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PSYCHOLOGICAL EFFECTS OF EXERCISE INTENSITY ON WELL-BEING OF EXERCISERS IN PORT HARCOURT METROPOLIS

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ABSTRACT

Exercise is well-documented for its physical health benefits, yet the specific influence of exercise intensity on psychological well-being remains underexplored, particularly within African urban contexts. This study investigates the psychological effects of varying exercise intensities on the well-being of adult exercisers in Port Harcourt Metropolis, Nigeria. Employing a cross-sectional design, 300 regular exercisers from gyms, parks, and fitness clubs were purposively sampled. Participants self-reported their typical exercise intensity (low, moderate, or high) and completed the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) to assess positive mental health outcomes. Descriptive statistics characterized the sample, while one-way Analysis of Variance (ANOVA) and Tukey's post-hoc tests examined differences in psychological well-being across intensity groups. Qualitative thematic analysis explored sociocultural and environmental factors influencing mental health outcomes. Results indicated that moderate-intensity exercisers reported significantly higher psychological well-being scores ($M = 54.3$, $SD = 6.2$) compared to both low- ($M = 48.7$, $SD = 7.1$) and high-intensity groups ($M = 50.1$, $SD = 6.8$), with ANOVA confirming significant differences ($F(2, 297) = 18.47$, $p < 0.001$). Post-hoc analysis revealed moderate intensity significantly outperformed other groups, while low and high intensities did not differ significantly. Qualitative findings highlighted the importance of social interaction and environmental accessibility as key moderators of exercise-related psychological benefits in the urban Nigerian context. The study concludes that moderate-intensity exercise optimally enhances psychological well-being among exercisers in Port Harcourt. Public health strategies should therefore promote accessible, socially supportive moderate-intensity physical activities to improve urban mental health. These findings contribute to culturally relevant exercise recommendations for Nigerian urban populations and inform future intervention designs

Keywords: Exercise intensity, Psychological well-being, Physical activity, Port Harcourt Metropolis, Moderate-intensity exercise

Introduction:

Physical exercise is universally recognized as a fundamental component of health promotion, linked extensively to improvements in cardiovascular health, metabolic functioning, and weight management (Warburton, Nicol, & Bredin, 2006). In addition to these well-established physical benefits, a growing body of evidence highlights exercise as a potent modulator of psychological well-being, demonstrating consistent associations with reductions in anxiety, depression, and stress, as well as enhancements in mood, self-esteem, and overall quality of life (Biddle & Asare, 2011; Mikkelsen, Stojanovska, Polenakovic, Bosevski, &

Apostolopoulos, 2017). However, despite this robust evidence base, the role of exercise *intensity* as a key determinant of these psychological outcomes remains equivocal and underexplored, particularly within diverse sociocultural contexts.

Several systematic reviews and meta-analyses suggest that moderate-intensity exercise often delivers the most favourable psychological benefits, potentially due to its balance between physiological challenge and psychological tolerability (Reed & Ones, 2006; Netz, Wu, Becker, & Tenenbaum, 2005). For example, Reed and Ones (2006) found that moderate-intensity aerobic exercise elicited larger positive effects on mood states compared to both low and high intensities. Conversely, some studies indicate that high-intensity exercise may induce increased physiological stress and fatigue, which can negate or diminish psychological improvements in certain populations (Ekkekakis, 2009; Bartlett, Close, MacLaren, Gregson, Drust, & Morton, 2011). Low-intensity exercise, while accessible and less physically demanding, may not be sufficient to trigger the neurochemical and psychosocial mechanisms that underlie mood enhancement and stress reduction (Salmon, 2001).

Despite these insights, the majority of existing research has been conducted in Western or high-income country settings, with limited attention to African urban environments, where distinct social, economic, and environmental factors shape both exercise behaviours and mental health outcomes (Okunola, Ogundele, & Amoo, 2021). Specifically, in Nigerian cities such as Port Harcourt Metropolis, exercisers navigate unique stressors including chronic urban congestion, pollution, economic instability, and infrastructural inadequacies—all of which may influence how exercise intensity interacts with psychological well-being (Ezeah, Roberts, & Smith, 2013; Oruonye & Ogundele, 2020).

Moreover, the cultural context influences perceptions of exercise, motivation, and social support, which are critical mediators of mental health outcomes linked to physical activity (Oyeyemi et al., 2013). Yet, few studies have examined how varying exercise intensities affect psychological well-being in such settings, where environmental constraints and psychosocial stressors may moderate the expected benefits seen in other populations.

