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Exercise snacking: A convenient and time-efficient strategy for enhancing physical fitness and health

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Abstract

This paper explores exercise snacking, which involves short bouts of physical activity spread throughout the day as a time-efficient alternative to traditional workouts. It examines its physiological, practical, and societal benefits, highlighting its role in improving cardiovascular health, metabolic function, and muscle activation. Exercise snacking integrates high-intensity exercises or everyday movements into daily routines, offering an accessible solution for individuals across fitness levels.

The study compares exercise snacking to prolonged exercise sessions, addressing challenges like consistency and misconceptions about its effectiveness. Research and case studies demonstrate its potential to enhance health outcomes and encourage adherence to an active lifestyle.

Additionally, the paper discusses strategies for incorporating exercise snacking into modern routines and explores its integration into public health initiatives. With growing popularity and evidence supporting its benefits, exercise snacking presents a promising approach to overcoming barriers to physical activity and promoting long-term health and well-being.

Keywords: Presents a promising, approach, overcoming

1. Introduction

The concept of "exercise snacks" has gained considerable attention in recent years as a practical and time-efficient approach to integrating physical activity into daily routines. First introduced by Dr. Howard Hartley in a 2007 *Newsweek* article, the term was later adopted in scientific literature, with the 2014 study by Francois *et al.* being one of the earliest to explore its health benefits. This foundational study demonstrated that intermittent, brief bouts of vigorous walking improved glycemic control in individuals with insulin resistance, utilizing a structured protocol of six 1-minute bouts interspersed with recovery, performed three times daily before meals.

Initially, exercise snacks referred to short-duration bouts of vigorous exercise performed sporadically throughout the day. Over time, the definition has been refined to include isolated, high-intensity activities lasting ≤ 1 minute, performed multiple times daily. This evolution reflects a growing understanding of the benefits of brief, intense physical activity and its feasibility for individuals with varying schedules.

A research conducted on the effects of stair climbing exercise snacks on cardiorespiratory fitness found that participants who performed three daily bouts of vigorous stair climbing, each lasting approximately 20 seconds with 1–4 hours of recovery in between, three days per week for six weeks, experienced a modest improvement in peak oxygen uptake (Francois *et al.*, 2018) [2]. This suggests that even short, intense exercise sessions can enhance cardiorespiratory fitness.

Another study explored the effects of hourly staircase sprinting exercise snacks on vascular health. Participants engaged in 14–20 second bouts of stair sprinting every hour during a prolonged sitting period. The findings indicated improvements in femoral artery shear patterns, although there were no significant changes in flow-mediated dilation or cerebrovascular regulation. This suggests that while brief, high-intensity exercise can positively influence vascular function, the effects may vary depending on the specific physiological parameter assessed (Thompson *et al.*, 2020) [4].

Traditional exercise routines, often characterized by structured, long-duration workouts such as running, weightlifting, or cycling, have been central to physical fitness for decades.

These routines generally require a significant time investment and are typically performed in specialized settings such as gyms or sports facilities. In contrast, modern exercise approaches have evolved to emphasize flexibility, accessibility, and time efficiency. Concepts like "exercise snacking" reflect this shift, where short, high-intensity bouts of physical activity are spread throughout the day, integrating fitness into daily routines (Thompson *et al.*, 2020) [4]. This approach allows individuals with busy schedules or limited access to traditional exercise facilities to engage in physical activity without the need for prolonged sessions (Francois *et al.*, 2018) [2]. The modern fitness landscape prioritizes overall movement and energy expenditure, recognizing that even brief, consistent bursts of activity can provide significant health benefits, supporting a more sustainable and inclusive model of physical fitness (Hartley, 2007) [1].

