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Understanding the hype of zone 2 cardio: Heart rate monitoring for effective regulation and optimization

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Abstract

In recent years, Zone 2 cardio training has gained significant attention in the fitness and endurance training communities. This moderate-intensity training, which falls within 60-75% of an individual's maximum heart rate, is praised for its potential to improve cardiovascular health, enhance endurance, and optimize fat burning. However, with the increasing popularity of Zone 2, it's essential to critically examine its benefits and assess the role of heart rate monitoring in ensuring the effective application of this training. This paper explores the physiological advantages of Zone 2 cardio, the rise in its popularity, and how heart rate monitoring plays a crucial role in maintaining the intensity required to reap its benefits. Through a review of current research and practical applications, the paper will also address how Zone 2 fits into a balanced training regimen.

Keywords: Zone 2 cardio, heart rate monitoring, endurance training, fat burning, cardiovascular health

Introduction

Historically, exercise physiologists categorized physical activity intensity into broad zones based on perceived effort, heart rate, and metabolic demand. Early classifications often included "light," "moderate," and "vigorous" intensity levels, which were determined using simple methods like heart rate monitoring or subjective measures like the Borg Rating of Perceived Exertion (RPE) scale. These zones aimed to guide athletes in balancing training stress and recovery, but they lacked precision in targeting specific physiological systems (National Academy of Sports Medicine, n.d.). With advancements in exercise science during the mid-20th century, concepts like the aerobic threshold (AeT) and lactate threshold (LT) emerged, offering a more scientific approach to defining training intensities (Spurway N. C. 1992) [7]. These thresholds, measured through blood lactate analysis or gas exchange methods, laid the groundwork for dividing exercise into multiple zones for structured training (Esteve-Lanao *et al.*, 2007) [8].

The concept of dividing training into multiple intensity zones gained prominence as sports science advanced, particularly with the development of heart rate monitoring technology in the 1970s and 1980s. These systems introduced finer distinctions between intensity levels, enabling athletes to optimize their training by targeting specific physiological adaptations. Edwards (1992) [2] first proposed a five-zone model based on percentage ranges of maximum heart rate (% HR max), which remains a foundational framework in modern training (Table 1).

Table 1: Intensity zones using % HRmax as defined by Edwards (1992) [2].

Intensity Zone	% HR max
Moderate Activity	50-60%
Weight Management	60-70%
Aerobic	70-80%
Anaerobic Threshold	80-90%
Red-Line	90-100%

Zone 2, characterized as moderate-intensity aerobic activity (60-70% HRmax), emerged as a focal point due to its unique physiological benefits.

Studies have shown that this zone enhances fat metabolism, increases mitochondrial density, and improves endurance capacity. Unlike higher-intensity zones, Zone 2 allows for extended periods of exercise with minimal fatigue, making it an integral component of base training for endurance athletes. Exercise physiologists have consistently emphasized Zone 2 as the foundation of periodized training plans, highlighting its role in building a robust aerobic base while reducing the risk of overtraining.

In recent years, Zone 2 training has gained widespread attention beyond elite athletics, appealing to recreational exercisers and individuals seeking sustainable fitness routines. Advancements in wearable technology have simplified heart rate monitoring and made it easier to target specific training zones, providing broader access to structured exercise programs. Research on metabolic health and chronic disease management has further underscored Zone 2's significance, highlighting its ability to enhance insulin sensitivity, reduce cardiovascular risk, and improve overall well-being (Healthspan, n.d.). This renewed interest has also sparked discussions on how Zone 2 training can be adapted for diverse populations, from beginners to older adults. Zone 2 training today embodies a fusion of decades of exercise science, combining fundamental principles with modern technology to provide an effective, accessible, and scientifically supported method for enhancing fitness and overall health.

Zone 2 training refers to an exercise intensity that lies between 60-75% of an individual's maximum heart rate (HRmax). At this intensity, the body predominantly relies on aerobic metabolism, where fat serves as the primary energy source, making it an ideal zone for endurance building and fat oxidation. Training in this zone has been shown to improve mitochondrial function, cardiovascular efficiency, and metabolic flexibility, all of which are essential for enhancing long-term endurance performance.

