

Review Article

Good Vibrations: How Whole-Body Vibration Elevates Mood and Offers a New Avenue for Exercise

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Email: vajluni@med.wayne.edu**Received:** December 20, 2023**Accepted:** January 12, 2024**Published:** January 20, 2024**Abstract**

The correlation between physical exercise and mental wellness has long been established through various studies. This paper extends the discourse to a specific exercise modality—Whole Body Vibration (WBV)—and its potential benefits for mental health. The initial discussion underlines the well-documented positive impact of exercise on mood enhancement and cognitive function. The narrative then transitions to a detailed examination of WBV and its rising prominence as an alternative exercise form, particularly focusing on its ability to improve mental health across different demographics. Notable studies are presented, showcasing the positive effects of WBV on mood, cognitive function, and the autonomic nervous system, especially in elderly populations. A segment is dedicated to analyzing the relationship between Growth Hormone (GH) secretion and mental health, with a special emphasis on how WBV might influence GH levels. Various investigations, differing in methodological approaches and demographics, are highlighted to understand the acute and possibly long-term effects of WBV on GH secretion. The review suggests that WBV could serve as a viable exercise alternative, potentially beneficial for individuals with mobility challenges or those who find traditional exercise regimes daunting. Moreover, the mood-enhancing effects often associated with WBV could partly be attributed to its impact on GH levels. The paper calls for more extensive research to elucidate the underlying mechanisms and to establish definitive guidelines on WBV application for mental health improvement, which could have broad implications spanning clinical settings, athletic training, and general well-being.

Introduction

The intricate relationship between physical exercise and mental health has been a focal point of scientific inquiry for several decades, yielding a wealth of knowledge and insights into how movement and mental well-being are interconnected. The positive ramifications of regular physical activity on mood, cognitive function, and overall psychological health are well-documented, establishing exercise as a pivotal component in the promotion of mental health and the mitigation of various psychological disorders. This paper seeks to contribute to this rich tapestry of knowledge by delving into a specific and innovative exercise modality—Whole Body Vibration (WBV)—and exploring its potential implications and benefits for mental health. Physical exercise, in its various forms, has been consistently linked to improvements in mood, reductions in symptoms of depression and anxiety, and enhancements in cognitive function. These benefits are believed to stem from a combination of physiological, psychological, and neurobiological changes induced by physical activity. Exercise has been shown to promote the release of endorphins, often referred to as “feel-good” hor-

mones, which play a crucial role in mood regulation and the alleviation of pain. Additionally, physical activity has been found to enhance neuroplasticity, the brain’s ability to form and reorganize synaptic connections, particularly in response to learning or experience. This enhancement in neuroplasticity is believed to contribute to improvements in cognitive function and resilience against stress. Despite the well-established benefits of exercise, there remains a significant portion of the population that is unable to engage in traditional forms of physical activity due to various barriers such as physical limitations, lack of access to facilities, or simply a lack of motivation. It is within this context that Whole Body Vibration (WBV) emerges as a promising alternative. WBV involves standing, sitting, or lying on a machine with a vibrating platform, where the vibrations induce muscle contractions and stimulate various physiological processes. Originally developed for athletes to enhance their performance, WBV has since gained popularity as a form of exercise for the general population, and more recently, as a potential therapeutic modality for various health conditions.

The initial allure of WBV lies in its low-impact nature, making it accessible to individuals with physical limitations or those who may find traditional exercise regimes daunting. However, the potential benefits of WBV extend beyond its accessibility. Preliminary research has suggested that WBV may have a unique impact on the body and mind, influencing hormonal balance, improving muscle strength, enhancing balance and coordination, and potentially elevating mood and cognitive function.

This paper aims to provide a comprehensive review of the existing literature on WBV and its effects on mental health, with a particular focus on mood enhancement and cognitive function. By exploring the mechanisms through which WBV operates, presenting notable studies that have investigated its effects, and discussing its potential as a viable exercise alternative, this paper seeks to shed light on how WBV could be harnessed as a novel avenue for exercise and mental health improvement. In doing so, it aims to contribute to the ongoing discourse on the relationship between physical activity and mental well-being, and to open new doors for research and application in clinical settings, athletic training, and general health promotion.

Exercise and Mood Enhancement

One of the earliest studies on this subject was conducted by Nowlis and Greenberg, who found that experienced joggers showed altered mood responses after jogging 12.5 miles, particularly an increase in pleasantness [1]. This study supported the idea that exercise could induce mood changes, specifically making individuals feel more pleasant or happier.

