

Comparative effects of Zumba and Yoga on stress, body satisfaction, and self-esteem in working women: a randomized control trial

Noortje Anita Kumaat^{1ABD}, Afif Rusdiawan^{1,2ABCD}, Procopio B. Dafun JR.^{3CD}, Heri Wahyudi^{1BC}, Popy Elisano Arfanda^{4AC}, Fransisca Januarumi Marhaendra Wijaya^{1AD}, Himawan Wismanadi^{1BE}, Ary Artanty^{5BE}

¹Faculty of Sport and Health Sciences, Universitas Negeri Surabaya, Indonesia

²Sport & Exercise Research Center, Universitas Negeri Surabaya, Indonesia

³Department of Physical Education, Mariano Marcos State University, Philippines

⁴Faculty of Sport and Health Sciences, Universitas Negeri Makassar, Indonesia

⁵Faculty of Exact Studies and Sports, Universitas Insan Budi Utomo, Indonesia

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Abstract

Background and Study Aim Working women experience increased stress due to their dual roles as employees, homemakers, and family carers. This study aimed to compare the effects of Zumba and yoga on stress, body satisfaction, and self-esteem in working women.

Material and Methods A total of 159 moderately stressed working women (ages 20 to 50) were randomly assigned to one of three groups: yoga (n = 53), Zumba (n = 53), or control (wellness education, n = 53). Biweekly sessions of yoga (low-to-moderate intensity poses and breathing techniques) and Zumba (moderate-to-vigorous aerobic dance) were provided over a 12-week period. Assessments of stress (Perceived Stress Scale-10), body satisfaction (Body Satisfaction Scale), and self-esteem (Rosenberg Self-Esteem Scale) were conducted before and after the intervention. Effect size analyses and non-parametric tests (Kruskal-Wallis, Wilcoxon, and Mann-Whitney) were performed.

Results Compared to the control group (stress: $\Delta = -3.25$; body satisfaction: $\Delta = -0.78$, not significant), both the Zumba and yoga groups showed significant reductions in stress (Zumba: $\Delta = -7.54$, $p < 0.001$; Yoga: $\Delta = -8.86$, $p < 0.001$) and improvements in body satisfaction (Zumba: $\Delta = -12.36$; Yoga: $\Delta = -9.69$, $p < 0.05$). Self-esteem increased significantly in both the Zumba ($\Delta = +5.59$) and yoga ($\Delta = +5.31$, $p < 0.001$) groups, but showed little change in the control group ($\Delta = +0.92$). Medium effect sizes were observed for body satisfaction and self-esteem, and large effect sizes for stress reduction (Zumba: $r = 0.419$; Yoga: $r = 0.504$). No significant differences were found between the yoga and Zumba interventions.

Conclusions Yoga and Zumba are equally effective, culturally adaptable interventions for improving psychological well-being and reducing stress among working women. Their integration into workplace wellness programs offers a scalable and cost-effective approach to managing occupational stress, particularly in high-pressure, non-Western settings. Such initiatives should be prioritized by organizations and policymakers to support female employees' productivity and resilience.

Keywords: working women, stress, Zumba, Yoga, body satisfaction

Introduction

Occupational stress is increasingly recognized as a serious public health issue, particularly among women who combine professional duties with domestic and caregiving responsibilities. In this context, the ongoing struggle to balance these dual roles often leads to chronic psychological strain and a diminished quality of life.

Many studies confirm this. Working women are particularly susceptible to psychological stress in the pressure-filled modern world due to their dual responsibilities as employees, homemakers, and family carers [1]. The accumulation of these roles

can lead to decreased self-esteem, reduced body satisfaction, and elevated stress levels [2]. Working women who experience chronic stress may develop mental health conditions such as anxiety and depression, along with an increased risk of metabolic and cardiovascular diseases if left untreated [3, 4]. Prolonged stress also lowers productivity and further increases the risk of psychological disorders [5]. Therefore, it is essential to identify effective, affordable, and widely applicable interventions to improve the psychological well-being of this population.

Non-pharmacological strategies, such as exercise, have gained popularity due to their broad benefits, even when pharmaceutical interventions are available. Among these, aerobic activities like Zumba and mind-body practices like yoga are

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increasingly recognized for their ability to reduce stress and improve psychological well-being [6, 7]. However, few comparative studies have assessed the effectiveness of these modalities, particularly among underrepresented populations such as working women in developing countries. Workplace wellness programs remain uncommon in Indonesia, where cultural and occupational pressures further elevate stress levels. Existing literature predominantly focuses on Western populations and often overlooks important outcomes such as body satisfaction and self-esteem [8, 9].

Through enjoyable rhythmic movement, Zumba has been shown to elevate mood, lower cortisol levels, and promote body acceptance [10, 11]. In contrast, yoga has been demonstrated to reduce stress by modulating the hypothalamic-pituitary-adrenal (HPA) axis through breathing awareness and relaxation techniques [12]. Recent meta-analyses indicate that physical activity lowers cortisol via HPA axis regulation, enhances emotional regulation through mindfulness, and fosters social connectedness through the group-based nature of Zumba and yoga [13, 14, 15]. However, methodological concerns remain, including a lack of randomized controlled trials (RCTs) and a narrow focus on outcome variables [16].

Although previous studies have confirmed the psychological benefits of both Zumba and yoga, several methodological and contextual issues remain unresolved. First, there is a lack of comparative research between Zumba and yoga, particularly in the context of developing nations. Most existing studies have focused on populations in high-income countries, which limits our understanding of how these findings apply to working women in developing regions who face specific social and cultural challenges, such as balancing work and domestic responsibilities. Second, while stress is commonly measured in isolation, important dimensions of women's mental health, including body satisfaction and self-esteem, are often overlooked [17, 18]. For example, a meta-analysis by Fong Yan et al. [19] found that only 12 percent of dance intervention studies addressed body image concerns despite the clear importance of this factor.

