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Exercise-focused wellness interventions for middle-aged adults: a scoping review

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ABSTRACT

Objectives Middle-aged adults face multifaceted physical and psychosocial challenges that impact their overall wellness. Exercise has become a key component of wellness interventions due to its positive impacts on physical and psychosocial health. However, the understanding of exercise-focused wellness interventions for this age group remains limited. Therefore, this scoping review aimed to identify and map the existing literature on exercise-focused wellness interventions for middle-aged adults and to summarise their characteristics and reported outcomes.

Design Scoping review.

Data sources Six databases, including PubMed, EMBASE, CINAHL, Cochrane Library, Web of Science and PsycInfo, were initially searched on 29 July 2024, and the search was updated on 12 October 2025, with no restrictions on publication date. The reference lists of articles selected in the database search were also screened for further relevant studies.

Eligibility criteria We included interventional studies, specifically randomised controlled trials (RCTs) and quasi-experimental designs, that examined exercise-focused wellness interventions for middle-aged adults.

Data extraction and synthesis Two independent reviewers extracted data on study characteristics and intervention details and outcomes, and assessed the risk of bias. Any discrepancies were resolved by a third reviewer.

Results A total of 15 studies were included in the review, of which 9 were RCTs and 6 were quasi-experimental studies. Most interventions targeted middle-aged women and were implemented in community settings. Exercise was often combined with diet and stress management. The majority of the interventions lasted for 3 months with weekly sessions. Additionally, various delivery modes were employed, including face-to-face, online, individual and group-based approaches. Outcome variables were categorised into exercise and physical activity, dietary intake, anthropometry and body composition, cardiovascular health, biochemical markers, menopausal symptoms, psychosocial health and wellness. Only one study assessed wellness as an outcome of the intervention. Across the included studies, improvements were commonly reported for physical and psychosocial health, whereas changes in biochemical markers were limited.

Conclusions Exercise-focused wellness interventions for middle-aged adults encompass varied content and outcome variables, contributing to improvements in physical, psychological and social dimensions of health. Delivery modes are diverse, demonstrating flexibility and adaptability for tailored interventions. There is a need to develop a validated, midlife-specific measurement tool that reflects the multidimensional nature of wellness. Moreover, exercise-focused interventions tailored for middle-aged men, particularly in workplace settings, should be developed.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This scoping review was conducted following the Joanna Briggs Institute Manual for Evidence Synthesis and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews guidelines.
⇒ To enhance the reliability and validity, study selection, data extraction and risk of bias assessment were conducted by two independent reviewers.
⇒ This review focused on studies published in English, which may limit the generalisability of the findings.

INTRODUCTION

Middle age, typically defined as the period between 45 and 65 years, is a critical stage of adulthood characterised by significant life changes.[1–3] According to Engel's biopsychosocial model, the changes experienced during this stage can be categorised into biological, psychological and social dimensions.[4] Biological changes include musculoskeletal decline, hormonal alterations, metabolic and cognitive decline, alongside increased chronic disease risk.[3 5 6] Psychological changes commonly involve anxiety about death, concerns regarding personal accomplishments and an increased vulnerability to depression.[1 2 7] Social changes are characterised by caregiving for ageing parents, children leaving home, changes in workplace roles and reduced social networks with a risk of isolation.[3 6 8]

Furthermore, numerous studies have identified a low point in life satisfaction, subjective well-being or happiness during midlife, typically represented by a U-shaped curve.[6 9–11] Consequently, these changes have drawn increasing attention towards middle-aged

adults, prompting many studies aimed at promoting their health across multiple dimensions.

