

Original Research Article

Comparison of respiratory fitness and happiness levels in morning and evening walkers

Priyanka Singh*, Shraddha Singh, Archana Ghildiyal, Dileep Kumar Verma

Department of Physiology, King George's Medical University, Lucknow, Uttar Pradesh, India

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***Correspondence:**

Dr. Priyanka Singh,

E-mail: priyasingh0490@gmail.com

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ABSTRACT

Background: Walking is a simple and widely practised form of physical activity with well-established benefits for respiratory health and psychological well-being. Although exercise timing is known to influence physiological responses through circadian mechanisms, there is a lack of comparative data on the impact of morning versus evening walking on respiratory fitness and happiness in apparently healthy adults.

Methods: This cross-sectional analytical study was conducted in the department of physiology, KGMU, Lucknow. Seventy-two apparently healthy adults aged 18-45 years were enrolled and classified as morning walkers (n=36) or evening walkers (n=36) based on their routine exercise timing. Anthropometric and resting cardiovascular parameters were recorded. Respiratory fitness was assessed using the 6-minute walk test (6MWT), and psychological well-being was evaluated using the Oxford happiness questionnaire.

Results: Baseline demographic and anthropometric characteristics were comparable between groups. Morning walkers demonstrated a higher mean 6-minute walk distance than evening walkers, though the difference was not statistically significant. The mean happiness index score was also slightly higher among morning walkers. Correlation and regression analyses showed minimal association between happiness scores and anthropometric or pulmonary parameters.

Conclusions: Both morning and evening walking were associated with favorable respiratory fitness and happiness levels in healthy adults. Although no statistically significant differences were observed, morning walkers showed a consistent trend toward higher 6-minute walk distance and happiness index scores. These findings indicated that exercise timing did not significantly alter outcomes, while suggesting a possible modest influence of morning activity.

Keywords: Circadian rhythm, Happiness index, 6-minute walk test, Respiratory fitness, Walking

INTRODUCTION

Exercise has been acknowledged for a long time as essential for health, and among the various forms of exercise, walking remains one of the most accessible and sustainable options across age groups. Regular walking improves respiratory efficiency, enhances lung capacity, and supports cardiovascular function, thereby reducing the risk of chronic diseases and promoting overall physical fitness.¹ Because walking requires minimal equipment and can be easily incorporated into daily routines, it holds particular relevance in preventive and community health.

Beyond physical fitness, walking exerts a meaningful influence on psychological well-being. Consistent aerobic exercise has been linked to better mood, lower anxiety, and increased positive feelings.²⁻⁴ These benefits are partly mediated through exercise-induced neurochemical changes involving serotonin, dopamine, and endorphins, which contribute to emotional regulation and stress reduction.⁵ Importantly, these effects are not limited to short-term mood changes; sustained physical activity has been linked with long-term improvements in mental health and subjective well-being.⁶

An emerging area of interest in exercise research is the role of exercise timing. Human physiological functions follow circadian rhythms that regulate sleep-wake cycles, hormonal secretion, autonomic balance, and metabolic activity.^{7,8} Physical activity conducted at various times during the day may influence these rhythms, potentially influencing physical performance and psychological responses. Morning exercise has been suggested to align more closely with circadian hormonal patterns, particularly the cortisol awakening response, which may enhance alertness and physiological readiness.^{8,9} In contrast, evening exercise may contribute to stress reduction after daily activities, although its interaction with circadian regulation appears more variable.⁷

Respiratory fitness represents an important link between physical activity and overall physiological health. Efficient breathing supports optimal oxygen delivery, autonomic regulation, and cardiovascular performance.¹⁰ Functional measures such as the six-minute walk test (6MWT) provide a practical and validated assessment of submaximal exercise capacity and daily functional endurance.^{11,12} Improvements in walking performance have been associated with better respiratory coordination and endurance even among apparently healthy individuals.¹

Psychological well-being, often assessed using standardized tools such as the Oxford happiness questionnaire, reflects an individual's subjective experience of life satisfaction and emotional balance. Happiness has been shown to influence health behaviors, stress responses, and long-term health outcomes.⁶ People who participate in regular exercise typically express greater happiness and life contentment than those who are inactive.^{13,14} However, whether the timing of exercise modifies these psychological outcomes remains insufficiently explored.