Moreover, the study designs employed in this field are sometimes methodologically weak. A comprehensive analysis by Remskar et al. [20] revealed that only 23 percent of studies on mindfulness and physical activity used a randomized controlled trial (RCT) design, which raises concerns about the internal validity of earlier findings. In addition, existing programs rarely incorporate cultural adaptations, such as the use of Latin music in Zumba or traditional breathing techniques in yoga, which may enhance participant engagement in developing countries [12, 21]. For example, research by Siregar et al. [22] conducted

in Indonesia examined only short-term effects without directly comparing the two modalities. Furthermore, most studies fail to explore the psychological mechanisms that account for differences in the effects of Zumba and yoga. While yoga is often associated with mindfulness-based emotional regulation, Zumba may enhance social connectedness through group interaction [15, 23]. In the absence of thorough comparative research, policy recommendations for workplace health interventions remain unclear.

A review of the existing literature reveals divergent perspectives among researchers regarding the relative benefits of Zumba and yoga. While most studies emphasize the positive effects of both practices on psychological health, including stress reduction and improved emotional well-being, there is no clear consensus on which modality is more effective or under what conditions. Moreover, current evidence highlights important gaps, particularly in terms of long-term outcomes, cultural adaptation, and the inclusion of diverse populations. These limitations underscore the ongoing need for more rigorous, context-sensitive research to better understand how and for whom these interventions are most effective.

This study aimed to compare the effects of Zumba and yoga on stress, body satisfaction, and self-esteem in working women.

Materials and Methods

Participants

A total of 159 participants were recruited for this study through social media platforms and fitness centers in Surabaya City. From July to September 2024, purposive sampling was conducted via the Instagram, Facebook, and WhatsApp channels of the Sport & Exercise Research Center, Universitas Negeri Surabaya, in collaboration with five local fitness centers and the Department of Labor in Surabaya, Indonesia. Recruitment was facilitated by distributing flyers on social media. The announcement outlined benefits for participants, including free Zumba and yoga sessions aimed at enhancing well-being, participation certificates, and stress management education.

Eligibility criteria included being female, aged between 20 and 50 years, working full-time (more than 35 hours per week), experiencing moderate stress (Perceived Stress Scale-10 score of 14 or higher), and having no prior experience with Zumba or yoga. Exclusion criteria involved pregnancy, cardiovascular or musculoskeletal disorders, or an inability to attend biweekly sessions. Of the 216 individuals screened, 159 met the inclusion criteria and were randomized by age into one of three groups: Zumba, yoga, or control.

Participants were randomly assigned to the

three groups (Zumba, Yoga, and Control), with an equal number of 53 individuals per group. Sample size was determined using G*Power software, based on a medium effect size ($f = 0.25$), 80% power, and $\alpha = 0.05$. Informed consent and ethical approval were obtained prior to participation. Attendance was systematically recorded throughout the intervention period. Participants who missed more than three sessions were excluded from the per-protocol analysis.

Research Design

This study employed an experimental design structured as a randomized controlled trial (RCT)

[24]. It compared the effects of two interventions (Zumba and yoga) and a control condition on stress, body satisfaction, and self-esteem. The intervention groups included a Zumba group, which received a 12-week Zumba program, and a yoga group, which participated in a 12-week yoga program. Both interventions were conducted twice per week. The control group received non-physical wellness education. Details of the intervention programs are presented in Table 1.

Table 1 presents the structure of the intervention programs. The Zumba group received moderate-to-vigorous intensity training (50–90% of maximum heart rate), delivered progressively over 12 weeks.

Table 1. 12-week intervention program of zumba, yoga and control groups

Week	Group	Intensity (% Max HR)	Focus	Core Movements	Duration	Annotation
1–4	Zumba	50–70% (Moderate to vigorous)	Basic rhythms and enjoyment	<i>Merengue</i> : Marching in place with hip swings; side step with hamstring curl <i>Salsa</i> : Forward–back step with torso rotation; guapea (Cuban basic step) <i>Cumbia</i> : Knee lifts with arm synchronization; side step with clap	45 min	Music: “ <i>La Vida Es Un Carnaval</i> ”(Celia Cruz), “ <i>Danza Kuduro</i> ”(Don Omar)
	Yoga	50–60% (Low)	Basic techniques and breathing	<i>Breathing</i> : Ujjayi Pranayama, Nadi Shodhana <i>Asanas</i> : Tadasana, Balasana, Adho Mukha Svanasana, Virabhadrasana I, Bhujangasana	50 min	Poses held for 15–20 seconds (3 breaths) with simple vinyasa transitions
	Control	—	Basic stress management	Education on stress, its sources, and effects; introduction to visualization and affirmations	45–50 min	Aims to build basic stress awareness and introduce coping tools
5–8	Zumba	60–80% (Moderate to vigorous)	Cardio and rhythm	<i>Reggaeton</i> : Basic perreo; jumping jacks with arm punches <i>Belly dance</i> : Hip drops and snake arms; shimmy with body roll <i>Afrobeat</i> : Bounce step with arm swings; high knees with shoulder rolls	45 min	Music: “ <i>Gasolina</i> ”(Daddy Yankee), “ <i>Jerusalem</i> ”(Master KG)
	Yoga	60–70% (Moderate)	Extended pose duration	<i>Breathing</i> : Kapalabhati, Bhramari <i>Asanas</i> : Virabhadrasana II, Trikonasana, Utkatasana, Setu Bandhasana <i>Flow</i> : Plank → Chaturanga → Cobra → Downward-Facing Dog (3 times)	50 min	Poses held for 30–45 seconds (5–7 breaths); new flows added (e.g., Warrior I → III)
	Control	—	Healthy lifestyle education	Topics include sleep hygiene, nutrition, time management, work-life balance; peer discussion	45–50 min	Encourages sustainable lifestyle changes for stress reduction

Table 1. Continued

Week	Group	Intensity (% Max HR)	Focus	Core Movements	Duration	Annotation
	Zumba	70–90% (Moderate to vigorous)	Advanced choreography and endurance	<i>Zumba toning:</i> Squats with overhead press; lunges with lateral arm raises <i>Bollywood fusion:</i> Namaste step with spin jump; arm swirls <i>Latin hip-hop:</i> Body isolations (chest and hips); quick footwork	45 min	Music: “ <i>Waka Waka</i> ” (Shakira), “ <i>Jai Ho</i> ” (A.R. Rahman)
9–12	Yoga	65–75% (Moderate to high)	Advanced poses and balance	<i>Breathing:</i> Sama Vritti (4-4-4 equal breathing) <i>Asanas:</i> Vrksasana, Ardha Chandrasana, Ustrasana, Headstand Prep (wall-supported), Side plank flow (Plank → Side plank → Vasisthasana, 3 times both sides)	50 min	Emphasis on balance transitions (e.g., Tree → Eagle); peak poses in Weeks 11–12
	Control	—	Mindfulness and self-reflection	Activities include mindful eating, music listening, journaling; structured reflection and growth planning	45–50 min	Aims to cultivate self-awareness, emotional regulation, and resilience

During weeks 1 to 4, sessions focused on basic movements such as merengue, salsa, and kumbia. Weeks 5 to 8 incorporated cardio and rhythmic elements, including reggaeton, belly dance, and afrobeat. In weeks 9 to 12, advanced choreography was introduced, including Zumba toning, Bollywood fusion, and Latin hip-hop.