Given that middle-aged adults experience multidimensional changes, there is a need for integrative approaches that address not only physical but also psychological and social dimensions. Wellness represents a holistic state achieved through the balanced interplay of physical, psychological and social dimensions, reflecting a multidimensional concept that goes beyond the mere absence of disease.[12 13] Wellness differs from well-being, which represents the balance between an individual's available resources and the challenges they confront.[14] Additionally, wellness should not be mistaken for quality of life, which reflects an individual's subjective perception of their health and functioning across physical, psychosocial and cognitive domains.[12] Wellness is influenced by individual actions and environmental factors that exist on a continuum.[13] Wellness interventions are strategies designed to promote wellness by addressing various lifestyle factors, such as exercise, nutritional guidance, stress management techniques and social support.[13 15] Their primary goal is to foster a holistic approach to health, enhancing both physical and psychosocial health.[15 16]

As concerns grow over the vulnerabilities of middle-aged adults and the benefits of wellness interventions, numerous studies have explored the effects of exercise-focused approaches.[17–24] Middle-aged adults who engage in regular exercise not only demonstrate improved physical health but also reduced depression and anxiety, along with greater life satisfaction, compared with those who do not exercise.[25] Moreover, physical activity is strongly correlated with successful ageing, underscoring its critical role in promoting the overall wellness.[26 27] Nevertheless, research on the details and outcomes of exercise-focused wellness interventions specifically designed for middle-aged adults remains limited. Therefore, this scoping review aimed to identify and map the existing literature on exercise-focused wellness interventions for middle-aged adults and to summarise their content, dosage, delivery modes and reported outcomes.

METHODS

This scoping review followed the Joanna Briggs Institute Manual for Evidence Synthesis and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews.[28 29] The protocol for this scoping review was registered on the Open Science Framework (http://10.0.68.197/OSF.IO/HYM6R).

Defining research questions

The following research questions were formulated.

1. What are the scope and characteristics of the existing literature on exercise-focused wellness interventions for middle-aged adults?
2. What are the intervention content, dosage and delivery modes in the included studies?
3. Which outcome variables were used to assess the interventions, and what results were reported?

Eligibility criteria

Studies were included based on the following population, concept and context (PCC) criteria.[28] We included only interventional studies with randomised controlled trials (RCTs) or quasi-experimental designs to focus on the characteristics and effects of exercise-focused wellness interventions.

Population (P): the majority of participants were aged 45–65, reflecting the common definition of middle age.[1 2]

Concept (C): wellness interventions or programmes incorporating exercise as a component, explicitly aimed at improving wellness in middle-aged adults.

Context (C): there were no restrictions on the context, including work, community and clinical settings.

Studies were excluded if they were not original articles, published in a language other than English, or duplicate publications.

Search strategy and study selection

A comprehensive database search was performed in PubMed, EMBASE, CINAHL, Cochrane Library, Web of Science and PsycInfo on 29 July 2024 and updated on 12 October 2025, using the identical strategy. Search terms were developed from the PCC framework and included Medical Subject Headings and relevant keywords, in consultation with a professional librarian. The detailed search strategy for each database is presented in the online supplemental appendix 1. In addition to the database search, the reference lists of the included studies through the database search and related journals were manually reviewed. After duplicates were removed, two independent reviewers (SL and YK) assessed the titles, abstracts and full texts of the identified studies based on the eligibility criteria. Disagreements regarding the relevance of a study were resolved through discussion with a third reviewer (JP).

Data extraction and analysis

Data extraction was performed by two independent reviewers (HL and YK) using a standardised form developed through discussion among authors. This form included the first author, year, country, aims, study design, setting, inclusion criteria for study participants, sample size and details of the exercise-focused wellness interventions, including delivery modes, length, frequency and session duration. Details of the comparison group, timing of outcome measurements, outcome variables and results were also included. A third reviewer (JP) examined all extracted data and resolved any discrepancies between the initial two reviewers.

