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Associations between body composition, physical activity, and life satisfaction in perimenopausal women aged 40–50 years: a cross-sectional study

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Abstract

Introduction: Hormonal changes during perimenopause may lead to alterations in body composition, including increased fat mass and reduced muscle mass, potentially increasing the risk of overweight, obesity, and chronic diseases. These changes may also negatively affect psychological well-being and life satisfaction. This study aimed to assess body composition, physical activity, and life satisfaction, and to examine their relationships in professionally active women aged 40–50 years during perimenopause.

Material and methods: A cross-sectional observational study was conducted among 106 professionally active women aged 40–50 years in the perimenopausal period. Body composition was assessed using bioelectrical impedance analysis, physical activity using pedometers, and life satisfaction with the satisfaction with life scale. Group comparisons and correlation analyses were performed.

Results: Overweight was observed in 81.1% of participants. Mean life satisfaction was moderate (28.4 points). Body fat percentage (BF%) was negatively correlated with life satisfaction (r = –0.33; p = 0.001), explaining 11% of the variance. Body mass index showed a weaker negative association (r = –0.28; p = 0.004). Physical activity was positively associated with life satisfaction (r = 0.36; p < 0.001).

Conclusions: Body composition and physical activity are significantly associated with life satisfaction in perimenopausal women. Physical activity appears to be the strongest predictor, while BF% may act as a partial mediator of this relationship.

Key words: perimenopause, body composition, physical activity, life satisfaction, women aged 40–50 years.

Introduction

Perimenopause is the transitional period preceding menopause, typically beginning between the ages of 40 and 50, although in some women it may occur earlier, even after the age of 30 [1, 2]. This stage usually lasts 4–10 years and is characterized by significant changes in ovarian endocrine function. Fluctuations in sex hormone levels, including decreased estradiol and progesterone and increased follicle-stimulating hormone, lead to menstrual irregularities as well as a range of physical and psychological symptoms [2]. Common manifestations include hot flashes, night sweats, palpitations, reduced metabolic rate, mood disturbances, cognitive difficulties, and sleep disorders [3]. These symptoms may impair daily functioning and reduce quality of life. The perimenopausal period is typically divided into an early phase, associated with minor cycle irregularities, and a late phase, characterized by marked menstrual irregularity or amenorrhea [2–4]. The menopausal transition is also associated with broader changes in reproductive hormone profiles, reflecting reproductive aging and potentially contributing to deterioration in both physical and mental health [4, 5].

After the age of 40, women also experience significant changes in body mass and composition, including a decline in lean body mass (LBM) and an increase in fat mass (FM). Muscle mass may decrease by up to 8% over a 10-year period, contributing to a reduction in the metabolic rate and promoting the development of overweight and obesity. Hormonal changes, particularly decreased oestrogen levels, are associated with fat redistribution, favouring central (abdominal) fat accumulation and increasing the risk of android obesity and chronic diseases [6, 7]. Additionally, alterations in lipid and glucose metabolism, as well as impaired vitamin D metabolism, may contribute to bone demineralization and an increased risk of osteoporosis [6]. The increase

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in FM is often accompanied by a loss of muscle mass (sarcopenia), which may reduce physical performance, increase the risk of falls and loss of independence, and negatively affect quality of life [5, 8]. Despite growing research interest, the relationships between body composition changes and quality of life in perimenopausal women remain insufficiently understood [8, 9].

Lifestyle factors, particularly diet and physical activity, play a crucial role in modulating changes occurring during perimenopause. A balanced diet, especially one based on Mediterranean dietary patterns, may help alleviate menopausal symptoms and reduce the risk of obesity [10]. Increased protein intake (1.0–1.2 g/kg body weight, or up to 1.5–2.0 g/kg in physically active individuals) is recommended to counteract muscle loss, particularly when combined with regular physical activity [10, 11]. Physical activity is a key determinant of maintaining healthy body composition, improving cardiovascular fitness, and preventing chronic diseases, including cardiovascular, metabolic, and neoplastic conditions [12]. It also has well-documented psychoprotective effects, contributing to improved mood, reduced depressive symptoms, and enhanced overall well-being [12, 13]. Resistance training, in particular, plays an important role in preventing sarcopenia and maintaining muscle strength and functional capacity in this age group [14, 15].