Lichtman and Poser extended this research by comparing the effects of vigorous exercise with a hobby class that served as a contrast group [2]. Their findings indicated that physical activity was associated with incremental changes in mood and mental functioning. Although the contrast group also showed changes, the magnitude of change was greater for the experimental group, thereby supporting the notion that exercise has a more significant impact on mood enhancement.

Yeung's comprehensive review on the acute mood effects associated with single sessions of exercise further substantiates these findings [3]. The review suggests that clinical and non-clinical subjects may benefit acutely from even a single bout of exercise. The paper also discusses the need for future research to explore the mechanisms behind these acute mood effects.

Exercise and Specific Mood States

The intricate relationship between physical activity and emotional well-being has been a subject of extensive research, leading to a nuanced understanding of how exercise can positively influence mood and mental health. Byrne and Byrne conducted a comprehensive review, delving into the effects of exercise on depression, anxiety, and various other mood states [4]. Their work corroborates the antidepressant, anti-anxiety, and mood-enhancing properties of regular physical activity, aligning with the broader consensus in the scientific community about the mental health benefits of exercise. However, they also shed light on the methodological discrepancies and inconsistencies present in numerous studies, highlighting a critical need for more stringent research protocols and robust experimental designs to ensure the reliability and validity of findings in this domain.

Expanding on the general understanding of exercise's impact on mood, specific demographic studies provide valuable con-

text and insights. Bartholomew et al. conducted a pivotal study focusing on older Mexican American women, a demographic that is often underrepresented in research [5]. Their findings underscore the immediate mood-enhancing effects of a single exercise session, demonstrating that even short-term physical activity can yield noticeable benefits in terms of emotional well-being. Interestingly, the mood improvements observed post-exercise were found to be comparable to those experienced during a period of social interaction, suggesting that the social aspects of exercise, such as group activities or classes, may play a significant role in its overall impact on mood.

Lane and Lovejoy took a different approach, examining the interplay between pre-exercise mood states and the subsequent impact of exercise on mood [6]. Their study provides valuable insights into how an individual's mood prior to engaging in physical activity can influence the extent of mood changes experienced post-exercise. They discovered that individuals reporting symptoms of depressed mood before engaging in exercise exhibited more substantial improvements in mood following physical activity compared to those with a more neutral or positive pre-exercise mood. This finding suggests that exercise may have a differential impact on mood based on an individual's initial emotional state, highlighting the potential of targeted exercise interventions for individuals experiencing mood disturbances or depressive symptoms.

In summary, the body of research exploring the relationship between exercise and specific mood states paints a promising picture of the potential benefits of physical activity for mental health. While the antidepressant, anti-anxiety, and overall mood-enhancing effects of exercise are well-supported, the nuances of how exercise influences different mood states, particularly in specific populations or under varying conditions, warrant further investigation. The highlighted studies underscore the importance of rigorous research methodologies and the consideration of demographic and individual differences in future studies, aiming to optimize exercise interventions for mental health improvement and contribute to the broader understanding of physical activity's role in emotional well-being.

Whole Body Vibration and Its Impact on Mental Health

Building on the established relationship between exercise and mental well-being, the focus now shifts to a specific form of exercise: Whole Body Vibration (WBV). WBV has gained attention for

its potential to improve various aspects of health, including mental health.

Choi and Mizukami conducted a study on the elderly to investigate the effects of Sonic Wave Vibration (SWV), a form of WBV, on mood, the autonomic nervous system, and cognitive function [7]. Their findings revealed that the stability and pleasure levels of mood increased significantly immediately after SWV. The study also found that SWV may activate the frontal lobe function, suggesting its potential utility for elderly people.

Abbate et al. explored the long-term effects of occupational exposure to WBV on neuropsychic and behavioral systems [8]. Their findings indicated that exposure to WBV was associated with alterations in mood status, particularly in factors such as fatigue, depression, and tension. The study also found that these mood alterations were directly proportional to exposure time.

Chawla et al. conducted a randomized controlled trial to determine the effects of WBV training on depression, anxiety, stress, and quality of life in college students [9]. The study found

significant reductions in depression, anxiety, and stress levels in the WBV group compared to the exercise group. This suggests that WBV could be a viable alternative to traditional exercise methods for improving mental health in younger populations.

Compare et al. designed a study to assess the psychological well-being, proactive attitude, and happiness effects of WBV versus Multicomponent Training in aged women [10]. Although the study is still in the protocol stage, it aims to provide valuable insights into how different forms of exercise, including WBV, influence mental health in older-aged women.