The yoga group received low-to-moderate intensity training (50–75% of maximum heart rate), emphasizing fundamental breathing techniques, endurance in holding poses, and the gradual inclusion of advanced postures such as Tree Pose and Headstand Preparation. The program began with basic breathing exercises and foundational poses in weeks 1 to 4, progressed to extended pose-holding and transitional movements in weeks 5 to 8, and culminated in the integration of advanced poses and complex flow sequences in weeks 9 to 12.

Instead of physical activity, the control group received wellness-based education covering basic stress management, healthy lifestyle practices, mindfulness, and self-reflection. This educational component was delivered online and included facilitated discussions, guided self-reflection, and peer-sharing activities designed to address social interaction factors without involving physical exercise. The sessions were led by health practitioners and academic staff with expertise in wellness education.

Data collection was conducted at two time points: week 0 (pretest) and week 12 (posttest). Stress levels

were assessed using the Perceived Stress Scale (PSS-10), which has demonstrated good internal consistency with a Cronbach’s alpha of 0.865 [25]. The PSS-10 is a 10-item self-report instrument designed to measure the extent to which individuals perceive their lives as unpredictable, uncontrollable, and overloaded. Responses are provided on a 4-point Likert scale ranging from “never” to “very often,” with each item scored from 0 to 4. The total score is obtained by summing all item responses, including four reverse-coded items. Higher total scores reflect greater perceived stress, with a maximum possible score of 40. No universally established cut-off score exists to differentiate between high and mild levels of stress [25].

Body satisfaction was measured using the Body Satisfaction Scale (BSS). The test-retest reliability of the BSS was reported to be 0.86 [17]. Participants rated their satisfaction with 24 specific body features using a six-point Likert scale ranging from “extremely satisfied” to “extremely dissatisfied” [26]. Higher scores indicate greater levels of body dissatisfaction.

Self-esteem was assessed using the Rosenberg Self-Esteem Scale (RSES). Test-retest reliability over a two-week period yielded correlation coefficients of 0.85 and 0.88, indicating excellent temporal stability [27]. The RSES consists of 10 items, each rated on a four-point Likert scale with response options ranging from “strongly agree” (scored as 4) to “strongly disagree” (scored as 1) [28].

Statistical Analysis

Statistical analysis began with data preparation, which involved addressing missing values and detecting outliers. Datasets for stress (PSS-10), body satisfaction (BSS), and self-esteem (RSES), collected at both pretest and posttest, were screened for missing data. When the proportion of missing values was less than 5% per variable, multiple imputation using fully conditional specification (FCS) was applied. The imputation model incorporated baseline scores, group allocation, and demographic covariates (age and occupational sector). Participants with more than 20% missing responses across the main outcome variables were excluded from the final per-protocol analysis to maintain consistency and analytical rigor.

Outliers were assessed using both univariate and multivariate methods. Univariate outliers were identified based on standardized Z-scores exceeding ± 3.29 . Additionally, boxplot analysis using Tukey's method was performed to detect mild outliers ($1.5 \times$ IQR beyond the quartiles) and extreme outliers ($3.0 \times$ IQR beyond the quartiles). Multivariate outliers were assessed by calculating Mahalanobis distances using the chi-square distribution with three degrees of freedom, with a significance threshold set at $p < 0.001$.

Descriptive statistics, including means and standard deviations (SD), were computed for each outcome variable at pretest and posttest. The Shapiro–Wilk test was used to assess normality. The Kruskal–Wallis test was used to examine differences across groups (Zumba, Yoga, Control), while intra-group differences were analyzed using the Wilcoxon signed-rank test for non-normally distributed data. Between-group comparisons were conducted using Bonferroni-adjusted pairwise tests.

Effect sizes were calculated using effect size r , interpreted as small ($r = 0.1$), medium ($r = 0.3$), or large ($r = 0.5$). All statistical analyses were conducted using SPSS version 25. Sample size adequacy was confirmed using G*Power software, based on an alpha level of 0.05, statistical power of 80%, and a medium effect size ($f = 0.25$), supporting the sufficiency of the final sample size ($n = 159$). Statistical significance was set at $p < 0.05$. Conclusions regarding the effectiveness of interventions were based on comparisons of pre-to-post score changes between groups. The randomized controlled trial design and use of standardized measures were intended to reduce bias and enhance external validity [24].

Results

This randomized controlled trial included a total of 159 adult working women aged 21 to 50 years. Participants were classified into three age groups: 46.54% were in the 31–40 age group, followed by 35.22% in the 41–50 age group, and 18.24% in the 21–30 age group. The employment sector

distribution was relatively balanced, with 28.93% employed in state-owned enterprises, 24.53% in the private sector, and 23.90% in the public service. The remaining 22.64% were engaged in alternative professions, including entrepreneurship, freelance work, and academia.

This demographic profile reflects the study's emphasis on recruiting a diverse and representative sample of working women in metropolitan Surabaya, Indonesia, thereby strengthening the external validity of the findings. Controlling for potential confounding variables related to age and occupational background was essential to ensure valid comparisons across the intervention groups (Zumba, Yoga, and Control).