Previous research has shown the effects of exercise on respiratory health and mental wellness individually, fewer studies have assessed both outcomes together in relation to exercise timing.^{8,15} Moreover, much of the available literature focuses on athletic or clinical populations, leaving limited evidence among apparently healthy adults who engage in habitual walking.

In the Indian context, where sedentary lifestyles are increasingly common, walking represents a practical and culturally acceptable form of physical activity.¹⁶ Understanding whether morning or evening walking is associated with differences in respiratory fitness and happiness may help refine simple lifestyle recommendations aimed at improving both physical and psychological well-being. It was hypothesized that individuals who engaged in morning walking would demonstrate better respiratory fitness and higher happiness index scores compared with those who walked in the evening. Therefore, the present study was undertaken to

compare respiratory fitness and happiness index among morning and evening walkers in apparently healthy adults.

METHODS

Study design and setting

After obtaining approval from the Institutional Ethics Committee of King George's Medical University, Lucknow, the work was carried out in the department of physiology using a cross-sectional approach over a period of one year, with due consideration to ethical requirements for studies involving human participants.

Study population

Apparently healthy adults aged 18 to 45 years were considered for inclusion. Participants were recruited from the local community through voluntary participation. Eligibility was confirmed using prespecified inclusion and exclusion criteria prior to recruitment, following which informed written consent was taken from participants.

Inclusion and exclusion criteria

The inclusion criteria was apparently healthy individuals, willing to participate, were able to do the six-minute walk test, and could follow the test instructions. The exclusion criteria was that if they were <18 years old or >45 years old, or if they had a history of cardiovascular, respiratory, psychiatric illness, pregnancy, medication use, smoking, substance abuse, menopausal syndrome, or any musculoskeletal or cognitive limitation that could interfere with test performance. People facing language barriers or those who did not give consent were not included.

Sample size

It was estimated using a standard formula that takes into account the anticipated difference and variability among groups. A total of 72 participants were enrolled, with 36 participants in each group.

Grouping of participants

Participants were categorized based on their habitual time of exercise.

Morning walkers included individuals who routinely performed walking or exercise in the morning hours up to 09:00 am

Evening walkers included individuals who routinely performed walking or exercise between 04:00 pm to 07:00 pm

Recording of baseline parameters

Baseline demographic and anthropometric information was collected for all participants. These comprised age,

gender and body mass index. Cardiovascular and respiratory parameters at rest, including blood pressure, pulse rate, and respiratory rate, were assessed under standardized conditions before the functional evaluation

Assessment of happiness index

Psychological well-being was assessed using the Oxford happiness questionnaire, a standardized 29-item self-report instrument designed to measure subjective happiness. Responses were recorded on a six-point Likert scale, with options extending from strong disagreement to strong agreement; negatively phrased statements were reverse-scored during analysis. The overall score was computed and divided by the quantity of items to generate the happiness index score.¹⁷

Assessment of respiratory fitness

The six-minute walk test was used to assess respiratory functional capacity, with the procedure carried out as per accepted guidelines.^{18,19} Participants completed a six-minute walking task along a level corridor, after which the distance walked was documented in metres. The test was conducted under supervision to ensure safety and uniformity, and participants were encouraged to walk at their own pace without running.

Data handling and confidentiality

All data were recorded in predesigned proformas and subsequently entered into electronic spreadsheets for analysis. Participant confidentiality was maintained by assigning identification codes, and personal identifiers were not used during analysis. Participation was entirely

voluntary, and individuals were free to discontinue involvement at any stage of the study.

