

REVIEW ARTICLE

Yoga Interventions for Reducing Sedentary Time in Office Workers: A Systematic Review and Meta-Analysis

Preeti Bhandari¹, Manesh Kanwar²

HOW TO CITE THIS ARTICLE:

Preeti Bhandari, Manesh Kanwar. Yoga Interventions for Reducing Sedentary Time in Office Workers: A Systematic Review and Meta-Analysis. Ind J Anct Med Yoga. 2026; 19(3): 190-196.

ABSTRACT

Background: Prolonged sitting among office workers is strongly associated with cardiometabolic risk, musculoskeletal complaints, decreased productivity, and impaired well-being. Micro-breaks and workplace physical activity programs can reduce sedentary time, and yoga because it can be performed in short bouts with low space/equipment needs has emerged as a pragmatic intervention for office settings.

Objective: To systematically review and synthesize evidence from randomized trials, quasi-experimental studies, and acute experimental trials testing yoga interventions (including micro-yoga breaks and workplace yoga programs) aimed at reducing sedentary time or mitigating physiological/psychological harms of prolonged sitting in office workers.

Methods: Electronic searches (PubMed/PMC/Google Scholar/Scopus/Cochrane central) identified trials and controlled studies published through 2025 that evaluated yoga delivered at/for the workplace, micro-yoga breaks, or yoga-based active breaks for desk-based employees. Outcomes included objectively or subjectively measured sedentary time, breaks in sitting, glycemic and vascular markers, musculoskeletal discomfort, mood, cognitive performance, and adherence.

Results: Thirty studies met inclusion: workplace yoga RCTs and controlled trials (e.g., Cheema *et al.*, 2013), short-bout yoga break trials (e.g., Colvin *et al.*, 2023), home/telework yoga interventions (e.g., Garcia *et al.*, 2021), and multi-component workplace programs including yoga. Across studies, yoga interventions produced small-to-moderate improvements in musculoskeletal discomfort, mood, short-term glycemic responses when used as breaks, and self-reported interruptions of sitting time; however, evidence on objectively measured sitting time reduction is limited and heterogeneous. Meta-analysis of trials reporting sitting-time or validated

AUTHOR'S AFFILIATION:

¹ Scholar, Department of Yoga, Jayoti Vidyapeeth Women's University, Jaipur, India.

² Assistant Professor, Department of Yoga, Jayoti Vidyapeeth Women's University, Jaipur, India.

CORRESPONDING AUTHOR:

Preeti Bhandari, Scholar, Department of Yoga, Jayoti Vidyapeeth Women's University, Jaipur, India.

E-mail: preetibhandari69@gmail.com

➤ Received: 09-06-2026 ➤ Accepted: 14-07-2026



Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons Attribution NonCommercial 4.0 License (<http://www.creativecommons.org/licenses/by-nc/4.0/>) which permits non-Commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the Red Flower Publication and Open Access pages (<https://rfppl.co.in>)

break frequency showed small reductions favoring yoga/active-break conditions but with high heterogeneity and limited sample sizes. Mechanisms likely include light-to-moderate physical activity during poses, improved autonomic regulation, better posture, and behavioral cues that interrupt prolonged sitting.

Conclusions: Yoga-based workplace strategies (micro-breaks, scheduled lunchtime sessions, or brief guided breaks) are feasible, acceptable, and can reduce some harms associated with prolonged sitting; but current evidence is insufficient to conclude consistent, clinically important reductions in total daily sitting time. High-quality adequately powered randomized trials with objective sitting measures and longer follow-up are needed.

KEYWORDS:

• Office Workers • Workplace Sedentary Life • Physical Activity • Yoga

INTRODUCTION

Modern office work commonly requires prolonged sitting: surveys and observational studies show many office employees spend ~70-80% of work hours seated, often in uninterrupted bouts that exceed evidence-based thresholds for increased cardiometabolic risk and musculoskeletal problems (Dieterich *et al.*, 2020; Shrestha *et al.*, 2018). Interventions that break prolonged sitting or replace sitting with short bouts of light activity can improve acute glucose metabolism, mood, and cognitive markers, and reduce musculoskeletal discomfort (Keadle *et al.*, 2017; Colvin *et al.*, 2023). Among feasible options for the workplace, yoga offers a low-cost, low-equipment approach that can be delivered as short micro-breaks (3-10 minutes), lunchtime classes, or remote guided sessions, making it attractive for employers and employees alike. Several trials have examined whether yoga practice at or around the workplace reduces sitting time, interrupts prolonged sitting, or mitigates its physiological and psychological consequences (Cheema *et al.*, 2013; Garcia *et al.*, 2021). This systematic review and meta-analysis synthesize evidence about the effectiveness of yoga interventions to reduce sedentary time and its effects on cardiometabolic, musculoskeletal, cognitive, and wellbeing outcomes in office workers.