The growing popularity of exercise snacking marks a significant shift in contemporary fitness culture, emphasizing convenience, accessibility, and time efficiency. Unlike traditional exercise regimens that require long, uninterrupted sessions, exercise snacking involves brief bursts of high-intensity physical activity, typically lasting less than a minute and spread throughout the day. This flexible approach caters to the increasing demand for time-efficient solutions to maintain physical health amidst busy schedules. However, the brief nature of these bouts poses challenges for traditional methods of assessing exercise intensity, such as percentages of maximal heart rate or oxygen uptake, which may not accurately reflect their physiological impact. Instead, relative effort, often rated as "hard" or above on the Borg CR10 scale, has emerged as a practical and effective alternative for characterizing intensity in these short-duration activities (Francois *et al.*, 2018; Thompson *et al.*, 2020) [2, 4].

Research has shown that even short, intense bouts of exercise can provide significant health benefits, such as improved cardiovascular fitness, enhanced metabolic function, and better glycemic control (Francois *et al.*, 2018; Thompson *et al.*, 2020) [2, 4]. In an era where sedentary lifestyles are prevalent, exercise snacking presents an effective strategy to reduce the negative effects of prolonged sitting and encourage regular movement. The concept resonates with contemporary fitness culture by empowering individuals to incorporate activity into their daily routines without the need for extended workout sessions or specialized equipment (Hartley, 2007) [1]. As such, exercise snacking is not only a practical solution for busy individuals but also a growing movement that promotes sustained health through consistent, manageable physical activity.

2. The Science Behind Exercise Snacking

Exercise snacking, the practice of breaking physical activity into short, manageable bouts throughout the day, is rooted in well-established physiological principles. Studies suggest that even brief periods of exercise, when performed consistently, can effectively stimulate cardiovascular, metabolic, and muscular systems (Jenkins *et al.*, 2019) [6]. Unlike prolonged workouts, exercise snacking capitalizes on the body's responsiveness to frequent bursts of activity, enhancing fitness and health outcomes without the significant time demands of traditional routines. Research has demonstrated that these micro-workouts can improve heart health, insulin sensitivity, and muscle strength,

particularly when customized to individual fitness levels (Little *et al.*, 2011; Francois & Little, 2015) [5, 3].

One of the primary benefits of exercise snacking is its impact on cardiovascular health. Short bursts of physical activity have been shown to improve arterial stiffness, lower blood pressure, and enhance overall cardiac function (Gillen *et al.*, 2016; Weston *et al.*, 2014) [9, 11]. These brief intervals stimulate blood flow, which helps maintain vascular elasticity and reduces the risk of cardiovascular diseases (Mensa *et al.*, 2014) [10]. Furthermore, exercise snacking has been linked to increased heart rate variability, a key indicator of cardiovascular fitness, without requiring extended time commitments. This makes it an accessible and effective option for individuals with busy schedules or those new to exercise (Gillen & Gibala, 2014) [8].

From a metabolic perspective, exercise snacking plays a vital role in regulating blood sugar levels and enhancing metabolism. Short bouts of physical activity throughout the day activate glucose transporters in muscle cells, improving insulin sensitivity and helping stabilize blood sugar levels (Tremblay *et al.*, 2010; Duvivier *et al.*, 2013) [15, 13]. This is particularly beneficial for individuals with or at risk of Type 2 diabetes, as even brief activities such as walking or squatting can prevent postprandial blood sugar spikes (Mamdouh *et al.*, 2020) [14]. Furthermore, regular bouts of movement promote fat oxidation, contributing to weight management and reducing the risk of metabolic disorders (Buchheit *et al.*, 2013; Gillen *et al.*, 2016) [9, 12].

Muscle activation and strength building are integral benefits of exercise snacking. Short, intense bouts of exercise effectively target muscle groups, promoting hypertrophy and neuromuscular coordination (Wakahara *et al.*, 2012) [18]. For instance, performing bodyweight squats, push-ups, or resistance band exercises several times a day ensures consistent stimulation of muscle fibers. Over time, these repeated efforts can lead to strength gains comparable to those achieved in longer sessions, provided the intensity is sufficiently high. Furthermore, exercise snacking plays a crucial role in maintaining muscle mass in individuals who might otherwise experience muscle loss due to inactivity or aging (Bamman *et al.*, 2003; Bhasin *et al.*, 2005) [16, 17].

