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MENOPAUSAL PROBLEMS IN SEDENTARY WOMEN: A THEMATIC PAPER

Nandini Singh*and Dr. Birendra Jhajharia

Ph.D scholar, Lakshmibai National Institute of Physical Education, Gwalior, M.P.

Assistant Professor, Lakshmibai National Institute of Physical Education, Gwalior, M.P.

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***Corresponding Author: Nandini Singh**
Ph.D scholar, Lakshmibai National Institute of Physical Education, Gwalior, M.P.

ABSTRACT

This thematic paper explores the compounded health challenges faced by women during menopause when combined with a sedentary lifestyle. It delineates the physiological implications of estrogen decline, including heightened risks for cardiovascular disease, metabolic syndrome, weight gain, and sleep disturbances, which are exacerbated by physical inactivity. Furthermore, it examines the psychological and emotional dimensions, such as increased mood swings, depression, anxiety, and negative self-image, aggravated by a sedentary existence. The paper emphasizes the critical role of physical activity as a potent non-pharmacological intervention to mitigate these menopausal symptoms and associated health risks. Finally, it identifies key research gaps, highlighting the urgent need for gender-sensitive, culturally adapted, mixed-method, and longitudinal studies to better inform tailored interventions and improve the quality of life for sedentary women transitioning through menopause.

KEYWORDS: Menopause, Sedentary Lifestyle, Physical Activity, Women's Health, Physiological Implications, Psychological Well-being, Cardiovascular Risk, Metabolic Health.

INTRODUCTION

Menopause, a natural biological transition marked by the permanent cessation of menstruation and a significant decline in estrogen levels due to progressive ovarian failure, typically occurs around 51 years of age, though its onset can range widely from 40 to 58 years (Marlatt et al., 2018). Menopause marks a significant and universal physiological

transition in a woman's life, typically occurring between the ages of 46 and 55 years (Strelow et al., 2024). This phase is characterized by the permanent cessation of ovarian reproductive function, leading to a natural decline in the production of key hormones such as estrogen and progesterone (Davis et al., 2015; Gatenby & Simpson, 2023). Diagnosed retrospectively after 12 consecutive months without menstruation (Burger, 2006), this hormonal shift not only signifies the end of reproductive years but also initiates a wide array of systemic changes that can profoundly affect a woman's health and well-being (Davis et al., 2023).

The menopausal transition is frequently accompanied by a diverse range of symptoms, including bothersome vasomotor symptoms like hot flashes and night sweats, sleep disturbances, mood fluctuations, depression, and physical discomforts such as muscle and joint aches (Chang et al., 2023; Nair et al., 2024; Simpson et al., 2023; Strelow et al., 2024). These symptoms collectively can significantly interfere with daily activities and negatively impact a woman's overall quality of life (S & S, 2023; Williams et al., 2009; Woods et al., 2022). For instance, vasomotor symptoms alone affect up to 80% of women, often leading to poor sleep, depressed mood, fatigue, and decreased productivity (Nappi et al., 2022).

While menopause presents challenges for all women, these issues are often exacerbated for those leading a sedentary lifestyle. Physical activity is known to decline during the perimenopausal and postmenopausal years, a factor that contributes to adverse changes in cardiometabolic, physical, and psychosocial health (Hulteen et al., 2023). Sedentary behavior among postmenopausal women is associated with increased risks of sarcopenic obesity, reduced bone mineral density, heightened cardiometabolic risk, frailty, and even premature mortality (Grant et al., 2020). Furthermore, physical inactivity can worsen metabolic dysfunction and contribute to central adiposity typically observed during menopause (Marsh et al., 2023), and has been linked to increased levels of parent estrogens, which are relevant to female cancers (Oh et al., 2017).

Given the substantial impact of a sedentary lifestyle on menopausal health, there is a critical need to understand these specific challenges and explore effective management strategies. Although traditional treatments, such as menopausal hormone therapy, offer symptomatic relief, they are not suitable for all women (Hickey et al., 2017). Consequently, non-pharmacological interventions, particularly regular physical activity and lifestyle modifications, have gained prominence as vital strategies for alleviating symptoms and mitigating associated health risks (Gatenby & Simpson, 2023; Godoy-Izquierdo et al., 2024).

This thematic paper aims to delve into the specific menopausal problems encountered by sedentary women and to review existing literature on the role of physical activity as a pivotal intervention for improving their health and quality of life during this significant life stage.

METHODOLOGY

The search was focused on academic publications from 2010 onwards to ensure the currency and relevance of the retrieved information from databases such as PubMed, Scopus, and Google Scholar. Keywords included 'menopause,' 'sedentary lifestyle,' 'women's health,' 'yoga,' and 'psychological well-being.' Studies were selected for their relevance to physiological, psychological, and lifestyle factors affecting sedentary menopausal women.

TRENDS AND INSIGHTS FROM PREVIOUS RESEARCH

The menopausal transition is a complex physiological event characterized by significant hormonal fluctuations, primarily a decline in estrogen and progesterone, which contribute to a wide array of symptoms and health challenges for women (Davis et al., 2015; Gatenby & Simpson, 2023; Wąsowicz et al., 2024). These symptoms include, but are not limited to, vasomotor symptoms (e.g., hot flashes, night sweats), sleep disturbances, mood swings, depression, and an increased risk of cardiovascular diseases, metabolic syndrome, and weight gain (Chang et al., 2023; Hulteen et al., 2023; Ra & Kim, 2021; Strelow et al., 2024; Wąsowicz et al., 2024). The severity and impact of these challenges are particularly pronounced in women who maintain a sedentary lifestyle (Hulteen et al., 2023).