METHODS

Eligibility criteria

We included randomized controlled trials (parallel or crossover), quasi-experimental designs, and controlled before/after or repeated-measures studies that: a yoga

intervention delivered to office or desk-based workers (including on-site workplace yoga, remote/telework yoga intended for work breaks, or short yoga micro-break protocols administered during simulated work shifts); reported outcomes relevant to sedentary behaviour (sitting time, breaks in sitting), cardiometabolic markers (acute glucose, vascular function), musculoskeletal discomfort, mood/wellbeing, or cognitive performance; and these were published in peer-reviewed journals or available via PubMed/PMC/major repositories up to 2025. Studies combining yoga with other major components were included if yoga comprised a clearly specified, replicable component and results for the combined program were reported.

Data extraction and outcomes

Data extracted included study design, sample size and population, intervention details (frequency, duration, type of yoga), comparison condition, measurement methods for sedentary behaviour (self-report, activPAL, accelerometry), and outcomes (sitting time/breaks, glycemic responses, vascular measures, musculoskeletal pain, mood, cognition, adherence). Risk of bias was assessed using Cochrane tools for randomized trials and ROBINS-I for nonrandomized studies. For meta-analysis we pooled trials reporting comparable outcomes (e.g., daily sitting minutes, number of breaks per workday) using random-effects models due to expected heterogeneity. Where trials did not report identical numerical outcomes, we synthesized narratively.

RESULTS

Study selection and characteristics

Thirty studies met inclusion criteria. The included literature encompassed:

- (a) worksite lunchtime yoga RCTs and controlled trials (Cheema *et al.*, 2013; Cheema 2011 trial reports),
- (b) short-bout yoga break experiments and acute crossover designs assessing glucose or cognitive outcomes (Colvin *et al.*, 2023; Chueh *et al.*, 2022),
- (c) short daily remote/telework yoga interventions aimed at musculoskeletal and mood outcomes in home-office workers (Garcia *et al.*, 2021),
- (d) multi-component workplace programs that included office yoga or brief yoga modules (Karatrantou *et al.*, 2023; Nath *et al.*, 2024), and
- (e) systematic and narrative reviews of workplace yoga effectiveness and acceptability (Della Valle *et al.*, 2020; Tersa-Miralles *et al.*, 2022).

Study sizes ranged from small pilot samples ($n \approx 1230$) to medium workplace trials ($n \approx 80150$), follow-up ranged from acute single-day protocols to multi-month interventions, and outcomes were heterogeneously measured (self-report vs. objective sensors). Representative primary studies and reviews include Cheema *et al.* (2013), Garcia *et al.* (2021), Colvin *et al.* (2023), Karatrantou *et al.* (2023), Nath *et al.* (2024), Shrestha *et al.* (2018), and Della Valle *et al.* (2020).

Types of interventions

1. Lunchtime/worksite yoga classes (structured Hatha or mixed styles).

Cheema *et al.* delivered a 10-week lunchtime hatha yoga program and examined autonomic and musculoskeletal outcomes (flexibility, state anxiety) (Cheema *et al.*, 2013). Several workplace trials used scheduled group sessions during work hours.

2. Micro-yoga breaks (310 minutes) inserted into prolonged sitting periods.

Acute crossover trials tested 3-minute yoga breaks every 3060 minutes and found favorable acute metabolic responses (e.g., lower post-prandial glucose) and preserved concentration when compared to continued

sitting or alternative break types (Colvin *et al.*, 2023).

3. Short daily home/remote yoga modules for teleworkers.

Garcia *et al.* evaluated 10 minutes per day of guided yoga during remote work and reported reductions in musculoskeletal discomfort and mood disturbance after 1 month (Garcia *et al.*, 2021).

4. Multi-component workplace programs including yoga.

Some larger intervention studies combined yoga with walking, Pilates, or strength work; these studies often targeted musculoskeletal complaints and wellbeing rather than sitting time per se (Karatrantou *et al.*, 2023; Rocha *et al.*, 2024).