Table 2 presents the effects of the Zumba and yoga interventions on perceived stress, body satisfaction, and self-esteem among working women. Both intervention groups demonstrated statistically significant reductions in perceived stress compared to the control group, with large effect sizes (Zumba: $\Delta = -7.54$, $p < 0.001$, $r = 0.419$; Yoga: $\Delta = -8.86$, $p < 0.001$, $r = 0.504$; Control: $\Delta = -3.25$, $p < 0.001$, $r = 0.334$). According to Cohen's classification, these results indicate clinically meaningful effects ($r \geq 0.5 =$ large; $r \geq 0.3 =$ medium). Reductions in body dissatisfaction were also observed in both intervention groups, with medium effect sizes (Zumba: $\Delta = -12.36$, $p = 0.013$, $r = 0.375$; Yoga: $\Delta = -9.69$, $p < 0.001$, $r = 0.295$), while the control group showed no statistically significant change ($\Delta = -0.78$, $p = 0.186$). Improvements in self-esteem were statistically significant in both intervention groups, with medium to large effect sizes (Zumba: $\Delta = +5.59$, $p < 0.001$, $r = 0.386$; Yoga: $\Delta = +5.31$, $p < 0.001$, $r = 0.348$). In contrast, the control group showed only a minor, non-significant change ($\Delta = +0.92$, $p = 0.249$). Although slightly greater improvements were observed in the Zumba group across all outcomes, between-group differences were not statistically significant ($p = 0.526$), suggesting that both interventions were similarly effective. Overall, both Zumba and yoga proved to be beneficial for reducing stress and improving body satisfaction and self-esteem among working women.

Furthermore, the Kruskal–Wallis test was conducted to examine whether there were significant differences in pre–post change scores (Δ) across the three independent groups (Zumba, Yoga, and Control). The results showed statistically significant differences for all three outcome variables: stress ($p < 0.001$), body satisfaction ($p = 0.022$), and self-esteem ($p < 0.001$), indicating that the interventions had differential effects across groups. Given these results, pairwise comparisons were performed using the Mann–Whitney U test to determine which specific group differences were statistically significant. The detailed outcomes of these comparisons are presented in Table 3.

Table 2. The effect of Zumba and Yoga intervention on variables

Group	Variable		Mean±SD	Min	Max	Shapiro wilk test	Wilcoxon test	Effect-size r
Zumba	Stress	Pre	23.36±4.78	15	32	0.110 [#]	0.00*	0.713
		Post	15.81±2.16	12	20	0.022		
		Δpre-post	-7.54±4.60	-15	3			
	Body Satisfaction	Pre	81.32±16.60	50	109	0.034	0.013*	0.375
		Post	68.97±13.84	49	92	0.002		
		Δpre-post	-12.36±22.76	53	27			
	Self-esteem	Pre	24.00±4.54	17	32	0.011	0.000*	-0.566
		Post	29.59±3.53	24	36	0.014		
		Δpre-post	5.59±5.30	-7	16			
Yoga	Stress	Pre	23.54±4.85	14	32	0.043	0.000*	0.770
		Post	14.68±1.85	12	18	0.003		
		Δpre-post	-8.86±4.93	-20	-1			
	Body Satisfaction	Pre	83.03±18.28	45	111	0.014	0.000*	0.295
		Post	73.34±12.57	52	96	0.009		
		Δpre-post	-9.69±19.34	-47	31			
	Self-esteem	Pre	24.98±4.44	18	32	0.003	0.573	-0.538
		Post	30.29±3.86	24	38	0.047		
		Δpre-post	5.31±5.98	-6	17			
Control	Stress	Pre	24.03±5.09	15	32	0.006	0.000*	0.334
		Post	20.78±4.02	14	29	0.137 [#]		
		Δpre-post	-3.25±4.68	-16	7			
	Body Satisfaction	Pre	84.54±20.82	47	113	0.000	0.186	0.021
		Post	83.76±16.21	53	114	0.166 [#]		
		Δpre-post	-0.78±13.63	-24	29			
	Self-esteem	Pre	26.56±4.60	19	34	0.007	0.249	-0.110
		Post	27.47±3.51	23	34	0.001		
		Δpre-post	0.92±5.84	-10	13			

Δ is the difference; #normally distributed with $p > 0.05$; *significantly different with $p < 0.05$

Table 3. Pairwise Comparisons of Intervention Effects on Perceived Stress, Body Satisfaction, and Self-Esteem (Mann–Whitney U Test)

Variable	Group Comparison		p-value	Effect Size (r)
Stress	Zumba	Yoga	$p = 0.394$	0.137
		Control	$p < 0.001^*$	0.419
	Yoga	Control	$p < 0.001^*$	0.504
Body Satisfaction	Zumba	Yoga	$p = 0.718$	0.063
		Control	$p = 0.020^*$	0.294
	Yoga	Control	$p = 0.015^*$	0.257
Self-Esteem	Zumba	Yoga	$p = 0.526$	0.025
		Control	$p < 0.001^*$	0.386
	Yoga	Control	$p = 0.001^*$	0.348

* Statistically significant at $p < 0.05$.

As illustrated in Figure 1, both the Zumba and yoga interventions led to greater improvements across all measured outcomes compared to the control group. The largest reduction in perceived stress was observed in the yoga group, followed closely by the Zumba group, whereas the control group exhibited only a modest decrease. In terms of body satisfaction, participants in the Zumba group experienced the most notable improvement, while the yoga group also showed a meaningful, albeit smaller, reduction in dissatisfaction. The control group, by contrast, demonstrated minimal change. Regarding self-esteem, both Zumba and yoga produced substantial and comparable increases, whereas the control group showed only a slight, non-significant improvement. These patterns suggest that while both interventions were effective, yoga may be more impactful in reducing stress, whereas Zumba appears to offer slightly greater benefits for body satisfaction.

Table 3 presents the results of Mann–Whitney U tests conducted to examine differences in pre–post change scores (Δ) among the three groups (Zumba, Yoga, and Control) for perceived stress, body satisfaction, and self-esteem. Statistically significant differences were observed between both intervention groups and the control group across all psychological outcomes. For perceived stress, the effect sizes were large (Zumba vs. Control: $r = 0.419$; Yoga vs. Control: $r = 0.504$), indicating strong practical significance. For body satisfaction, the effect sizes were in the medium range (Zumba vs. Control: $r = 0.294$; Yoga vs. Control: $r = 0.257$). In terms of self-esteem, both interventions also demonstrated medium to large effects (Zumba vs. Control: $r = 0.386$; Yoga vs. Control: $r = 0.348$). No statistically significant differences were found between the Zumba and Yoga groups on any of the measured outcomes.