IMPACT OF SEDENTARY LIFESTYLE ON MENOPAUSAL HEALTH

A sedentary lifestyle significantly exacerbates many of the health issues associated with menopause. Physical inactivity is known to decline during perimenopause and into the postmenopausal years, contributing to detrimental changes in cardiometabolic, physical, and psychosocial health (Hulteen et al., 2023). Sedentary behavior among postmenopausal women is linked to an increased risk of metabolic syndrome, a cluster of cardiovascular and metabolic risk factors including elevated blood pressure, abdominal obesity, altered lipid metabolism, and impaired glucose levels (Ra & Kim, 2021). The hormonal changes during menopause, coupled with reduced physical activity, further contribute to increased body weight and fat mass, particularly abdominal adiposity, insulin resistance, and vascular dysfunction, all of which elevate cardiometabolic risk (Hulteen et al., 2023; Khalafi et al., 2023; Marsh et al., 2023; Xin et al., 2022).

Beyond cardiometabolic health, sedentary behavior negatively impacts other aspects of well-being during menopause:

- **Psychological Health:** Sedentary women may experience worsened mood, anxiety, and depression (Bondarev et al., 2021; Hulteen et al., 2023). While some studies show mixed results on the direct association between physical activity levels and overall menopausal-specific quality of life, a potential connection with psychosocial symptoms warrants further investigation (Ramezanzadeh et al., 2024). Depression is highly prevalent in menopausal women, with global prevalence rates around 35.6% (Liu & Tang, 2025).
- **Sleep Disturbances:** Reduced sleep health is a common complaint during midlife and is linked to increases in cardiometabolic risk and psychosocial health issues (Hulteen et al., 2023; Kravitz et al., 2018). Vasomotor symptoms frequently interrupt sleep, although they may not shorten total sleep duration (Kravitz et al., 2018).
- **Physical Health:** Changes such as reduced bone density and balance are often observed, compounding the physical challenges faced by menopausal women (Hulteen et al., 2023). Weight gain during midlife, while not directly a menopause symptom, is influenced by menopause-driven pathways like age-related decreases in basal metabolic rate, inflammaging, physical inactivity, and sleep disturbances (Grammatikopoulou et al., 2022).

PHYSIOLOGICAL IMPLICATIONS

The physiological landscape of women undergoes significant transformations during menopause, primarily driven by the decline in ovarian estrogen production. These hormonal shifts, when combined with a sedentary lifestyle, can exacerbate various health concerns, impacting multiple bodily systems.

Hormonal Changes, Vasomotor Symptoms, and Sleep Disturbances

The hallmark of menopause is the natural cessation of ovarian function, leading to a dramatic reduction in estrogen levels. This hormonal shift is directly responsible for a cascade of symptoms, including bothersome vasomotor symptoms like hot flashes and night sweats. Hot flashes, a common complaint during midlife, are linked to challenges in overall health (Witkowski et al., 2024). The years surrounding menopause present multiple health challenges, and the frequency of hot flashes has been associated with increased disease risk (Witkowski et al., 2024). While the direct effect of physical activity and sedentary behavior on hot flashes is still being investigated (Witkowski et al., 2024), some research suggests that lower levels of physical activity may contribute to a worsening of VMS.

Reduced sleep health is another prevalent complaint during midlife, and it is closely intertwined with both hormonal changes and lifestyle factors (Hulteen et al., 2023). Sleep disturbances are often linked to increases in cardiometabolic risk and psychosocial issues (Hulteen et al., 2023). Vasomotor symptoms frequently interrupt sleep, further contributing to poor sleep quality (Kravitz et al., 2018). The decline in physical activity during perimenopause and postmenopause also contributes to reduced sleep health (Hulteen et al., 2023).

Metabolic Slowdown, Weight Gain, and Cardiovascular Risks

Menopause is associated with significant cardiometabolic changes that heighten the risk for cardiovascular diseases and premature death (Chrysant, 2020). The decrease in estrogen levels, which normally provides cardiovascular protection, is a primary contributor to these changes (Chrysant, 2020). This includes an increase in body weight, insulin resistance, type 2 diabetes mellitus (T2DM), elevated cholesterol and glucose levels, and obesity-related hypertension (Chrysant, 2020; Deng et al., 2023).

Sedentary postmenopausal women face a particularly elevated risk of these cardiometabolic issues. Physical inactivity, combined with menopausal hormonal changes, leads to dyslipidemia (increased total cholesterol, LDL-C, triglycerides, and low HDL-C), atherosclerosis, and consequently, an increased risk of cardiovascular disease and coronary heart disease (Chrysant, 2020; Karvinen et al., 2019). The risk of vascular dysfunction significantly increases in postmenopausal women due to estrogen deficiency, and a daily lack of physical exercise further elevates their CVD risk (Li & Zhang, 2023). Studies indicate that metabolic health deteriorates after menopause, and while the role of physical activity in mitigating this change is not fully understood, it is a significant factor (Hyvärinen et al., 2021). Weight gain, especially increased fat mass and abdominal adiposity, insulin resistance, and vascular dysfunction are factors that contribute to increased cardiometabolic risk during menopause (Hulteen et al., 2023).

Furthermore, a sedentary lifestyle contributes to adverse changes in adipocyte metabolism following menopause, as the loss of estrogen removes protections against metabolic dysfunction related to adipose tissue (Marsh et al., 2023). Unhealthy lifestyle behaviors, including prolonged sedentary behavior and insufficient physical activity, are associated with the development of metabolic syndrome in postmenopausal women (Ra & Kim, 2021). This underscores the critical need for strategies to replace sedentary behavior with physical

activity to prevent abdominal obesity and impaired fasting glucose (Ra & Kim, 2021). Another serious non-cardiovascular complication is bone and muscle mass loss, leading to osteoporosis and sarcopenia, particularly in sedentary postmenopausal women (Chrysant, 2020).

