletes consume 1.2 to 2.0 grams of protein per kilogram of body weight, depending on the sport's demands.[15]

Lastly, lipids, from which the most important class is that of fatty acids. As explained shortly in the book 'Nutrition and Metabolism in Sports', those are 'a long chain of carbons bonded together and flanked by hydrogen'.[16] Commonly known as fats – macronutrients that are often misunderstood. They are essential for hormonal balance and long-term energy, especially in endurance sports. Research indicates that healthy fat intake can also enhance

[10] Jie Kang, *Nutrition and metabolism in sports, exercise and health* (2nd edition., Taylor and Francis, 2018, p 26.
[11] Jie Kang, *Nutrition and metabolism in sports, exercise and health* (2nd edition., Taylor and Francis, 2018, p 27.
[12] Ibid, p 68.
[13] Ibid.
[14] Ibid.
[15] Travis D. Thomas et al., 'Nutrition and Athletic Performance' [2016] Medicine & Science in Sports & Exercise 48(3), 6, p 551.
[16] Jie Kang, *Nutrition and metabolism in sports, exercise and health* (2nd edition., Taylor and Francis, 2018, p 47.

overall caloric intake without the risk of excessive energy depletion.[17] Additionally, it is medically proven that fats stabilise the decomposition of carbohydrates, hence minimalising the effects of the so-called *glucose spike*, leading to misreading hunger cues and overeating.[18] It is estimated that the appropriate intake for athletes of fats should lie above 20% of all their macronutrients.[19]

A glucose spike is a phenomenon referring to a rapid decrease in blood sugar levels following the consumption of carbohydrates – particularly those quickly digestible and absorbed, such as sugars and refined grains.[20] Such spikes can occur shortly after eating. They are often followed by a crash in blood sugar levels, leading to probable feelings of fatigue, irritability, and cravings for more foods (particularly those high in sugar, such as chocolate, cakes or ice cream – foods that we all love but must pay attention to).

Studies show that managing glucose spikes is essential for maintaining balanced energy levels and overall good health conditions.[21] This is especially important for individuals who are at risk of insulin resistance or any type of diabetes.[22] Glucose spikes can be managed and kept under control. This can be done via, e.g., understanding the glycaemic index of the foods consumed, portioning accurate sizes, and the overall composition of your meal in a balanced approach. Such a moderate tactic would mean the inclusion of proteins, fats, and fibre, which are responsible for helping our organism slow down the sole absorption of sugars.

Realising and understanding *glucose spikes* is crucial and critical for athletes and those engaged in sports, as trying to maintain relatively stable blood sugar levels can improve energy management and increase the athlete's overall performance. This, however, should not, in our eyes, mean that professional athletes should at all times refrain from having some guilty pleasures – as we all are humans, and sometimes, we should indulge ourselves. This funnily may contradict what Micheal Phelps believed as he once said that 'If you want to be the best,

[17] Louise Burke and Vicki Deakin, Clinical Sports Nutrition (2017, McGraw-Hill Education), p 220.
[18] Evelyn Tribole and Elyse Resch, Intuitive Eating: A Revolutionary Program that Works (St. Martin's Press, 2003) 207-210.
[19] Travis D. Thomas et al., 'Nutrition and Athletic Performance' [2016] *Medicine & Science in Sports & Exercise* 48(3), 6, p 552.
[20] Antonio Ceriello, et al., 'Glucose "peak" and glucose "spike": Impact on endothelial function and oxidative stress' [2008] *Diabetes Research and Clinical Practice* 82(2), 262–267, p 262-4.
[21] Ibid.
[22] Maysa H. Almomani and Shahinaz Al-Tawalbeh, 'Glycemic Control and Its Relationship with Diabetes Self-Care Behaviors Among Patients with Type 2 Diabetes in Northern Jordan: A Cross-Sectional Study' [2022] *Patient Prefer Adherence, Dovepress* 16:449-465, p 458-460.

you have to do things that other people are not willing to do'.[23] This demonstrates how devoted, hard-working and goal-oriented those individuals are.

ii. Micronutrients that matter for athletes

While macronutrients receive significant attention, micronutrients – meaning: vitamins and minerals – are equally important but less paid attention to. They function as an aid to athletes in achieving optimal performance and recovery. These nutrients play crucial roles in metabolic processes, stabilising our immune system and production of energy. To well-note - all those traits that we also discussed in relation to macronutrients. For example, iron is essential for transporting oxygen in the blood.[24] Athletes may have higher iron requirements, particularly those engaged in endurance sports or those following a vegetarian or vegan diet who are inherently faced with a lack of this pivotal ingredient in their diets.[25]