Although a risk of bias assessment is typically not required in scoping reviews, we conducted it to provide contextual information that may assist readers in interpreting the evidence and to support informed decision-making regarding exercise-focused wellness

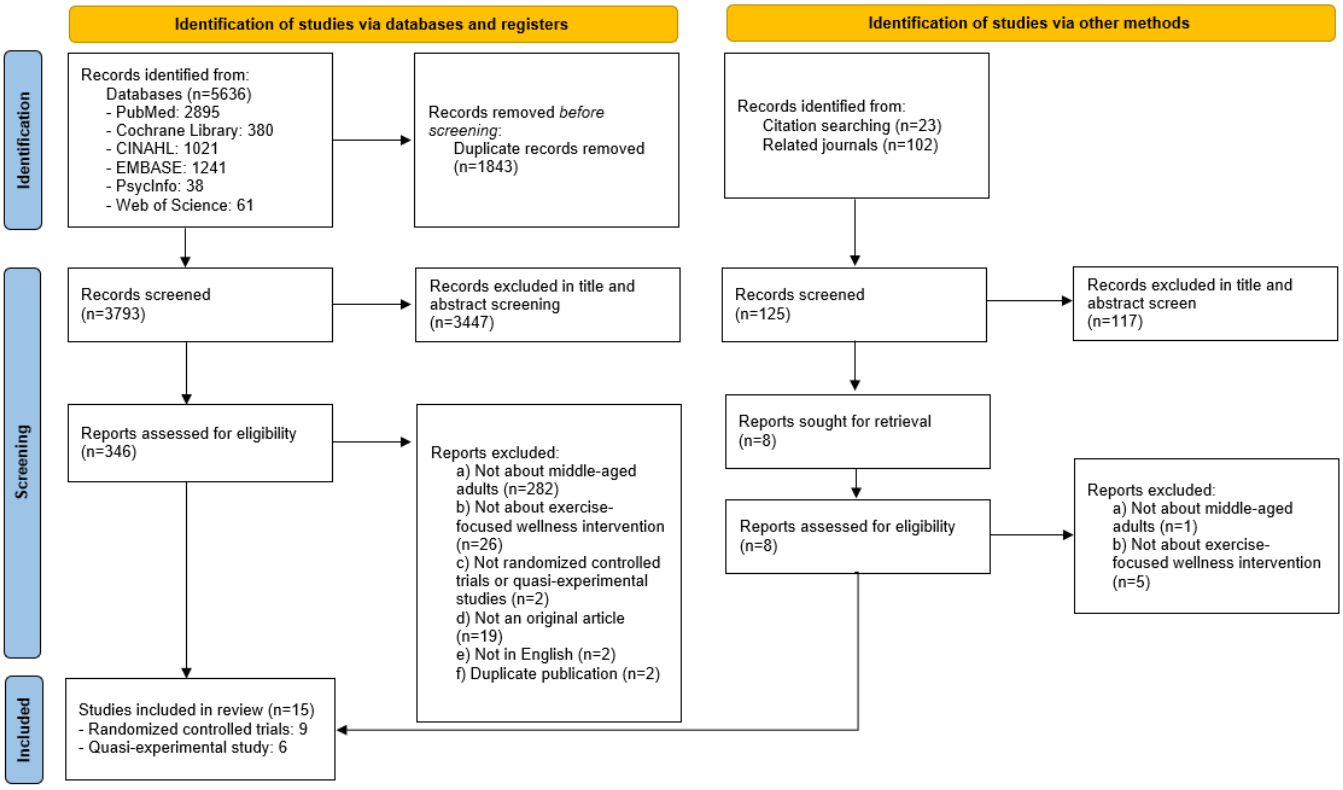

Figure 1 Flow diagram of the study selection process.

interventions.[28 30] Two independent reviewers (YK and HL) assessed the risk of bias for all included studies. RCTs were appraised using the revised Cochrane Risk of Bias tool,[31] and quasi-experimental studies were assessed with the Risk Of Bias In Non-randomised Studies of Interventions.[32] Any disagreements were resolved by consensus through discussion with a third reviewer (JP). A scoping review aims to map and summarise the existing literature rather than to appraise study effects. Therefore, the results of this assessment were not used to exclude studies or to weight the interpretation of findings.

Patient and public involvement

Patients or the public were not involved in the design, conduct or reporting of this study.