Statistical analysis

Data were analysed in SPSS v24. Continuous variables were expressed as mean±standard deviation, group comparisons were performed using the independent t-test, and correlations were assessed between anthropometric, respiratory, and happiness variables, with significance set at $p < 0.05$.

RESULTS

The study population comprised 72 participants, with equal representation in the morning and evening walking groups.

Baseline participant characteristics are outlined (Table 1). The average age was comparable between morning walkers (30.67±6.71 years) and evening walkers (31.97±6.23 years). Gender distribution was almost uniform across both groups. No significant differences were identified in height, weight, or body mass index between the two groups (Table 1).

Resting cardiovascular and respiratory parameters are summarized in Table 2. Mean systolic blood pressure was 123.11±4.29 mmHg in morning walkers and 121.22±6.11 mmHg in evening walkers, while diastolic blood pressure values were 76.28±2.95 mmHg and 76.00±2.83 mmHg, respectively. Respiratory rate and pulse rate at rest were also similar between the two groups, and none of the resting physiological parameters showed statistically significant intergroup differences (Table 2).

Table 1: Baseline demographic and anthropometric characteristics of participants.

Parameters	Morning walkers (n=36)	Evening walkers (n=36)	P value
Age (years)	30.67±6.71	31.97±6.23	0.43
Sex (Male/Female)	19/17	18/18	—
Height (cm)	163.53±7.33	161.61±7.28	0.28
Weight (kg)	64.50±5.85	62.83±4.97	0.18
BMI (kg/m ²)	24.60±0.82	23.77±4.16	0.29

Values expressed as mean±standard deviation unless stated otherwise.

Table 2: Resting cardiovascular and respiratory parameters of participants.

Parameter	Morning walkers (Mean±SD)	Evening walkers (Mean±SD)	P value
Systolic BP (mmHg)	123.11±4.29	121.22±6.11	0.15
Diastolic BP (mmHg)	76.28±2.95	76.00±2.83	0.68
Pulse rate (beats/minute)	84.94±5.27	85.28±5.13	0.79
Respiratory rate (breaths/minute)	17.03±0.81	16.97±0.81	0.74

Values are expressed as mean ± standard deviation.

Table 3: Comparison of respiratory fitness and happiness index between morning and evening walkers.

Parameter	Morning walkers (Mean±SD)	Evening walkers (Mean±SD)	t value	P value
6-minute walk distance (m)	454.44±59.35	435.00±41.92	1.52	0.13
Happiness index score	4.25±0.48	4.11±0.44	1.44	0.15

Values are expressed as mean±standard deviation. Intergroup comparison was performed using independent t-test.

Table 4: Correlation between anthropometric parameters and 6-minute walk distance (6MWT).

Outcome variable	Height (cm) (r)	Weight (kg) (r)	BMI (kg/m ²) (r)
6-minute walk distance (m)	0.57	0.56	0.07

Pearson correlation coefficients (r).

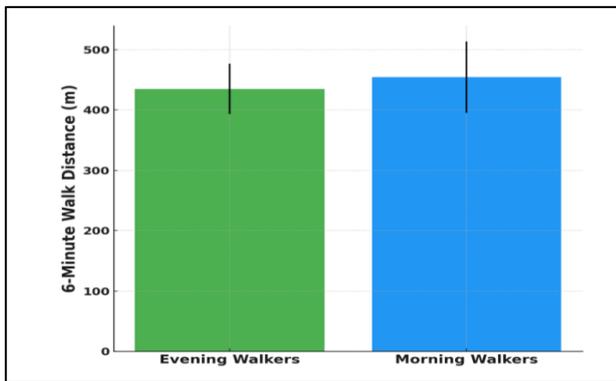


Figure 1: 6MWT between morning and evening walkers.

Bars represent mean 6-minute walk distance and error bars indicate standard deviation. Morning walkers demonstrated a higher mean walk distance compared to evening walkers; however, the difference was not statistically significant.