Moving forward, calcium and vitamin D are crucial for bone health and muscle function. Insufficient intake of those micronutrients can lead to decreased bone mineral density and increased injury risk, particularly in female athletes.[26] This certainly is aimed to be avoided as recovering from an injury is much more complicated than preventing it. It needs to be kept in mind that vitamin D is inherently minimal in our bodies, and our diets are not able to provide the standard intake required, so it should be advised that this ingredient should be supplemented.[27] On top of that, vitamin D may help to absorb other micronutrients such as magnesium and calcium, which is presented in Figure 1.[28] Additionally, athletes should keep in mind dosing another mineral important for the prevention of injury (magnesium is mostly

[23] Triatlon Noticias, '4 Michael Phelps Quotes To Keep You Motivated' [2021] https://en.triatlonnoticias.com/noticias-triatlon/4-citas-de-michael-phelps-para-mantenerte-motivado/.
[24] John L. Beard, 'Iron biology in immune function, muscle metabolism and neuronal functioning' [2001] American Society for Nutritional Sciences, p 568.
[25] Ibid, p 574-7.
[26] Jie Kang, *Nutrition and metabolism in sports, exercise and health* (2nd edition., Taylor and Francis, 2018, p 85-8; p 111-5.
[27] Ibid, 82-5.
[28] Ibid 114-5.

found in the bones), and moreover specifically preventing cramps (as the rest of it is found in the muscle and soft tissues) and unnecessary water retention – magnesium.[29]

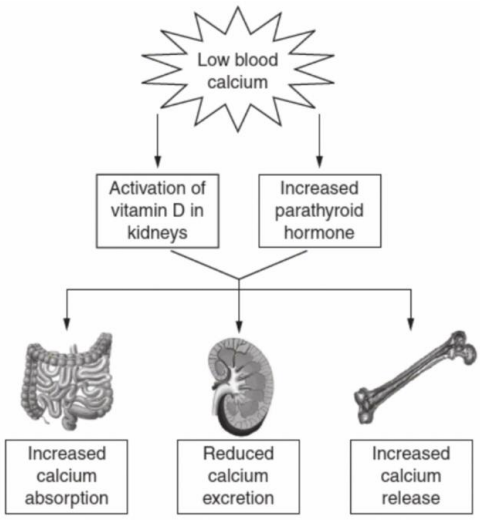

Figure 1. Role of Vitamin D in regulation of micronutrients

Furthermore, antioxidants such as vitamins C and E help combat oxidative stress resulting from intense physical activity and, therefore, guarantee a better overall well-being of an athlete.[30] Those can be found in natural products such as kiwis, cooked carrots, raw tomatoes, peanuts, and their processed version – peanut butter, oranges and other citruses, etc.[31] However, concerning the previously found information, some of these are also high in carbohydrates and therefore could be consumed with a little bit of yoghurt or cottage cheese – to add those proteins and fat that will help in reducing *glucose spike*. Hence, all-embracing – maintaining a well-proportioned intake of all of these micronutrients is essential for both high-level performance and long-term health.

iii. The myth of 12,000-calorie Micheal Phelps's diet? – calorie intake in a nutshell

There has been an infamous claim going around the internet that the legendary Olympic swimmer Michael Phelps was consuming upwards of 12,000 calories a day when preparing for

[29] Jie Kang, *Nutrition and metabolism in sports, exercise and health* (2nd edition., Taylor and Francis, 2018, p 85-8; p 114-5.
[30] Madalyn Riley Higgins, Azimeh Izadi and Mojtaba Kavian, 'Antioxidants and Exercise Performance: With a Focus on Vitamin E and C Supplementation' [2020] International Journal of Environmental Research and Public Health 17(22), p 18-20.
[31] Jie Kang, *Nutrition and metabolism in sports, exercise and health* (2nd edition., Taylor and Francis, 2018, p 85-8; p 89.

the Olympics (he participated in the 2004, 2008, 2012, 2014 and 2016 Olympics).[32] Such "fake news" (as there was confirmation on the issue from Phelps stating that those numbers varied between 8-10 thousand) overshadows the importance of understanding individual caloric needs.[33] While it is true that Phelps's rigorous training regimen necessitated substantially higher caloric intake than that of an average man, this figure is certainly not to be regarded as a set number. The daily calorie intake will vary throughout the periods of training. When more intensive, it will probably be higher. When more lenient, it will probably be lower. Such intake may not only be categorically dissimilar periodically but also daily. Any other information that is given on the subject may be misleading for the athletes.