RESULTS

Study selection

As shown in figure 1, the database search retrieved 5636 studies. After removing 1843 duplicates, the titles and abstracts of 3793 studies were reviewed. A total of 282 studies were excluded due to their lack of focus on middle-aged adults, 26 for not being about exercise-focused wellness interventions, 2 for not being RCTs or quasi-experimental studies, 19 for not being original articles, 2 for not being published in English and 2 for being duplicate publications. Consequently, 13 studies were included in the analysis. Additionally, 125 studies were identified through reference list screening of the identified studies from database searches and related journals, 117 of which were excluded after screening titles and abstracts. The full texts of the remaining eight studies were reviewed. Among these, one study was not about middle-aged adults, and five studies were not about exercise-focused wellness interventions. Finally, two studies were included in the analysis.

General characteristics of the included studies

Table 1 summarises the general characteristics of the 15 included studies. Of these, nine were RCTs[18–21 24 33–36] and six were quasi-experimental studies[17 22 23 37–39] conducted between 2006 and 2022. Regarding the countries where the studies were performed, eight studies were conducted in the USA,[17 20 21 23 24 34 35 39] four in Australia[18 36–38] and one each in Germany,[33] Malaysia[19] and Ukraine.[22] The sample sizes ranged from 27 to 289 participants across the studies. Of the included studies, 12 exclusively targeted women,[17–22 24 33 35–38] while 3 included both men and women.[23 34 39] 13 studies were conducted in community settings,[17–20 22 23 33–39] while 2 were in workplace settings.[21 24] The results of risk of bias assessment are available in the online supplemental appendix 2.

Intervention content, dosage and delivery modes

The details of exercise-focused wellness interventions are summarised in the online supplemental table 1. A total of 14 interventions were identified across 15 studies. One intervention was reported in two separate papers, each focusing on different outcome variables,[37 38] while

Table 1 General characteristics of the included studies (n=15)

First author (year) /Country	Study design	Sample size	Inclusion criteria	Setting
Alsukait (2021)/USA[17]	Quasi-experimental	27	Sedentary African American women, 40–65 years old, with BMI≥25 kg/m²	Community
Anderson (2006)/Australia[18]	RCT	90	Women, 40–65 years old	Community
Anderson (2015)/Australia[37]	Quasi-experimental	225	Australian women, 40–65 years old	Community
Bebenek (2010)/Germany[33]	Three-arm RCT	128	Women, 48–55 years old, with 1–3 years postmenopausal	Community
Dorough (2014)/USA[34]	RCT	27	Adults, 45–65 years old, with prehypertension	Community
Hageman (2014)/USA[35]	Three-arm RCT	289	Rural women, 40–69 years old, with prehypertension	Community
Hassan (2017)/Malaysia[19]	RCT	64	Perimenopausal women, 45–55 years old	Community
Jones (2022)/USA[20]	RCT	48	Black women, 40–64 years old	Community
Low (2015)/USA[21]	RCT	57	Women, 40–65 years old, who self-identify as having an increased cardiovascular risk and are ready for change	Workplace
McGuire (2019)/Australia[38]	Quasi-experimental	225	Australian women, 40–65 years old	Community
Schepens (2018)/USA[23]	Quasi-experimental	37	Rural-dwelling Latino adults, 50–64 years old	Community
Schepens (2021)/USA[39]*	Quasi-experimental	27	Rural-dwelling Latino adults, 50–64 years old	Community
Ruban (2022)/Ukraine[22]	Quasi-experimental	27	Perimenopausal women, with climacteric syndrome and hypertension onset	Community
Smith-DiJulio (2009)/Australia[36]†	RCT	60	Women, 45–60 years old	Community
Urda (2016)/USA[24]	RCT	44	Sedentary middle-aged women	Workplace

*Long-term follow-up study for the study conducted by Schepens *et al.*[23]
†Long-term follow-up study for the study conducted by Anderson *et al.*[18]
BMI, body mass index; RCT, randomised controlled trial.