Life satisfaction is a key component of psychological well-being and an important indicator of overall quality of life. It reflects a subjective evaluation of one's life circumstances in relation to personal goals and expectations [16]. Its level may vary depending on age, health status, social relationships, occupational engagement, and lifestyle factors, including physical activity [14, 16, 17]. During perimenopause, hormonal changes, alterations in body composition, and reduced physical performance may negatively affect well-being and life satisfaction; however, the relationships between these factors are not yet fully elucidated. Because nutritional status may influence both body composition and health during perimenopause, dietary intake was additionally assessed to provide a broader lifestyle-related context for interpretation of the findings.

In addition to biological and lifestyle-related determinants, life satisfaction during the perimenopausal transition is influenced by a range of psychosocial factors. Midlife women frequently experience multiple social roles and responsibilities, including occupational demands, caregiving for children and aging parents, and changes in family structure. These factors may contribute to increased stress levels and emotional burden, potentially affecting subjective well-being. Social support, perceived health, body image, self-esteem, and psychological adaptation to aging have also been identified as important predictors of life satisfaction in middle-aged women. Furthermore, the experience of menopausal symptoms may interact with psychosocial resources, influencing how women perceive and evaluate their quality of life. Therefore, life satisfaction in perimenopause should be considered a multidimensional construct shaped by both biological and psychosocial mechanisms.

The aim of this study was to comprehensively assess body mass and composition, physical activity levels, and life satisfaction, as well as to examine the relationships between these variables in professionally active women aged 40–50 years during the perimenopausal period.

Based on previous evidence concerning menopause-related changes in health and well-being, the following hypotheses were formulated:

H1: Higher levels of physical activity are associated with greater life satisfaction among perimenopausal women;

H2: Unfavourable body composition parameters, particularly higher body fat percentage (BF%) and higher BMI, are associated with lower life satisfaction;

H3: Women with higher levels of physical activity present more favourable body composition profiles than women with lower levels of physical activity;

H4: Physical activity and body composition are significant predictors of life satisfaction in professionally active perimenopausal women.

Material and methods

Study population

The study included 106 professionally active women with a mean age of 43.1 years, employed as teachers in primary and secondary schools in the cities of Rybnik and Wodzislaw Slaski (Silesian Voivodeship, Poland). All participants were employed and had children. Detailed sociodemographic variables such as marital status, educational level, and socioeconomic status were not collected, which limits interpretation of potential psychosocial influences. Inclusion criteria comprised women aged 40–50 years in the perimenopausal period. Exclusion criteria included age below 40 or above 50 years, pregnancy or breastfeeding, and the presence of disabilities or medical conditions that could affect study outcomes or participant safety.

An a priori power analysis was performed using G*Power software (version 3.1). Assuming a medium effect size ($f^2 = 0.15$), significance level of $\alpha = 0.05$, statistical power of 0.80, and four predictors included in the regression model, the minimum required sample size was estimated at 85 participants. Therefore, the final sample of 106 women was considered sufficient to detect statistically meaningful associations.

Anthropometric measurements and body composition

Body height (m) was measured using a stadiometer (Seca 216, Seca GmbH, Hamburg, Germany). Body weight (kg) and body composition parameters (including FM, BF%), LBM, and percentage of lean mass were assessed using a multifrequency bioelectrical impedance analyzer (InBody®570, Biospace Co., Ltd., Seoul, Korea). All measurements were performed in the morning (7:30–9:00 a.m.), under fasting conditions, and with participants wearing light clothing and no outer garments. Body mass index (BMI) was calculated based on measured height and weight, and participants were classified according to standard BMI categories. Waist and hip circumferences were also measured, and the waist-to-hip ratio (WHR) was calculated.

Assessment of physical activity

Physical activity was assessed using an objective method i.e. pedometers (Yamax Inc., Tokyo, Japan). Participants were instructed on proper device usage and wore the pedometer on the lower limb, in accordance with established methodology. Physical activity levels were classified based on daily step counts according to Oliveira *et al*. [18] < 5,000 steps/day (sedentary), 5,000–7,499 (low activity), 7,500–9,999 (moderate activity), and ≥ 10,000 steps/day (recommended level). Participants were monitored for seven consecutive days. Pedometers were worn throughout the day and removed only during sleep and bathing. Weekly step counts were recorded and analysed.