When compared to prolonged exercise sessions, exercise snacking offers unique advantages. While longer workouts allow for sustained cardiovascular and endurance training, shorter bursts can be equally effective for improving fitness markers when accumulated over the day. Exercise snacking reduces the barriers to physical activity by requiring less time and equipment, making it an appealing option for diverse populations. Moreover, it minimizes sedentary behavior by encouraging movement throughout the day, which can enhance overall health beyond what traditional workouts alone achieve.

3. Types and Formats of Exercise Snacks

Exercise snacking involves incorporating short, high-intensity activities into one's day, designed to enhance fitness without requiring long, dedicated workout sessions. These activities can vary in type, but they are typically quick, intense bursts that target different aspects of physical health. Examples include stair climbing, which engages large muscle groups and improves cardiovascular endurance, or bodyweight exercises like squats, push-ups, and lunges. These movements can be performed anywhere and are highly effective in promoting muscular strength,

endurance, and metabolic function. Additionally, short intervals of high-intensity exercises like jumping jacks or burpees can boost aerobic capacity while requiring minimal equipment, making them ideal for anyone with limited time or space.

4. Incorporating Daily Activities into Exercise Snacking

Exercise snacking can also be seamlessly integrated into daily routines, ensuring consistent physical activity without disrupting normal tasks. For instance, individuals can take brisk walks during work breaks, a simple yet effective way to boost circulation and increase calorie expenditure. Desk stretches, standing or walking meetings, or quick stretches between work tasks can provide necessary relief from sedentary behavior, improving flexibility and posture (Tremblay *et al.*, 2010) [15]. These micro-movements add up over the day, contributing to overall health improvements. Incorporating everyday tasks like climbing stairs or taking the longer route to the car can also contribute to increasing daily activity levels, enhancing cardiovascular and metabolic health while avoiding prolonged periods of sitting (Tremblay *et al.*, 2010) [15].

Structured vs. Unstructured Approaches

Exercise snacking can be approached in two distinct ways: structured or unstructured. A structured approach involves pre-planning specific short bursts of exercise throughout the day, such as setting a timer to perform a set of bodyweight squats every hour or following a specific routine of high-intensity interval training (HIIT) during breaks. This method allows for consistency and ensures that exercise is deliberately incorporated into one's day. On the other hand, an unstructured approach is more flexible and organic, allowing individuals to integrate physical activity spontaneously into their schedule. For example, someone may decide to take a brisk walk after lunch or perform a set of push-ups while waiting for the kettle to boil. Both approaches offer flexibility but depend on individual preference and lifestyle, allowing exercise snacking to fit various needs and daily schedules (Weston *et al.*, 2014) [11].

5. Benefits of Exercise Snacking

Accessibility and Time Efficiency

One of the most compelling advantages of exercise snacking is its accessibility and time efficiency. Traditional exercise routines often require a significant time commitment, which can be a barrier for many people. Exercise snacking, on the other hand, involves short, manageable bouts of activity that can be easily incorporated into daily routines, making it ideal for individuals with busy schedules. Whether it's a set of squats between work tasks or a quick walk during lunch breaks, these brief sessions can significantly improve fitness without the need for extended workout durations (Gillen & Gibala, 2014) [8]. This approach allows individuals to engage in physical activity without disrupting their day, making it a practical option for everyone, regardless of their time constraints.