Energy is defined in the literature as 'the ability to produce change and is measured by the amount of work performed during a given change'.[34] In other words, it is the effort that we need to put in in order to achieve the desired result. In sports, it would be the desired performance at the trials, qualifications or any other event. The energy in our bodies is found in the resources that our bodies are capable of storing and from the foods we are putting into them.[35] Quantitatively, about such energy found in food sources, we talk about calories in which some foods are more dense and some less.[36]

When it comes to research indicates that daily caloric needs depend on several factors, including body size, activity level, and overall goals.[37] For most athletes, particularly those not engaged in elite-level training, a caloric intake between 2,100 and 4,000 calories (females – 2,100-3,500 and men – 3,000-4000) is typically sufficient to meet their requirements.[38] This might seem, for some, like a low number. However, it needs to be kept in mind that our bodies adapt to the intensity of particular exercises. Something that had been taken as frazzling before would, within time, slowly become less challenging as our bodies started adapting to it. Caloric intake will also depend on age and gender, which is nicely illustrated in Figure 2.

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[32] OlympicTalk, 'How many calories Michael Phelps consumed as a swimmer' [2020] https://www.nbcsports.com/olympics/news/michael-phelps-calories-swimming.
[33] Ibid.
[34] Jie Kang, *Nutrition and metabolism in sports, exercise and health* (2nd edition., Taylor and Francis, 2018, p 85-8; p 163.
[35] Ibid, p 166.
[36] Ibid, p 167.
[37] Asker E. Jeukendrup, 'Periodized Nutrition for Athletes' [2017] Sports Med 47(Suppl 1):51-63, p 52-3.
[38] Ashley Thomas, 'Daily Energy Requirements Between Males and Females' [2023] *Aid Station*, https://aidstation.com/blogs/news/satiety-of-sexes?shpxid=ba6c0543-ed4f-4ad2-b4d0-332ec82ee24e. This number is soccer-player specific but may be transposed into other athletes' needs as well to keep it simple. Also, this number is indicative only (based on the assessed literature), as there are many more factors that could be calculated and taken into account when it comes to caloric needs such as direct and indirect calorimetry. For the purposes of this article, it was kept simple, so if you are trying to implement the advice, please consult a specialist beforehand.

	Males		Females	
Age (years)	MJ/day	kcal/day	MJ/day	kcal/day
0–3	$0.2548w - 0.226$ $0.007w + 6.349h - 2.584$	$60.9w - 54$ $1.673w + 1517h - 617$	$0.255w - 0.213$ $0.068w + 4.281h - 1.730$	$61.0w - 51$ $16.252w + 1023h - 413$
3–10	$0.0949w + 2.07$ $0.082w + 0.545h + 1.736$	$22.7w + 495$ $19.59w + 130h + 415$	$0.0941w + 2.09$ $0.071w + 0.677h + 1.5453$	$22.5w + 499$ $16.97w + 161h + 531$
10–17	$0.0732w + 2.72$ $0.068w + 0.574h + 2.157$	$17.5w + 651$ $16.25w + 137h + 516$	$0.0510w + 3.12$ $0.035w + 1.948h + 0.837$	$12.2w + 746$ $8.365w + 465h + 200$
18–29	$0.0640w + 2.84$ $0.063w - 0.042h + 2.953$	$15.3w + 679$ $15.06w + 10.04h + 705$	$0.0615w + 2.08$ $0.057w + 1.184h + 0.411$	$14.7w + 496$ $13.62w + 283h + 98$
30–59	$0.0485w + 3.67$ $0.048w - 0.011h + 3.670$	$11.6w + 879$ $11.47w + 2.629h + 877$	$0.0364w + 3.47$ $0.034w + 0.006h + 3.530$	$8.7w + 829$ $8.126w + 4.434h + 843$
>60	$0.0565w + 2.04$	$13.5w + 487$	$0.0439w + 2.49$	$10.5w + 596$

Source: Data reported by Schofield (1985a, 1985b); recalculated for estimation of BMR in kcal. w, body weight (kg); h, height (m).

Figure 2. Estimating basal metabolic rate from weight/height based on different age/gender group

Regarding calories, as identified and indicated in the work of Kinga Woźniak and her team in their work 'Nutrition Strategies for Optimizing Performance and Health in Young Athletes', the American College of Sports Medicine recommends 45-65% of total daily calories should come from carbohydrates, 25-35% from fats and the remaining from proteins, guaranteeing optimal and well-balanced nutrition.[39]

Additionally, it is not advised for athletes to reduce calorie intake during training at altitude as expected, but an unwanted result would be physiological adaptation, which could result in plummeting performance.[40] A more advisable approach would be gradually, yet safely, increasing the activity expenditure.

Having regard to the above, while excess calories can be necessary for athletes with extraordinarily high energy expenditures, it needs to be reminded that the primary focus should be on the quality of calories consumed. We should prioritise non-processed, natural foods rich in fibre and all the other macro- and micronutrients. A well-rounded diet will provide the essential nutrients required for low- and high-performance training sessions, as well as a tremendously important step of recovery.

[39] Kinga Woźniak et al., 'Nutrition Strategies for Optimizing Performance and Health in Young Athletes' [2024] Journal of Education Health and Sport 60:11-33, p 14.
[40] Ron J. Maughan and IOC Medical Commission, Sports nutrition (2nd ed., John Wiley & Sons, 2014), p 622.