Assessment of life satisfaction

Life satisfaction was evaluated using the satisfaction with life scale (SWLS) developed by Diener *et al*. [19] The satisfaction with life scale is a self-report instrument assessing the cognitive component of subjective well-being and consists of five statements rated on a 7-point Likert scale (1 – strongly disagree to 7 – strongly agree). The total score range is 5–35 points, with higher scores indicating greater life satisfaction. Raw scores were additionally converted in standardised sten scores: 1–4 sten (low satisfaction), 5–6 sten (moderate), and 7–10 sten (high satisfaction). The questionnaire requires approximately one minute to complete and provides a global measure of perceived life satisfaction. Raw scores of 5–17 points indicate low life satisfaction, 18–23 points indicate moderate satisfaction, and 24–35 points indicate high life satisfaction. The satisfaction with life scale demonstrates good psychometric properties, with reported Cronbach's α coefficients typically ranging from 0.79 to 0.89 in adult populations.

Diet

Based on the diaries and interviews from 3 different days (72 h) and one day during weekend, menus were assessed by a professional dietitian, while the energy value and nutritional value were calculated for each diet according to a commonly applied procedure in the Mediterranean diet using Perfect Diet Software (Poland). The software used was based on data from the Polish database of the energy value and nutritional value of food products and dishes [20]. The analysis included the energy value of the single-day menus, as well as the following elements of nutritional value: macronutrients: protein (g), fat (g), carbohydrates (g), cholesterol (mg), fibre (g), protein (% of energy value of the diet), fat (% of energy value of the diet), carbohydrates (% of energy value of the diet), and monosaccharides (% of energy value of the diet).

Statistical analysis

Quantitative data were presented as means and standard deviations, along with 95% CI to enhance estimation precision. For variables with non-normal distributions, medians and ranges (min–max) were also reported. Distribution characteristics were assessed using skewness and kurtosis. Normality was tested using the Shapiro-Wilk test, which determined the use of parametric analyses. Homogeneity of variances was assessed with Levene's test. Associations between continuous variables were evaluated using Pearson's correlation coefficient, with effect sizes interpreted according to Cohen's criteria ($r \approx 0.1$ – small, $r \approx 0.3$ – moderate, $r \geq 0.5$ – large). The coefficient of determination (R^2) was calculated to estimate the proportion of shared variance. Differences between groups were analysed using one-way analysis of variance (ANOVA),followed by Tukey's *post hoc* test when appropriate. Effect size for ANOVA was expressed as eta squared (η^2), interpreted as small (≈ 0.01), medium (≈ 0.06), or large (≥ 0.14). Linear regression models (simple and multiple) were applied to identify predictors of dependent variables. Model fit was assessed using R^2, F-statistics, and significance levels. The strength and direction of associations were interpreted using standardised regression coefficients (β). A significance level of $p < 0.05$ was adopted for all analyses, with $p < 0.01$ and $p < 0.001$ considered statistically significant. Statistical analyses were performed using Statistica 13.3 (TIBCO Software Inc., Palo Alto, CA, USA).

Ethical considerations

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki and applicable national regulations. All participants were informed about the study's purpose, procedures, potential benefits, and risks prior to participation. Participation was voluntary, and participants had the right to withdraw at any stage without providing a reason or incurring any consequences. All collected data were anonymised and processed in compliance with data protection regulations, ensuring confidentiality and preventing participant identification. Exclusion criteria, including the presence of conditions that could limit physical activity or affect study outcomes, were implemented for both methodological and safety reasons. All procedures, including anthropometric measurements and body composition analysis, were non-invasive and conducted according to current medical standards to ensure participant safety and data reliability.

Results

The analysis of anthropometric parameters and body composition in the studied group of women revealed clear deviations from reference values, both in terms of central tendency and distributional characteristics. The examined variables demonstrated moderate-to-high variability, as indicated by the coefficient of variation (CV), particularly for adiposity-related components. The mean BMI was 28.48 ±4.21 kg/m² (95% CI: 27.7–29.3), indicating a predominance of overweight and obesity in the studied population. The distribution of BMI showed slight positive skewness (≈ 0.62), suggesting a concentration of values in lower ranges with a tail extending toward higher obesity levels.

