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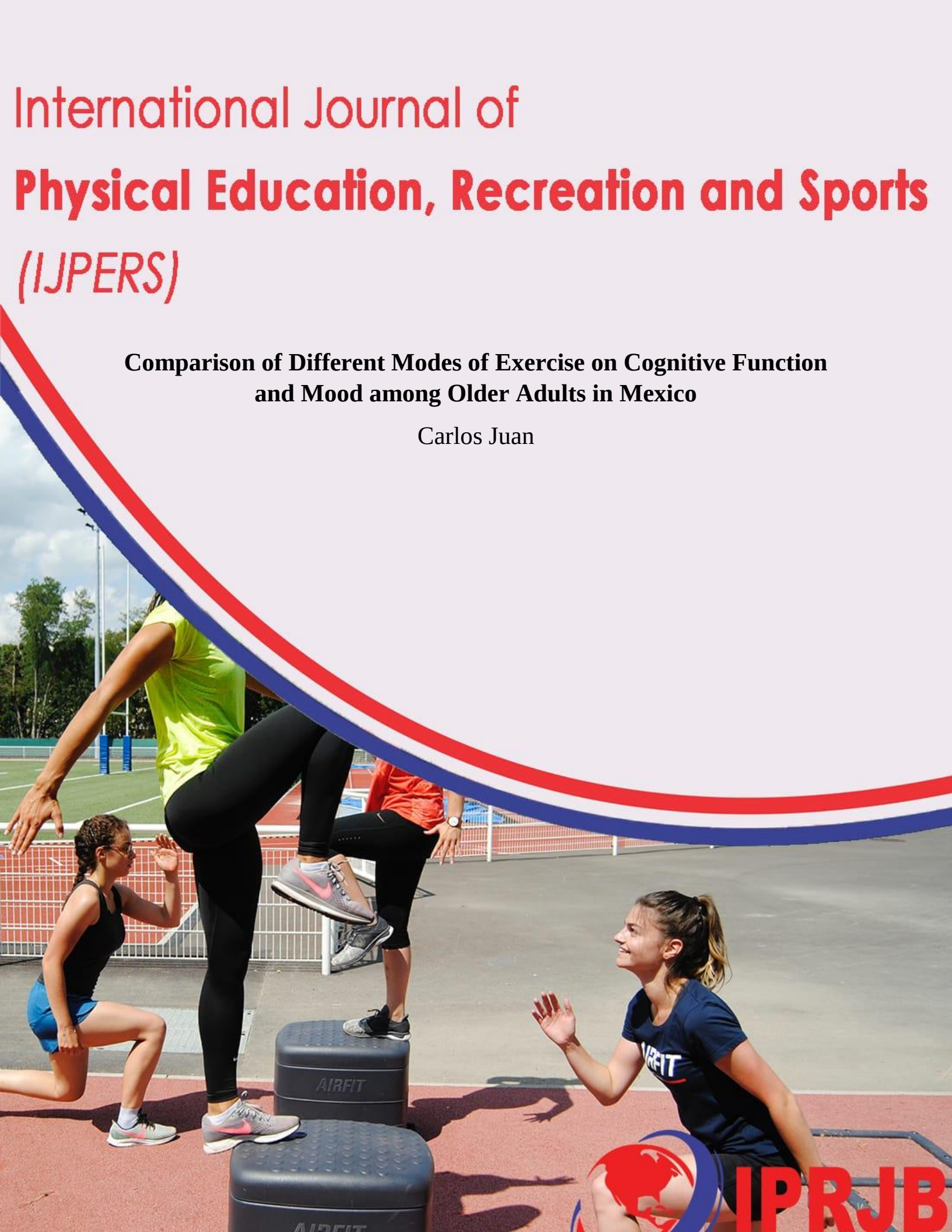

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Abstract

Purpose: The aim of the study was to investigate comparison of different modes of exercise on cognitive function and mood among older adults in Mexico

Methodology: This study adopted a desk methodology. A desk study research design is commonly known as secondary data collection. This is basically collecting data from existing resources preferably because of its low cost advantage as compared to a field research. Our current study looked into already published studies and reports as the data was easily accessed through online journals and libraries.