two interventions had additional long-term follow-up studies.[18 23 36 39] Additionally, two studies implemented exercise-focused wellness interventions for both the experimental and control groups.[20 34] In one study, the experimental group received dietary approaches to stop hypertension (DASH) to wellness plus intervention, which included a walking and weight programme, eating plan guide, self-monitoring, weekly feedback and personal goal setting, whereas the control group received the standard DASH wellness intervention, consisting only of a walking and weight programme and eating plan guide.[34] In the other study, the experimental group's intervention was based on the American Heart Association's Life's Simple 7 guidelines, while the control group's intervention did not include stress reduction strategies or goal setting.[20]

Content

Diet and stress management, alongside exercise, were major components of the interventions, with most interventions including two or three of these components. Four interventions combined exercise and diet,[18 34–36] while seven interventions incorporated three main components—exercise, diet and stress management.[17 18 20–23 38 39] Three interventions focused exclusively on the exercise component.[19 24 33]

Exercise strategies for middle-aged adults included daily activities,[18 24] aerobic exercises,[18 19 21 22 33 34] resistance training[18 19 33 35] and pelvic floor exercises.[18 37 38] Most interventions were customised to develop personalised exercise plans, often accompanied by individualised goal setting.[18–21 23 34–39]

Of the included interventions, 11 incorporated dietary components alongside exercise, six of which provided specific details about dietary guidance.[18 20 34–36] Among these, three delivered educational materials related to the DASH diet.[34 35] Two interventions emphasised healthy eating according to the American Heart Association's Life's Simple 7 guidelines.[20] The remaining intervention, targeting middle-aged women, recommended increasing the intake of phytoestrogens, water, fruits and vegetables, whole foods and calcium while reducing saturated fats and increasing monounsaturated and polyunsaturated fats.[18 36] Moreover, there were stress management strategies, including peer massage, art therapy, body-oriented therapy and respiration methods combined with exercise.[20–23 37–39]

Dosage

The details of exercise-focused wellness interventions, including duration, frequency and session length, are

summarised in the online supplemental table 1. The lengths of the exercise-focused wellness interventions ranged from 2 weeks to 12 months. The majority of the interventions were provided one time a week.[17 20 23 37–39] One study delivered the intervention through a single workshop,[21] while two studies reported varying frequencies depending on the timing and strategies employed.[33 35] Among the five interventions that reported session durations, two provided 90 min each,[20] while the others ranged from 40 min[18 36] to 2 hours per session.[17]

Delivery modes

Face-to-face interventions were implemented in five interventions,[17 20 22 33] while four adopted remote delivery modes.[24 34 35] The remaining five interventions used a combination of face-to-face and remote modes.[18 19 21 23 36–39] Most remote interventions were web based, with one delivered via mail.[35] One study compared the same intervention delivered online and by mail,[35] while another compared three delivery modes; online independent, face-to-face-supported group and online-supported group.[37 38] Six interventions were conducted one-on-one,[18 19 24 34–36] while five were group based.[17 20 22 33] Three interventions incorporated both one-on-one and group sessions.[21 23 37–39]

Outcome variables and results of the interventions

The word cloud reflecting the frequency of the outcome variables as a weight is shown in figure 2. Across the included studies, outcome variables were categorised into eight domains: exercise and physical activity, dietary intake, anthropometry and body composition, cardiovascular health, biochemical markers, menopausal symptoms, psychosocial health and wellness. Outcome variables related to exercise and physical activity were commonly measured. Additionally, variables related to dietary intake, anthropometry and body composition, cardiovascular health, biochemical markers, menopausal symptoms, psychosocial health and wellness were also used to assess the effects of exercise-focused wellness interventions. Details on the specific outcome variables for each intervention are provided in the online supplemental table 1.

Figure 2 Outcome variables measured in exercise-focused wellness interventions. BMI, body mass index; CHD, coronary heart disease; CVD, cardiovascular disease; F&V, fruit and vegetable; HbA1c, haemoglobin A1c; IPAQ, International Physical Activity Questionnaire; MET, metabolic equivalent of task; MYMOP2, measure yourself medical outcome profile; VO2 max, maximum oxygen consumption.