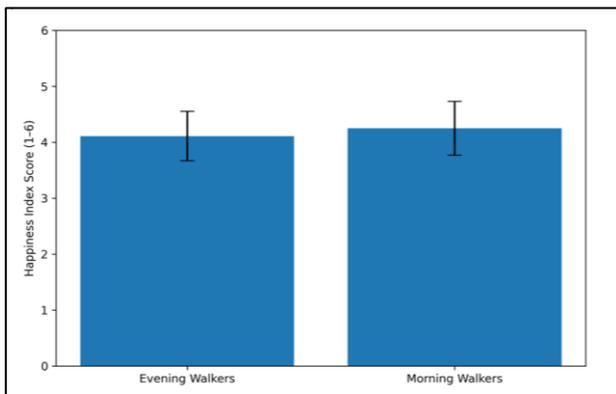


Figure 2: Overall happiness index scores in morning and evening walkers.

Bars represent mean happiness index scores and error bars indicate standard deviation. The difference between morning and evening walkers was not statistically significant.

The comparison of respiratory fitness and overall happiness index between morning and evening walkers is presented in Table 3. Morning walkers demonstrated a higher mean 6-minute walk distance (454.44±59.35 m) compared to evening walkers (435.00±41.92 m); however,

this observed difference did not reach statistical significance (p=0.13). Similarly, the mean happiness index score was slightly higher among morning walkers (4.25±0.48) than evening walkers (4.11±0.44), with no statistically significant difference between groups (p=0.15). These comparisons are illustrated in Figure 1 and Figure 2, respectively (Table 3).

Correlation analysis between anthropometric parameters and 6-minute walk distance revealed a moderate positive correlation with height (r=0.57) and weight (r=0.56), while the correlation with body mass index was weak (r=0.07) (Table 4).

Correlation analysis revealed that happiness index scores showed minimal association with the measured physiological variables. Very weak correlations were observed with six-minute walk distance (r=0.05), pulse rate (r=-0.02), respiratory rate (r=-0.13), systolic blood pressure (r=-0.16), diastolic blood pressure (r = 0.12), and body mass index (r=-0.09), suggesting little linear relationship between psychological well-being and these physiological measures (Table 5).

Table 5: Correlation between happiness index and physiological variables.

Variable	Correlation coefficient (r)
6-minute walk distance (m)	0.05
Pulse rate (beats/minute)	-0.02
Respiratory rate (breaths/minute)	-0.13
Systolic BP (mmHg)	-0.16
Diastolic BP (mmHg)	0.12
BMI (kg/m²)	-0.09

Pearson correlation coefficients (r)

The distribution of participants across respiratory fitness categories and happiness index categories was comparable between morning and evening walkers. No statistically significant association was observed between time of walking and categorical distribution of respiratory fitness or happiness levels (Figure 3).

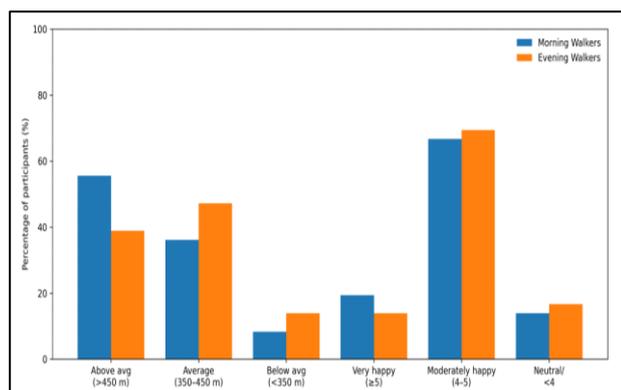


Figure 3: Distribution of respiratory fitness and happiness categories by time of walking.

The figure illustrates the percentage distribution of participants across respiratory fitness categories based on 6-minute walk distance and happiness index categories. No statistically significant association was observed between time of walking and category distribution.

DISCUSSION

The present study compared respiratory fitness and psychological well-being between morning and evening walkers and demonstrated that both groups showed largely comparable outcomes. Although morning walkers exhibited slightly higher mean values for 6-minute walk distance and happiness index scores, these differences were not statistically significant. This finding indicated that the timing of walking alone did not significantly influence functional exercise capacity or subjective well-being in healthy adults.

