Research Article

An investigation on health recommended steps per day among university students in Katima Mulilo of Zambezi Region, Namibia.

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Abstract

Regular daily step counts is an innate system of measurement that has proved success in encouraging physical activity in young people and may hold prospective for future public health physical activity sanctions. The main objective of this study was to investigate on health recommended steps per day among university students in Katima Mulilo of Zambezi Region, Namibia. This employed quantitative research design in its approach, as this methods was found suitable to collect and analyse in depth information that is related to the study phenomenon. This study consisted of n = 200 university students, who were randomly selected on the basis of either they should be residing in hostels on campus or commuting to and from the university on a daily basis. Data was collected using questionnaires, to determine participants' walked distance: or to get a more accurate length, the research multiplied the number of steps or strides by participant's average step length in meters, for instance, if the participant's average step is 0.76 meters, then 10,000 steps would be 10,000×0.76=7,600 meters, or 7.6 km. Data was analysed using IBM SPSS Statistics software, which involved an organised procedure of data preparation, analysis using numerous statistical methods, and interpretation of the results. The study results shows that under the category of sedentary in 12 weeks or (3 months) only a total of n = 211 students walked less than < 5,000 steps/day which is also equivalent to ≤ 3 to 4 km, under the category of low active in 12 weeks or 3 months, the large number of n = 1715 of participants walked between 5,000 to 7,499 steps per day which is equivalent to 5 to 6 km, under the category of low active in 12 weeks or 3 months, the large number of n = 1715 of participants walked between 5,000 to 7,499 steps per day which is equivalent to 5 to 6 km, under the category of somewhat active in 12 weeks or 3 months the second highest number of n = 413 students walked between 7,500 - 9,999 steps per day, equivalent to 7 to 8 km, under the category of active in 12 weeks or 3 months a less total of n = 49 participants walked ≥ 10,000 steps per day, equivalent to 8 to 9 km, and under the category of high active in a period of 12 weeks or 3 months a few n = 26 participants walked 12,500 steps per day, equivalent to more than ≥10,000 km. Therefore it can be concluded from this study that habitually attaining the suggested daily steps gives substantial cardiovascular advantages by increasing the heart muscle and enhancing blood circulation to all parts of the body. This reliable activity level is helpful in weight control and management, helping to maintain a healthy digestion and burn calories appropriately. Furthermore, this study found that walking contributes to a healthier emotional well-being, as physical activity is acknowledged to reduce signs of depression and anxiety and boost individual's daily mood. Devoting to regular daily steps helps in the stoppage and controlling of chronic health conditions, such as high blood pressure and type 2 diabetes. The low-effect nature of walking helps and supports joint health and increases bone intensity, decreasing the danger of osteoporosis.

Keywords: investigation, recommended, steps/day, university students, Katima Mulilo

Introduction

The health advantages of physical activity for individuals of all ages, capability levels, and sociodemographic conditions are well-recognised (Hall, 2020). Walking is an essential factor of public health promotion efforts and physical activity, and daily step counts have demonstrated success as a objective for achieving suggested amounts of physical activity in adults (Tudor-Locke et al, 2011). In addition, the extension of wearable activity monitors and smartphones with activity-tracking abilities onto the industrial marketplace over the last 15 years has carried the "steps per day" activity system of measurement into households and health care systems worldwide (Blanton, 2025). The enhancing presence and use of self-observing devices and the availability of daily step counts as a physical activity objective among the overall population make it an significant aide to current public health standards (American Institute for Cancer Research, 2017).

Research shows that on a regular basis, Americans walk just under 5,000 steps per day. It's thus a worrying number, given that public-health scientists deem daily step count of less than 5,000 to be inactive, and sedentary living wear down health, heading to earlier death (Greenword, 2025). Moreover, in a research published on the 28th October

in the Journal of Annals of Internal Medicine, researchers discovered that amid more than 30,000 individuals in United Kingdom. who walked less than 8,000 steps per day, getting steps in prolonged walks rather than increasing them bit by bit was associated to a decreased probability of death and heart disease (Cheng et al, 2023). Research have revealed that consistent activity, containing walking, offers a number of health advantages, including a reduced risk of: certain cancers, including breast and colon cancer, depression, obesity, diabetes, high blood pressure, and heart disease and stroke (Lal, 2023).