This equivalency highlights the complexity of

the psychophysiological mechanisms underlying the two modalities. Although Zumba and yoga produced comparable outcomes in stress reduction ($\Delta = -7.54$ vs. -8.86) and improvements in body satisfaction ($\Delta = -12.36$ vs. -9.69), they likely operate through distinct strategies that influence shared neuroendocrine pathways. One such pathway involves the regulation of cortisol and the hypothalamic–pituitary–adrenal (HPA) axis. Yoga incorporates controlled breathing and mindfulness practices that enhance self-awareness and support emotion regulation. In contrast, Zumba utilizes rhythmic aerobic movement, which may increase endorphin release and foster social connectedness through group interaction [15, 29].

Individual differences in preferences for activity intensity may partially account for the variation in stress-related effect sizes ($r = 0.419$ vs. 0.504). For example, individuals with more introverted dispositions may respond more positively to yoga’s inward-focused structure, whereas those with extroverted tendencies may find Zumba’s energetic and socially engaging format more beneficial [23]. Although Zumba produced a greater reduction in body dissatisfaction ($\Delta = -12.36$ vs. -9.69), the difference between the two interventions was not statistically significant ($p = 0.718$). Embodiment theory may offer an explanation for this pattern. It posits that Zumba’s expressive movements, such as those found in Latin dance and body isolations, promote body acceptance through enjoyment rather than through performance-based self-evaluation [21]. In comparison, yoga fosters nonjudgmental body awareness, which can gradually reduce internalized criticism related to physical appearance [18]. Despite these differing mechanisms, both interventions address core sources of body dissatisfaction. Yoga does so through mindfulness and self-compassion, while Zumba achieves similar outcomes through pleasurable and expressive physical activity.

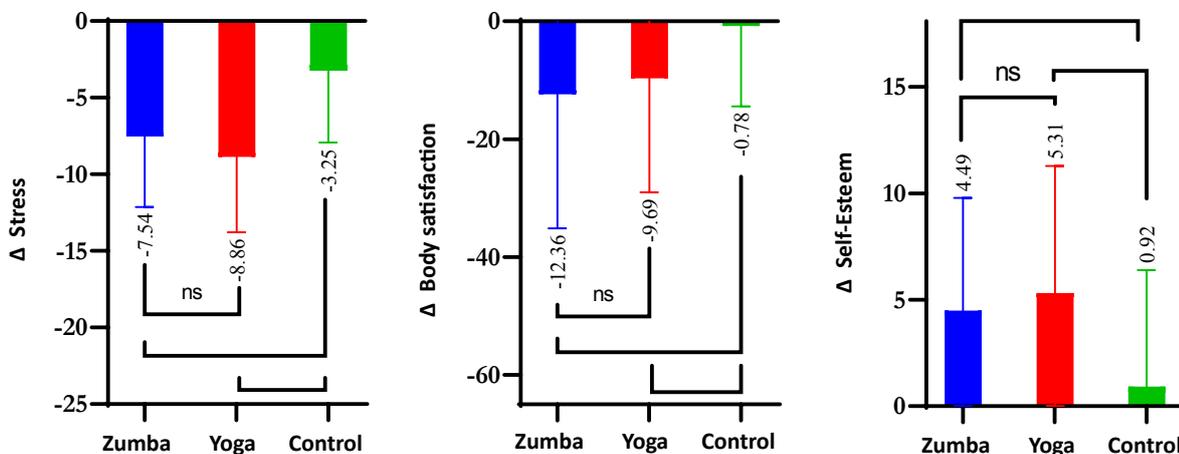


Figure 1. Pre-to-post intervention changes in perceived stress, body satisfaction, and self-esteem across the Zumba, Yoga, and Control groups.

Discussion

This randomized controlled trial examined the comparative effectiveness of Zumba and yoga interventions on perceived stress, body satisfaction, and self-esteem among working women. The results showed that both interventions significantly reduced stress levels and improved body satisfaction and self-esteem, with large effect sizes particularly evident for stress reduction. These findings are consistent with earlier studies that highlight the positive influence of physical activity on psychological well-being.

In the present study, the Zumba intervention, functioning as a form of aerobic exercise, likely contributed to stress reduction and mood enhancement through the release of endorphins [30]. Similarly, prior research by Pascoe et al. [29] demonstrated that aerobic and mind-body activities can reduce the activity of the hypothalamic pituitary adrenal (HPA) axis and lower cortisol levels, thereby decreasing psychological stress. Yoga, which incorporates mindfulness and controlled breathing, also appears to influence these neuroendocrine pathways. Its focus on pranayama, meditative awareness, and relaxation may provide cumulative physiological benefits that are not limited to physical movement alone [31, 32].

Zumba, in contrast, may exert its psychological benefits through rhythmic aerobic movement, musical engagement, and group interaction. These elements are thought to enhance emotional states through mechanisms related to social connection and collective participation, as described in sport psychology literature [22]. The lack of significant differences between the interventions suggests that Zumba and yoga offer similar benefits in psychological outcomes, possibly because both approaches include structured movement, rhythm, and cognitive engagement, even though they activate these components through different mechanisms.

The increase in body satisfaction observed in both the Zumba and yoga groups supports the potential of structured exercise programs to enhance body image. The Zumba group demonstrated the largest improvement ($\Delta = -12.36$), which may be attributed to the expressive and dynamic nature of the activity. This form of movement encourages body acceptance and enjoyment by shifting focus away from performance-based evaluation [33]. Zumba may also incorporate social and artistic elements of dance, which facilitate body appreciation through shared enjoyment and expressive physicality [34]. Among women particularly affected by societal beauty standards, the rhythmic and culturally diverse movements of Zumba may contribute to reduced self-objectification and a stronger sense of embodiment [21].

In comparison, yoga emphasizes mindful awareness and nonjudgmental acceptance of the body. This inward focus may help explain its more moderate impact on body satisfaction [18]. Although less physically intense, yoga fosters a reflective relationship with the body and promotes self-acceptance, which has been linked to greater body appreciation [35]. These findings are consistent with previous meta-analyses reporting small to moderate effects of both modalities on body image outcomes, which align with the effect sizes identified in this study (Zumba: $r = 0.294$; Yoga: $r = 0.257$).