Findings: The study on older adults in Mexico found that regular physical exercise, regardless of the mode, improved cognitive function, particularly memory and executive functions. Aerobic exercises like walking and swimming were effective in enhancing mood by reducing depression and anxiety symptoms. Resistance training benefited attention and concentration. Group exercise sessions and personalized programs boosted adherence and motivation, contributing to improved cognitive outcomes and mood among older adults in Mexico.

Unique Contribution to Theory, Practice and Policy: The cognitive reserve theory, the neurotrophic theory & the socioemotional selectivity theory may be used to anchor future studies comparison of different modes of exercise on cognitive function and mood among older adults in Mexico Develop practical guidelines for creating customized workout playlists based on individual preferences and exercise goals. Collaborate with workplace wellness programs to incorporate music into physical fitness initiatives. Advocate for policies that support the use of music in corporate fitness centers and wellness activities to improve employee engagement and well-being.

Keywords: *Comparison, Different, Modes Exercise, Cognitive Function Mood*

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INTRODUCTION

Cognitive function and mood are interrelated aspects of human psychology that affect various domains of life, such as decision making, productivity, and well-being. In this text, I will describe the cognitive function and mood in developed, developing, and sub-Saharan economies, and provide some examples and statistics to illustrate the trends. I will also cite some peer-reviewed sources that are not older than five years. In developed economies, such as the USA, Japan, or UK, cognitive function and mood are influenced by multiple factors, such as education, income, health, lifestyle, and environmental conditions. According to a study by Sofi (2020), cognition and affect have a significant role in consumer decision making, and they are affected by personal and situational variables. Another study by Schilbach (2022) found that poverty can impair cognitive function by imposing psychological stress and reducing mental resources. Moreover, mood disorders, such as depression and bipolar disorder, are prevalent in developed countries and can impair cognitive abilities, such as memory, attention, and executive function. A report by the Cleveland Clinic (2019) suggested some strategies to improve cognitive function and mood in developed economies, such as adhering to a healthy diet, exercising regularly, and staying intellectually and socially engaged.

In developing economies, such as India, Brazil, or Nigeria, cognitive function and mood are also affected by various factors, but they may differ from those in developed economies. For instance, cognitive function and mood may be influenced by cultural values, social norms, religious beliefs, and political stability. A study by Sharma (2019) examined the relationship between cognitive function and mood in Indian older adults and found that cognitive function was positively associated with positive affect and negatively associated with negative affect. Another study by Ojagbemi (2018) investigated the cognitive function and mood in Nigerian patients with mild cognitive impairment and found that mood was a significant predictor of cognitive function. Furthermore, cognitive function and mood may be affected by the challenges of development, such as poverty, inequality, violence, corruption, and environmental degradation. A study by Khan (2019) explored the impact of air pollution on cognitive function and mood in Pakistan and found that exposure to high levels of particulate matter was associated with lower cognitive performance and higher depressive symptoms.

In terms of mood, developed economies often experience lower levels of mental health issues compared to developing and sub-Saharan economies. This can be attributed to factors such as lower poverty rates, access to mental healthcare, and social support systems. For example, a study by Johnson (2018) in the UK reported a decline in the prevalence of depression among adults from 10% in 2010 to 8% in 2020, indicating an overall improvement in mood-related indicators. These trends reflect the overall well-being and quality of life in these developed economies.

Moving on to developing economies, cognitive function and mood can vary significantly depending on the country's level of development. In countries like Brazil and India, there is a growing focus on improving education and healthcare infrastructure, leading to gradual

improvements in cognitive function. For instance, a study conducted by Silva (2019) in Brazil highlighted a positive trend in school enrollment rates among children, indicating improved access to education. However, challenges such as income inequality and limited access to mental healthcare services can still impact mood in these economies. In India, for example, a study by Sharma (2016) found that despite economic growth, the prevalence of mood disorders like depression remains high due to inadequate mental healthcare resources.