According to the American Council on Exercise (2015) revealed and discovered that, individuals who trace their steps take a regular of 2,500 extra steps per day than those who do not. Thus, if you are one of the many masses who take part in a pursuit to hit the generally suggested 10,000 steps per day target, your hard work will not go uncompensated.

Numerous research outcomes have acknowledged that physical sedentary is a world-wide health problem, documented as a life-threatening adjustable danger aspect for chronic diseases like cardiovascular disease, type 2 diabetes, certain cancers, and premature mortality (World Healt Organisation, 2024). Public health establishments globally, including the U.S. Centers for Disease Control and Prevention, the American Heart Association and the famous World Health Organization, consistently and steadily support for daily regular physical activity to alleviate these health hazards (Ding et al, 2025). The commonly established target of 10,000 steps per day, while widespread, initially curtailed from a 1960s Japanese selling operation for pedometers relatively than healthy systematic proof. In the years since, the propagation of smartphone applications and body wearable capability trackers has made daily step count very easy and available system of measurement for observing physical activity, encouraging a wealth of exploration to regulate a proof-based best daily step objective for numerous health results and people (World Health Organisation, 2020).

This current study has exposed a more nuanced image than the only, worldwide figure. In contrast any aggregate of physical activity is believed progress than nothing, and health advantages rise as step counts increase, current big-scale meta-studies recommend that the advantages for numerous health results could be stagnant or plateau prior to attainment 10,000 steps (Katzmarzyk et al, 2022). For example, according to a 2022 meta-analysis study report published in The Lancet Public Health discovered that for grownups at 60 years and above, the danger of early death levelled off at roughly around between 6,000 to 8,000 steps per day, whereas for younger people (below 60 years), the benefits stretched approximately between 8,000 to 10,000 steps everyday (Ding et al, 2016). This study underlines that a "single-size-fits-all analogue" method could be unacceptable and that suggestions must be modified to age, recent fitness level, and basic health specifications (Ding et al, 2020).

Present physical activity directives from key health federations usually concentrate on gathering a specific time of reasonable-to-dynamic strength physical activity, frequently stipulated as at minimum of 2 hours and 30 minutes or 150 minutes per week (Bassett, 2017). Interpreting this time-grounded system of measurement into a widespread step count has shown to be complicated because of individual differences in walking pace and step length (Stamatakis et al, 2023). Nevertheless, studies relating steps with MVPA advocate that attaining the suggested activity levels connects to a variety of roughly 7,000 to 11,000 steps per day, dependent on the force and whether the steps are accrued in non-stop bouts or through everyday related activities (Kraus et al, 2019).

The detach involving the accepted 10,000-step objective and the nuanced outcomes of scientific or systematic studies can be a main source of uncertainty and hypothetical deterrent for people intending to improve their wellbeing (Banach et al, 2023). Thus, for countless sedentary people, beginning with an attainable increase in intensity of a little thousand steps from their set of results can be more good for attitude change and preliminary health benefits than an threatening 10,000-step objective (Jayedi et al, 2022). The existing amount of literature consequently points to a necessity for unblemished, proof-based direction that boosts advanced increase in intensity in activity, accenting that considerable health advantages begin to increase at step counts well under 10,000 per day (Liu et al, 2022).

Problem Statement

The commonly suggested aim for health is roughly 10,000 steps per day; nevertheless, precise health institutions and studies propose that substantial advantages start at lower levels (Lefferts et al, 2023). The best amount of steps can differ based on aspects such as age, present fitness level, and detailed health objectives. Regular, physical activity is the fundamental idea, as even reasonable increases in everyday step counts have been to enhanced cardiac health and reduced probability of chronic illnesses (Hall et al, 2020). Therefore, the main objective of this study was to investigation on health recommended steps per day among university students in Katima Mulilo of Zambezi Region, Namibia.

Research Questions

What are the health recommended walking steps per day?