B. Tailoring diets to sport types

Undoubtedly, different sports engage in different energy consumption. Logically, when we think about sports from the initial example – swimming will consume a lot of energy resources as it involves tons of hours spent in the pool (using all parts of muscle) and weight lift sessions. In comparison, sports that do not demand such high intensity, in a constant move use of muscles – e.g., archery will require much less. That is why we will first consider those differences in terms of endurance sports with strength training.

i. Endurance sports vs strength training

In tailoring diets for athletes, it is essential to recognise the distinct nutritional requirements that are posed by their sport's physical demands. Endurance athletes require diets rich in carbohydrates to fuel prolonged periods of exertion, as carbohydrates are responsible for providing the energy required to take on those sessions.[41] Sports that are qualified as *endurance sports* are running (short [sprinting] and long distance) as well as swimming, where you have to build a strong aerobic base to be able to compete at the highest level.[42] Hence, it is prescribed for those athletes to consume higher amounts of carbohydrates around training sessions – similar to studies which emphasise carbohydrate loading to optimise glycogen stores.[43] However, no matter the sport, carbohydrates will be required to provide the right fuel for training sessions and competitions.

Conversely, strength training athletes need a balanced intake of proteins and carbohydrates to support fuelling their training while simultaneously supporting significant muscle growth and recovery.[44] Research suggests that an elevated protein intake is desirable, if not compulsory, for gaining and maintaining muscle mass and indorsing recovery – ranging between 1.6 to 1.7 grams of protein per kilogram of body weight, which in other words amounts to twice that of a sedentary individual.[45] Research also indicated that those consumed numbers are far greater than that of the actually prescribed dosage.[46] A well-versed diet will be one that

[41] Asker E. Jeukendrup, 'Carbohydrate intake during exercise and performance' [2004] Nutrition 20:669-77, p 669-672.
[42] Ron J. Maughan and IOC Medical Commission, Sports nutrition (2nd ed., John Wiley & Sons, 2014), 561-581; 607-615.
[43] Asker E. Jeukendrup, 'Carbohydrate intake during exercise and performance' [2004] Nutrition 20:669-77, p 669-672.
[44] Ron J. Maughan and IOC Medical Commission, Sports nutrition (2nd ed., John Wiley & Sons, 2014), p 552-3.
[45] Ibid, p 553.
[46] Ibid.

is tailored to these needs and ensures athletes receive the necessary nutrients for their specific sport.

Worth mentioning is that all athletes will strive to achieve bodies that will fuel them to achieve the best performance in their disciplines (by achieving the right mass and composition in the most required and used muscles). As righteously noted in Maughan's book 'Sports Nutrition': 'in this sense all athletes are bodybuilders'.[47]

ii. Weight class considerations in combat-sports

Combat sports where a weight is considered to have the ability to give some kind of advantage over an opponent (in terms of strength, speed, vigour or responsiveness) will substantially differ when it comes to data within one discipline, which will be less common in other sports. That is why sports such as wrestling, judo, taekwondo, weightlifting, sometimes lightweight rowing and boxing require athletes to compete in specific weight classes – making precise dietary administration predominant.[48] Those sports are generally grouped under the name of *weight-category sports*.[49]

Athletes in these sports must balance maintaining a competitive weight while at the same time successfully safeguarding optimum performance and health. Hence, nutritional strategies play an important role. Athletes usually aim to cut their weight (lose body fat and/or water) while maintaining lean body mass (also known as: LBM) when making their weight-in.[50] This includes a reduction of caloric intake during initial weight cuts, followed by a focus on nutrient-dense foods that replenish energy post-weigh-in.[51] Although, it will, of course, all depend on the type of sport that athlete performs in.

C. Timing and meal planning

Timing and meal planning are critical aspects of nutritional strategies for athletes. In the articles dedicated to sports professionals, we may often find nutrition for pre-workout, during and post-workout.[52] For the purposes of this article, we will limit ourselves to the discussion of pre-workout and post-workout nutrition and considerations of its importance as the

[47] Ron J. Maughan and IOC Medical Commission, Sports nutrition (2nd ed., John Wiley & Sons, 2014), p 72.
[48] Ibid, p 639.
[49] Ibid.
[50] Ibid, p 639-640; Paulina Januszko and Ewa Lange, 'Nutrition, supplementation and weight reduction in combat sports: a review' [2021] AIMS Public Health 8(3):485-498, p 491-3.
[51] Ibid.
[52] Travis D. Thomas et al., 'Nutrition and Athletic Performance' [2016] Medicine & Science in Sports & Exercise 48(3), 6, p 554-5.

remaining category of nutrition during workouts focuses mostly on water and other fluids intake (such as isotonic) and in case of excessively long training sessions – energy gels or other stimulants of energy.[53] This is a very complex issue which athletes often need to master after years of experimenting with different brands, flavours and other traits of such products.

i. Pre-workout nutrition – what and when to eat?