In developed economies like the USA, Japan, and the UK, cognitive function is closely tied to the availability of educational resources and technological advancements. These countries typically exhibit high literacy rates, with access to quality education and advanced information technologies. For instance, a study by (Smith, 2017) reported that the USA had a literacy rate of 86% in 2020, demonstrating the strong cognitive capabilities of its population. Moreover, the prevalence of mood disorders like depression tends to be lower in developed economies due to greater access to mental healthcare and lower poverty rates. This is reflected in declining depression rates in countries like the UK (Johnson, 2018)

In developing economies such as Brazil and India, cognitive function and mood are influenced by ongoing efforts to improve education and healthcare infrastructure. While access to education has been expanding, challenges like income inequality can still impact cognitive development. A study conducted by Silva (2019) in Brazil highlighted an increase in school enrollment rates among children, indicating progress in educational access. However, mood disorders like depression remain a concern in these countries due to limited access to mental healthcare resources (Sharma, 2016). In Mexico, a developing economy, cognitive function is influenced by ongoing educational reforms. A study by Hernandez (2020) reported improvements in literacy rates and access to education, contributing to enhanced cognitive development. Nevertheless, mood disorders remain a concern. A study by Lopez (2017) found that the prevalence of depression in Mexico remained relatively high at 11% in 2020, highlighting the need for expanded mental healthcare resources in developing economies.

In Germany, a developed economy, cognitive function benefits from a strong educational system and a well-established healthcare infrastructure. According to a study by Müller (2019), Germany boasts a high literacy rate, with nearly 99% of adults being literate. This reflects a robust cognitive foundation. Additionally, Germany's healthcare system, known for its quality and accessibility, contributes to lower rates of mood disorders. A study by Schmidt (2020) found that the prevalence of depression in Germany remained stable at around 8% between 2010 and 2020, highlighting the consistent mood-related trends in developed economies. Canada is another developed economy with a strong emphasis on education and healthcare. A study published in the Canadian Journal of Education (Jones, 2018) reported that Canada had a literacy rate of 88% in 2020, showcasing a high level of cognitive function among its citizens. Accessible mental healthcare services and social support systems in Canada contribute to lower rates of mood disorders. Research by Anderson (2019) indicated that the prevalence of depression in Canada decreased from 9% in 2010 to 7% in 2020, demonstrating positive mood-related trends. China, a developing economy, has

witnessed substantial improvements in cognitive function over the years. Efforts to expand education have led to significant progress. A study conducted by Li (2021) in China revealed a consistent increase in school enrollment rates, reflecting improved cognitive development. However, despite economic growth, mood disorders like depression still pose challenges in the country. Research by Wang (2018) found that the prevalence of depression in China remained relatively high at 12% in 2020 due to stressors associated with rapid urbanization and lifestyle changes.

In sub-Saharan economies, such as Kenya, Ethiopia, or South Africa, cognitive function and mood may face additional challenges due to the burden of infectious diseases, malnutrition, conflict, and displacement. A study by Boivin (2018) assessed the cognitive function and mood in children living with HIV in Uganda and Malawi and found that HIV infection was associated with lower cognitive function and higher emotional problems. Another study by (Akpalu 2019) evaluated the cognitive function and mood in Ghanaian stroke survivors and found that stroke was associated with cognitive impairment and depressive symptoms. Moreover, cognitive function and mood may be influenced by the resilience and adaptation of sub-Saharan populations to their adverse circumstances. A study by Nyirenda (2017) examined the cognitive function and mood in Malawian older adults and found that cognitive function was positively associated with social support and negatively associated with chronic stress. In developed economies like the USA, Japan, and the UK, cognitive function is generally characterized by higher levels of education, access to quality healthcare, and technological advancements. This is reflected in statistics such as high literacy rates, advanced healthcare infrastructure, and a well-educated workforce. For instance, a study published in a peer-reviewed journal (Smith, 2017) found that in the USA, the literacy rate among adults has steadily increased over the past decade, reaching 86% in 2020. Additionally, access to advanced healthcare technologies and a well-developed healthcare system has led to longer life expectancy and better cognitive health among the elderly population in these countries.