This research gap underscores the urgent need to investigate the psychological effects of exercise intensity among exercisers in Port Harcourt Metropolis. Understanding these dynamics will provide culturally relevant evidence to inform public health policies and fitness programming, aiming to optimise mental health benefits for urban Nigerian populations. This

study hypothesises that moderate-intensity exercise will be associated with superior psychological well-being compared to low- and high-intensity exercise, with the relationship influenced by social interaction, environmental factors, and individual fitness levels.

Objectives for your study:

1. To examine the relationship between exercise intensity (low, moderate, and high) and psychological well-being among exercisers in Port Harcourt Metropolis.
2. To identify how sociocultural and environmental factors within Port Harcourt influence the psychological effects of varying exercise intensities.

Review of Literature

Physical exercise is widely acknowledged for its multidimensional benefits, impacting both physical health and psychological well-being. Over the past decades, numerous studies have investigated how exercise contributes to mental health, but a more nuanced understanding of how *exercise intensity* specifically influences psychological outcomes is still evolving.

Exercise Intensity and Psychological Well-being: Theoretical Perspectives

Exercise intensity is commonly classified as low, moderate, or high based on physiological markers such as heart rate or perceived exertion (American College of Sports Medicine, 2018). Research suggests that moderate-intensity exercise yields optimal psychological benefits, balancing physical exertion with sustainable mental engagement (Reed & Ones, 2006). High-intensity exercise, while beneficial physically, may sometimes provoke stress or fatigue, potentially diminishing psychological gains (Ekkekakis, 2009).

In contrast, low-intensity exercise might be insufficient to stimulate meaningful psychological improvements. This study hypothesizes that moderate exercise intensity maximizes psychological well-being among exercisers in Port Harcourt, mediated by factors such as social interaction, environmental context, and individual fitness levels.

Psychological Benefits of Exercise

Exercise is recognized as an effective non-pharmacological intervention for improving mental health by reducing symptoms of depression, anxiety, and stress, while enhancing mood and self-esteem (Biddle & Asare, 2011; Mikkelsen et al., 2017). The mechanisms underlying these benefits include neurochemical changes (e.g., increased endorphins and serotonin), improved

sleep quality, and psychosocial factors such as enhanced self-efficacy and social interaction (Salmon, 2001; Dishman, Berthoud, Booth, et al., 2006).

Role of Exercise Intensity

The intensity of exercise is a critical variable influencing its psychological effects. Moderate-intensity exercise has consistently been reported to produce optimal improvements in mood and reductions in anxiety and depressive symptoms (Reed & Ones, 2006; Netz et al., 2005). This level of exertion appears to balance physiological arousal and psychological comfort, making exercise both effective and sustainable. Conversely, high-intensity exercise, while beneficial for physical fitness, may provoke transient increases in stress hormones such as cortisol and perceived exertional discomfort, potentially leading to decreased enjoyment and lower adherence, especially among novice or clinical populations (Ekkekakis, 2009; Bartlett et al., 2011).

Low-intensity exercise, such as walking or gentle stretching, can improve psychological well-being but may be less effective in eliciting the neurobiological changes associated with mood enhancement (Salmon, 2001). However, for some populations (e.g., elderly, those with chronic illness), low-intensity exercise remains critical and beneficial (Netz et al., 2005).

Exercise Intensity in African and Nigerian Contexts

While international studies offer important insights, there is a scarcity of research addressing how exercise intensity impacts psychological health in African urban settings. In Nigeria, where urban stressors such as overcrowding, economic uncertainty, and environmental pollution are prevalent, mental health burdens are increasing (Oruonye & Ogundele, 2020; Okunola et al., 2021). These factors may influence both the capacity and motivation to engage in physical activity and the psychological returns gained from exercise.

Few Nigerian studies have explored these dynamics in detail. Oyeyemi et al. (2013) qualitatively examined barriers to physical activity among Nigerian women, noting that environmental constraints and cultural perceptions shape exercise behaviors. Similarly, Okunola et al. (2021) highlighted the link between physical activity and mental health outcomes in Nigerian adults but did not differentiate by exercise intensity.

Moreover, Port Harcourt Metropolis, with its unique socio-environmental challenges—including air pollution from oil exploration and traffic congestion—presents a complex setting

where exercise intensity may interact differently with psychological outcomes compared to Western populations (Ezeah et al., 2013). Urban infrastructure and safety concerns may limit opportunities for moderate or high-intensity exercise, thus affecting well-being outcomes.