The minimal change observed in the control group underscores the importance of active engagement in structured physical or mental practices. Compared to passive instruction, organized interventions appear to yield greater psychological benefits, particularly in the domain of body image enhancement [20].

Following the intervention, both Zumba and yoga groups demonstrated significant increases in self-esteem, as measured by the Rosenberg Self-Esteem Scale (Zumba: $\Delta = 5.59$; Yoga: $\Delta = 5.31$). Although the difference between the two interventions was not statistically significant ($p = 0.526$), participants in the Zumba group reported slightly greater gains. These findings are consistent with previous research indicating that enjoyable, mastery-oriented physical activities can enhance self-worth, particularly among women who experience the dual demands of occupational stress and societal appearance norms [23].

In addition to the physical component, the group-based delivery of both interventions may have contributed to improved self-perception by promoting social support and a sense of collective efficacy [19]. From a theoretical perspective, self-compassion theory offers further insight into yoga's impact on self-esteem. Through its introspective techniques, yoga may reduce self-criticism and promote emotional regulation, ultimately fostering a more stable and positive self-concept [36].

The therapeutic relevance of the observed effect sizes for stress reduction ($r = 0.419$ to 0.504) in both intervention groups, compared to the control, underscores the clinical significance of these findings. These results are consistent with meta-analytic evidence indicating that exercise-based interventions yield moderate to substantial reductions in stress, particularly among populations experiencing high stress levels [37]. At the same time, the absence of a statistically significant difference between Zumba and yoga aligns with previous comparative research suggesting that the specific type of exercise may be less important than the consistency of participation [38].

The limited improvements observed in the control group, which received only wellness-related information without active physical engagement, underscore the importance of

incorporating physical activity into psychological health interventions. The medium to large effect sizes observed between the intervention and control groups, such as the impact of yoga on stress reduction compared to control ($r = 0.504$), highlight the practical relevance of these findings for workplace health promotion. Integrating Zumba or yoga into organizational wellness programs may represent a cost-effective and scalable approach for mental health professionals and educators seeking to improve employees' psychological well-being. This is particularly pertinent for addressing stress, body satisfaction, and self-esteem among working populations.

This randomized controlled trial conducted in Surabaya, Indonesia, demonstrated that both Zumba and yoga were effective in reducing stress, enhancing body satisfaction, and improving self-esteem among working women, with no significant differences between the two interventions. However, several limitations should be acknowledged. The potential influence of group dynamics on mental health outcomes, as well as the possibility of expectancy effects due to participants' awareness of engaging in physical activity, may have contributed to the observed results [33, 34]. The use of a passive control group limits the ability to isolate the specific effects of physical activity itself. Additionally, the reliance on self-reported measures introduces the possibility of response bias.

The cultural specificity of the urban Indonesian context may constrain the generalizability of the findings to other populations. Excluding participants who did not complete the full intervention may have also introduced selection bias. Moreover, the relatively short duration of the intervention and the absence of follow-up assessments limit conclusions regarding the sustainability of the effects over time [25].

Future research should employ more rigorous designs, including active control conditions and objective outcome measures. Longitudinal studies conducted across diverse cultural settings are needed to assess long-term effects. In addition, tailoring interventions to individual psychological and occupational profiles may enhance their effectiveness in high-stress work environments.

Several limitations should be taken into account when interpreting the results of this study. First, the generalizability of the findings is restricted, as the sample included only working women from metropolitan Surabaya, Indonesia. Therefore, the conclusions may not be applicable to men, individuals living in rural areas, or populations from different cultural backgrounds. Second, although the randomized controlled design helps reduce various forms of bias, it does not eliminate the possibility of social desirability bias. Participants may have responded in ways they believed were

expected, particularly when completing self-report questionnaires on body satisfaction and self-esteem.

Third, the study did not include objective physiological or biological measures that could provide independent confirmation of the intervention's effects, such as heart rate variability or cortisol levels. In addition, the 12-week intervention period was relatively short and did not allow for assessment of whether the observed psychological improvements would be sustained over time. Lastly, the study design did not adequately account for non-specific effects of active participation, including increased motivation, social interaction, and engagement related to group-based physical activity. The control condition consisted only of passive wellness education without comparable levels of involvement.

Future studies are encouraged to incorporate biomarker assessments, include actively engaged control groups, and conduct long-term follow-up evaluations in order to better understand the mechanisms and sustainability of intervention outcomes.

Conclusions

This study, conducted in an urban Indonesian context, found that both Zumba and yoga interventions were equally effective in reducing perceived stress and enhancing body satisfaction and self-esteem among working women. These findings suggest that organizations can implement either modality depending on logistical constraints, cultural context, and participant preferences. The results support the scalability, cost-effectiveness, and cultural adaptability of structured physical activity interventions.

Integrating Zumba or yoga into workplace wellness programs may assist human resources and occupational health departments in addressing employee stress, preventing burnout, and promoting a supportive organizational environment. In addition, such interventions may contribute to improved social support and team cohesion, which are recognized predictors of job satisfaction and workplace productivity. Tailoring intervention content to include culturally relevant music or traditional mindfulness practices may further enhance participant engagement and adherence.

To broaden reach across diverse employee groups, hybrid programs that offer both Zumba and yoga sessions may be beneficial. Incorporating brief, accessible routines such as breathing exercises inspired by yoga or movement breaks based on dance formats can support psychological well-being even among employees with limited time availability. Finally, the study highlights the need for gender- and culture-sensitive models and encourages further research to increase generalizability and strengthen the role of physical activity in public health policy.

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Conflict of interest

The authors declare no conflict of interest.