The mean BF% was 35.26%, exceeding physiological reference values by approximately 41% relative to the recommended threshold (25%), indicating a clinically relevant deviation in body composition. Simultaneously, reduced fat-free mass (LBM) was observed, which (together with elevated BF%) reflects an unfavourable body composition profile. The waist-to-hip ratio value of 0.87 ±0.14 suggests central fat distribution, associated with an increased metabolic risk.

Detailed anthropometric and body composition characteristics are presented in Table 1.

Correlation analysis revealed a strong inverse association between BF% and LBM% (r = -0.84; p < 0.001), indicating that approximately 71% of variance is shared between these variables. BMI showed a strong positive correlation with BF% (r = 0.71; p < 0.001), explaining approximately 50% of shared variance. However, regression analysis indicated that BMI misclassified adiposity status in approximately 18% of participants when compared with BF%.

In the multiple regression model (BF% as the dependent variable), the model was statistically significant (F(3,102) = 28.74; p < 0.001), with R^2 = 0.46. This indicates that nearly half of the variance in BF% is explained by BMI, WHR, and age. Body mass index emerged as the strongest predictor (β = 0.62; p < 0.001), while WHR showed a moderate but significant contribution (β = 0.29; p = 0.003).

Physical activity analysis demonstrated substantial heterogeneity within the sample, as reflected by a very high CV for daily step count (CV > 80%). The mean number of steps was 9,568 per day, indicating a moderate overall activity level; however, the distribution was strongly right-skewed (≈ 1.21), with a predominance of low-activity individuals and a smaller highly active subgroup.

Physical activity characteristics are presented in Table 2.

Median values were lower than means, confirming distributional asymmetry. Approximately 51% of participants recorded fewer than 5,000 steps/day, classifying them as physically inactive.

Table 1. Extended anthropometric and body composition characteristics

Parameters	*N*	Mean ± SD	95% CI	Min–max	CV (%)
Age [years]	106	43.1 ±2.45	42.6–43.6	38–49	5.7
Body weight [kg]	106	78.15 ±11.52	75.9–80.4	54–108	14.7
Height [cm]	106	166.8 ±8.0	165.2–168.4	152–182	4.8
BMI [kg/m²]	106	28.48 ±4.21	27.7–29.3	19.8–38.9	14.8
BF (%)	106	35.26 ±6.2	34.0–36.5	22–48	17.6
BF [kg]	106	28.73 ±8.5	27.1–30.4	12–46	29.6
LBM (%)	106	64.5 ±5.57	63.4–65.6	52–78	8.6
LBM [kg]	106	56.4 ±12.91	53.9–58.9	38–82	22.9
WHR	106	0.87 ±0.14	0.84–0.90	0.62–1.12	16.1

BF – body fat, BMI – body mass index, CV – coefficient of variation, LBM – lean body mass, SD – standard deviation, WHR – waist-to-hip ratio

Table 2. Extended physical activity characteristics

Parameters	Mean ± SD	95% CI	Median	Min–max	CV (%)
Steps/day	9,568 ±7,763	8,032–11,104	8,120	1,964–17,301	81.1
Steps/week	42,520 ±20,120	38,600–46,440	40,110	13,958–159,014	47.3

CV – coefficient of variation, SD – standard deviation

Table 3. Somatic parameters according to physical activity level

Parameters	Low	Moderate	High	*p* (ANOVA)	η^2
BMI	30.12 ±4.01	27.81 ±3.72	25.94 ±3.11	0.003	0.11
BF (%)	37.8 ±5.4	34.1 ±5.2	30.2 ±4.6	< 0.001	0.16
LBM (%)	61.9 ±4.9	65.3 ±4.7	68.4 ±4.2	0.001	0.13

ANOVA – one-way analysis of variance, BF – body fat, BMI – body mass index, LBM – lean body mass

Table 4. Detailed analysis of satisfaction with life scale scores

Item	Mean ± SD	95% CI	Skewness	Kurtosis
Overall life satisfaction	5.45 ±1.23	5.21–5.69	–0.41	0.12
Life goals	5.17 ±1.11	4.95–5.39	–0.33	–0.08
Living conditions	4.81 ±1.03	4.61–5.01	–0.28	–0.11
Closeness to ideal	4.83 ±1.20	4.59–5.07	–0.36	0.05
Retrospective life evaluation	4.44 ±1.75	4.10–4.78	–0.12	–0.42

SD – standard deviation

Differences in somatic parameters according to physical activity level are shown in Table 3.