Exercise and physical activity

One study reported a significant increase in daily step count following wellness interventions (p<0.01).[34] Similarly, two interventions targeting middle-aged women showed a significant increase in weekly aerobic exercise frequency (p<0.01 for both).[18 38] Another intervention for middle-aged women led to significant improvements in perceived exercise benefits, overall physical activity and general activity.[38] Additionally, VO_2 max (estimated maximum oxygen consumption) significantly increased in the web-based wellness intervention compared with the control group (p=0.037).[35]

Dietary intake

Fruit and vegetable intake significantly increased in the three interventions (all p<0.05).[34 35] Significant decreases in daily calorie intake from fat and saturated fat (web based: p=0.018 and print mailed: p=0.03) and increases in low-fat dairy intake (web based: p<0.001 and print mailed: p=0.002) were observed in the wellness intervention groups compared with the control group.[35] Additionally, dietary calorie intake from saturated fat (p=0.001) and sodium (p<0.001) significantly decreased in the wellness intervention group.[23]

Anthropometry and body composition

A significant weight reduction was observed in one study following the wellness intervention (p<0.05).[34] Additionally, waist circumference significantly decreased in the wellness intervention groups (web based: p=0.017 and print mailed: p=0.16) compared with the control group, while body mass index was significantly decreased in only the web-based wellness intervention group (p=0.047).[35]

Lumbar spine bone mineral density significantly decreased in the low-frequency and low-intensity exercise-focused wellness intervention groups compared with the exercise plus placebo and exercise plus supplementation groups (p=0.003).[33] However, whole-body total fat, abdominal fat and lean body mass showed no significant differences among groups.[33]

Cardiovascular health

Systolic blood pressure was assessed in eight interventions,[17–19 22 23 34–36 39] with six demonstrating a significant reduction.[19 22 23 34 35 39] Diastolic blood pressure was assessed in six interventions,[17–19 22 23 35 36 39] with significant reductions observed in two interventions.[19 22] Additionally, the Robinson index, representing haemodynamic load (p<0.05) and the coefficient of endurance (Kvas formula), indicating cardiovascular condition during physical activity (p<0.05), showed significant improvements following the wellness intervention.[22] In the same intervention, heart rate significantly decreased (p<0.05), while pulse pressure significantly increased (p<0.05).[22]

Biochemical markers

Six interventions assessed biochemical markers, including blood glucose, total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, triglycerides and haemoglobin A1c.[19–21 23 35 39] Among them, three interventions reported no significant changes,[19 23 35 39] while the remaining three did not report statistical significance, likely due to small sample sizes.[20 21]

Menopausal symptoms

Wellness interventions aimed at alleviating menopausal symptoms, delivered through online, face-to-face-supported and online-supported modes, effectively reduced anxiety (p<0.01), vasomotor symptoms (p=0.04), sexual dysfunction (p<0.01) and somatic symptoms (p=0.02).[37] Notably, the face-to-face-supported groups showed greater reductions in vasomotor symptoms (p=0.01), somatic symptoms (p=0.03) and overall Greene Climacteric Scale scores (p<0.01) compared with other groups.[37 38] Another study reported significant reductions in menopausal symptoms in exercise plus placebo and exercise plus supplementation groups (both p<0.01), while no significant changes were observed in the low-frequency and low-intensity exercise-focused wellness intervention group.[33]

Psychosocial health

Anxiety levels were significantly reduced in perimenopausal women with hypertension following the wellness intervention (p<0.05).[22] Although perceived stress was assessed in four studies, none demonstrated significant effects.[20 21 23 39]

Wellness

Only one study assessed the level of perceived wellness.[24] In this study, perceived wellness improved significantly in both the workplace intervention and control group, with no statistically significant difference between them.[24]

DISCUSSION

This scoping review identified the existing literature on exercise-focused wellness interventions and summarised their contents, outcome variables and results. A total of 15 studies were included, consisting of 9 RCTs and 6 quasi-experimental studies. The findings of this study indicate that: (1) exercise-focused wellness interventions for middle-aged adults effectively improved physical and psychosocial health outcomes; however, they did not lead to significant changes in biochemical markers; (2) a few studies assessed wellness as a holistic outcome, instead measuring it through fragmented physical and psychosocial variables; (3) most interventions primarily targeted middle-aged women and were conducted in community settings and (4) these interventions were delivered through diverse modes, including online, remote, face-to-face, one-on-one and group-based approaches.