References

1. Apriani I, Risnawaty W. Parenting Self-Efficacy Among Full-Time Working Mothers in Jabodetabek: In: *Proceedings of the 2nd Tarumanagara International Conference on the Applications of Social Sciences and Humanities (TICASH 2020)*, Jakarta Barat, Indonesia: Atlantis Press; 2020. <https://doi.org/10.2991/assehr.k.201209.078>
2. March J, Paper R. Stress among working women: a literature review. *Int J Indian Psychol.* 2023;11(1):176–82.
3. Astuti Y, Orhan BE, Setyawan H, Karacam A, Susanto N. Exploring the Connection between Physical and Mental Health in Women and Dog Ownership. *Retos*, 2024;58: 190–204. <https://doi.org/10.47197/retos.v58.106626>
4. M. S, S. M, Vadakkiniath IJ, A. G. Prevalence and correlates of stress, anxiety, and depression in patients with chronic diseases: a cross-sectional study. *Middle East Current Psychiatry*, 2023;30(1): 66. <https://doi.org/10.1186/s43045-023-00340-2>
5. Girotti M, Bulin SE, Carreno FR. Effects of chronic stress on cognitive function – From neurobiology to intervention. *Neurobiology of Stress*, 2024;33: 100670. <https://doi.org/10.1016/j.ynstr.2024.100670>
6. Klaperski-van Der Wal S, Skinner J, Opacka-Juffry J, Pfeffer K. Dance and stress regulation: A multidisciplinary narrative review. *Psychology of Sport and Exercise*, 2025;78: 102823. <https://doi.org/10.1016/j.psychsport.2025.102823>
7. Omelan A, Wisniewska J, Podstawski R. Body composition and psychophysical well-being of women practicing yoga. *Baltic Journal of Health and Physical Activity*, 2022;14(3): 4. <https://doi.org/10.29359/BJHPA.14.3.04>
8. Laksono RDWI, Sanusi A, Arifin S. Work stress and well-being in Indonesia: the role of social support and healthy life. *Seybold Rep.* 2023;18(Dec):1432–45. doi:10.5281/zenodo.10441858
9. Yi Lian S, Lian Tam C. Work Stress, Coping Strategies and Resilience: A Study among Working Females. *Asian Social Science*, 2014;10(12): p41. <https://doi.org/10.5539/ass.v10n12p41>
10. Wahyuniati CFS, Marsudi I, Rusdiawan A, Dafun Jr PB, Kumaat NA, Yudhistira D, et al. Gamification in physical education: improving rhythmic gymnastics skills and student engagement through coaching games. *Pedagogy of Physical Culture and Sports*, 2025;29(2): 131–141. <https://doi.org/10.15561/26649837.2025.0207>
11. Kareri D, Tallo Manafe D, Sasputra IN. Exercise habits and cortisol level among women at a local Zumba club. *Biomedicine*, 2022;42(4): 820–822. <https://doi.org/10.51248/v42i4.1765>
12. R P, Kumar AP, Dhamodhini K S, Venugopal V, Silambanan S, K M, et al. Role of yoga in stress management and implications in major depression disorder. *Journal of Ayurveda and Integrative Medicine*, 2023;14(5): 100767. <https://doi.org/10.1016/j.jaim.2023.100767>
13. Merawati D, Pranoto A, Susanto H, et al. Decreased Activity of the Hypothalamic-Pituitary-Adrenal Axis after Acute Aerobic Exercise in Obese Women. *Natural and Life Sciences Communications*, 2023;22. <https://doi.org/10.12982/NLSC.2023.037>
14. Beserra AHN, Kameda P, Deslandes AC, Schuch FB, Laks J, Moraes HSD. Can physical exercise modulate cortisol level in subjects with depression? A systematic review and meta-analysis. *Trends in Psychiatry and Psychotherapy*, 2018;40(4): 360–368. <https://doi.org/10.1590/2237-6089-2017-0155>
15. Vargas-Uricoechea H, Castellanos-Pinedo A, Urrego-Noguera K, Vargas-Sierra HD, Pinzón-Fernández MV, Barceló-Martínez E, et al. Mindfulness-Based Interventions and the Hypothalamic–Pituitary–Adrenal Axis: A Systematic Review. *Neurology International*, 2024;16(6): 1552–1584. <https://doi.org/10.3390/neurolint16060115>
16. Hussein H, Taylor RS, Manyara AM, Purvis A, Emsley R, Duarte R, et al. The need for further guidance on the handling of multiple outcomes in randomized controlled trials: a scoping review of the methodological literature. *Journal of Clinical Epidemiology*, 2025;181: 111724. <https://doi.org/10.1016/j.jclinepi.2025.111724>
17. Shankar S, Dutt S. Relationship between body image satisfaction, psychological well-being and resilience in young adults. *Int J Indian Psychol.* 2024;12(3):3351–61. <https://doi.org/10.25215/1203.326>
18. Cox AE, Tylka TL. A conceptual model describing mechanisms for how yoga practice may support positive embodiment. *Eating Disorders*, 2020;28(4): 376–399. <https://doi.org/10.1080/10640266.2020.1740911>
19. Fong Yan A, Nicholson LL, Ward RE, Hiller CE, Dovey K, Parker HM, et al. The Effectiveness of Dance Interventions on Psychological and Cognitive Health Outcomes Compared with Other Forms of Physical Activity: A Systematic Review with Meta-analysis. *Sports Medicine*, 2024;54(5): 1179–1205. <https://doi.org/10.1007/s40279-023-01990-2>
20. Remskar M, Western MJ, Osborne EL, Maynard OM, Ainsworth B. Effects of combining physical activity with mindfulness on mental health and wellbeing: Systematic review of complex interventions. *Mental*