Compared to higher-intensity training zones, such as Zone 3 (75-85% of HRmax), Zone 2 allows for prolonged training durations without significant fatigue accumulation. Studies suggest that training in Zone 2 helps increase the density and function of mitochondria, contributing to more efficient energy production and utilization during prolonged activities like long-distance running or cycling (Coyle, 1995) ^[1].

The Hype Surrounding Zone 2 Cardio

The increasing hype surrounding Zone 2 cardio is largely driven by endorsements from athletes, trainers, and fitness influencers on social media platforms. These advocates claim that Zone 2 provides a safe and sustainable method to achieve endurance gains while minimizing injury risks and maximizing fat loss. The fact that Zone 2 training emphasizes aerobic base building with minimal muscle fatigue has made it particularly attractive to beginners and recreational athletes. Additionally, its association with fat-burning and weight loss has fueled its widespread use among those seeking sustainable fitness routines without overexertion.

Zone 2 cardio is gaining popularity for its effectiveness in supporting long-term endurance and improving cardiovascular health, metabolic efficiency, and aerobic capacity. It is accessible for people of all fitness levels, as it includes activities like brisk walking, cycling, or jogging at a conversational pace. Unlike high-intensity workouts, Zone 2 training minimizes stress on the body, making it suitable

for those recovering from injuries or seeking sustainable exercise habits (Mayo Clinic Press, n.d.).

However, the rapid rise in popularity has led to an oversimplification of its benefits. Zone 2 training is not a "magic bullet," and it is important to understand that optimal performance gains require a balanced training approach, which integrates higher-intensity sessions for strength and power development. While Zone 2 is effective for improving cardiovascular health and endurance, it should be incorporated alongside more intense training methods to ensure comprehensive fitness development.

The Role of Heart Rate Assessment in Maintaining Zone-2

Maintaining the correct intensity in Zone 2 is critical for achieving the desired physiological benefits, and heart rate assessment plays a central role in this process. To train effectively in Zone 2, athletes must consistently monitor their heart rate to ensure they stay within the 60-75% HRmax range. This ensures that the body is engaging in aerobic metabolism rather than transitioning into anaerobic energy systems, which occurs at higher intensities.

Heart rate monitoring tools, such as smart watches and chest straps, provide real-time feedback, helping individuals stay within the desired zone. The Karvonen formula, which calculates heart rate zones based on an individual's resting heart rate (HR rest) and maximum heart rate, is widely used to determine the target heart rate for Zone 2. This formula offers a more personalized approach compared to using just HR max and helps account for differences in fitness levels between individuals.

In addition to the Karvonen formula, heart rate variability (HRV) can be monitored using wearable technology to assess an athlete's recovery and readiness for training. Research indicates that HRV is a strong indicator of an individual's overall cardiovascular fitness and fatigue levels, allowing athletes to adjust their training intensity based on physiological feedback (Düking *et al.*, 2021) ^[3].

The Impact of Zone 2 Training on Health and Performance

The benefits of Zone 2 cardio training extend far beyond enhancing endurance. This moderate-intensity exercise improves cardiovascular health, supporting the development of a strong heart and efficient circulatory system. Studies have shown that regular Zone 2 training can lead to a lower resting heart rate, increased stroke volume, and improved oxygen uptake (VO₂ max).

Moreover, Zone 2 is particularly effective for fat loss, as it relies predominantly on fat oxidation for energy production. Researches have found out that athletes training in Zone 2 for extended periods tend to have improved fat-burning efficiency, which is key for those looking to manage body composition (Coyle, 1995) ^[1]. For athletes seeking to maintain low body fat while optimizing endurance, Zone 2 provides a sustainable and non-taxing approach to long-term training.

Additionally, injury prevention is a significant benefit of Zone 2 training. Unlike high-intensity exercise, which can lead to overtraining and increased injury risk, Zone 2 training is less likely to cause overuse injuries. It is therefore a valuable tool for athletes in recovery or those who wish to maintain consistent training without compromising long-term health.