First, exercise-focused wellness interventions effectively improved exercise and physical activity, dietary intake, anthropometry and body composition, cardiovascular health, menopausal symptoms and psychosocial health, but had no significant impact on biochemical markers.

The findings on the positive effects of exercise-focused wellness interventions align with the previous studies demonstrating that exercise improves metabolic health, physical function, health-related quality of life and depression in middle-aged adults.[40–43] A recent systematic review and meta-analysis found that the protective effects of exercise were greater in middle-aged adults than in older adults.[27] Similarly, a longitudinal cohort study showed that adopting and maintaining physical activity from age 55 to 65 was associated with better physical health-related quality of life at around age 70.[44] Another study further demonstrated that higher levels of exercise in midlife delayed the onset of disability and extended disability-free life expectancy.[45] Particularly, unlike standalone exercise programmes, wellness interventions take a comprehensive approach, addressing multiple dimensions of health, including exercise, lifestyle modifications and stress management.[15 16] Therefore, implementing exercise-focused wellness interventions in midlife is essential for both immediate and long-term benefits, providing a proactive opportunity to enhance physical and psychosocial health and support healthy ageing.

Biochemical markers often require longer intervention periods or more intensive, targeted approaches to achieve measurable changes.[46–48] Particularly, lipid or glucose metabolism in midlife is negatively impacted by several factors, such as hormone changes, decreased basal metabolic rate, insulin resistance and reduced physical activity.[47 48] Moreover, there is a paucity of robust, evidence-based interventions for improving these biochemical markers.[49] Therefore, more intervention studies focusing on biochemical markers in midlife are warranted, and these interventions should be integral components of exercise-focused wellness interventions for middle-aged adults.

Second, only one study measured wellness as a single, comprehensive outcome, while others fragmented it into separate physical and psychological variables, limiting a holistic assessment of its multidimensional nature. Wellness is a dynamic process that integrates physical and psychosocial health, aiming for an individual's full potential.[12 13] Given its comprehensive nature, effective measurement is critical for designing a successful wellness intervention and guiding clinicians to determine the most appropriate approach.[50] However, a systematic review indicates that there is insufficient evidence to support the clinical utility of any single wellness instrument, highlighting the limited number of included studies that used wellness measurement tools.[50] Therefore, it is essential to use measurement tools that align with the multidimensional nature of wellness. Furthermore, beyond adopting the existing instruments, future research should focus on developing wellness measurement tools specifically tailored to middle-aged adults.

Third, the majority of the included studies focused on middle-aged women were conducted in community settings, with relatively few workplace-based interventions. Middle-aged men's wellness is often overlooked, even though they face multidimensional challenges, including central obesity, sexual dysfunction, lack of energy and irritability stemming from andropause.[51 52] Andropause, characterised by physical and psychological changes in middle-aged men due to declining testosterone levels, typically develops gradually, unlike the more abrupt onset of menopause.[52 53] Moreover, while menopausal symptoms are well defined, andropause symptoms are less clearly characterised, often leading to their perception as a natural part of ageing.[53 54] Furthermore, middle-aged men are less likely to seek help for health-related issues due to traditional masculine norms, which can contribute to social isolation and a decline in the overall wellness.[52 55] Therefore, there is a need to develop exercise-focused wellness interventions specifically tailored to middle-aged men, addressing the multidimensional aspects of wellness.