Pre-workout nutrition guidelines generally recommend consuming a meal rich in carbohydrates with moderate protein about 3-4 hours before exercise, supplemented by a small snack closer to the activity.[54] Such a moderate approach helps in maximising energy levels and optimising performance. This must hold particularly true in endurance events, as racing on an empty or full stomach could be catastrophic. However, an athlete's preferences based on years of experience and trying different foods consumed before events, as well as later discussed intuitive eating principles, may be effectively integrated into the athlete's routine. One noteworthy advantage of intuitive eating that should be mentioned here is that it negates overly restrictive behaviours or dieting, which could lead to under-fuelling and, therefore, a decreased level of performance in an important meeting.

ii. Post-workout recovery meals and snacks

Post-workout nutrition is, as the name suggests, not concerned about preparing the body for high-demanding training or racing but for the recovery after such exhaustion. This means not exclusively but most notably muscle repair and replenishing glycogen stores.[55] Typically, within 30-60 minutes, a combination of carbohydrates and protein is recommended.[56] An optimal recovery meal may include a ratio of approximately 3:1 of carbohydrates to protein (bearing in mind an overall high intake of protein, which enables speed and effective recovery).[57] Caution before diving into intuitive eating should be placed here, as providing athletes with flexibility is surely tempting, it needs to be ensured that necessary nutrient needs are met sufficiently, which will accordingly enhance the recovery process and lead to more consistent post-exercise eating habits.

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[53] Travis D. Thomas et al., 'Nutrition and Athletic Performance' [2016] Medicine & Science in Sports & Exercise 48(3), 6, p 555-6.
[54] Kinga Woźniak et al., 'Nutrition Strategies for Optimizing Performance and Health in Young Athletes' [2024] Journal of Education Health and Sport 60:11-33, p 14-15; 17-18.
[55] Asker E. Jeukendrup, 'Periodized Nutrition for Athletes' [2017] Sports Med 47(Suppl 1):51-63, p 54.
[56] Travis D. Thomas et al., 'Nutrition and Athletic Performance' [2016] Medicine & Science in Sports & Exercise 48(3), 6, p 550-1.
[57] Ibid; John L. Ivy, 'Dietary strategies to promote glycogen synthesis after exercise' [2004] Canadian Journal of Applied Physiology 26 Suppl (S1), 236-245

3. Intuitive Eating: Finding Freedom within Structure for Athletes

A. Understanding intuitive eating

As previously explained, the art of intuitive eating is an approach that encourages individuals to develop a healthier relationship with food by recognising hunger and satiety cues rather than adhering to any restrictive and limiting diets.[58] Principles of this type of eating include disavowing a stereotype of the diet mentality, honouring and trying to understand hunger, and finding satisfaction in whole foods.[59] It does not mean eating tons of fast food, sweets and other treats, hoping that it will not ruin our high expectations of flawless performance, but simply finding joy in the simplicity of the art of natural eating. This method aligns well with the rendition needs of athletes by allowing for more personalised and sustainable eating patterns.

i. Principles of intuitive eating

The key principles of intuitive eating involve understanding and respecting biological hunger signals, as well as building a diet based on personal choices and preferences rather than strict guidelines or pre-established patterns. This involves dropping the use of any calorie-counting apps or strict food plans. Although intuitive eating attaches a lot of freedom to the art of eating, which means support of dieting methods and knowledge healthily and wisely can be occasionally put to use. Living by such principles, or should we say lack of them, can empower athletes to make mindful food choices while maintaining flexibility and ultimately fostering a much more positive mindset toward food and body image.[60]

ii. Benefits for mental health and relationship with food

Intuitive eating offers various mental health benefits. To name a few – reducing anxiety around food consumption that is present to some people and enhancing overall better life

[58] Harvard T. H. Chan School of Public Health, The Nutrition Source Website, *Intuitive Eating* (last reviewed November 2023), https://nutritionsource.hsph.harvard.edu/intuitive-eating/.
[59] Ibid; Evelyn Tribole and Elyse Resch, Intuitive Eating: A Revolutionary Program that Works (St. Martin's Press, 2003), p 20-30.
[60] Ibid; Jake Linardon, Tracy L. Tylka and Matthew Fuller-Tyszkiewicz, 'Intuitive eating and its psychological correlates: A meta-analysis' [2021] The International Journal of Eating Disorders 54(7), 1073–1098, p 1074-6.

satisfaction.[61] The latter may stem from the fact that athletes feel that they have sacrificed a lot for the discipline they specialise in, and sacrificing even more of their freedom would have a detrimental effect.[62] Therefore, there has been a lot of research suggesting that practising and implementing intuitive eating correlates with improved psychological well-being and reduced disordered eating.[63] One such athlete who advocates for this style of living who had been previously struggling with eating disorders is American long-distance runner Allie Ostrander.[64] She now creates online content with one of the main focuses of trying to help all those struggling with sports fuelling.[65] As can be seen from Allie's example, for athletes, adopting an intuitive eating approach can mitigate the stress of performance pressure, creating healthier proportions between fuelling their bodies and mental wellness.