- Health and Physical Activity*, 2024;26: 100575. <https://doi.org/10.1016/j.mhpa.2023.100575>
21. Nieri T, Hughes E. Zumba Instructor Strategies: Constraining or Liberating for Women Participants? *Leisure Sciences*, 2023;45(7): 684–701. <https://doi.org/10.1080/01490400.2021.1881669>
 22. Siregar SM, Manurung RQ, Purba RE, Hafiza S, Putri I, Debataraja YR, et al. Exercise for College Students: Effects of Yoga Dan Zumba as a Stress Management Technique. In: Hutagalung F, Moordinarsih M, Kim U, Aluede O, Tsuda A (eds.) *International Conference of Psychology: International Conference on Indigenous Treatment and Contemporary Psychology (ICoP 2022)*, Paris: Atlantis Press SARL; 2023. P. 111–119. https://doi.org/10.2991/978-2-38476-080-0_14
 23. Martín-Rodríguez A, Gostian-Ropotin LA, Beltrán-Velasco AI, Belando-Pedreño N, Simón JA, López-Mora C, et al. Sporting Mind: The Interplay of Physical Activity and Psychological Health. *Sports*, 2024;12(1): 37. <https://doi.org/10.3390/sports12010037>
 24. Hariton E, Locascio JJ. Randomised controlled trials – the gold standard for effectiveness research: Study design: randomised controlled trials. *BJOG: An International Journal of Obstetrics & Gynaecology*, 2018;125(13): 1716–1716. <https://doi.org/10.1111/1471-0528.15199>
 25. Chen JY, Chin WY, Tiwari A, Wong J, Wong ICK, Worsley A, et al. Validation of the perceived stress scale (PSS-10) in medical and health sciences students in Hong Kong. *The Asia Pacific Scholar*, 2021;6(2): 31–37. <https://doi.org/10.29060/TAPS.2021-6-2/OA2328>
 26. Frederick D, Bohrnstedt GW, Hatfield E, Berscheid E. Factor structure and validity of the Body Parts Satisfaction Scale: results from the 1972 Psychology Today Survey. *Psicol Teme*. 2014;23:223–42.
 27. Jelisavac D. Validation of the Rosenberg Self-Esteem Scale-RSES. *Int J Educ Res*. 2024;12(10):83–94.
 28. Maroqi N. Uji Validitas Konstruk Pada Instrumen Rosenberg Self Esteem Scale Dengan Metode Confirmatory Factor Analysis (CFA). *Jurnal Pengukuran Psikologi dan Pendidikan Indonesia (JP3I)*, 2019;7(2): 92–96. <https://doi.org/10.15408/jp3i.v7i2.12101>
 29. Pascoe MC, Thompson DR, Jenkins ZM, Ski CF. Mindfulness mediates the physiological markers of stress: Systematic review and meta-analysis. *Journal of Psychiatric Research*, 2017;95: 156–178. <https://doi.org/10.1016/j.jpsychires.2017.08.004>
 30. Mrug S, Pollock J, Pollock D, Seifert M, Johnson KA, Knight DC. Early Life Stress, Coping, and Cardiovascular Reactivity to Acute Social Stress. *Psychosomatic Medicine*, 2022; <https://doi.org/10.1097/PSY.0000000000001165>
 31. Pakulanon S, Le Scanniff C, Filaire E, Cottin F, Rama L, Teixeira A, et al. Effects of Yoga and Mindfulness Meditation on Stress-Related Variables: A Randomized Controlled Trial. *International Journal of Yoga Therapy*, 2024;34(2024): Article 7. <https://doi.org/10.17761/2024-D-22-00021>
 32. Nourollahimoghadam E, Gorji S, Gorji A, Khaleghi Ghadiri M. Therapeutic role of yoga in neuropsychological disorders. *World Journal of Psychiatry*, 2021;11(10): 754–773. <https://doi.org/10.5498/wjp.v11.i10.754>
 33. Tiggemann M, Anderberg I. Muscles and bare chests on Instagram: The effect of Influencers' fashion and fitspiration images on men's body image. *Body Image*, 2020;35: 237–244. <https://doi.org/10.1016/j.bodyim.2020.10.001>
 34. Cardoso AA, Reis NM, Marinho AP, Boing L, Guimarães ACDA. Study of body image in professional dancers: a systematic review. *Revista Brasileira de Medicina do Esporte*, 2017;23(4): 335–340. <https://doi.org/10.1590/1517-869220172304162818>
 35. Brahmabhatt A, Kumavat PP. Yoga and Mindfulness Practices: Their Role in Modern Mental Health and Wellness Programs. *Research Review Journal of Indian Knowledge Systems*, 2024;1(2): 09–17. <https://doi.org/10.31305/rrjiks.2024.v1.n2.002>
 36. Muris P, Otgaar H. Self-Esteem and Self-Compassion: A Narrative Review and Meta-Analysis on Their Links to Psychological Problems and Well-Being. *Psychology Research and Behavior Management*, 2023;16: 2961–2975. <https://doi.org/10.2147/PRBM.S402455>
 37. Zhang Z, Liu JY, Zhu KT, Huo GQ. A meta analysis and systematic review of the effects of exercise interventions on middle-aged and elderly patients with depression. Luo Z (ed.) *PLOS ONE*, 2025;20(1): e0303594. <https://doi.org/10.1371/journal.pone.0303594>
 38. Packyanathan J, Preetha S. Comparison of the effect of Yoga, Zumba and Aerobics in controlling blood pressure in the Indian population. *Journal of Family Medicine and Primary Care*, 2020;9(2): 547. https://doi.org/10.4103/jfmpc.jfmpc_607_19

Information about the authors:

Noortje Anita Kumaat; (Corresponding author); <https://orcid.org/0000-0001-6045-7553>; noortjeanita@unesa.ac.id; Faculty of Sport and Health Sciences, Universitas Negeri Surabaya; Surabaya, Indonesia.

Afif Rusdiawan; <https://orcid.org/0000-0001-5388-7061>; affrusdiawan@unesa.ac.id; Faculty of Sport and Health Sciences, Universitas Negeri Surabaya; Surabaya, Indonesia.

Procopio B. Dafun JR.; <https://orcid.org/0000-0002-4249-6126>; pbdafun@mmsu.edu.ph; Department of Physical Education, Mariano Marcos State University; City of Batac, Ilocos Norte, Philippines.

Heri Wahyudi; <https://orcid.org/0009-0000-1355-6954>; heriwahyudi@unesa.ac.id; Faculty of Sport and Health Sciences, Universitas Negeri Surabaya; Surabaya, Indonesia.

Popy Elisano Arfanda; <https://orcid.org/0000-0002-8191-6912>; poppy.elisano@unm.ac.id; Faculty of Sport and Health Sciences, Universitas Negeri Makassar; Makassar, Indonesia.

Fransisca Januarumi Marhaendra Wijaya; <https://orcid.org/0000-0002-3417-1305>; fransiscajanuarumi@unesa.ac.id; Faculty of Sport and Health Sciences, Universitas Negeri Surabaya; Surabaya, Indonesia.

Himawan Wismanadi; <https://orcid.org/0000-0003-2618-172X>; himawanwismanadi@unesa.ac.id; Faculty of Sport and Health Sciences, Universitas Negeri Surabaya; Surabaya, Indonesia.

Ary Artanty; <https://orcid.org/0009-0009-1010-937X>; aryartanty@uibu.ac.id; Faculty of Exact Studies And Sports, Universitas Insan Budi Utomo; Malang, Indonesia.

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