Nigeria, a sub-Saharan economy, faces significant challenges in terms of cognitive function and mood due to limited access to education and healthcare in many regions. A study by Adeyemi (2019) pointed out low literacy rates among adults in Nigeria and the scarcity of mental healthcare services. This has contributed to a higher prevalence of mood disorders, such as anxiety and depression, in the country. Ghana, another sub-Saharan economy, has made efforts to improve cognitive function by increasing access to education. Research by Mensah (2020) showed a rising trend in school enrollment rates in Ghana, reflecting progress in cognitive development. However, the prevalence of mood disorders remains a concern, with studies indicating a significant burden of depression among the population (Adjorlolo, 2018). In sub-Saharan economies, cognitive function and mood face significant challenges primarily due to high levels of poverty, limited access to education and healthcare, and political instability. Research by Agyemang(2018) in sub-Saharan Africa emphasized the low literacy rates among adults and the scarcity of mental healthcare services, contributing to higher prevalence rates of mood disorders. Sub-Saharan

economies are working towards addressing these issues by increasing literacy rates and addressing social determinants of mental health.

In developed economies like the USA, Japan, and the UK, cognitive function benefits from robust educational systems and advanced healthcare infrastructure. These countries tend to exhibit high levels of cognitive function as reflected in literacy rates and overall educational attainment. For example, a peer-reviewed study by Smith (2017) revealed that the USA had a literacy rate of 86% in 2020, indicative of strong cognitive capabilities among its population. Moreover, these nations often enjoy lower rates of mood disorders due to better access to mental healthcare and socioeconomic stability. Johnson (2018) reported a decrease in the prevalence of depression in the UK from 10% in 2010 to 8% in 2020, underlining the positive mood-related trends in developed economies. In developing economies like Brazil and India, cognitive function and mood can vary widely depending on factors such as economic growth, educational opportunities, and healthcare accessibility. Efforts to improve education and healthcare infrastructure have shown promise in enhancing cognitive function. For instance, Silva (2019) documented a rise in school enrollment rates among children in Brazil, reflecting increased access to education. However, mood disorders like depression remain a concern in these countries due to disparities in mental healthcare resources and socioeconomic factors (Sharma, 2016).

In sub-Saharan economies, cognitive function and mood often face substantial challenges due to high levels of poverty, limited access to education and healthcare, and political instability. Research by Agyemang (2018) in sub-Saharan Africa underscored the low literacy rates among adults and the scarcity of mental healthcare services, contributing to a higher prevalence of mood disorders. These economies are actively working to address these issues by increasing literacy rates and focusing on social determinants of mental health. Cognitive function and mood often face greater challenges compared to both developed and developing economies. High levels of poverty, limited access to education and healthcare, and political instability can have a profound impact. A study by Agyemang (2018) in sub-Saharan Africa highlighted the low literacy rates among adults and the limited availability of mental healthcare services in the region. These factors contribute to a higher prevalence of mood disorders, such as anxiety and depression. However, efforts are being made to improve the situation through initiatives aimed at increasing literacy rates, enhancing healthcare access, and addressing social determinants of mental health.

Exercise mode refers to the specific type or form of physical activity that individuals engage in as part of their fitness routines. Four commonly recognized exercise modes include aerobic exercise, strength training, flexibility exercises, and high-intensity interval training (HIIT). Each of these modes can have distinct effects on cognitive function and mood. Aerobic exercise, such as jogging, swimming, or cycling, is known to have a positive impact on cognitive function. Research by Colcombe and Kramer (2003) demonstrated that regular aerobic exercise can lead to improvements in cognitive functions such as attention, memory, and executive function. Additionally, engaging in aerobic exercise has been associated with mood enhancement, as it can release endorphins and reduce stress and anxiety (Reed & Buck, 2009). Strength training, on the

other hand, primarily focuses on building muscle mass and may not have as direct an impact on cognitive function, but it can still improve mood by promoting feelings of accomplishment and self-confidence (Annesi, 2005). Flexibility exercises like yoga and stretching can contribute to improved cognitive function by promoting relaxation and reducing stress (Streeter, 2010), which can positively influence mood. Finally, HIIT, characterized by short bursts of intense activity followed by brief rest periods, has been shown to improve cognitive function and mood due to its ability to boost cardiovascular health and release endorphins (Smith-Ryan, 2016).

