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This review provides an overview of the nutritional requirements for active enthusiasts and highlights the role of dairy in sports nutrition.

A publication for health professionals

Nutritional considerations and the use of milk and dairy to sustain a healthy and active lifestyle in today's fast-paced society.

Regular physical activity is one of the cornerstones of health, and active lifestyles are often promoted to optimise well-being and prevent disease.[1] For significant health benefits, the World Health Organisation (WHO) recommends that adults (aged 18—64 years) engage in at least 150—300 minutes of moderate-intensity aerobic physical activity, 75—150 minutes of vigorous-intensity aerobic physical activity, or an equivalent combination of these per week. Adults should also include muscle-strengthening activities involving all major muscle groups at least two days per week.[1] From a practical point of view, this equates to 30 minutes of moderate-intensity physical activity for most days (i.e. ≥5) of the week.[2] South Africa's food-based dietary guidelines (FBDGs) also advise adults to 'be active' and do at least 30 minutes of moderate-intensity physical activity (at 50—70% of maximal heart rate) per day.[3]

An active lifestyle is not just about engaging in structured exercise or formal sport activities but also about incorporating physical movement in daily routines and leisure time.[2] Interest and engagement in several recreational activities that offer fitness and social connection such as padel, outdoor community activities such as parkrun, or hiking and cycling are increasing.

Indoor or gym-based fitness movements such as CrossFit and HYROX fitness racing (combination of high-intensity aerobic physical activity and strength-based functional training) as well as virtual or AI fitness trends using home-based coaching apps and investing in wearable technology (i.e. smartwatches) are also gaining traction. However, even active enthusiasts are not immune to the physical and psychological (mental and emotional) challenges imposed by today's fast-paced, success-driven, technology-heavy and often stressful society. To avoid burnout, fatigue and long-term health issues, active individuals should also optimise nutrition, prioritise rest and sleep, manage stress and set digital boundaries.[4] This article will focus on the nutritional strategies to sustain an active lifestyle with emphasis on nutritional considerations for physical activity, with some reference to psychological (mental and emotional) well-being. Including all food groups in the diet is important, but the composition and matrix of dairy foods in particular are unique. Dairy foods, including milk, maas and yoghurt, are recommended as part of healthy dietary patterns globally and are promoted in South Africa through the South African FBDGs.[5] The role of milk and dairy to optimise health and performance will also be highlighted in this article.

Nutritional considerations for physical activity

Energy and macronutrient requirements

Muscle activity as part of an active lifestyle, whether it is in the form of structured exercise, recreational activities or daily chores, requires energy and nutrients.[6] The optimal amount and source (carbohydrates vs. fat) of energy depends mainly on the intensity and duration of the activity.[7] Physically active individuals expend more calories than sedentary individuals, but conceivably not as much as competitive or professional athletes. Energy intakes should therefore be tailored to match energy expenditures. Chronic undereating can result in a low energy availability and negatively influence mental and physical health and performance.[8] However, being physically active also does not justify unrestricted energy intakes or mindless eating, as chronic overeating or unhealthy diets can also negatively influence health and performance. Physically active individuals should therefore be mindful of dietary intakes, especially during intense training periods, stressful situations, when injured or sick or when they face modern-day challenges that influence diet and energy intakes.

An active lifestyle also does not necessarily warrant the use of sport supplements, and preference should be given to eating healthy foods to meet daily energy requirements.[9-11] During endurance events or activities interspersed with high-intensity sprints (e.g. soccer, rugby, tennis, hockey, netball), a sport supplement (e.g. carbohydrate energy drink) may offer a practical and energy-dense option to prevent fatigue. However, carbohydrate energy drinks are deemed unnecessary for activities such as yoga or golf, which are of lower intensity or mostly focus on skill, or those of short duration (<30 – 60 minutes).[10,12]