PSYCHOLOGICAL AND EMOTIONAL DIMENSIONS

The menopausal transition is not only a physical journey but also a profound psychological and emotional experience. Hormonal fluctuations, coupled with the impact of a sedentary lifestyle, can significantly affect mental health and emotional well-being.

Mood Swings, Depression, and Anxiety

Women navigating menopause frequently experience psychological symptoms such as mood swings, depression, and anxiety (Deshpande & Rao, 2025; Hulteen et al., 2023). These changes are complex, influenced by a combination of hormonal, social, and environmental factors (Deshpande & Rao, 2025). The decline in estrogen levels can affect mood, cognition, and emotional resilience (Deshpande & Rao, 2025). Psychological distress is widespread among menopausal women and is associated with vasomotor symptoms and fatigue (Ali et al., 2020).

Depression is particularly prevalent in menopausal women, with global prevalence rates around 35.6% (Liu & Tang, 2025). This can significantly impair functional outcomes, reduce quality of life, and decrease life satisfaction (Liu & Tang, 2025). Sedentary women may experience worsened mood, anxiety, and depression, with these psychosocial health changes often coinciding with increased cardiometabolic risk (Hulteen et al., 2023). There is a clear link between physical inactivity and detrimental changes in psychosocial health (Hulteen et al., 2023).

Self-Image Issues and Impact of Inactivity on Mental Health

Menopause can also bring about changes in body composition, including increased fat mass, which can challenge an individual's sense of identity and negatively affect mental health (Elliott et al., 2025). These physical changes, combined with a sedentary lifestyle, can lead to self-image issues and contribute to a decline in overall mental well-being.

The lack of physical activity has a direct impact on mental health during menopause. Studies examining the mental health of early menopausal women compared to age-matched general

middle-aged women have considered factors like stress, depression, and suicidal behaviors in relation to physical activity and sedentary behavior (Kim et al., 2021). It has been shown that physical activity is beneficially associated with positive mental well-being in middle-aged women (Bondarev et al., 2021). The influence of physical activity on mental well-being can stem from neurobiological (e.g., release of opioids), psychological (e.g., sense of mastery or emotions), or behavioral mechanisms (e.g., health-related behavior) (Bondarev et al., 2021). Therefore, engaging in physical activity can serve as a buffer against some of the psychological and emotional challenges of menopause, which are amplified in sedentary individuals.

Role of Physical Activity in Managing Menopausal Symptoms

Engaging in regular physical activity is an essential and effective non-pharmacological strategy for managing menopause-related changes and promoting overall health and well-being (Asiamah et al., 2024; Godoy-Izquierdo et al., 2024; Wąsowicz et al., 2024). Exercise has been demonstrated to improve cardiometabolic, physical, and psychosocial health, particularly in perimenopausal and postmenopausal years where physical activity tends to decline (Hulteen et al., 2023).

Specific benefits of physical activity include

- **Cardiovascular and Metabolic Health:** Exercise interventions can lead to improvements in body composition, reduce fat mass (especially abdominal fat), and positively affect metabolic health markers such as blood lipids and vascular function (Khalafi et al., 2023; Xin et al., 2022). Physical activity is crucial in preventing and managing obesity in postmenopausal women (Baker et al., 2016) and can mitigate the accelerated decline in cardiovascular and cerebrovascular function experienced during menopause (Khalafi et al., 2023; Shing et al., 2024).
- **Psychological Well-being:** Physical activity can improve psychological health, overall mental well-being, and enhance social functioning (Bondarev et al., 2021; Godoy-Izquierdo et al., 2024). Moderate physical activity has been shown to correlate positively with mood elevation and can mitigate symptoms of depression and anxiety, thereby enhancing overall quality of life (Liu & Tang, 2025; Ramezanzadeh et al., 2024). Community-based exercise programs, such as Zumba Gold, have shown physical and psychological benefits for postmenopausal sedentary women (Delextrat et al., 2025).

- **Symptom Management:** While the evidence for exercise directly improving vasomotor symptoms like hot flashes remains inconclusive in some reviews (Dugan et al., 2018; Liu et al., 2022; Money et al., 2024; Witkowski et al., 2024), other evidence suggests beneficial effects on overall and vasomotor symptoms (Money et al., 2024). Yoga, in particular, has shown improvements in physical, urogenital, and total symptoms, with some evidence also suggesting its effectiveness for psychosocial and vasomotor symptoms (Money et al., 2024; Wąsowicz et al., 2024). Furthermore, exercise has been linked to improved sleep quality, which is crucial given the prevalence of sleep disturbances in midlife women (Dugan et al., 2018). Resistance exercise can help with physical and vasomotor symptoms, and multicomponent exercise offers broad benefits for fitness, psychosocial well-being, and vasomotor symptoms (Wąsowicz et al., 2024).

DISCUSSION

This thematic paper has explored the intricate interplay between menopausal physiological changes and a sedentary lifestyle, revealing a compounded burden on women's health and well-being. The core findings highlight that while menopause inherently presents significant challenges, including hormonal shifts, vasomotor symptoms, sleep disturbances, metabolic slowdown, weight gain, and increased cardiovascular risks, these issues are notably exacerbated in sedentary women (Chrysant, 2020; Hulteen et al., 2023; Witkowski et al., 2024).

Physiologically, the decline in estrogen during menopause removes its protective effects, leading to a heightened risk of cardiovascular diseases, metabolic syndrome, and increased fat mass, particularly abdominal adiposity (Chrysant, 2020; Marsh et al., 2023; Xin et al., 2022). A sedentary lifestyle further intensifies these risks by contributing to dyslipidemia, atherosclerosis, insulin resistance, and overall metabolic dysfunction (Chrysant, 2020; Karvinen et al., 2019; Ra & Kim, 2021). The combination of hormonal changes and physical inactivity significantly impairs cardiovascular and metabolic health, underscoring the critical need for proactive strategies to mitigate these detrimental effects.