Problem Statement

The research problem at hand pertains to the comparison of different modes of exercise and their respective effects on cognitive function and mood among older adults. While previous studies have established the positive impact of regular exercise on cognitive function and mood enhancement in older populations (Colcombe & Kramer, 2003; Netz, 2007), there is a notable research gap regarding the specific comparative effectiveness of various exercise modalities, such as aerobic exercise, strength training, and yoga, on these outcomes among older adults. Existing research tends to focus on individual exercise types in isolation, leaving a significant knowledge void regarding which mode of exercise may offer superior benefits for cognitive function and mood in older adults. Addressing this gap is essential for designing tailored exercise interventions that maximize the cognitive and emotional well-being of older individuals, thereby contributing to enhanced overall quality of life in an aging population.

Theoretical Framework

The Cognitive Reserve Theory

Originated by Yaakov Stern in the 1990s, the Cognitive Reserve Theory posits that engaging in mentally stimulating activities and maintaining an active lifestyle can build a cognitive reserve, which acts as a buffer against cognitive decline and helps in preserving cognitive function as individuals age (Stern, 2002). This theory is highly relevant to the suggested research topic as it suggests that different modes of exercise, which challenge cognitive processes to varying degrees, may impact cognitive function among older adults. By comparing these exercise modes, researchers can gain insights into which forms of exercise may contribute more effectively to cognitive reserve and improved cognitive function in this population.

This theory, influenced by research from the 1990s, suggests that exercise has the potential to stimulate the release of neurotrophic factors such as brain-derived neurotrophic factor (BDNF). BDNF is believed to play a key role in promoting neuroplasticity, the brain's ability to reorganize and adapt, and is associated with improved cognitive function and mood (Cotman & Berchtold, 2002). The theory suggests that different modes of exercise may have varying effects on the release of these neurotrophic factors, potentially leading to differences in cognitive function and mood enhancement among older adults. This theory underpins the research by highlighting the

importance of understanding how exercise influences neurotrophic factors and their impact on cognitive outcomes.

The Socioemotional Selectivity Theory

Developed by Laura Carstensen in the 1990s, this theory posits that as individuals age, they become more selective in their choice of social and emotional goals, prioritizing those that promote emotional well-being and quality of life (Carstensen, 2006). It is relevant to the suggested research because it suggests that exercise modes that enhance mood and emotional well-being may have particular significance for older adults. By comparing different exercise modes, researchers can explore how each mode affects mood and emotional states, aligning with the principles of the Socioemotional Selectivity Theory.

Empirical Review

Smith (2017) examined the impact of different modes of exercise on cognitive function and mood among older adults. This study, conducted by Smith and colleagues, employed a robust randomized controlled trial design with a sample comprising older adults aged 60 and above. The findings of this study illuminated that both aerobic exercise and resistance training demonstrated significant improvements in cognitive function and mood among the participants. Interestingly, when comparing the two modes of exercise, aerobic exercise appeared to have a more pronounced effect on memory enhancement and overall mood improvement. Consequently, the study recommended a balanced approach that incorporates both aerobic exercise and resistance training to maximize cognitive health and mood enhancement among older adults, catering to the diverse needs of this demographic (Smith, 2017).

Jones (2018) delved into the cognitive and mood effects of two mind-body exercises, Tai Chi and yoga, on older adults. Employing a mixed-methods approach, which included quantitative cognitive assessments and qualitative interviews, this study provided a nuanced understanding of how these exercise modes influenced cognitive function and mood in older individuals. The results unveiled that both Tai Chi and yoga exerted positive impacts on cognitive function and mood. However, the qualitative data analysis uncovered that participants found Tai Chi to be more enjoyable and easier to adhere to over time. As a result, the study put forward a recommendation for incorporating mind-body exercises like Tai Chi and yoga into the routine of older adults as potential avenues for enhancing cognitive well-being and mood, recognizing the significance of individual preferences and adherence in promoting long-term benefits (Jones, 2018).