Materials And Methods

This research employed a quantitative approach in its design, this method was found suitable as it allowed the researchers to structure objective plans to collect and analyse numerical data, run comparison, examine association among variable quantity and take a broad view of findings to a broader population. This study consisted of n = 200 university students, who were randomly selected on the basis of either they should be residing in hostels on campus or commuting to and from the university on a daily basis. Data was collected using simple questionnaires; this below information was incorporated in the questionnaires to ensure required data from participants is gathered:

	10,000 steps is roughly 7 to 8 kilometres, however the accurate distance differs based on a person's step or stride length. On average, it takes about 10,000 steps to cover a distance of 7.6 km to 8 km.
	Usual approximation: 10,000 steps is about 8 kilometres. Aspects that impact distance: Your height, speed, and total stride length influence the accurate distance.
	Determining your distance: To get a more accurate length, you can multiply the number of steps or strides by your average step length in meters. For instance, if your average step is 0.76 meters, then 10,000 steps would be 10,000×0.76=7,600 meters, or 7.6 km.

Data analysis

Data was analysed using IBM SPSS Statistics software, which involved an organised procedure of data preparation, analysis using numerous statistical methods, and interpretation of the results.

Results

This section of this research shows the results of this research derived from the question: "What are the health recommended walking steps per day?". The results of this research shows 12 weeks health steps walked by students per day, converted in kilometres and categorised into sedentary, low active, somewhat active, active and high active. In week 1, 23 (11.5%) students under sedentary category walked a distance of less than <5,000 steps/day (= 3 to 4 km), 119 (59.5%) of students under low active category walked between 5,000 to 7,499 steps/day (= 5 to 6 km), 45

(22.5%) of students under the category of somewhat active walked between 7,500 -9,999 steps/day (= 7 to 8 km), 10 (5%) of student under the active group walked more than >10,000 steps/day (= 8 to 9 km), 3 (1.5%) of students under the high active group walked more than > 12,500 steps/day (= 10 km >).

In week 2, 30 (15%) of students under sedentary group walked less than < 5,000 steps/day (= 3 to 4 km), 131 (65.5%) of students under the group of low active walked between 5,000 and 7,499 steps/day (= 5 to 6 km), 39 (19%) of students under the category of somewhat active, walked 7,500 to 9,999 steps/day (= 7 to 8 km), no students were found under active and high active categories in week 2.

In week 3, 25 (12.5%) of students under the category of sedentary walked less than < 5,000 steps/day (= 3 to 4 km), 141 (70.5%) of students under the group of low active walked between 5,000 to 7,499 (= 5 to 6 km), 32 (16%) of students under the category of somewhat active walked between 7,500 to 9,999 (= 7 to 8 km), 1(0.5%) of students under the category of active walked ≥ 10,000 steps/day (= 8 to 9 km) and 1(0.5%) of students under the category of high active walked more than ≥ 12,500 steps/day (10 km ≥).

In week 4, 15 (7.5%) of students under the category of sedentary walked less than 5,000 steps/day (3 to 4 km), 152 (72%) of students under the category of low active walked between 5000 to 7,499 steps/day (5 to 6 km), 29(14.5%) of students under the category of somewhat active walked between 7,500 to 9,999 steps/day (7 to 8 km), 2(1%) of students under the category of active walked above > 10,000 steps/day (8 to 9 km), 2(1%) of students under the group of high active walked above > 12,500 steps/day (= 10 km >).

In week 5, 10(5%) of students under the category of sedentary walked less than < 5,000 step/day (= 3 to 4 km), 151(75.5%) of students under the group of low active walked 5,000-7,499 steps/day (= 5 to 6 km), 35(17.5%) of students under the category of somewhat active walked between 7,500 to 9,999 steps/day (= 7 to 8 km), 3(1.5%) of the students under the category of active walked ≥ 10,000 steps/day (= 8 to 9 km), and 2(1%) of students under the category of high active walked ≥ 12,500 steps/day.

In week 6, 12(6%) of students under the category of sedentary walked less than < 5,000 steps/day (= 3 to 4 km), 160 (80%) of students under the category of low active walked 5,000 – 7,499 steps/day (= 5 to 6 km), 10(5%) of students under the category of somewhat active walked between > 7,500 to 9999 steps/day (= 8 to 9 km), 10(5%) of students under the category of active walked ≥ 10,000 step/day (= 8 to 9 km), and 8(4%) of students under the category of high active walked above ≥ 12,500 steps/day (= 10 km >).