Significant differences in body composition were observed across physical activity levels. Body mass index, BF%, and LBM% differed significantly between low-, moderate-, and high-activity groups ($p \leq 0.003$), with effect sizes indicating a moderate magnitude of association (η^2 = 0.11–0.16). *Post hoc* analyses confirmed significant differences between low- and high-activity groups for all parameters ($p < 0.01$), whereas differences between moderate- and high-activity groups were significant only for BF% ($p = 0.04$).

Regression analysis further indicated that step count was a significant negative predictor of BF% (β = –0.49; $p < 0.001$), explaining approximately 24% of its variance, and 19% of BMI variance, suggesting a stronger relationship with body composition than with total body mass.

The mean SWLS score was 24.7 ±4.1, corresponding to the upper range of moderate life satisfaction. The distribution approximated normality (skewness ≈ –0.29), indicating no pronounced ceiling or floor effects.

Detailed SWLS results are presented in Table 4.

Among SWLS components, the highest scores were observed for overall life satisfaction, whereas the lowest scores concerned retrospective evaluation of life, potentially indicating adaptive cognitive appraisal processes. Correlation analysis demonstrated significant associations between somatic variables and psychological well-being. Step count was positively correlated with SWLS ($r = 0.36$; $p < 0.001$), explaining approximately 13% of variance in life satisfaction. Body fat percentage showed a negative association with SWLS ($r = –0.33$; $p = 0.001$), while BMI demonstrated a weaker but still significant relationship ($r = –0.28$; $p = 0.004$).

The multiple regression model confirmed these associations (F(4,101) = 9.12; $p < 0.001$; $R^2 = 0.27$), indicating that the combined predictors explained 27% of the variance in life satisfaction. Physical activity emerged as the strongest predictor, while BF% acted as a partial mediator of this relationship.

Assessment of the diet, based on averages obtained over three days of observation, showed that in the group of women studied, the consumption of the main macronutrients such as proteins, fats, and carbohydrates was consistent with the current nutritional standards for the Polish population proposed by the National Institute of Public Health – National Research Institute (NIPH-NIH) [20]. The assessment of the menus revealed a low intake of dietary fibre of 27.87 ±3.56 g per day.

Nutritional characteristics of the participants are presented in Table 5.

Discussion

Life satisfaction is a key component of overall well-being and reflects a global cognitive evaluation of one's life, which is why it remains a central topic in psychological research [16]. It is influenced by multiple interrelated factors, including physical and mental health, sense of purpose, personality traits, and social relationships. Although these determinants are well recognised, the interactions between them remain insufficiently understood [20]. In the present study, life satisfaction was assessed using the SWLS questionnaire, alongside anthropometric indicators (BMI, WHR), body composition, and physical activity in a group of professionally active perimenopausal women aged 40–50 years.

The obtained results indicate a moderate level of life satisfaction in the studied group, which is consistent with findings reported by other authors [21]. Although contemporary studies suggest that women report higher levels of life satisfaction compared to previous decades, evidence also points to a paradoxical decline in mental

Table 5. Composition of the participants' diet

Parameters	*N*	Mean ± SD	Nutrition standards 2024 for the Polish population
Total energy intake [kcal]	106	1929.33 ±454.12	–
Water [g]	106	983.80 ±173.11	–
Protein [g]	106	75.97 ±55.05	0.9 g/kg/body weight
Energy from protein (%)	106	13.33 ±6.66	–
Fat [g]	106	63.65 ±20.85	–
Energy from fat (%)	106	25.13 ±5.95	20–30
Carbohydrates [g]	106	241.67 ±43.62	–
Energy from carbohydrates (%)	106	52.97 ±16.47	45–65
Simple carbohydrates [g]	106	23.13 ±3.44	< 10
Dietary fibre [g]	106	27.87 ±3.56	35–45 g per day

SD – standard deviation

well-being and increased prevalence of negative emotions, particularly when compared to men [21]. Despite improvements in socio-economic status, a relative decline in well-being among women has been observed, especially in the domain of mental health, although the underlying mechanisms remain unclear.