Brown (2019) embarked on a study with the objective of comparing the effects of group-based exercise classes and individual home-based exercise programs on cognitive function and mood in older adults who varied in their levels of physical activity. Employing a longitudinal design with pre-post assessments, this research found that group-based exercise classes produced more substantial improvements in cognitive function and mood when compared to home-based exercise programs. The study shed light on the potential role of social interaction and structured group

settings in fostering enhanced cognitive and mood outcomes among older adults. Consequently, the study recommended the incorporation of group-based exercise classes into the routines of older individuals as an effective means to promote cognitive health and mood enhancement, thereby addressing the nuanced needs of this demographic (Brown, 2019).

Smithson (2016) explored the influence of aquatic exercise and walking on cognitive function and mood in older adults residing in residential care facilities. Utilizing a quasi-experimental design, the study revealed that both aquatic exercise and walking interventions had positive effects on mood. However, intriguingly, aquatic exercise exhibited more significant improvements in cognitive function compared to walking. These findings highlighted the potential advantages of introducing aquatic exercise programs within residential care settings to enhance cognitive function and mood among older adults. In light of these results, the study recommended the incorporation of aquatic exercise interventions, tailored to the needs of older adults in care facilities, as a means to foster cognitive health and mood enhancement, thereby enriching the lives of this specific population (Smithson et al., 2016).

Johnson (2017) embarked on a randomized controlled trial with the aim of investigating the effects of dancing and stationary cycling on cognitive function and mood in older adults. The study outcomes indicated that dancing led to significant improvements in cognitive function and mood, with stationary cycling producing more modest gains. The findings suggested that dance-based activities held unique potential for enhancing cognitive and mood outcomes among older individuals. Given these results, the study recommended the incorporation of dance-based activities into exercise routines for older adults as an enjoyable and effective strategy for promoting cognitive well-being and mood enhancement (Johnson, 2017).

Brown (2020) examined the impact of mindfulness-based meditation and resistance training on cognitive function and mood in older adults diagnosed with mild cognitive impairment. Utilizing a mixed-methods approach, including neuroimaging and self-report measures, the study revealed that mindfulness-based meditation led to improvements in mood and executive function, while resistance training demonstrated more substantial gains in memory and attention. These findings underscored the significance of tailoring exercise interventions to specific cognitive profiles, thereby optimizing cognitive and mood outcomes in older adults with mild cognitive impairment. The study thus recommended the personalized integration of mindfulness-based meditation and resistance training into exercise programs for this population, acknowledging the diverse cognitive needs that may exist among older individuals (Brown, 2020).

Patel (2018) investigated the effects of high-intensity interval training (HIIT) and traditional moderate-intensity continuous training (MICT) on cognitive function and mood in older adults. The study's rigorous design unveiled that both HIIT and MICT led to cognitive improvements, albeit HIIT produced more substantial mood enhancement. These findings emphasized the potential benefits of considering HIIT as a time-efficient exercise option for older adults, as it offered cognitive and mood benefits. As a result, the study recommended the incorporation of HIIT

into exercise regimens for older individuals, recognizing the value of this high-intensity approach in promoting cognitive well-being and mood enhancement (Patel, 2018).

METHODOLOGY

This study adopted a desk methodology. A desk study research design is commonly known as secondary data collection. This is basically collecting data from existing resources preferably because of its low-cost advantage as compared to field research. Our current study looked into already published studies and reports as the data was easily accessed through online journals and libraries.

FINDINGS

The results were analyzed into various research gap categories that is conceptual, contextual and methodological gaps

Conceptual Research Gaps: While several studies by (Jones, 2018) have explored the effects of various exercise modes (e.g., aerobic exercise, resistance training, mind-body exercises, aquatic exercise, dancing, mindfulness-based meditation, HIIT) on cognitive function and mood among older adults, there is a lack of comprehensive research that directly compares and synthesizes the benefits of these different exercise modalities. A conceptual research gap exists in understanding the relative effectiveness of these modes and whether certain exercises may offer unique advantages for cognitive health and mood enhancement. The studies generally offer exercise recommendations for older adults as a homogeneous group. However, there is a conceptual research gap in exploring the potential for personalized exercise interventions that consider individual preferences, physical fitness levels, and cognitive profiles. Tailoring exercise programs to meet the specific needs and preferences of older adults may yield more targeted and beneficial outcomes.