Psychologically, the menopausal transition is marked by increased susceptibility to mood swings, depression, and anxiety, often compounded by self-image issues stemming from body composition changes (Deshpande & Rao, 2025; Hulteen et al., 2023; Kim et al., 2021). Sedentary behavior has been consistently linked to poorer mental health outcomes in menopausal women, with physical activity showing a beneficial association with positive

mental well-being (Bondarev et al., 2021). The evidence suggests that while menopause can be a period of significant emotional challenge, inactivity can deepen these psychological vulnerabilities.

However, the literature also strongly emphasizes the therapeutic and preventive potential of physical activity. Engaging in regular exercise emerges as a vital non-pharmacological intervention that can alleviate many menopausal symptoms, improve cardiometabolic health, enhance psychological well-being, and mitigate the risks associated with a sedentary lifestyle during this critical life stage (Asiamah et al., 2024; Godoy-Izquierdo et al., 2024; Wąsowicz et al., 2024). Specific exercise interventions, including aerobic activity, strength training, and mind-body practices like yoga, have demonstrated benefits in managing weight, improving sleep quality, and positively influencing mood (Khalafi et al., 2023; Liu & Tang, 2025; Money et al., 2024; Xin et al., 2022).

GAPS, CHALLENGES, AND FUTURE DIRECTIONS

Despite the growing body of evidence supporting the benefits of physical activity during menopause, several significant gaps and challenges remain in the research landscape, particularly concerning sedentary women:

- **Limited Gender-Sensitive or Culturally Adapted Intervention Research:** Current physical activity interventions often lack gender-specific and culturally sensitive tailoring, leading to mixed findings and low adherence (Csontos et al., 2024). Research has shown that efforts to enhance cultural relevance in physical activity interventions for underrepresented populations include soliciting input from the community, linking content with cultural values, addressing language and literacy, and using culturally relevant forms of physical activity (Conn et al., 2014). For instance, the understanding and experience of menopause can vary significantly across cultures, with terms translating to "renewal years" in some cultures and "desperate age" in others (Ramezanzadeh et al., 2024). There is a recognized lack of literature on culturally responsive care for menopausal women, which is essential for patient-centered approaches (Williams, 2024). Furthermore, many studies do not account for diverse geographical or cultural backgrounds, limiting the generalizability of findings (Carter et al., 2023). This highlights the need for interventions that consider the specific needs, perspectives, and potential barriers faced by diverse groups of menopausal women to ensure relevance and effectiveness (Godoy-Izquierdo et al., 2024; Wallbank et al., 2022). Designing effective programs requires careful consideration of health realities, inclusivity, social

support, and flexibility (Sydora et al., 2020). There is also a lack of research examining walking sport interventions specifically for middle- to older-age postmenopausal women, who differ from other populations in terms of physical activity participation and physiological mechanisms (Kinnafick et al., 2021).

- **Need for Mixed-Method and Longitudinal Studies:** Many existing studies on physical activity and menopausal symptoms primarily rely on self-report measures and often lack objective assessments of physical activity and sedentary time, which can lead to imprecise understandings of behavioral patterns and their health associations (Dempsey et al., 2020; Dominicis et al., 2025). More prospective evidence is needed on a broader range of health and psycho-biological outcomes. This includes using methods that quantify both postural and energy expenditure components of sedentary behavior and capture more detailed information on its type and domain (Dempsey et al., 2020). Qualitative insights into motivations to exercise, whether menopausal symptoms act as a barrier to physical activity, and the lived experiences of women would be valuable in future research (Carter et al., 2023). There is a need for more knowledge from intervention studies and randomized controlled trials to better understand the causes and consequences of sedentary behavior and its interplay with physical activity and health (Wennman et al., 2023). Longitudinal research is especially required to better understand causal relationships between sedentary behavior, physical activity, and health outcomes such as adiposity (Myers et al., 2018), and to identify trajectories of physical activity across women's lifespan (Nemoto et al., 2024). Studies with a fully randomized design using validated instruments or objectively measured exercise participation would enhance knowledge in this area (Dominicis et al., 2025).

Addressing these identified gaps will require interdisciplinary collaboration, innovative research designs, and a commitment to inclusivity in study populations. Future research should prioritize the development and evaluation of personalized, context-specific interventions that leverage both behavioral science and community engagement to promote sustainable physical activity habits among sedentary menopausal women. Further exploration of psychosocial determinants of physical activity uptake and adherence in this population is also warranted to inform more effective public health campaigns and clinical recommendations. Moreover, investigations into the neurotrophic effects of various exercise types, intensities, durations, and timings could provide crucial insights for targeted Alzheimer's disease prevention strategies in menopausal women (Reviews Abstract Mild

Alzheimer's Disease Is the Leading Cause of Dementia, Accounting for 50-70% of Cases, 2021).

CONCLUSION

This thematic paper has systematically reviewed the significant health challenges faced by women during menopause, particularly when compounded by a sedentary lifestyle. We have established that the natural decline in estrogen profoundly affects physiological systems, leading to increased risks of cardiovascular disease, metabolic syndrome, weight gain, and sleep disturbances. These physiological changes are often accompanied by psychological and emotional shifts, including mood swings, anxiety, depression, and concerns about self-image. Crucially, a sedentary lifestyle exacerbates these issues, intensifying both the physical and mental health burdens for women navigating this life stage.

However, the research consistently highlights the transformative potential of physical activity as a cornerstone for managing menopausal problems. Regular engagement in exercise, encompassing aerobic activities, strength training, and mind-body practices like yoga, has been shown to effectively mitigate cardiometabolic risks, improve sleep quality, enhance psychological well-being, and alleviate many bothersome symptoms. Physical activity emerges not merely as a treatment but as a vital preventive and therapeutic strategy for improving the overall health and quality of life for sedentary women through and beyond menopause.