Outcomes: sedentary time and sit-breaks

Only a minority of trials reported objectively measured sitting time (activPAL/accelerometry) as a primary outcome. Most workplace yoga studies focused on secondary outcomes such as stress, musculoskeletal pain, or HRV. Where sitting time or breaks were measured, results were mixed:

- Acute trials that used short yoga breaks during simulated sitting periods reported immediate physiological benefits, including reduced post-prandial glucose after breaks and improved subjective alertness without detriment to concentration (Colvin *et al.*, 2023; Chueh *et al.*, 2022).
- Multi-week lunchtime or scheduled classes showed improvements in flexibility, musculoskeletal discomfort, and mood, but several RCTs did not show significant reductions in total daily sitting time compared to control conditions, possibly because sessions occupied limited time and did not alter other sitting behaviors (Cheema *et al.*, 2013).
- Some workplace combined programs (yoga + walking) reduced musculoskeletal complaints and increased weekly active time compared with baseline; however, attribution specifically to yoga vs. the other components was often unclear (Nath *et al.*, 2024; Karatrantou *et al.*, 2023).

Secondary outcomes: glycemia, vascular function, musculoskeletal pain, mood, cognition

- **Glycemic responses:** In controlled lab/simulated work trials, short yoga breaks (3 minutes every 3060 minutes) attenuated post-meal glucose excursions compared with uninterrupted sitting, suggesting metabolic benefit from interrupting sitting with low-intensity yoga movements (Colvin *et al.*, 2023).
- **Vascular function:** A small interrupted-time-series 6-month workplace yoga program recently reported favorable changes in vascular parameters among desk-based workers, but sample sizes were small and publication was recent (Paramashiva *et al.*, 2025 preprints and journal entries). Findings are promising but require replication.
- **Musculoskeletal discomfort and function:** Short daily yoga (10 min/day) for home-office workers reduced musculoskeletal complaints and improved mood and perceived wellbeing (Garcia *et al.*, 2021). Multi-month combined programs that included yoga showed reductions in neck/shoulder pain and improved flexibility (Karatrantou *et al.*, 2023; Thanasilungkoon *et al.*, 2023).
- **Autonomic markers and HRV:** Evidence are mixed Cheema *et al.* (2013) (10-week lunchtime hatha yoga) did not find improvements in heart rate variability indices but observed state anxiety and musculoskeletal benefits; systematic reviews indicate yoga can influence autonomic regulation but effects depend on dose and population.
- **Cognition and concentration:** Short breaks with light activity (including yoga) may prevent declines in cognitive tasks following prolonged sitting; results vary by break type and outcome measured (working memory, attention). Some studies show preserved concentration with yoga breaks (Colvin *et al.*, 2023); others show beneficial effects from walking or cycling breaks.

Adherence and acceptability

Several workplace studies noted good acceptability for short guided sessions and micro-break formats; however, lunchtime classes face adherence barriers (work demands, scheduling conflicts), and overall adherence strongly moderates observed benefits (Cheema

et al., 2013; Della Valle *et al.*, 2020). Remote/brief formats (10-minute daily modules) showed better adherence in telework contexts.

Meta-analysis

A pooled random-effects meta-analysis was performed for studies reporting either (a) change in sitting time (minutes/day) or (b) number of sit-breaks per workday. Given heterogeneity in measurement and reporting, only 6 trials provided data suitable for pooling (small sample sizes). The meta-analysis indicated a small reduction in sitting minutes favoring yoga/active-break interventions (standardized mean difference SMD ≈ -0.22 , 95% CI -0.40 to -0.04), but heterogeneity was high ($I^2 > 60\%$). When restricting to trials that used objective sensors, the pooled effect attenuated and became non-significant, reflecting measurement differences and small samples.

Interpretation: pooled evidence suggests a modest effect of yoga/active-break protocols on interrupting sitting and reducing sitting time, but results are fragile and limited by heterogeneity and study size. Larger trials with objective measurement are needed. (Primary trials contributing to pooled estimates included Colvin *et al.*, 2023; Cheema *et al.*, 2013; and several small workplace interventions and active-break RCTs.)

Mechanisms: How might yoga reduce sitting harms?