Oberste et al. are conducting a study to investigate the effects of a 6-week WBV strength-training intervention on symptoms of major depressive episodes in adolescent inpatients [11].

The study aims to explore potential underlying endocrinological and neurobiological mechanisms, providing a comprehensive understanding of how WBV could be used as an add-on therapy for treating major depressive episodes.

WBV as an Alternative to Exercise

Whole Body Vibration (WBV) has emerged as a novel and intriguing modality in the realm of physical training and rehabilitation, presenting itself as a potential alternative or adjunct to traditional exercise routines. Bonanni et al. delved into this topic through a comprehensive narrative review, aiming to unravel the complexities and potentialities of WBV as a form of passive training [12]. Their work sheds light on the multifaceted nature of WBV, exploring its applications, benefits, and the scientific rationale behind its use.

The review by Bonanni et al. underscores the versatility of WBV, highlighting its accessibility and ease of use, which makes it an attractive option for diverse populations, including the elderly, individuals with mobility impairments, and those who may find conventional exercise regimes challenging or unappealing. The authors posit that WBV has the potential to serve as a standalone exercise modality or as a complementary strategy to enhance the effects of traditional training methods.

WBV operates on the principle of transmitting vibrations through the body, eliciting involuntary muscle contractions and stimulating various physiological processes. This unique mechanism of action has been linked to a range of benefits, including improvements in muscle strength, balance, bone density, and circulation. Moreover, emerging evidence suggests that WBV may also have positive implications for mental health, contributing to mood enhancement and cognitive function improvement.

Despite the promising prospects of WBV, Bonanni et al. emphasize the need for a deeper understanding of the underlying mechanisms that drive the observed benefits of this exercise modality. The review calls for more rigorous and well-designed research studies to elucidate the biological, neurological, and psychological processes influenced by WBV. Such research is crucial for optimizing WBV protocols, establishing evidence-based guidelines, and ensuring the safe and effective implementation of WBV in various settings.

In conclusion, WBV presents itself as a promising and versatile exercise alternative, with the potential to cater to a wide array of individuals and needs. The work of Bonanni et al. plays a pivotal role in highlighting the potential of WBV, while also drawing attention to the gaps in our current understanding and the imperative for further research. As the body of evidence around WBV continues to grow, it holds the promise of broadening the horizons of physical training and rehabilitation, offering new avenues for enhancing physical and mental well-being.

Hormonal and Metabolic Responses to WBV

Whole Body Vibration (WBV) has garnered significant attention in recent years, not just for its potential physical benefits, but also for its intriguing effects on hormonal and metabolic processes within the body. Fricke et al. conducted a pivotal study to investigate these specific responses in healthy adults, providing valuable insights into the intricate ways in which WBV interacts with our body's internal systems [13].

The research conducted by Fricke et al. was comprehensive in its approach, meticulously analyzing the hormonal and metabolic changes that occur in response to WBV. The study's findings are crucial, as they lay the groundwork for understanding the broader implications of WBV, extending beyond the immediate physical effects to encompass potential influences on mental health and well-being.

Hormones play a vital role in regulating various bodily functions, including mood, stress response, and cognitive processes. By examining the hormonal responses to WBV, Fricke et al. have opened the door to exploring how this exercise modality might impact these critical aspects of mental health. The study's results indicate that WBV elicits specific hormonal changes, which could potentially translate to mood enhancement, reduced stress levels, and improved cognitive function.

In addition to hormonal responses, the metabolic effects of WBV were also a focal point of the study. Metabolism is intricately linked to energy production, and fluctuations in metabolic rates can have direct implications on an individual's energy levels, stamina, and overall sense of well-being. By shedding light on how WBV influences metabolic processes, the study provides valuable information that could help in optimizing WBV protocols for enhanced energy production and vitality.

Fricke et al.'s work also underscores the importance of understanding individual variability in responses to WBV. Just as people respond differently to various forms of exercise, the hormonal and metabolic reactions to WBV can vary from person to person. This highlights the need for personalized approaches in implementing WBV, ensuring that each individual receives the maximum benefit from this unique form of exercise.

In conclusion, the study conducted by Fricke et al. is a significant contribution to the field, offering a detailed analysis of the hormonal and metabolic responses to WBV in healthy adults. While the primary focus of the study was on these specific physiological aspects, the findings have far-reaching implications, paving the way for future research into how WBV could be harnessed to enhance mental health and well-being through hormonal and metabolic pathways. As we continue to unravel the complexities of WBV, it holds great potential as a holistic exercise modality, capable of benefiting both body and mind.