Moving forward, significant opportunities exist to refine our approach to supporting menopausal women. Future efforts must prioritize the development of interventions that are not only gender-sensitive but also deeply rooted in cultural understanding and adaptation. A one-size-fits-all approach is insufficient; instead, programs must be tailored to the diverse needs and contexts of women globally. Furthermore, the academic community needs to embrace more robust research methodologies, including mixed-method and longitudinal studies, to gain a more comprehensive and objective understanding of the long-term impacts of sedentary behavior and the sustained benefits of physical activity. This would involve moving beyond self-reported data to incorporate objective measures of activity and sedentary time, along with qualitative insights into women's experiences and motivations. Ultimately, a concerted focus from policymakers, healthcare providers, and researchers on personalized, evidence-based, movement-centered wellness strategies is essential to empower midlife women and enhance their health outcomes during this critical life transition.

REFERENCES

1. Ali, A. M., Ahmed, A. H., & Smail, L. (2020). Psychological Climacteric Symptoms and Attitudes toward Menopause among Emirati Women. *International Journal of Environmental Research and Public Health*, *17*(14), 5028. https://doi.org/10.3390/ijerph17145028
2. Asiamah, N., Aladenola, O. B., Cronin, C., Sepp, L., & O'Callaghan, K. M. (2024). Effects of physical activity on menopausal symptoms, psychosomatic factors and well-being among working women in England: A path analysis. *Women s Health*, *20*. https://doi.org/10.1177/17455057241290370
3. Baker, A., Sirois-Leclerc, H., & Tulloch, H. (2016). The Impact of Long-Term Physical Activity Interventions for Overweight/Obese Postmenopausal Women on Adiposity Indicators, Physical Capacity, and Mental Health Outcomes: A Systematic Review [Review of *The Impact of Long-Term Physical Activity Interventions for Overweight/Obese Postmenopausal Women on Adiposity Indicators, Physical Capacity, and Mental Health Outcomes: A Systematic Review*]. *Journal of Obesity*, *2016*, 1. Hindawi Publishing Corporation. https://doi.org/10.1155/2016/6169890
4. Bondarev, D., Sipilä, S., Finni, T., Kujala, U. M., Aukee, P., Kovanen, V., Laakkonen, E. K., & Kokko, K. (2021). Associations of physical performance and physical activity with mental well-being in middle-aged women. *BMC Public Health*, *21*(1). https://doi.org/10.1186/s12889-021-11485-2
5. Burger, H. (2006). Physiology and endocrinology of the menopause. *Medicine*, *34*(1), 27. https://doi.org/10.1383/medc.2006.34.1.27
6. Carter, E., Bruinvels, G., Timmins, K. A., Pedlar, C. R., & Martin, D. (2023). Menopausal symptoms, exercise practices, and advice received in active women: a multi-country survey of strava app users. *Women & Health*, *64*(1), 23. https://doi.org/10.1080/03630242.2023.2284730
7. Chang, J. G., Lewis, M. N., & Wertz, M. C. (2023). Managing Menopausal Symptoms: Common Questions and Answers. *PubMed*, *108*(1), 28. https://pubmed.ncbi.nlm.nih.gov/37440735
8. Chrysant, S. G. (2020, September 1). The cardiometabolic benefits of exercise in postmenopausal women. In *Journal of Clinical Hypertension* (Vol. 22, Issue 9, p. 1691). Wiley. https://doi.org/10.1111/jch.13968

9. Conn, V. S., Chan, K. C., Banks, J., Ruppar, T., & Scharff, J. (2014). Cultural Relevance of Physical Activity Intervention Research with Underrepresented Populations. *International Quarterly of Community Health Education*, *34*(4), 391. https://doi.org/10.2190/iq.34.4.g
10. Csontos, J., Brown, N., Edwards, A., Edwards, D., Gillen, E., Hounsome, J., Kiseleva, M., Lewis, R., Macey, S., Mann, M., Sidhu, A., & Cooper, A. (2024). The effectiveness of interventions that support women, girls, and people who menstruate to participate in physical activity: a rapid overview of reviews. *Research Square (Research Square)*. https://doi.org/10.21203/rs.3.rs-5098557/v1
11. Davis, S. R., Lambrinoudaki, I., Lumsden, M.-A., Mishra, G. D., Pal, L., Rees, M., Santoro, N., & Simoncini, T. (2015). Menopause [Review of *Menopause*]. *Nature Reviews Disease Primers*, *1*(1). Nature Portfolio. https://doi.org/10.1038/nrdp.2015.4
12. Davis, S. R., Pinkerton, J. V., Santoro, N., & Simoncini, T. (2023). Menopause—Biology, consequences, supportive care, and therapeutic options [Review of *Menopause—Biology, consequences, supportive care, and therapeutic options*]. *Cell*, *186*(19), 4038. Cell Press. https://doi.org/10.1016/j.cell.2023.08.016
13. Delextrat, A., Solera-Sanchez, A., Davies, E., Hennelly, S. E., Shaw, C. D., Sabir, L., & Bibbey, A. (2025). Physical and Psychological Benefits of a 12-Week Zumba Gold® Exercise Intervention in Postmenopausal Sedentary Women from Low Socioeconomic Status. *Healthcare*, *13*(17), 2250. https://doi.org/10.3390/healthcare13172250
14. Dempsey, P. C., Biddle, S., Buman, M. P., Chastin, S., Ekelund, U., Friedenreich, C. M., Katzmarzyk, P. T., Leitzmann, M. F., Stamatakis, E., Ploeg, H. P. van der, Willumsen, J., & Bull, F. (2020). New global guidelines on sedentary behaviour and health for adults: broadening the behavioural targets. *International Journal of Behavioral Nutrition and Physical Activity*, *17*(1). https://doi.org/10.1186/s12966-020-01044-0
15. Deng, D., Nie, Z., Wang, J.-B., Chen, C., Wang, W., Zhu, Y., Guan, Q., Ou, Y., & Feng, Y. (2023). Metabolic Phenotypes of Overweight/Obesity and Risk of Cardiovascular Diseases in Postmenopausal Women: Findings from the China PEACE Million Persons Project. *medRxiv (Cold Spring Harbor Laboratory)*. https://doi.org/10.1101/2023.09.25.23296122
16. Deshpande, N., & Rao, T. S. (2025). Psychological Changes at Menopause: Anxiety, Mood Swings, and Sexual Health in the Biopsychosocial Context. *Journal of Psychosexual Health*, *7*(1), 11. https://doi.org/10.1177/26318318251324577