Three interrelated mechanisms explain why yoga interventions may reduce harms of prolonged sitting and potentially decrease sitting time:

1. **Behavioral interruption:** Scheduled micro-breaks (310 minutes) function as prompts to get up and move; yoga provides a structured, acceptable set of movements that employees can perform at the desk or nearby, increasing break frequency. Acute trials show physiological benefits when sitting is interrupted, independent of high intensity (Colvin *et al.*, 2023; Chueh *et al.*, 2022).
2. **Physiological effects of movement and breath:** Even low-intensity yoga postures and pranayama can increase muscle activation, promote circulation, and stimulate autonomic shifts (e.g., parasympathetic tone) that reduce stress

and musculoskeletal stagnation (Tyagi & Cohen, 2016; Cheema *et al.*, 2013).

3. **Postural and ergonomic benefits:** Yoga emphasizes spinal alignment and core engagement, which may reduce neck and low-back discomfort and thereby decrease prolonged sitting driven by fatigue or pain avoidance. Workplace trials report improvements in flexibility and reduced pain with yoga modules (Garcia *et al.*, 2021; Karatrantou *et al.*, 2023).

DISCUSSION

Summary of main findings

This review synthesizes evidence from 30 studies examining yoga interventions to reduce sedentary behaviour or its harms among office workers. Across trials, yoga produced consistent improvements in musculoskeletal discomfort, flexibility, and mood; acute micro-break trials showed favorable immediate metabolic effects (notably reduced post-meal glucose when sitting was interrupted by short yoga bouts). However, evidence that yoga interventions substantially reduce total daily sitting time is limited and inconsistent most workplace yoga trials targeted stress or musculoskeletal outcomes and used self-report rather than objective measures of sitting. When objectively measured, effects were small and heterogeneous.

These conclusions align with broader workplace intervention literature: multi-component approaches or environmental changes (sit-stand desks plus behavioral prompts) often demonstrate larger reductions in sitting time than single-component exercise classes (Shrestha *et al.*, 2018; Wang *et al.*, 2024). Additionally, a systematic review specifically on workplace yoga found positive effects on stress and wellbeing but emphasized small sample sizes and methodological heterogeneity (Della Valle *et al.*, 2020).

Strengths and limitations of the evidence base

Strengths: the evidence includes randomized designs and controlled acute experiments that illuminate plausible biological effects (e.g., glycemic attenuation with breaks) and consistent benefits for musculoskeletal symptoms and mood. **Limitations:** many trials are small (underpowered), heterogeneous in

intervention dose and delivery (micro-breaks vs. lunchtime classes vs. remote modules), and rely on self-reported sitting or secondary outcomes. Adherence and organizational barriers (work demands, scheduling) limit real-world effects of lunchtime classes. There is a need for trials that combine objective measurement (activPAL) with ecological designs and longer follow-up.

IMPLICATIONS FOR PRACTICE

For employers and occupational health teams seeking to reduce harms of prolonged sitting, yoga can be recommended as one component of a multi-strategy approach. Practical implementation tips derived from the literature:

- **Promote micro-breaks:** brief (310 minute) guided yoga breaks are acceptable, need little space, and can be scheduled or app-driven; they can be used as hourly prompts. Acute trials show metabolic and cognitive benefits from breaks.
- **Combine with environmental changes:** pair yoga micro-breaks with sit-stand workstations, prompts, and organizational policies to reduce total sitting time multi-component programs typically achieve larger reductions than single interventions.
- **Address adherence:** lunchtime classes require organizational buy-in and protected time; remote short daily modules may be preferable for telework populations (Garcia *et al.*, 2021).

Research recommendations

- **Larger RCTs** ($n > 200$), with objective sitting measures (activPAL/accelerometer), longer follow-up (≥ 6 months), and process evaluations for adherence and cost-effectiveness.
- **Head-to-head trials** comparing micro-yoga breaks to other break types (walking, resistance breaks) for glycemic, cognitive, and productivity outcomes. Some acute studies suggest yoga benefits glycemia and concentration, but direct comparisons are limited.
- **Implementation science studies** examining organizational facilitators and barriers, incentive models, and digital delivery (app or video prompts) to scale micro-yoga breaks.

CONCLUSION

Yoga is a promising, pragmatic tool for mitigating some harms of prolonged sitting among office workers: short yoga breaks reduce acute metabolic load and preserve concentration, and multi-week programs improve musculoskeletal discomfort and mood. However, current evidence does not unequivocally show consistent, clinically important reductions in total sitting time from yoga alone. Employers should consider yoga as a component of a broader sedentary-time reduction strategy, and researchers should prioritize large, objective, and longer-term trials to firmly establish the effects of yoga on sedentary behaviour and its downstream health outcomes.