B. Advantages for athletes

i. Enhancing body awareness

As could have already been observed, intuitive eating encourages athletes to develop a deepened awareness of their body's physiological signals, such as hunger and fullness. By trying and adapting, athletes understand their bodies to a much fuller extent. Such heightened sensitivity allows athletes to develop a responsive mechanism that allows tailoring their nutritional needs appropriately. Studies show that such enhancement will positively influence their overall performance.[66] To be exact, research has shown that athletes who practice intuitive eating are more in tune with their bodies and can better identify what types of foods fuel their energy levels most effectively.[67] As athletes become more accustomed to recognising their

[61] Jake Linardon, Tracy L. Tylka and Matthew Fuller-Tyszkiewicz, 'Intuitive eating and its psychological correlates: A meta-analysis' [2021] The International Journal of Eating Disorders 54(7), 1073–1098, p 1079-1089; Lauren J. Bruce and Lina A. Ricciardelli, 'A systematic review of the psychosocial correlates of intuitive eating among adult women' [2016] Appetite 96:454-72, p 457-465.
[62] VARA Youth Coordinator Alex Krebs, 'The Sacrifices Athletes Make', *Vermont Alpine Racing Association.*
[63] Jake Linardon, Tracy L. Tylka and Matthew Fuller-Tyszkiewicz, 'Intuitive eating and its psychological correlates: A meta-analysis' [2021] The International Journal of Eating Disorders 54(7), 1073–1098, p 1079-1089; Lauren J. Bruce and Lina A. Ricciardelli, 'A systematic review of the psychosocial correlates of intuitive eating among adult women' [2016] Appetite 96:454-72, p 457-465.
[64] Information on Allie that may be found online: https://en.wikipedia.org/wiki/Allie_Ostrander.
[65] Allie's YouTube channel on which she posts videos with such content: @allie_ostrander; https://www.youtube.com/@allie_ostrander.
[66] Jake Linardon, Tracy L. Tylka and Matthew Fuller-Tyszkiewicz, 'Intuitive eating and its psychological correlates: A meta-analysis' [2021] The International Journal of Eating Disorders 54(7), 1073–1098, p 1079-1089; Lauren J. Bruce and Lina A. Ricciardelli, 'A systematic review of the psychosocial correlates of intuitive eating among adult women' [2016] Appetite 96:454-72, p 457-465.
[67] Jake Linardon, Tracy L. Tylka and Matthew Fuller-Tyszkiewicz, 'Intuitive eating and its psychological correlates: A meta-analysis' [2021] The International Journal of Eating Disorders 54(7), 1073–1098, p 1090-4.

internal cues, they may experience improved energy balance and overall enjoyment of food, both of which can contribute to enhanced performance.

ii. Reducing the stress of strict dieting

Many athletes face significant pressure to adhere to rigid dietary regimens in order to succeed and reach their performance goals.[68] This may lead to stress, anxiety, and even in result to disordered eating behaviours. As previously mentioned, athletes may seem to experience heavy mental downs and ups due to their feelings that they must sacrifice everything for the sport.

Intuitive eating provides an alternative approach by promoting this previously mentioned flexibility and adaptability in food choices.[69] This allows athletes to enjoy a wider variety of foods and can reduce the psychological burden associated with traditional dieting. By detaching the notion of morality from food choices, athletes are able to adopt a healthier mindset towards food in general, which can lead to a more satisfactory lifestyle. Consequently, reduced stress can positively influence performance and recovery, helping athletes to focus more on their training rather than on other concerns such as calorie counting.

C. Potential pitfalls

i. Misinterpretation of hunger cues

While intuitive eating promotes body awareness, one potential pitfall is the misinterpretation of hunger cues, which is, unfortunately, seen as not so rare.[70] Athletes, like other people, may sometimes confuse thirst or fatigue for hunger, which will ultimately lead to inappropriate eating decisions that do not accurately align with their actual needs.[71] If that does not happen systematically, it is totally fine. However, if it does reoccur with some intensity, it can become particularly problematic during intense training periods when an athlete's body may require precise, on top of the athlete's form-fuelling strategies and energy.