Respiratory fitness, assessed using the 6-minute walk test, was marginally higher among morning walkers. Earlier studies have indicated that when total physical activity is sustained, the timing of aerobic exercise has little influence on gains in cardiorespiratory fitness, as reported by Lin et al.¹¹ The absence of a statistically significant difference in the present study suggested that maintaining regular walking habits appeared to outweigh the influence of exercise timing.

Resting cardiovascular and respiratory parameters were comparable between morning and evening walkers. Similar observations have been described by Warburton and Bredin, who noted that regular physical activity was linked to stable resting cardiovascular measures, independent of exercise timing.⁸ The similarity in systolic and diastolic blood pressure, pulse rate, and respiratory rate between groups supported the view that regular walking contributed to maintained baseline physiological homeostasis.

Psychological well-being, assessed using the happiness index, was moderately high in both groups, with morning walkers demonstrating slightly higher mean scores. A similar association between physical activity and improved subjective well-being had been reported by An

et al, who observed positive relationships between regular physical activity and happiness and life satisfaction.¹⁹ The absence of a significant difference between groups indicated that walking, regardless of time of day, was associated with similar psychological benefits.

Correlation analysis revealed a moderate positive association between 6-minute walk distance and anthropometric parameters such as height and weight, while body mass index showed only a weak relationship with walking performance. Comparable observations had been reported by Mereles et al, who found that structural and functional capacity influenced exercise performance more prominently than body mass index in physically active individuals.¹² This indicated that linear body dimensions may have played a greater role in walking efficiency within a relatively healthy population.

The happiness index demonstrated negligible correlations with respiratory fitness, cardiovascular parameters, and anthropometric variables. Similar findings had been described by Diener et al, who reported that subjective well-being was influenced by multiple psychosocial factors and could not be explained solely by physical or physiological measures.⁶ This supported the observation that happiness levels in the present study were largely independent of measurable fitness indicators.

Overall, the findings of the present study suggested that regular walking, irrespective of whether it was performed in the morning or evening, was associated with comparable respiratory fitness and psychological well-being. While minor trends favored morning walking, the absence of statistically significant differences emphasized the importance of consistency in physical activity rather than the timing of exercise.

Interpretation of the findings should account for the limited sample size (n=72), which may have restricted sensitivity for detecting smaller intergroup differences. The cross-sectional study design restricted the ability to assess long-term changes in respiratory fitness or happiness levels over time. Adherence to walking routines and certain lifestyle factors were self-reported, which may have introduced recall bias. Additionally, other potential confounding variables such as dietary habits, sleep quality, and stress levels were not objectively measured or controlled. Finally, the study population consisted of healthy urban adults, which may limit the generalizability of the findings to individuals with chronic medical conditions, rural populations, or different age groups.

CONCLUSION

The study compared respiratory fitness and happiness levels between morning and evening walkers and found no statistically significant differences between the two groups. However, morning walkers demonstrated slightly higher mean 6-minute walk distance and happiness index scores. Baseline anthropometric and physiological parameters were comparable, suggesting that these trends

were related to exercise timing rather than pre-existing differences. The findings partially supported the study hypothesis and indicated that while both morning and evening walking were beneficial, morning walking may offer a modest advantage in respiratory fitness and psychological well-being.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of King George's Medical University, Lucknow