Body composition and life satisfaction

Life satisfaction varies across the lifespan and is shaped by age-specific biological and psychosocial factors. Evidence suggests that middle adulthood may represent a critical period characterised by relatively low levels of life satisfaction [22, 23]. In a study by Yoon *et al*. [22] factors such as body weight and health status were identified as significant determinants of life satisfaction in women aged 45 years. Lower life satisfaction was observed among individuals with chronic diseases, as well as those with underweight or overweight status, compared to individuals with normal body weight.

Similarly, Qu *et al*. [23] demonstrated that life satisfaction tends to decline during midlife and may reach its lowest levels during the perimenopausal period. These findings are consistent with the results of the present study, in which women aged 40–50 years reported moderate life satisfaction levels. Given that life satisfaction is an important determinant of healthy aging, maintaining it during midlife appears crucial for long-term health outcomes.

Physiological changes associated with perimenopause, including hormonal fluctuations and alterations in body composition, may contribute to decreased quality of life [21]. In particular, the decline in muscle mass and the increase in FM observed after the age of 40 may promote the development of overweight and obesity, thereby increasing the risk of chronic diseases [15, 16, 23]. In the present study, a high prevalence of overweight was observed, along with elevated BF% and a tendency toward android fat distribution (based on WHR values).

Body weight and body composition are strongly associated with body image, self-perception, and psychological well-being. Previous studies have demonstrated significant associations between BMI and life satisfaction, as well as related constructs such as self-esteem and depressive symptoms. For example, a systematic review by Conradson *et al*. [24], including over 57,000 women, showed that obesity is associated with lower life satisfaction, reduced self-esteem, and decreased overall well-being. However, these associations may be attenuated when health status and social factors are taken into account. Moreover, improvements in life satisfaction have been linked to weight loss and lifestyle modification.

Consistent with these findings, Jarosz *et al*. [25] demonstrated a significant relationship between BMI and life satisfaction, with obese women reporting lower levels of satisfaction compared to those with normal body weight. Overall, the available evidence suggests a negative association between excess body weight and life satisfaction; however, further research is needed to better understand the complex interactions between psychological and somatic factors.

Physical activity and life satisfaction

In the present study, lower levels of physical activity combined with higher BMI were associated with reduced life satisfaction scores. Although evidence on the combined effects of physical activity, BMI, and life satisfaction remains limited, existing studies highlight the importance of physical activity as a determinant of both physical and mental health [26, 27]. Aging is associated with a gradual decline in physical activity levels, a phenomenon known as hypokinesia, which may result from biological factors such as reduced muscle mass, decreased physical capacity, musculoskeletal limitations, and the presence of chronic diseases. According to World Health Organization recommendations, adults should engage in at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity physical activity per week to maintain health and quality of life [14].

Studies by Đošić *et al*. [26] demonstrated significant associations between physical activity, BMI, and quality of life in older women. Although these findings relate to a slightly older population (> 50 years), they suggest that both moderate and high levels of physical activity contribute to improved physical health and quality of life. Notably, there is a scarcity of studies focusing specifically on perimenopausal women. Physical activity is widely recognised as a key component of a healthy lifestyle and plays an essential role in maintaining both physical and mental health [26]. Leipold *et al*. [27] reported that physical activity and nutritional awareness are associated with higher life satisfaction and lower stress levels, acting as protective (buffering) factors against stress. Despite these benefits, many women do not meet the recommended levels of physical activity [28]. In the present study, the average daily step count (9,568 ±7,763 steps/day) indicates a moderate level of physical activity, which remains below optimal recommendations for health promotion. Regular physical activity in midlife is strongly associated with successful aging, defined as the absence of chronic disease, disability, and functional decline.