Carbohydrate requirements are generally higher in physically active individuals, especially in competitive athletes [4,9,12] as carbohydrates (muscle glycogen) are the predominant fuel for muscle contraction.[7] Active individuals generally require 3 – 12 g carbohydrates per kilogram of body weight per day, depending on training frequency, intensity and duration.[12] Protein re-quirements are also slightly higher in physically active individuals than their sedentary counterparts and is needed for general health, muscle repair and muscle adaptations.[9,13] Approximately 1.2 – 2 g protein is required per kilogram body weight per day, but the requirement depends on training status and the nature of physical activity (endurance vs. strength-based).[13] Fat is also an important macronutrient that can provide fuel, especially for exercise of lower intensity but extended duration.[7] Fat is further important for hormone production and vitamin absorption. Omega-3 fatty acids, an essential and long-chain polyunsaturated fatty acid, is of particular importance for active individuals owing to its role in immunity (i.e. reducing inflammation) and recovery following exercise.[14] Omega-3 fatty acids also provide cognitive support and improve gut health. Fat requirements for physically active individuals depend on body composition goals and align with the recommendations for the healthy sedentary population (20 – 35% of total energy).[6,9]

Micronutrient requirements and fluid

Active individuals and competitive athletes also have increased micronutrient requirements compared with sedentary individuals owing to increased physiological demands, including increased energy metabolism, oxidative stress and sweat losses.[9] Sufficient intake of key vitamins and minerals that support energy metabolism, muscle function, bone strength, immunity and recovery is warranted. Key vitamins and minerals include vitamin A, thiamine (vitamin B1), riboflavin (vitamin B2), niacin (vitamin B3), vitamin B12, vitamin D, antioxidants (e.g. selenium), calcium, iron, zinc, magnesium, sodium and potassium.[9]

Active individuals who consume a varied diet high in nutrient-dense foods and that meets energy requirements typically do not require vitamin or mineral supplements. However, those who struggle to meet their micronutrient needs (e.g. vegetarians, those on low-energy diets, sick or injured athletes) may benefit from supplementation.[9] Milk is a good source of vitamin A, thiamine, riboflavin and vitamin B12, as well as of readily bioavailable minerals, including calcium, potassium, sodium and magnesium, and trace elements such as zinc and selenium. Including milk in the daily diet will help active individuals and lacto-vegetarians to meet the recommended intakes of these vitamins and minerals.

Adequate hydration is not only important for good health, but water also has a central role in most physiological functions related to muscle contraction and exercise performance. Active individuals should ensure they drink enough fluids to maintain an optimal hydration status during the day depending on the nature and type of exercise and the environmental conditions, which can have a significant effect on sweat losses.[9,15]

Importance of a healthy gut microbiome

Evidence is mounting regarding the importance of a diverse and balanced gut microbiome (beneficial bacteria in the digestive tract) to support health and performance, especially in active individuals.[16,17] As most of the body's immune cells (70 – 80%) reside in the gut and are deeply interrelated to gut microbes, a healthy (diverse and balanced) gut microbiome promotes stronger immunity. There is also a direct link

between the gut microbiota and the brain, referred to as the gut – brain axis. An unbalanced gut microbiome (due to, for example, poor nutrition and stress) results in chronic low-grade inflammation and increased gut permeability (so-called 'leaky gut'), which can compromise immunity and contribute to mental health problems such as depression and anxiety.[18]

Strategies to support an active lifestyle should therefore also consider gut health and include fibre-rich foods (containing prebiotic fibres) to support gut barrier function and reduce inflammation. Fermented foods such as yoghurt, amasi and kefir, which introduce live microorganisms, and foods that contain polyphenols (e.g. berries, leafy greens, turmeric, green tea) with prebiotic-like effects and antioxidant properties should also be considered to enhance the gut microbiota.[17] In contrast, refined carbohydrates or grains (e.g. white bread), alcohol, ultra-processed foods (e.g. processed meat products, instant soups and noodles), and foods high in sugar or saturated fats should be kept to a minimum, as they can disrupt gut health, increase inflammation and negatively impact physical and mental health.[17,18]