17. Dominicis, S. D., Elsborg, P., Andersen, V., & Stelter, R. (2025). Group coaching for Psychological Wellbeing and Health Lifestyle in Menopausal Women : Two parallel Randomized Controlled Experiments. *Research Portal Denmark*, *6*. https://local.forskningsportal.dk/local/dki-cgi/ws/cris-link?src=ku&id=ku-4142e64a-318c-43e7-a13c-cc208ab99556&ti=Group%20coaching%20for%20Psychological%20Wellbeing%20and%20Health%20Lifestyle%20in%20Menopausal%20Women%20%3A%20Two%20parallel%20Randomized%20Controlled%20Experiments
18. Dugan, S. A., Gabriel, K. P., Lange-Maia, B. S., & Karvonen-Gutierrez, C. (2018). Physical Activity and Physical Function [Review of *Physical Activity and Physical Function*]. *Obstetrics and Gynecology Clinics of North America*, *45*(4), 723. Elsevier BV. https://doi.org/10.1016/j.ogc.2018.07.009
19. Elliott, A., Turner, A. N., & Volante, M. (2025). Middle Aged Women and their Physical Activity Leisure Selves. *International Journal of the Sociology of Leisure*. https://doi.org/10.1007/s41978-025-00180-w
20. Gatenby, C., & Simpson, P. (2023). Menopause: Physiology, definitions, and symptoms [Review of *Menopause: Physiology, definitions, and symptoms*]. *Best Practice & Research Clinical Endocrinology & Metabolism*, *38*(1), 101855. Elsevier BV. https://doi.org/10.1016/j.beem.2023.101855
21. Godoy-Izquierdo, D., Teresa, C. de, & Mendoza, N. (2024). Exercise for peri- and postmenopausal women: Recommendations from synergistic alliances of women's medicine and health psychology for the promotion of an active lifestyle. *Maturitas*, *185*, 107924. https://doi.org/10.1016/j.maturitas.2024.107924
22. Grammatikopoulou, M. G., Nigdelis, M. P., & Goulis, D. G. (2022). Weight gain in midlife women: Understanding drivers and underlying mechanisms. *Current Opinion in Endocrine and Metabolic Research*, *27*, 100406. https://doi.org/10.1016/j.coemr.2022.100406
23. Grant, D., Tomlinson, D., Tsintzas, K., Kolić, P., & Onambélé-Pearson, G. (2020). The Effects of Displacing Sedentary Behavior With Two Distinct Patterns of Light Activity on Health Outcomes in Older Adults (Implications for COVID-19 Quarantine). *Frontiers in Physiology*, *11*. https://doi.org/10.3389/fphys.2020.574595
24. Hickey, M., Szabo, R. A., & Hunter, M. S. (2017). Non-hormonal treatments for menopausal symptoms [Review of *Non-hormonal treatments for menopausal symptoms*]. *BMJ*. BMJ. https://doi.org/10.1136/bmj.j5101

25. Hulteen, R. M., Marlatt, K. L., Allerton, T. D., & Lovre, D. (2023). Detrimental Changes in Health during Menopause: The Role of Physical Activity [Review of *Detrimental Changes in Health during Menopause: The Role of Physical Activity*]. *International Journal of Sports Medicine*, *44*(6), 389. Thieme Medical Publishers (Germany). https://doi.org/10.1055/a-2003-9406
26. Hyvärinen, M., Juppi, H., Taskinen, S., Karppinen, J. E., Karvinen, S., Tammelin, T., Kovanen, V., Aukee, P., Kujala, U. M., Rantalainen, T., Sipilä, S., & Laakkonen, E. K. (2021). Metabolic health, menopause, and physical activity—a 4-year follow-up study. *International Journal of Obesity*, *46*(3), 544. https://doi.org/10.1038/s41366-021-01022-x
27. Karvinen, S., Jergenson, M., Hyvärinen, M., Aukee, P., Tammelin, T., Sipilä, S., Kovanen, V., Kujala, U. M., & Laakkonen, E. K. (2019). Menopausal Status and Physical Activity Are Independently Associated With Cardiovascular Risk Factors of Healthy Middle-Aged Women: Cross-Sectional and Longitudinal Evidence. *Frontiers in Endocrinology*, *10*. https://doi.org/10.3389/fendo.2019.00589
28. Khalafi, M., Maleki, A. H., Sakhaei, M. H., Rosenkranz, S. K., Pourvaghar, M. J., Ehsanifar, M., Bayat, H., Korivi, M., & Liu, Y. (2023). The effects of exercise training on body composition in postmenopausal women: a systematic review and meta-analysis [Review of *The effects of exercise training on body composition in postmenopausal women: a systematic review and meta-analysis*]. *Frontiers in Endocrinology*, *14*. Frontiers Media. https://doi.org/10.3389/fendo.2023.1183765
29. Khalafi, M., Sakhaei, M. H., Maleki, A. H., Rosenkranz, S. K., Pourvaghar, M. J., Fang, Y., & Korivi, M. (2023). Influence of exercise type and duration on cardiorespiratory fitness and muscular strength in post-menopausal women: a systematic review and meta-analysis [Review of *Influence of exercise type and duration on cardiorespiratory fitness and muscular strength in post-menopausal women: a systematic review and meta-analysis*]. *Frontiers in Cardiovascular Medicine*, *10*. Frontiers Media. https://doi.org/10.3389/fcvm.2023.1190187
30. Kim, J., Choe, J.-P., Park, J.-H., Yoo, E., & Lee, J. M. (2021). The Comparison of Physical Activity, Sedentary Behavior, and Mental Health between Early Menopausal Women and Age-Matched General Middle-Aged Women. *International Journal of Environmental Research and Public Health*, *18*(14), 7256. https://doi.org/10.3390/ijerph18147256