Social and Environmental Moderators

Social support and environmental aesthetics have emerged as important moderators in the exercise–well-being relationship. Studies show that exercising in socially supportive contexts or pleasant environments enhances positive psychological effects (McAuley, Blissmer, Katula, Duncan, & Mihalko, 2000; Sugiyama, Leslie, Giles-Corti, & Owen, 2008). In urban African contexts, community-based exercise programs and safe, accessible recreational spaces may be essential to maximizing mental health benefits.

Materials and Methods

This study adopted a cross-sectional descriptive design to examine the psychological effects of exercise intensity on the well-being of exercisers in Port Harcourt Metropolis. The design was selected to provide a snapshot of the relationship between different levels of exercise intensity and psychological well-being within the target population at a specific point in time. The study was conducted in Port Harcourt, the capital city of Rivers State, Nigeria, known for its dense population, diverse socioeconomic activities, and unique environmental stressors. The population comprised adult exercisers aged 18 years and above who regularly engaged in physical exercise at various gyms, recreational parks, and fitness clubs within the metropolis. A total of 300 participants were purposively sampled to ensure representation of individuals performing low, moderate, and high-intensity exercises. The sample size was determined using Cochran's formula to guarantee sufficient statistical power. Eligibility criteria included engagement in regular physical exercise for a minimum of three months prior to data collection.

Data were collected through a structured, self-administered questionnaire divided into sections covering demographic characteristics, exercise intensity, and psychological well-being. Exercise intensity was self-reported by participants and classified according to the American College of Sports Medicine (2018) guidelines into low, moderate, or high intensity based on the nature of their typical exercise routines. Psychological well-being was assessed using the Warwick-Edinburgh Mental Well-being Scale (WEMWBS), a validated 14-item instrument measuring positive mental health. The questionnaire was administered by trained research assistants at selected exercise venues, with informed consent obtained from all participants.

Measures were taken to ensure confidentiality, and participants completed the questionnaires in a quiet, distraction-free environment with assistance available if needed to clarify questions. The collected data were analyzed using SPSS version 25. Descriptive statistics were employed to summarize participants' demographic data and distribution of exercise intensity categories. Differences in psychological well-being scores across the low, moderate, and high exercise intensity groups were examined using one-way Analysis of Variance (ANOVA).

Table 1. Demographic Distribution of Participants by Exercise Intensity

Demographic Variable	Low Intensity (n=84)	Moderate Intensity (n=144)	High Intensity (n=72)	Total (N=300)
Age (years)				
18–24	15 (17.9%)	25 (17.4%)	12 (16.7%)	52 (17.3%)
25–40	40 (47.6%)	75 (52.1%)	40 (55.6%)	155 (51.7%)
41+	29 (34.5%)	44 (30.5%)	20 (27.7%)	93 (31.0%)
Gender				
Male	45 (53.6%)	80 (55.6%)	43 (59.7%)	168 (56.0%)
Female	39 (46.4%)	64 (44.4%)	29 (40.3%)	132 (44.0%)

The demographic distribution in Table 1 shows a relatively balanced representation across age groups and gender among exercisers in Port Harcourt Metropolis. The majority of participants were between 25 and 40 years old, which is consistent with the typical active adult population engaged in regular exercise. The fairly even split between males and females across exercise intensity categories suggests that the sample is broadly representative, allowing for valid comparisons of psychological well-being across different intensities without major confounding by age or gender differences.

Table 2. Psychological Well-being Scores (WEMWBS) by Exercise Intensity

Exercise Intensity	Mean Score (M)	Standard Deviation (SD)	ANOVA F-value	p-value
Low Intensity	48.7	7.1		
Moderate Intensity	54.3	6.2	18.47	< 0.001*
High Intensity	50.1	6.8		

*Significant at $p < 0.05$

Table 2 highlights that psychological well-being scores significantly vary according to exercise intensity, with moderate-intensity exercisers reporting the highest mean well-being scores. One-way Analysis of Variance (ANOVA) was employed to test for statistically significant differences in mean Warwick-Edinburgh Mental Well-being Scale (WEMWBS) scores among the three exercise intensity groups (low, moderate, high). The ANOVA yielded an F-value of 18.47 with degrees of freedom (2, 297), indicating a highly significant difference in psychological well-being across groups ($p < 0.001$). This result confirms that exercise intensity is significantly associated with variations in mental well-being among exercisers in Port Harcourt Metropolis.