Practical Applications and Recommendations

To maximize the benefits of Zone 2 training, athletes should incorporate heart rate monitoring into their exercise routines. For beginners, starting with easy-to-use devices like wrist-based smartwatches can offer practical insight into heart rate zones. More experienced athletes may benefit from using chest straps, which provide more precise heart rate data, particularly in dynamic sports.

A typical Zone 2 training session should last between 30 to 90 minutes to provide adequate stimulation for cardiovascular adaptations. It can be used as a standalone workout or as part of a balanced weekly training plan that includes higher-intensity intervals for strength and speed.

To further enhance the effectiveness of Zone 2 training, nutrition plays a critical role in optimizing performance and recovery. Consuming a balanced diet that supports energy requirements is essential, particularly for those engaging in longer Zone 2 sessions. Carbohydrates, healthy fats, and proteins should be tailored to the duration and intensity of the workout, ensuring the body has the necessary fuel for sustained aerobic activity. Additionally, hydration is crucial during Zone 2 training, as even mild dehydration can affect endurance and perceived effort. Athletes should pay attention to electrolyte balance, especially during extended training sessions, to maintain optimal physiological function.

Another consideration is the psychological benefits of Zone 2 training. The moderate intensity and conversational pace of these workouts can serve as a stress reliever, providing a mental break from the demands of high-intensity sessions or daily life. Engaging in Zone 2 activities like cycling, walking, or jogging outdoors can enhance mood and reduce symptoms of anxiety and depression, making it a holistic approach to fitness and mental well-being. This low-stress training method also encourages consistency, which is key for long-term health and fitness improvements (Anderson, E. et al. 2013). By incorporating mindfulness techniques during Zone 2 sessions, such as focusing on breath or body sensations, athletes can further enrich the experience, creating a sustainable and enjoyable fitness routine.

It is also crucial for athletes to monitor their recovery using heart rate variability and resting heart rate. For those new to Zone 2, gradual progression should be emphasized to avoid overtraining. Research has shown that too much time spent in Zone 2 without sufficient recovery can hinder overall performance gains (Düking *et al.*, 2021)^[3].

Conclusion

The hype surrounding Zone 2 cardio is based on its proven benefits for enhancing aerobic endurance, promoting fat loss, and improving cardiovascular health. However, it is essential to recognize that while Zone 2 offers significant advantages, it should not be viewed as a one-size-fits-all solution. For optimal results, athletes must combine Zone 2 with other training intensities and carefully monitor their heart rate to ensure they are training in the correct zone. The use of heart rate monitoring, particularly through wearable devices and the Karvonen formula, is a key tool in maintaining Zone 2 intensity and ensuring that the benefits of this training modality are fully realized. In addition to its aerobic and cardiovascular benefits, Zone 2 training plays a crucial role in improving metabolic efficiency, particularly by enhancing the body's ability to utilize fat as a primary energy source. This makes it an essential component of endurance training for athletes across various sports, as it helps to build a solid aerobic base that supports longer, more

intense training sessions. However, it is important to understand that Zone 2 training should not be the sole focus of an athlete's training regimen. Incorporating a variety of intensities, such as high-intensity interval training (HIIT) and strength training, ensures a well-rounded approach that targets different aspects of fitness, from muscular strength to anaerobic capacity. Furthermore, heart rate monitoring remains an indispensable tool for maximizing the effectiveness of Zone 2 training. Using wearable devices that track heart rate in real time enables athletes to stay within the desired intensity range and adjust their efforts as needed. The Karvonen formula, which accounts for an individual's resting heart rate, provides a more accurate and personalized target zone for training. By combining Zone 2 training with careful heart rate monitoring, athletes can optimize their training sessions, prevent overtraining, and achieve long-term fitness goals while minimizing the risk of injury. Ultimately, a balanced approach that includes Zone 2 along with other training strategies offers the most comprehensive way to enhance athletic performance and overall health.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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