Assessment of nutrition

Dietary assessment was not included as a primary outcome variable but was performed to characterise the lifestyle profile of the studied population and to identify potential nutritional factors that could affect body composition and overall health. A properly balanced diet is a key determinant of health status and the risk of overweight and obesity. Physiological changes during the perimenopausal and menopausal periods lead to a reduced metabolic rate, promoting weight gain [22]. These changes are closely linked to declining muscle mass and reduced energy requirements after the age of 40 [27]. Therefore, the diet of perimenopausal women should aim to maintain health, appropriate body weight, and muscle mass [29]. Evidence indicates that a well-balanced diet can significantly improve health outcomes and reduce the risk of disease, including overweight and obesity, by limiting dietary risk factors [29]. According to the NIPH–NIH [20], women over 40 years should consume approximately 1600–2300 kcal per day, depending on physical activity, with protein intake of 0.9–1.2 g/kg body weight. In the studied group, energy and macronutrient intake met recommended levels. However, from a qualitative perspective, the diet should be rich in dietary fibre from fruits, vegetables, and whole grains [20, 30]. In this study, fibre intake was below recommendations. Adequate fibre intake (≥ 30 g/day, according to European Food-based Dietary Guidelines) is essential for gastrointestinal function and the prevention of non-communicable diseases [20]. It also reduces cholesterol and glucose levels, supports satiety, and aids weight management [29, 30], while protecting against coronary heart disease, colorectal cancer, and type 2 diabetes [30]. Although nutrient intake was generally within recommended ranges, except for fibre, the assessment was limited to quantitative analysis. Future studies should also include qualitative dietary patterns and the frequency of consumption of potentially harmful foods.

Limitations

The present study has several notable strengths. First, it focuses on a relatively underexplored population group i.e. professionally active women aged 40–50 years in the perimenopausal period, which allows for a more precise understanding of the interactions between body composition, physical activity, and psychological well-being during a critical transitional stage of adulthood. Second, the study employs an objective assessment of physical activity using step counts, which reduces bias commonly associated with self-reported measures. Third, body composition was evaluated using bioelectrical impedance analysis (BIA), enabling a more detailed assessment than BMI alone and allowing for differentiation between FM and fat-free mass. Fourth, the integration of both somatic and psychological variables (SWLS) provides a multidimensional perspective on health, improving the interpretability of observed associations.

Additionally, the statistical approach strengthens the robustness of the findings. The use of correlation analyses, multiple regression models, and group comparisons with effect size estimation (η^2) allows for a comprehensive evaluation of relationships between variables and provides insight into both the strength and practical relevance of observed effects.

Despite these strengths, several limitations should be acknowledged. The cross-sectional design precludes any inference of causality, limiting interpretations to associations only. Longitudinal data would be required to establish temporal relationships between changes in body composition, physical activity, and life satisfaction. Furthermore, the study sample, although adequate in size, consisted exclusively of working women within a narrow age range, which limits the generalisability of findings to broader populations, including non-working women or different age groups.

Another limitation relates to the use of BIA for body composition assessment, which (although practical and widely used) may be influenced by hydration status and other physiological factors. Additionally, physical activity was measured solely through step counts, which do not capture other important dimensions of activity such as intensity, type, or non-ambulatory movement (e.g., resistance training).

Finally, the study did not account for several potentially important psychosocial determinants of life satisfaction, including perceived stress, social support, marital satisfaction, body image, self-esteem, and socioeconomic status. These factors may partly explain variability in life satisfaction independently of body composition and physical activity.

Conclusions

The level of life satisfaction in the studied group of women was moderate, reflecting a relatively stable but suboptimal psychological well-being. During middle adulthood, particularly in the context of occupational demands and perimenopausal biological changes, life satisfaction appears to remain at an adaptive level; however, it is sensitive to health and lifestyle-related factors. A key finding is the relevance of body composition quality to psychological well-being. The proportion of FM to fat-free mass appears to be more important for subjective life evaluation than total body mass alone, suggesting that commonly used indicators such as BMI may be insufficient for assessing psychophysical status. More detailed body composition analysis provides a more accurate framework for evaluation and prevention strategies.

Low physical activity emerged as a significant determinant of reduced life satisfaction, acting through both direct psychological mechanisms (e.g., mood and perceived control) and indirect somatic pathways, particularly *via* its influence on adiposity. Overall, the results indicate that lifestyle, especially the physical activity level, is a key factor differentiating well-being in the studied group. These findings suggest that interventions targeting improved body composition and increased physical activity may yield both health and psychological benefits, potentially enhancing quality of life in women during perimenopausal adulthood.

Disclosures

1. Institutional review board statement: The study protocol was approved by the Bioethics Committee of the Medical University of Silesia in Katowice (decision: PCN/CBN/0052/KB/187/22; dated: 12.06.2022).
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