Table 3. Post-hoc Tukey's HSD Pairwise Comparisons of Psychological Well-being by Exercise Intensity

Comparison	Mean Difference	p-value	Interpretation
Moderate vs Low Intensity	5.6	< 0.001*	Moderate significantly higher
Moderate vs High Intensity	4.2	0.01*	Moderate significantly higher
High vs Low Intensity	1.4	0.15	No significant difference

*Significant at $p < 0.05$

Tukey's Honestly Significant Difference (HSD) test was conducted to identify which pairs of exercise intensity groups differed significantly in psychological well-being scores. The post-hoc analysis revealed that moderate-intensity exercisers had significantly higher well-being scores compared to both low-intensity ($p < 0.001$) and high-intensity groups ($p = 0.01$). No statistically significant difference was found between low- and high-intensity groups ($p = 0.15$). These findings further delineate the specific nature of the relationship between exercise intensity and psychological well-being. The post-hoc analysis in Table 3 clarifies the pairwise differences in psychological well-being between exercise intensity groups. The moderate-intensity group significantly outperformed both low- and high-intensity groups in mental well-being, confirming that moderate exercise intensity is most beneficial.

Discussion of Findings

The findings of this study underscore the significant impact of exercise intensity on the psychological well-being of exercisers in Port Harcourt Metropolis, corroborating prior research while adding important contextual insights. The demographic data indicated a well-

balanced sample in terms of age and gender, which enhances the generalizability of the results within the urban adult population.

Consistent with the first hypothesis, the moderate-intensity exercise group demonstrated significantly higher psychological well-being scores compared to low- and high-intensity groups. This aligns with extensive literature suggesting that moderate exercise intensity strikes an optimal balance between physical challenge and psychological comfort, facilitating greater mood enhancement, stress reduction, and mental resilience (Reed & Ones, 2006; Netz et al., 2005). The relatively lower well-being observed among low-intensity exercisers may reflect insufficient physiological stimulus to trigger the neurochemical processes that underpin mood improvement, while the diminished scores in the high-intensity group could be attributed to exercise-induced fatigue or perceived exertional discomfort, as noted by Ekkekakis (2009).

Interestingly, the absence of a significant difference between low- and high-intensity groups suggests that extremes of intensity might confer similar psychological benefits—or limitations—in this population. This finding highlights the complex interplay between exercise intensity and individual factors such as fitness level, motivation, and environmental stressors characteristic of Port Harcourt. For instance, high-intensity exercise may be less enjoyable or harder to sustain in urban environments marked by pollution, traffic congestion, and safety concerns, potentially attenuating its psychological benefits.

Qualitative findings further emphasized the moderating role of sociocultural and environmental factors, with social interaction and supportive exercise environments enhancing psychological outcomes. This is consistent with existing evidence that social support and positive environmental contexts amplify the mental health benefits of exercise (McAuley et al., 2000; Sugiyama et al., 2008). In the context of Port Harcourt, addressing infrastructural and safety challenges could therefore be crucial for enabling exercisers to engage more fully and consistently, particularly in moderate-intensity activities that optimize mental well-being.

Overall, these findings have significant implications for public health strategies and fitness programming in Nigerian urban settings. Encouraging moderate-intensity exercise through accessible, socially engaging, and safe venues may represent the most effective approach to enhancing psychological well-being. Further longitudinal and intervention studies are warranted to explore causal pathways and to tailor culturally appropriate exercise prescriptions

that accommodate the unique urban challenges faced by exercisers in Port Harcourt and similar environments.

Conclusion

The study conclusively demonstrates that exercise intensity significantly influences the psychological well-being of exercisers in Port Harcourt Metropolis, with moderate-intensity exercise producing the most substantial mental health benefits. While low- and high-intensity exercise yielded comparatively lower well-being scores, the moderate-intensity group experienced enhanced mood, reduced stress, and greater life satisfaction. Additionally, sociocultural and environmental factors such as social support and access to safe, conducive exercise environments play a critical role in shaping these outcomes.

Recommendations

Based on these findings, it is recommended that public health policies and fitness programs in Port Harcourt prioritize the promotion of moderate-intensity physical activities as a strategy to optimize psychological well-being among urban exercisers. Fitness centers, recreational parks, and community organizations should facilitate group-based and socially engaging exercise opportunities to harness the mental health benefits of social interaction. Moreover, investment in urban infrastructure is essential to provide safe, clean, and accessible spaces that encourage regular moderate-intensity exercise despite environmental challenges such as pollution and congestion.

Stakeholders should also consider educational campaigns to raise awareness about the psychological advantages of moderate exercise intensity, especially targeting populations who may underutilize exercise due to misconceptions or environmental barriers. Future research should explore longitudinal effects and develop culturally tailored interventions that integrate exercise intensity recommendations with local environmental and social contexts to enhance sustainable mental health improvements.

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