Growth Hormone and Its Influence on Mental Health

While the focus has been on Whole Body Vibration (WBV) and its impact on mental health, it is crucial to consider other physiological factors that may play a role. One such factor is the Growth Hormone (GH), which has been studied for its effects on psychological well-being and cognitive functions.

Almqvist et al. conducted a pilot study on adults with Growth Hormone Deficiency (GHD) to assess the effects of growth hormone substitution on mental performance [14]. The study found that growth hormone had a beneficial impact on certain cognitive functions, suggesting that GH could play a role in mental health.

Mahajan et al. explored the effects of growth hormone treatment on depression and quality of life in adults with GHD [15]. The study found that those receiving active treatment experienced significant improvements in their energy level and mood, suggesting that GH therapy could alleviate symptoms of atypical depression.

Psychological Well-Being and Growth Hormone Treatment

McGauley et al. studied the impact of recombinant-DNA human growth hormone treatment on psychological well-being and quality of life in adults with GHD [16]. The study reported that those receiving active treatment experienced less perceived illness and significant psychological improvements, particularly in their energy level and mood.

Sartorio et al. assessed the psychological aspects of adults with childhood onset GHD before and after 6 months of recombinant GH therapy [17]. The study found an overall improvement in intellectual tasks and emotional control, although it did not significantly change the subjects' perception of body image.

Pavel et al. investigated the impact of growth hormone on central nervous activity, vigilance, and tiredness in growth hormone-deficient adults [18]. The study did not find significant differences in pupillary unrest index or reaction time but noted improvements in some subjective sleep parameters and a tendency for mood improvement.

L. Lašaitė et al. studied the relationship between changes in mood, cognitive functioning, quality of life, and hormone concentration in adult patients with GHD syndrome [19]. The study found significant improvements in mood scales and cognitive performance tests, correlating with an increase in Insulin-like growth factor-1 (IGF-1) concentration.

DEIJEN et al. evaluated emotional well-being and cognitive performance in men with multiple pituitary hormone deficiencies and isolated growth hormone deficiency [20]. The study concluded that cognitive impairment in both groups was related to GH deficiency, and subnormal vigor scores in MPHJ patients were attributed to reduced testosterone levels.

Conclusion

The influence of Whole-Body Vibration (WBV) on Growth Hormone (GH) secretion has garnered significant attention in scientific research. Various studies have delved into the acute and potentially long-term effects of WBV on GH levels, often juxtaposing it with other exercise modalities or incorporating additional variables like external load.

For example, the systematic review by Paineiras-Domingos et al. highlighted that while WBV does induce GH responses, the methodologies among the studies are highly varied, necessitating cautious interpretation of the results [21]. Giunta et al. in 2012 focused on a specific demographic—severely obese women—and found that WBV alone was sufficient to stimulate GH release, negating the need for additional squatting exercises [22].

In contrast, Cardinale et al. explored the hormonal responses in older individuals and found that a single session of WBV could produce an acute increase in IGF-1 and cortisol levels, but not in GH and testosterone [23]. This suggests that age could be a factor in the hormonal response to WBV. Another study by Giunta et al. in 2013 found that combining squatting, external load, and WBV could enhance the GH-releasing effect, indicating that a multi-modal approach might offer additional benefits [24].

Studies by Sartorio et al. and Di Loreto et al. both concluded that WBV stimulates GH secretion and lactate production [25,26]. However, Di Loreto et al. also noted that this form of exercise might not be effective in reducing fat mass in obese subjects due to the absence of other hormonal changes [26].

Tying all these findings together, it becomes evident that WBV has a complex but promising role in stimulating GH secretion. The effectiveness of WBV appears to be contingent on multiple factors, including the demographic being studied, the methodology employed, and whether

WBV is used in conjunction with other exercise forms.

Importantly, WBV not only has the potential to stimulate GH secretion but also offers a viable alternative for individuals who may find traditional forms of exercise challenging. This is particularly relevant for older adults, the obese, and those with mobility issues. Moreover, the improvement in mood often reported with WBV could be partially attributed to its effect on GH levels, although this warrants further investigation.

As the body of research expands, it is likely that more definitive guidelines on the use of WBV for GH secretion will emerge. These guidelines could have broad applications, from clinical settings and athletic training to general well-being.

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