Suitability for Various Fitness Levels and Lifestyles

Exercise snacking is highly versatile, making it suitable for various fitness levels and lifestyles. Whether a person is just beginning their fitness journey or is a seasoned athlete, exercise snacks can be tailored to meet their needs. For beginners, low-intensity activities like stretching or walking

can provide significant health benefits, while more experienced individuals can incorporate higher-intensity exercises, such as bodyweight squats or burpees, into their daily routines (Tremblay *et al.*, 2010) [15]. Additionally, exercise snacking can be adapted to fit different lifestyles. For people with sedentary jobs, incorporating short bursts of physical activity during breaks helps counteract the negative effects of prolonged sitting. For those who enjoy outdoor activities, short bouts of exercise can be integrated into everyday tasks like walking the dog or taking the stairs instead of the elevator.

Contribution to Overall Physical and Mental Health

Exercise snacking not only benefits physical health but also contributes to mental well-being. Regular short bursts of exercise can improve cardiovascular health, enhance metabolic function, and help regulate blood sugar levels (Weston *et al.*, 2014) [11]. This can reduce the risk of chronic diseases such as type 2 diabetes, cardiovascular disease, and obesity. On the mental health front, exercise snacking has been shown to reduce stress and improve mood by stimulating the release of endorphins, the body's natural "feel-good" chemicals (Tremblay *et al.*, 2010) [15]. Additionally, engaging in frequent, small bouts of exercise can improve focus, productivity, and cognitive function, which are crucial for maintaining overall mental well-being. Whether for physical fitness or mental clarity, exercise snacking offers a practical and effective approach to supporting both aspects of health.

6. Challenges and Limitations

The long-term efficacy of exercise snacking compared to traditional exercise remains an area with limited data, primarily due to the novelty of the concept and the challenges associated with longitudinal studies. While short-term research demonstrates that brief bouts of activity can significantly improve cardiovascular health, metabolic function, and muscle activation, there is less evidence to confirm whether these benefits are maintained over years or decades (Jenkins *et al.*, 2019) [6]. Traditional exercise programs, such as structured aerobic or resistance training sessions, have well-documented long-term outcomes, including reductions in chronic disease risk, improved mental health, and enhanced longevity. In contrast, the fragmented nature of exercise snacking raises questions about its consistency, scalability, and ability to produce comparable results in the long run (Little & Francois, 2014) [23].

Moreover, adherence and behavioral factors further complicate the assessment of long-term efficacy. Exercise snacking may appeal to individuals due to its flexibility and time efficiency, potentially fostering greater adherence compared to traditional routines (Buchan *et al.*, 2012) [20]. However, the sporadic and often unstructured nature of exercise snacking might limit its ability to produce the sustained intensity or volume required for some long-term health outcomes. Additionally, while exercise snacking is promising for improving functional fitness and addressing sedentary behavior, its role in achieving advanced athletic performance or significant strength gains over time is unclear (Ekkekakis & Lind, 2006) [21]. More extensive, controlled studies are needed to establish the viability of exercise snacking as a substitute or complement to traditional exercise for long-term health and fitness goals.

7. Practical Applications

Incorporating Exercise Snacking into Daily Routines

Individuals can incorporate exercise snacking by identifying brief opportunities in their daily routines, such as climbing stairs during breaks, performing bodyweight squats before meals, or taking brisk walks during phone calls. A study by Francois and Little (2015) [51] found that stair-climbing exercise snacks can improve cardiovascular health markers even in sedentary individuals. By focusing on consistency rather than session length, exercise snacking allows busy individuals to maintain an active lifestyle with minimal disruption to their schedules.

Tips for Maintaining Motivation and Tracking Progress

Motivation for exercise snacking can be sustained by setting achievable goals, using tracking tools, and celebrating small victories. Studies emphasize the importance of self-monitoring for adherence to physical activity programs (Michie *et al.*, 2009) [23]. Fitness apps, wearable devices, or simple journals can help individuals track progress, such as the number of daily steps or repetitions completed. Research highlights that social support, like engaging in physical activities with friends or family, can further enhance adherence and enjoyment (Kinnafick *et al.*, 2014). Visual reminders, such as calendar notifications, can reinforce habits, while recognizing milestones helps maintain long-term commitment. This multifaceted approach ensures that exercise snacking becomes an ingrained part of daily life.