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[68] Jake Linardon, Tracy L. Tylka and Matthew Fuller-Tyszkiewicz, 'Intuitive eating and its psychological correlates: A meta-analysis' [2021] The International Journal of Eating Disorders 54(7), 1073–1098, p 1074-6.
[69] Evelyn Tribole and Elyse Resch, Intuitive Eating: A Revolutionary Program that Works (St. Martin's Press, 2003), p 214-6.
[70] Jake Linardon, Tracy L. Tylka and Matthew Fuller-Tyszkiewicz, 'Intuitive eating and its psychological correlates: A meta-analysis' [2021] The International Journal of Eating Disorders 54(7), 1073–1098, p 1079-1089; Lauren J. Bruce and Lina A. Ricciardelli, 'A systematic review of the psychosocial correlates of intuitive eating among adult women' [2016] Appetite 96:454-72, p 457-465.
[71] Evelyn Tribole and Elyse Resch, Intuitive Eating: A Revolutionary Program that Works (St. Martin's Press, 2003), p 59-74; Harvard T. H. Chan School of Public Health, The Nutrition Source Website, https://nutritionsource.hsph.harvard.edu.

Therefore, it is essential for athletes to truly develop a clear understanding of their hunger signals and to complement intuitive eating with an informed approach by actively broadening their knowledge regarding different nutrients and products and how a body may respond to certain produce. Such a well-versed attitude will also take into consideration the specific demands of their sports.

ii. Balancing performance needs with intuitive choices and cravings

Another challenge sportsmen and women may face is balancing their performance needs with intuitive eating (the food choices it takes) and normal food cravings. This was somehow touched upon previously when talking about athletes wanting to enjoy freedom in relation to food while doing so responsibly.

While listening to cravings may encourage the consumption of enjoyable foods such as doughnuts, ice cream, ice lollies, gummies, candy floss and other sweets and treats – those foods are certainly something we all should avoid as they are not natural but chemically induced produce. Hence, their ingesting will often lead to nutritional imbalances and deprivation of valuable nutrients of the organism unless athletes prioritise nutrient density over taste and a short-sighted feeling of satisfaction.

For instance, an athlete may crave a high-sugar snack after his/her workout routine (even more heightened by the need for his/her reward system). This, however, is certainly not going to provide the optimal recovery of energy levels and muscles on other important parameters as such meal would inherently lack nutrients required, which were elaborated in the previous section. Therefore, striking a balance between satisfying cravings and adhering to nutritional guidelines is decisive for maintaining performance while practising the art of intuitive eating. Athletes must learn to decipher which food choices support their goals and which may hinder them in order to foster a holistic approach to nutrition that truly benefits performance. Additionally, they need to prioritise whole and natural foods over excessively processed and chemically induced produce.

4. Conclusion: Synthetising Nutrition for Excellence

To sum up, the interplay between nutrition and athletic performance cannot be overstated. As we have seen after exploring foundational knowledge of macronutrients and micronutrients, it is pivotal for athletes to keep looking to work out the best possible route for the acceleration of their performance and recovery. As underlined, different nutrients play different roles – yet

all having crucial roles. Carbohydrates fuel energy resources, proteins help muscle repair, and fats support overall body functioning. With a more in-depth understanding of these macroelements, athletes can make informed choices that elevate their capabilities to the fullest extent possible.

Moreover, *intuitive eating* presents an appealing and noteworthy solution for athletes to cultivate a positive relationship with food. By listening to their body's natural hunger and fullness signals, athletes can achieve ultimate flexibility and freedom in their food choices. This has the effect of reducing the psychological burdens of strict dieting and other advantages. Nevertheless, there are some challenges posed as well, such as proximate misinterpretation of hunger cues or balancing performance needs with personal cravings. Undoubtedly, with long-term commitment and adequate carefulness, it may be the best possible solution for athletes to secure their life satisfaction.

5. List of Figures

1. Figure 1. Role of Vitamin D in regulation of micronutrients – Jie Kang, *Nutrition and metabolism in sports, exercise and health* (2nd edition., Taylor and Francis, 2018, p 86.
2. Figure 2. Estimating basal metabolic rate from weight/height based on different age/gender groups – Ron J. Maughan and IOC Medical Commission, Sports nutrition (2nd ed., John Wiley & Sons, 2014), p 4.

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All authors have reviewed and agreed to the publication of the final version of the manuscript.

Conflict of Interest Statement:
No conflicts of interest.

Funding Statement:
This study did not receive any specific funding.

Informed Consent Statement:
Not applicable.

Ethics Committee Statement :
Not applicable.