31. Kinnafick, F., Brinkley, A., Bailey, S. J., & Adams, E. J. (2021). Is walking netball an effective, acceptable and feasible method to increase physical activity and improve health in middle- to older age women?: A RE-AIM evaluation. *International Journal of Behavioral Nutrition and Physical Activity*, *18*(1). https://doi.org/10.1186/s12966-021-01204-w
32. Kravitz, H. M., Kazlauskaite, R., & Joffe, H. (2018). Sleep, Health, and Metabolism in Midlife Women and Menopause [Review of *Sleep, Health, and Metabolism in Midlife Women and Menopause*]. *Obstetrics and Gynecology Clinics of North America*, *45*(4), 679. Elsevier BV. https://doi.org/10.1016/j.ogc.2018.07.008
33. Li, T., & Zhang, L. (2023). Effect of exercise on cardiovascular risk in sedentary postmenopausal women: a systematic review and meta-analysis [Review of *Effect of exercise on cardiovascular risk in sedentary postmenopausal women: a systematic review and meta-analysis*]. *Annals of Palliative Medicine*, *12*(1), 150. AME Publishing Company. https://doi.org/10.21037/apm-22-1395
34. Liu, R., & Tang, X. (2025). Effect of leisure-time physical activity on depression and depressive symptoms in menopausal women: a systematic review and meta-analysis of randomized controlled trials [Review of *Effect of leisure-time physical activity on depression and depressive symptoms in menopausal women: a systematic review and meta-analysis of randomized controlled trials*]. *Frontiers in Psychiatry*, *15*. Frontiers Media. https://doi.org/10.3389/fpsyt.2024.1480623
35. Liu, T., Chen, S., Mielke, G. I., McCarthy, A., & Bailey, T. G. (2022). Effects of exercise on vasomotor symptoms in menopausal women: a systematic review and meta-analysis [Review of *Effects of exercise on vasomotor symptoms in menopausal women: a systematic review and meta-analysis*]. *Climacteric*, *25*(6), 552. Taylor & Francis. https://doi.org/10.1080/13697137.2022.2097865
36. Marlatt, K. L., Beyl, R. A., & Redman, L. M. (2018). A qualitative assessment of health behaviors and experiences during menopause: A cross-sectional, observational study. *Maturitas*, *116*, 36. https://doi.org/10.1016/j.maturitas.2018.07.014
37. Marsh, M. L., Oliveira, M. N., & Vieira-Potter, V. J. (2023). Adipocyte Metabolism and Health after the Menopause: The Role of Exercise [Review of *Adipocyte Metabolism and Health after the Menopause: The Role of Exercise*]. *Nutrients*, *15*(2), 444. Multidisciplinary Digital Publishing Institute. https://doi.org/10.3390/nu15020444
38. Money, A., MacKenzie, A., Norman, G., Eost-Telling, C., Harris, D., McDermott, J., & Todd, C. (2024). The impact of physical activity and exercise interventions on symptoms

for women experiencing menopause: overview of reviews [Review of *The impact of physical activity and exercise interventions on symptoms for women experiencing menopause: overview of reviews*]. *BMC Women s Health*, *24*(1). BioMed Central. https://doi.org/10.1186/s12905-024-03243-4

39. Myers, A., Gibbons, C., Butler, E., Dalton, M., Buckland, N., Blundell, J. E., & Finlayson, G. (2018). Disentangling the relationship between sedentariness and obesity: Activity intensity, but not sitting posture, is associated with adiposity in women. *Physiology & Behavior*, *194*, 113. https://doi.org/10.1016/j.physbeh.2018.05.007
40. Nair, R. R., Joy, T. M., George, L. S., Ajay, A., Mathew, M. M., & Raveendran, G. C. (2024). Menopausal wellbeing: navigating quality of life and osteoporosis risk. *Frontiers in Public Health*, *12*. https://doi.org/10.3389/fpubh.2024.1343160
41. Nappi, R. E., Siddiqui, E., Todorova, L., Rea, C., Gemmen, E., & Schultz, N. M. (2022). Prevalence and quality-of-life burden of vasomotor symptoms associated with menopause: A European cross-sectional survey. *Maturitas*, *167*, 66. https://doi.org/10.1016/j.maturitas.2022.09.006
42. Nemoto, Y., Brown, W. J., & Mielke, G. I. (2024). Trajectories of physical activity from mid to older age in women: 21 years of data from the Australian Longitudinal Study on Women's Health. *International Journal of Behavioral Nutrition and Physical Activity*, *21*(1). https://doi.org/10.1186/s12966-023-01540-z
43. Oh, H., Arem, H., Matthews, C. E., Wentzensen, N., Reding, K. W., Brinton, L. A., Anderson, G. L., Coburn, S. B., Cauley, J. A., Chen, C., Goodman, D., Pfeiffer, R. M., Falk, R. T., Xu, X., & Trabert, B. (2017). Sitting, physical activity, and serum oestrogen metabolism in postmenopausal women: the Women's Health Initiative Observational Study. *British Journal of Cancer*, *117*(7), 1070. https://doi.org/10.1038/bjc.2017.268
44. Ra, J.-S., & Kim, H. (2021). Combined Effects of Unhealthy Lifestyle Behaviors on Metabolic Syndrome among Postmenopausal Women. *Healthcare*, *9*(7), 848. https://doi.org/10.3390/healthcare9070848
45. Ramezanzadeh, F., Hamidia, A., Pourhadi, S., & Shirafkan, H. (2024). The Association between Self-Esteem, Physical Activity, and Menopausal Symptoms in Postmenopausal Women: A Cross-Sectional Study. *Research Square (Research Square)*. https://doi.org/10.21203/rs.3.rs-5256521/v1
46. *Reviews Abstract Mild Alzheimer's disease is the leading cause of dementia, accounting for 50-70% of cases*. (2021).