Regarding the intervention setting, only two included interventions were conducted in workplaces.[21 24] Middle-aged adults often experience unique challenges, such as balancing work and personal life while managing increased job responsibilities and spending a large portion of their time at work.[6] Workplace interventions provide a unique opportunity to a large number of employees by using the existing health promotion infrastructure, allowing for tailored strategies to meet individual needs.[56] Recent systematic reviews suggest that workplace wellness interventions can effectively improve cardiorespiratory fitness, muscle strength and musculoskeletal health while enhancing productivity.[57] Similarly, other systematic reviews highlight their positive impacts on both physical and psychosocial health, emphasising workplaces as a promising setting for intervention.[58–60] Considering these benefits and the significant amount of time middle-aged adults spend at work, workplace-based wellness interventions should be implemented more widely and tailored to this population.

Finally, exercise-focused wellness interventions were delivered through diverse modes, highlighting their flexibility and applicability to tailored interventions. Given that middle-aged adults often face multiple demands, including job responsibilities, caregiving for family members and financial challenges, selecting optimal delivery modes is important.[6 38 61] Effective delivery modes not only save time but also enhance accessibility and allow for greater personalisation.[62] Particularly, the rapid advancement of technology and the COVID-19 pandemic have led to the emergence of various digital delivery modes, which have been used in studies targeting middle-aged adults.[38 63 64]

Two studies evaluated the effects of wellness interventions based on the delivery modes. One compared web-based and print-mailed interventions for managing prehypertension in middle-aged women, finding significant improvements in dietary intake and waist circumference in both groups, with no significant differences between them.[35] Another study examined online-dependent, face-to-face-supported and online-supported

delivery modes for menopausal symptom relief, reporting improvements across all groups, with the face-to-face-supported group showing the greatest benefits.[37] These findings are consistent with previous studies indicating comparable outcomes between online and face-to-face interventions.[65–67] However, middle-aged adults often exhibit lower acceptance of and greater scepticism towards digital interventions compared with younger populations,[66 68] likely due to lower digital literacy levels in this demographic.[69 70] Therefore, exercise-focused wellness interventions should be designed with diverse delivery methods that align with middle-aged adults' needs and preferences.

There are several limitations that should be considered when interpreting the findings. First, most included interventions were conducted in Western countries, limiting generalisability. This may reflect a greater emphasis on midlife wellness in ageing societies.[71] However, Eastern countries, including South Korea, Japan and China, are also undergoing rapid ageing.[72 73] Therefore, more research is needed to explore wellness perceptions in these countries and address this gap through interventional studies. Second, this review focused on studies published in English due to the time required for translation and the potential for bias introduced during the translation process. This may constrain the scope of the evidence.

Despite these limitations, this review has several notable strengths. To our knowledge, it is the first scoping review to systematically identify and map the existing literature on exercise-focused wellness interventions specifically targeting middle-aged adults. Furthermore, this review was conducted using an established scoping review framework to ensure transparency and rigour. This study design allowed us to comprehensively summarise the scope of the current knowledge and identify gaps in the literature.

Based on these findings, this study has practical implications. The findings of the current review serve as evidence for policy development aimed at promoting multidimensional health among middle-aged adults. Additionally, they provide a reference for the design and implementation of exercise-focused wellness interventions for this population.

CONCLUSIONS

Exercise-focused wellness interventions for middle-aged adults demonstrate wide variation in content, with outcome variables encompassing physical, psychological and social dimensions of health. These interventions were delivered through diverse modes, including online, remote, face-to-face, one-on-one and group-based approaches, highlighting their flexibility and adaptability to tailored interventions. Measurement practices that reflect the multidimensional nature of wellness were limited. Therefore, the development of a validated and midlife-specific measurement tool is warranted. Evidence of improvements in biochemical markers was scarce, indicating a need for strategies that target these outcomes. Furthermore, research on developing tailored interventions for middle-aged men, particularly in workplace settings, is needed.

Contributors JP and YK contributed to the review concept, data analysis, interpretation, visualisation, writing of the original draft and editing. JP designed the study. Data collection was conducted by YK, HL and SL. Data analysis was performed by JP, YK and HL. All authors read and edited the original draft and approved the final manuscript. YK is the guarantor.

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