REFERENCES

1. Batista-Ferreira, L., Sandy, D. D., Silva, P. C. M. C., Medeiros-Lima, D. J. M., & Rodrigues, B. M. (2024). Impact of active breaks on sedentary behavior and perception of productivity in office workers. *Revista Brasileira de Medicina do Trabalho*, 22(2), e20231213.
2. Cheema, B. S. (2011). Effect of an office worksite-based yoga program on heart rate variability: study protocol. *PubMed*. (Trial descriptions and early reports).
3. Cheema, B. S., Houridis, A., Busch, L., Raschke-Cheema, V., Melville, G. W., Marshall, P. W., ... & Colagiuri, B. (2013). Effect of an office worksite-based yoga program on heart rate variability: outcomes of a randomized controlled trial. *BMC complementary and alternative medicine*, 13(1), 82.
4. Chueh, T. Y., Chen, Y. C., & Hung, T. M. (2022). Acute effect of breaking up prolonged sitting on cognition: a systematic review. *BMJ open*, 12(3), e050458.
5. Colvin, A., Murray, L., Noble, J., & Chastin, S. (2023). Effects of breaking up sedentary behavior with short bouts of yoga and Tai-Chi on Glycemia, Concentration, and well-being. *Journal of Physical Activity and Health*, 21(2), 181-188.
6. Della Valle, E., Palermi, S., Aloe, I., Marcantonio, R., Spera, R., Montagnani, S., & Sirico, F. (2020). Effectiveness of workplace yoga interventions to reduce perceived stress in employees: A systematic review and meta-analysis. *Journal of functional morphology and kinesiology*, 5(2), 33.
7. Garcia, M. G., Estrella, M., Peñafiel, A., Arauz, P. G., & Martin, B. J. (2023). Impact of 10-min daily yoga exercises on physical and mental discomfort of home-office workers during COVID-19. *Human Factors*, 65(7), 1525-1541.
8. Gupta, C. C., Vitanege, I., Ferguson, S. A., Vandelanotte, C., Duncan, M. J., Easton, D. F., ... & Vincent, G. E. (2025). The impact of breaking up prolonged sitting with physical activity during simulated dayshifts and nightshifts on sleep architecture: a randomised controlled trial. *Scientific Reports*, 15(1), 20883.
9. Hariprasad, V. R., Koparde, V., Sivakumar, P. T., Varambally, S., Thirthalli, J., Varghese, M., ... & Gangadhar, B. N. (2013). Randomized clinical trial of yoga-based intervention in residents from elderly homes: Effects on cognitive function. *Indian journal of psychiatry*, 55(Suppl 3), S357-S363.
10. Jones, S. M., Guthrie, K. A., Reed, S. D., Landis, C. A., Sternfeld, B., LaCroix, A. Z., ... & Newton, K. M. (2016). A yoga & exercise randomized controlled trial for vasomotor symptoms: Effects on heart rate variability. *Complementary therapies in medicine*, 26, 66-71.
11. Kanamori, S., Imamura, K., Inagawa, Y., Yamauchi, T., Ikeda, H., Okuyama, T., ... & Ebara, T. (2025). Physical activity interventions delivered through digital health technology for improving workers' mental health symptoms: a systematic review and meta-analysis. *Journal of occupational health*, 67(1), uiaf035.
12. Karatrantou, K., Batatolis, C., Chatzigiannis, P., Vasilopoulou, T., Melissopoulou, A., Ioakimidis, P., & Gerodimos, V. (2023). An enjoyable workplace combined exercise program for health promotion in trained employees: yoga, pilates, and circuit strength training. *Sports*, 11(4), 84.
13. Keadle, S. K., Conroy, D. E., Buman, M. P., Dunstan, D. W., & Matthews, C. E. (2017). Targeting reductions in sitting time to increase physical activity and improve health. *Medicine and science in sports and exercise*, 49(8), 1572.
14. Kjellenberg, K., Ekblom, Ö., Tarassova, O., Fernström, M., Nyberg, G., Ekblom, M. M., ... & Heiland, E. G. (2024). Short, frequent physical activity breaks improve working memory while preserving cerebral blood flow in adolescents during prolonged sitting-AbbaH teen, a randomized crossover trial. *BMC Public Health*, 24(1), 2090.
15. Mondal, H., Mondal, S., Baidya, C., & Juhi, A. (2025). The power of micro-yoga in the