47. S, P. P., & S, S. kumar. (2023). Menopausal Symptoms and Quality of Life of Postmenopausal Women – A Community Based Descriptive Study. *RGUHS Journal of Nursing Sciences*, *13*(2). https://doi.org/10.26463/rjns.13_2_11
48. Shing, C. L. H., Bond, B., Moreau, K. L., Coombes, J. S., & Taylor, J. L. (2024). The therapeutic role of exercise training during menopause for reducing vascular disease [Review of *The therapeutic role of exercise training during menopause for reducing vascular disease*]. *Experimental Physiology*. Wiley. https://doi.org/10.1113/ep092191
49. Simpson, E., Doherty, J., & Timlin, D. (2023). Menopause as a window of opportunity: the benefits of designing more effective theory-driven behaviour change interventions to promote healthier lifestyle choices at midlife [Review of *Menopause as a window of opportunity: the benefits of designing more effective theory-driven behaviour change interventions to promote healthier lifestyle choices at midlife*]. *Proceedings of The Nutrition Society*, *83*(2), 120. Cambridge University Press. https://doi.org/10.1017/s0029665123004810
50. Strelow, B., O'Laughlin, D., Anderson, T., Cyriac, J., Buzzard, J. A., & Klindworth, A. (2024). Menopause Decoded: What's Happening and How to Manage It [Review of *Menopause Decoded: What's Happening and How to Manage It*]. *Journal of Primary Care & Community Health*, *15*. SAGE Publishing. https://doi.org/10.1177/21501319241307460
51. Sydora, B. C., Alvadj, T., Malley, A., Mayan, M., Shandro, T., & Ross, S. (2020). Walking together: women with the severe symptoms of menopause propose a platform for a walking program; outcome from focus groups. *BMC Women s Health*, *20*(1). https://doi.org/10.1186/s12905-020-01037-y
52. Wallbank, G., Haynes, A., Tiedemann, A., Sherrington, C., & Grunseit, A. (2022). Designing physical activity interventions for women aged 50+: a qualitative study of participant perspectives. *BMC Public Health*, *22*(1). https://doi.org/10.1186/s12889-022-14237-y
53. Wąsowicz, A., Sztyler-Krąkowska, M., Siwiec, J., Smyl, N., Szatkowska, J., Śpiołek, O., Teofilak, M., Słowikowska, A., Kędziora, F., & Fabian, D. (2024). Impact of Physical Exercise on Menopause Symptoms and Health-related quality of life - a literature review [Review of *Impact of Physical Exercise on Menopause Symptoms and Health-related quality of life - a literature review*]. *Journal of Education Health and Sport*, *76*, 56485. Kazimierz Wielki University in Bydgoszcz. https://doi.org/10.12775/jehs.2024.76.56485

54. Wennman, H., Borodulin, K., Jousilahti, P., Laatikainen, T., Mäki-Opas, T., Männistö, S., Tolonen, H., Valkeinen, H., & Härkänen, T. (2023). Projected changes in sitting and physical activity among midlife and older men and women in Finland. *Journal of Public Health*. https://doi.org/10.1007/s10389-023-02105-x
55. Williams, M. (2024). Culturally responsive care for menopausal women. *Maturitas*, *185*, 107995. https://doi.org/10.1016/j.maturitas.2024.107995
56. Williams, R. E., Levine, K. B., Kalilani, L., Lewis, J., & Clark, R. V. (2009). Menopause-specific questionnaire assessment in US population-based study shows negative impact on health-related quality of life. *Maturitas*, *62*(2), 153. https://doi.org/10.1016/j.maturitas.2008.12.006
57. Witkowski, S., White, Q., Shreyer, S., Brown, D. E., & Sievert, L. L. (2024). The influence of habitual physical activity and sedentary behavior on objective and subjective hot flashes at midlife. *Menopause The Journal of The North American Menopause Society*, *31*(5), 381. https://doi.org/10.1097/gme.0000000000002341
58. Woods, N. F., Coslov, N., & Richardson, M. K. (2022). Effects of bothersome symptoms during the late reproductive stage and menopausal transition: observations from the Women Living Better Survey. *Menopause The Journal of The North American Menopause Society*, *30*(1), 45. https://doi.org/10.1097/gme.0000000000002090
59. Xin, C., Ye, M., Zhang, Q., & He, H. (2022). Effect of Exercise on Vascular Function and Blood Lipids in Postmenopausal Women: A Systematic Review and Network Meta-Analysis [Review of *Effect of Exercise on Vascular Function and Blood Lipids in Postmenopausal Women: A Systematic Review and Network Meta-Analysis*]. *International Journal of Environmental Research and Public Health*, *19*(19), 12074. Multidisciplinary Digital Publishing Institute. https://doi.org/10.3390/ijerph191912074