REFERENCES

- Murtagh EM, Nichols L, Mohammed MA, Holder R, Nevill AM, Murphy MH. The effect of walking on risk factors for cardiovascular disease: an updated systematic review and meta-analysis of randomized controlled trials. *Prev Med.* 2015;72:34-43.
- Thun E, Bjorvatn B, Flo E, Harris A, Pallesen S. Sleep, circadian rhythms, and athletic performance. *Sleep Med Rev.* 2015;23:1-9.
- Youngstedt SD, Elliott JA, Kripke DF. Human circadian phase-response curves for exercise. *J Physiol.* 2019;597(8):2253-68.
- Reed J, Buck S. The effect of regular aerobic exercise on positive-activated affect: A meta-analysis. *Psychol Sport Exerc.* 2009;10(6):581-94.
- Netz Y. Is the comparison between exercise and pharmacologic treatment of depression evidence-based? *Front Pharmacol.* 2017;8:257.
- Diener E, Pressman SD, Hunter J, Delgado-Chase D. If, why, and when subjective well-being influences health. *Appl Psychol Health Well Being.* 2017;9(2):133-67.
- McDowell CP, Dishman RK, Gordon BR, Herring MP. Physical activity and anxiety: A systematic review and meta-analysis. *Am J Prev Med.* 2019;57(4):545-56.
- Warburton DER, Bredin SSD. Health benefits of physical activity: a systematic review. *Curr Opin Cardiol.* 2017;32(5):541-56.
- Courtney R. The functions of breathing and its dysfunctions. *Int J Osteopath Med.* 2009;12(3):78-85.
- Budde H, Wegner M, Soya H, Völker K, Barten J, Szabo A. Neuroscience of exercise: Neuroplasticity and behavioral consequences. *Neural Plast.* 2016;2016:3643879.
- Lin X, Zhang X, Guo J, Roberts CK, McKenzie S, Wu WC, et al. Effects of exercise training on cardiorespiratory fitness: a systematic review and meta-analysis. *J Am Heart Assoc.* 2015;4(7):e002014.
- Mereles D, Ehlken N, Kreuzer S, Ghofrani S, Hoepfer MM, Halank M, et al. Exercise and respiratory training improve exercise capacity. *Circulation.* 2006;114(14):1482-9.
- Gabriel BM, Zierath JR. Circadian rhythms and exercise- re-setting the clock. *Nat Rev Endocrinol.* 2019;15(4):197-206.
- Shen B, Zheng H, Liu H, Yang G. Differential benefits of morning vs evening aerobic exercise. *Sci Rep.* 2025;15(1):11359.
- Morales-Palomo F, Moreno-Cabañas A, Alvarez-Jimenez L, Mora-Gonzalez D, Ortega JF, Mora-Rodriguez R. Morning versus afternoon aerobic exercise training. *J Physiol.* 2024;602(23):6463-77.
- Thomas JM, Kern PA, Bush HM, McQuerry KJ, Black WS, Clasey JL, et al. Circadian rhythm phase shifts caused by timed exercise. *Am J Physiol Regul Integr Comp Physiol.* 2020;318(5):R983-93.
- Brito LC, Marin TC, Azevêdo L, Rosa-Silva JM, Shea SA, Thosar SS. Chronobiology of exercise. *Compr Physiol.* 2022;12(3):3621-39.
- Bu F, Bone JK, Fancourt D. Will things feel better in the morning? *BMJ Ment Health.* 2025;28:e301418.
- An HY, Chen W, Wang CW, Yang HF, Huang WT, Fan SY. Physical activity and life satisfaction and happiness. *Int J Environ Res Public Health.* 2020;17(13):4817.
- Panza GA, Taylor BA, Thompson PD, White CM, Pescatello LS. Physical activity intensity and subjective well-being. *J Health Psychol.* 2019;24(9):1257-67.
- Novotová K, Šulcová M, Kašparová D, Novotný M. Influence of walking to improve lung function. *Int J Environ Res Public Health.* 2022;19(13):7852.
- Hower IM, Harper SA, Buford TW. Circadian rhythms, exercise, and cardiovascular health. *J Circadian Rhythms.* 2018;16:7.
- Kim N, Ka S, Park J. Effects of exercise timing on circadian rhythm and sleep quality. *Phys Act Nutr.* 2023;27(3):52-63.
- Gallagher MW, Lopez SJ, Preacher KJ. The hierarchical structure of well-being. *J Personal.* 2009;77(4):1025-50.

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