6. Bibliography

1. Harvard T. H. Chan School of Public Health, The Nutrition Source Website, https://nutritionsource.hsph.harvard.edu;
2. Beard John L., 'Iron biology in immune function, muscle metabolism and neuronal functioning' [2001] American Society for Nutritional Sciences 568;
3. Burke Louise and Vicki Deakin, *Clinical Sports Nutrition* (2017, McGraw-Hill Education);
4. Jeukendrup Asker E. and Sophie C. Killer, 'The myths surrounding pre-exercise carbohydrate feeding' [2011] Annals of Nutrition and Metabolism 57(suppl 2):18–25;
5. Jeukendrup Asker E., 'Carbohydrate intake during exercise and performance' [2004] Nutrition 20:669-77;
6. Holmes Matthew and Keith Ward 'Introduction to Nutrition for Sports and Exercise Therapists' in *Routledge Handbook of Sports and Exercise Therapy* (2nd ed., pp. 745–783, Routledge, 2024);
7. Kang Jie, *Nutrition and metabolism in sports, exercise and health* (2nd edition., Taylor and Francis, 2018;
8. Higgins Madalyn Riley, Azimeh Izadi and Mojtaba Kavian, 'Antioxidants and Exercise Performance: With a Focus on Vitamin E and C Supplementation' [2020] *International Journal of Environmental Research and Public Health 17*(22);
9. Lamprecht Manfred, *Antioxidants in sports nutrition* (M. Lamprecht, Ed.; 1st ed., Taylor & Francis, 2015);
10. Sims Stacy T., et al., 'International society of sports nutrition position stand: nutritional concerns of the female athlete' [2023] *Journal of the International Society of Sports Nutrition* 20(1);
11. Thomas Travis D., et al., 'Nutrition and Athletic Performance' [2016] *Medicine & Science in Sports & Exercise* 48(3), 6;
12. Burke Louise Mary, John A. Hawley, Stephen H. Wong and Asker E. Jeukendrup, 'Carbohydrate and exercise' [2011] *Journal of Sports Sciences* 29(1), 1-11;
13. Bruce Lauren J. and Lina A. Ricciardelli, 'A systematic review of the psychosocial correlates of intuitive eating among adult women' [2016] *Appetite* 96:454-72;
14. Januszko Paulina and Ewa Lange, 'Nutrition, supplementation and weight reduction in combat sports: a review' [2021] AIMS Public Health 8(3):485-498;

15. Ivy John L., ‘Dietary strategies to promote glycogen synthesis after exercise’ [2004] *Canadian Journal of Applied Physiology* 26 Suppl (S1), 236-245;
16. Jeukendrup Asker E., ‘Periodized Nutrition for Athletes’ [2017] Sports Med 47(Suppl 1):51-63;
17. Martin Rachel, Ivanka Prichard, Amanda D. Hutchinson and Carlene Wilson, ‘The role of body awareness and mindfulness in the relationship between exercise and eating behavior’ [2013] J Sport Exerc Psychol 35(6):655-60;
18. Joy Elizabeth, Andrea Kussman and Aurelia Nattiv, ‘Update on eating disorders in athletes: A comprehensive narrative review with a focus on clinical assessment and management’ [2016] Br J Sports Med 50(3):154-62;
19. Phillips Stuart M., ‘Dietary protein for athletes: from requirements to metabolic advantage’ [2006] Appl Physiol Nutr Metab 31(6):647-54;
20. Spano Marie et al., ‘Future Trends: Nutritional Supplements in Sports and Exercise’ in Mike Greenwood, Douglas Kalman and Jose Antonio, *Nutritional Supplements in Sports and Exercise* (2008, ISBN: 978-1-58829-900-0, 491-508);
21. Tribole Evelyn and Elyse Resch, *Intuitive Eating: A Revolutionary Program that Works* (St. Martin's Press, 2003);
22. Cash Thomas F. and Thomas Pruzinsky, *Body Image: A Handbook of Theory, Research, and Clinical Practice* (Guilford Press, 2011);
23. Linardon Jake, Tracy L. Tylka and Matthew Fuller-Tyszkiewicz, ‘Intuitive eating and its psychological correlates: A meta-analysis’ [2021] *The International Journal of Eating Disorders* 54(7), 1073–1098;
24. Woźniak Kinga et al., ‘Nutrition Strategies for Optimizing Performance and Health in Young Athletes’ [2024] *Journal of Education Health and Sport* 60:11-33;
25. Ceriello Antonio, et al., ‘Glucose “peak” and glucose “spike”: Impact on endothelial function and oxidative stress’ [2008] *Diabetes Research and Clinical Practice* 82(2), 262–267;
26. Maughan Ron J. and IOC Medical Commission, *Sports nutrition* (2nd ed., John Wiley & Sons, 2014);
27. VARA Youth Coordinator Alex Krebs, ‘The Sacrifices Athletes Make’, *Vermont Alpine Racing Association*;
28. Almomani Maysa H. and Shahinaz Al-Tawalbeh, ‘Glycemic Control and Its Relationship with Diabetes Self-Care Behaviors Among Patients with Type 2 Diabetes

in Northern Jordan: A Cross-Sectional Study' [2022] *Patient Prefer Adherence, Dovepress* 16:449-465.