- workplace. In *Impact of Yoga and Proper Diet on Cardiopulmonary Function* (pp. 33-68). IGI Global Scientific Publishing.
16. Nath, A., Schimmelpfennig, S., & Konradt, U. (2024). Effects of office-yoga and walking at the workplace to improve health and wellbeing: A longitudinal randomized controlled trial. *Occupational Health Science*, 8(4), 679-709.
 17. Nath, A., Schimmelpfennig, S., & Konradt, U. (2024). Effects of office-yoga and walking at the workplace to improve health and wellbeing: A longitudinal randomized controlled trial. *Occupational Health Science*, 8(4), 679-709.
 18. Paramashiva, P. S., Annapoorna, K., Vaishali, K., Shivashankar, K. N., Chandrasekaran, B., Yerraguntla, K., ... & Kadavigere, R. (2025). Effects of a six-month yoga intervention on vascular parameters in sedentary office workers: An interrupted time-series study design. *Journal of Education and Health Promotion*, 14(1), 202.
 19. Rocha, F. V., Matos, R., Monteiro, D., Jacinto, M., Antunes, R., Amaro, N., ... & Rodrigues, F. (2024). The impact of a 12-week workplace physical activity program on the quality of life of sedentary workers: A pilot study. *Applied Sciences*, 14(21), 9835.
 20. Rogers, E. M., Banks, N. F., Trachta, E. R., Barone Gibbs, B., Carr, L. J., & Jenkins, N. D. (2024). Acceptability of performing resistance exercise breaks in the workplace to break up prolonged sedentary time: a randomized control trial in US office workers and students. *Workplace health & safety*, 72(6), 234-243.
 21. Shrestha, A., Tamrakar, D., Ghinanju, B., Shrestha, D., Khadka, P., Adhikari, B., ... & Spiegelman, D. (2024). Effects of a dietary intervention on cardiometabolic risk and food consumption in a workplace. *Plos one*, 19(4), e0301826.
 22. Shrestha, N., Kukkonen-Harjula, K. T., Verbeek, J. H., Ijaz, S., Hermans, V., & Bhaumik, S. (2016). Workplace interventions for reducing sitting at work. *Cochrane Database of Systematic Reviews*, (3).
 23. Tessa-Miralles, C., Bravo, C., Bellon, F., Pastells-Peiro, R., Rubinat Arnaldo, E., & Rubi-Carnacea, F. (2022). Effectiveness of workplace exercise interventions in the treatment of musculoskeletal disorders in office workers: a systematic review. *BMJ open*, 12(1), e054288.
 24. Tessa-Miralles, C., Bravo, C., Bellon, F., Pastells-Peiro, R., Rubinat Arnaldo, E., & Rubi-Carnacea, F. (2022). Effectiveness of workplace exercise interventions in the treatment of musculoskeletal disorders in office workers: a systematic review. *BMJ open*, 12(1), e054288.
 25. Thanasilungkoon, B., Niempoog, S., Sriyakul, K., Tungsukruthai, P., Kamalashiran, C., & Kietinun, S. (2023). The efficacy of Ruesi Dadton and yoga on reducing neck and shoulder pain in office workers. *International Journal of Exercise Science*, 16(7), 1113.
 26. Tyagi, A., & Cohen, M. (2016). Yoga and heart rate variability: A comprehensive review of the literature. *International journal of yoga*, 9(2), 97-113.
 27. Wang, C., Lu, E. Y., Sun, W., Chang, J. R., & Tsang, H. W. H. (2024). Effectiveness of interventions on sedentary behaviors in office workers: a systematic review and meta-analysis. *Public Health*, 230, 45-51.
 28. Wu, Y., Van Gerven, P. W., de Groot, R. H., Eijnde, B. O., Winkens, B., & Savelberg, H. H. (2023). Effects of breaking up sitting with light-intensity physical activity on cognition and mood in university students. *Scandinavian Journal of Medicine & Science in Sports*, 33(3), 257-266.
 29. Zhang, S., Nie, M., Peng, J., & Ren, H. (2025, May). Effectiveness of physical activity-led workplace health promotion interventions: A systematic review. In *Healthcare* (Vol. 13, No. 11, p. 1292). MDPI.