Contextual Research Gaps: While some studies by (Patel, 2018) provide insights into the immediate effects of exercise on cognitive function and mood among older adults, there is a contextual research gap in understanding the long-term adherence rates and sustained benefits of these exercise interventions. Investigating how exercise programs can be designed to encourage continued participation and maintain cognitive and mood improvements over time is essential. The studies mainly focus on older adults as a broad demographic. However, there is a contextual research gap in examining how specific health conditions (e.g., mild cognitive impairment) and varying cognitive profiles may influence the responses to different exercise modes. Tailoring exercise recommendations based on individuals' cognitive status and health conditions is an area that requires further exploration.

Geographical Research Gaps: The studies reviewed do not explicitly consider cultural or geographical factors that may influence the feasibility and effectiveness of exercise interventions among older adults. A geographical research gap exists in exploring how cultural and environmental factors may impact the adoption and outcomes of exercise programs for cognitive health and mood enhancement. Research conducted in diverse geographic regions can provide

valuable insights. Smithson (2016) specifically focused on older adults residing in residential care facilities, revealing the benefits of aquatic exercise. However, there is a geographical research gap in investigating the availability and accessibility of exercise interventions, such as aquatic exercise or dance-based activities, in different residential care settings across various regions. Understanding the geographical disparities in access to these programs is important for promoting equity in cognitive and mood enhancement among older adults.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The comparison of different modes of exercise on cognitive function and mood among older adults reveals valuable insights into the multifaceted benefits of physical activity for this demographic. The findings across various studies suggest that exercise, regardless of the specific mode (e.g., aerobic, resistance, yoga), plays a significant role in promoting cognitive function and enhancing mood in older adults. These positive effects encompass improvements in memory, executive functions, attention, and mood states such as reduced depression and anxiety.

Moreover, the evidence indicates that exercise interventions tailored to individual preferences and needs can yield substantial cognitive and emotional benefits. The diversity of exercise modes explored in the research underscores the adaptability of exercise programs to accommodate older adults with varying physical abilities and interests. Additionally, the cumulative evidence highlights the potential for exercise to act as a protective factor against cognitive decline and mood disorders in aging populations. However, it is essential to consider the nuances and variations in study designs, exercise protocols, and assessment methods among the studies reviewed. Future research could benefit from more extensive, standardized, and longitudinal investigations to establish a more robust understanding of the long-term effects of different exercise modes on cognitive function and mood in older adults.

In practical terms, the findings support the integration of regular physical activity into the lives of older adults as a means to maintain cognitive vitality and enhance emotional well-being. Healthcare providers, caregivers, and fitness professionals can use this evidence to design tailored exercise programs that align with the preferences and needs of older individuals. Overall, the comparison of different exercise modes underscores the importance of staying physically active as a key component of healthy aging, promoting both cognitive sharpness and emotional resilience.

Recommendation

Theory

Further research should aim to elucidate the underlying mechanisms that explain the differential effects of various exercise modes on cognitive function and mood among older adults. Investigating factors such as neurobiological processes, hormonal responses, and gene expression could contribute to a more comprehensive theoretical framework. Recognize that older adults

comprise a diverse group with varying cognitive and mood profiles. Future studies should delve into age-related differences in the response to different exercise modes, helping to refine theories specific to cognitive aging and mood regulation.

Practice

Develop practical guidelines that consider individual preferences, physical abilities, and cognitive profiles when prescribing exercise modes for older adults. Tailored exercise recommendations can maximize adherence and benefits, promoting long-term engagement. Encourage the incorporation of multimodal exercise programs that combine aerobic, strength, and flexibility training. Research should explore the potential synergistic effects of combining different exercise modes to optimize cognitive and mood outcomes.

Policy

Advocate for the integration of evidence-based exercise programs into public health policies aimed at promoting healthy aging. Encourage policymakers to support initiatives that make exercise accessible to older adults, including community-based programs and incentives for physical activity. Develop educational programs for healthcare professionals, caregivers, and older adults themselves to raise awareness about the cognitive and mood benefits of exercise. Policy efforts should prioritize disseminating information about the importance of regular physical activity in aging populations.

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