Practical guidelines to meet general energy and nutrient intakes

The South African FBDGs (Box 1) are short, positive, science-based messages to advise the general population on optimal diets that meet energy and nutrient requirements.[19] Individuals who want to sustain an active lifestyle should also adopt these guidelines as a foundation for a healthy diet, with targeted modification (e.g. higher total energy and macronutrient intake, inclusion of sports drinks or drinks higher in sugar if warranted) to meet individual energy and nutrient demands and performance goals.[9]

To sustain an active lifestyle and meet energy and nutrient requirements, the practical guidelines in Box 2 should be considered. Planning and meal preparation (on weekends or cooking in batches) are useful to save time, reduce stress and limit reliance on ultra-processed or unhealthy foods.

Box 1: The nutrition-related South African FBDGs[19]

Box 2: Practical guidelines to sustain an active lifestyle

1. Eat regular meals and snacks (3 meals plus 2–3 snacks) throughout the day and include a variety of foods. Do not skip meals, as this can lead to fatigue and poor concentration.
2. Choose whole foods or minimally processed foods that are nutrient dense most of the time.
3. Choose complex carbohydrates that are also high in fibre (e.g. wholegrain bread, oats, brown rice, sweet potatoes, fruits, legumes).
4. Choose high-quality protein sources (e.g. lean meats, eggs, milk, yoghurt, legumes) and distribute protein intake evenly throughout the day.
5. Choose foods that contain healthy fats, with an emphasis on omega-3 fatty acids (e.g. salmon, sardines, avocado, nuts and seeds).
6. Eat plenty of vegetables and fruit (aim for at least five a day). Try to include vegetables and fruit of different colours and also some that are rich in polyphenols, such as berries and leafy green vegetables.
7. Stay hydrated by drinking lots of clean, safe water. Be mindful with alcohol and caffeine intake. They act as diuretics and over consumption also negatively affects the gut microbiome. Having a glass of milk or amasi is an excellent way to help keep you hydrated.
8. Ensure an adequate iron and calcium intake to reduce the risk of anaemia and bone loss. This is especially important for women. Animal-source foods are high in iron. Milk and dairy are excellent sources of calcium.
9. Limit excess refined carbohydrates (e.g. white bread, added sugar and sugary snacks) unless they form part of planned exercise-related nutrition.
10. Limit ultra-processed foods (e.g. savoury snacks, processed meats, ready-to-eat meals). These foods are often high in sugar, salt and saturated

Box 3:
Practical ideas for including dairy in an active lifestyle

- Consider cereal with milk or amasi, muesli or fruit with yoghurt, or cottage cheese on toast for breakfast.
- Mix milk or yoghurt with oats and leave it in the fridge overnight for an even more convenient breakfast option.
- Combine milk, amasi, yoghurt or cottage cheese with fruit and other ingredients (e.g. peanut butter, honey etc.) to make smoothies.
- Use cottage cheese or cheese on crackers, sandwiches or baked potatoes.
- Use small amounts of cheese in salads for added protein.
- Drink flavoured milk after an exercise session.
- Include fruit and yoghurt as a healthy dessert option.
- Have a small tub of yoghurt and some fruit as a mid-morning snack.

Conclusion

An active lifestyle is recommended for optimal health. However, physically active individuals need to ensure they meet the relevant energy and nutrient requirements to sustain an active lifestyle in today's fast-paced conditions.

A variety of foods, including complex carbohydrates, high-quality protein, fruits, vegetables and healthy fats should generally be prioritised. An adequate fluid intake and optimising gut health are also important. Milk and dairy are nutrient dense and offer a unique combination of high-quality protein to support muscle protein synthesis and recovery, carbohydrates for energy and muscle glycogen recovery, and a variety of vitamins and minerals to support bone health, rehydration, energy metabolism and immunity. Ultra-processed foods and alcohol should be limited, and individuals should be mindful of what, when and how much they eat – especially when engaging in intensive training and having to balance work and life in a fast-paced society.

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