Exercise Snacks Based on Goals

The selection of exercise snacks should align with individual fitness goals. For weight loss, high-intensity interval training (HIIT) exercises like jumping jacks or burpees are effective in boosting caloric expenditure and improving cardiovascular health. Strength-building goals can benefit from bodyweight exercises such as push-ups and lunges or the use of resistance bands, which are supported by research on progressive resistance training for muscle growth (Kraemer *et al.*, 2002) [24]. For stress reduction or flexibility, yoga-based movements or dynamic stretches can be integrated, aligning with studies on the benefits of yoga for mental health and flexibility (Cramer *et al.*, 2013) [25]. By aligning exercise snacks with personal objectives, individuals can optimize the benefits of this time-efficient fitness approach.

8. Future Directions and Implications

Integrating exercise snacking into public health strategies could have far-reaching implications for addressing physical inactivity. Studies are needed to evaluate the effectiveness of incorporating exercise snacking into public health campaigns and policies, particularly in schools, workplaces, and community settings. Evidence suggests that nudging behavior through structured programs can significantly improve physical activity levels across populations (Thorndike & Sonnenberg, 2021) [27]. Workplace wellness programs that include exercise snack breaks may enhance employee productivity, reduce stress, and improve overall health. Research in this area can provide insights into the practicality and benefits of implementing these interventions (Ekkekakis & Zenko, 2016) [28].

The integration of technology offers immense potential for advancing exercise snacking. Wearable devices and mobile applications can prompt and monitor activity, personalize

recommendations, and engage users through gamification. Research is needed to assess the efficacy of these tools in improving adherence to exercise snacking and achieving desired health outcomes (Piwek *et al.*, 2016) [26]. Additionally, AI-driven virtual coaching and real-time feedback systems could revolutionize the way individuals engage with exercise snacking, offering personalized guidance and motivation. These advancements could make exercise snacking more accessible and effective for a wide range of users.

Lastly, technology-assisted exercise snacking could inform public health and individual behavior modification through data-driven insights. Wearable devices can generate valuable data on activity patterns, enabling researchers to understand the real-world implementation and impact of exercise snacking. This information could be used to design evidence-based interventions and refine public health policies (Wang *et al.*, 2021) [29]. Such research will not only enhance our understanding of exercise snacking but also help integrate it into broader strategies to combat physical inactivity and promote holistic well-being.

9. Conclusion

Exercise snacking offers a practical and scientifically supported approach to improving physical fitness and overall health. Its benefits include enhanced cardiovascular health, improved insulin sensitivity, increased muscle strength, and better mental well-being, all achievable through short, manageable bouts of activity throughout the day. The feasibility of this approach is particularly evident in its adaptability to various lifestyles, making it accessible to individuals with time constraints or sedentary routines. This flexibility positions exercise snacking as an effective solution to overcoming barriers to traditional exercise programs.

As a fitness strategy, exercise snacking empowers individuals to incorporate physical activity seamlessly into their daily lives. Unlike longer workout sessions, these brief bursts of activity can be performed anywhere, requiring minimal equipment or preparation. This makes exercise snacking not only efficient but also sustainable, fostering a consistent routine that can lead to long-term health benefits. Furthermore, its potential to address physical inactivity across diverse populations highlights its importance as a public health tool (Thorndike & Sonnenberg, 2021) [27].

To fully harness the potential of exercise snacking, individuals and communities must embrace the philosophy of small, consistent efforts leading to meaningful results. By integrating exercise snacking into daily routines, workplaces, and public health initiatives, we can collectively work toward a more active and healthier society. The adoption of this approach is a call to action for everyone to prioritize movement, even in small doses, to combat the adverse effects of sedentary lifestyles. With continued research, innovation, and public awareness, exercise snacking could redefine how we think about and engage in physical activity.

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