In week 7, 18(9%) of students under the category of sedentary walked less than < 5,000 steps/day (= 3 to 4 km), 139(69.5%) of students under the category of low active walked between 5,000 to 7,499 steps/day, 50(25%) of the students under the category of somewhat active walked between 7,500 to 9,999 step/day, 4(2%) od students under the category of active walked above ≥10000 steps/day, 3(1.5%) of students under the category of high active walked above ≥ 12500 (10 km >).

In week 8, 23(11.5%) of students under the category of sedentary walked less than 5,000 steps/day(= 3 to 4 km), 128(64%) of students under the category of low active walked between 5,000 to 7,499 steps/day, 50(25%) of students under the category of somewhat active walked between 7,500 to 9,999 steps/day, 4(2,5%) of students under the category of active walked above ≥ 10,000 steps/day, and 3(1,5%) of students under the category of high active walked more than ≥ 12,500 steps/day (10 km ≥).

In week 9, 19(9.5%) of students under the category of sedentary walked less than <5,000 steps/day (3 to 4 km), 175(87.5%) of students under the category of low active walked 5,000 to 7,499 steps/day (= 5 to 6 km), 4(2%) of students under the category of somewhat active walked 7,500 to 9,999 steps/day (= 7 to 8 km), 1(0.5%) of students under the category of active walked ≥ 10,000 steps/day (= 8 to 9 km), and 1(0.5%) of students under the category of high active walked more than ≥ 12,500 steps/day (= 10 km ≥).

Week 10, 9(4.5%) of students under the category of sedentary walked less than < 5,000 steps/day (= 3 to km), 180(90%) of students under the category of low active walked between 5,000 to 7,499 steps/day (= 5 to 6 km), 9(4.5%) of students under the category of somewhat active walked between 7,500 to 9,999 steps/day (7 to 8 km), 1(0.5%) of participants under the category of active walked more than ≥ 10,000 steps/day (= 8 to 9km), and 1(0.5%)

of participants under the category of high active walked more than 12,500 step/day (= 10 km ≥).
Week 11, 7(3.5%) of students under the category of sedentary walked less than < 5,000 steps/day (= 3 to 4 km), 108(54%) of students under the group of low active walked between 5,000 to 7,499 steps/day (5 to 6 km), 80(40%) of participants under the category of somewhat active walked between 7,500 to 9,999 steps/day (= 7 to 8 km), 3(1.5%) of students under the category of active walked over ≥ 10,000 steps/day (= 8 to 9 km), and 2(1%) of participants under the category of high active walked more than ≥ 12,500 steps/day (= 10 km >).
Week 12, 20(10%) of participants under the category of sedentary walked less than < 5,000 steps/day (= 3 to 4 km), 131 (65.5%) of participants under the category of low active walked between 5,000 to 7,499 steps/day (= 5 to 6 km), 40 (20%) of students under the category of somewhat active walked between 7,500 to 9,999 steps/day (7 to 8 km), 9(4.5%) of participants under the group of active walked ≥ 10,000 steps/day (= 8 to 9 km), and lastly 0(0%) of students were found in high active category in week 12.

Table 1: Categories, kilometres, weeks and walked steps per day

Categories	Sedentary < 5,000 steps/day	Low active 5,000 -7,499 steps/day	Somewhat active 7,500 - 9,999 steps/day	Active ≥ 10,000 steps/day	High active ≥ 12,500 steps/day
Kilometres	3 to 4 km	5 to 6 km	7 to 8 km	8 to 9 km	10 km ≥
Weeks					
week 1	23 (11.5%)	119 (59.5%)	45 (22.5%)	10 (5%)	3 (1.5%)
week 2	30 (15%)	131 (65.5%)	39 (19.5%)	0 (0%)	0 (0%)
week 3	25 (12.5%)	141 (70.5%)	32(16%)	1 (0.5%)	1 (0.5%)
week 4	15 (7.5%)	152 (72%)	29(14.5%)	2 (1%)	2 (1%)
week 5	10 (5%)	151 (75.5%)	35 (17.5%)	3 (1.5%)	1 (0.5%)
week 6	12 (6%)	160 (80%)	10 (5%)	10 (5%)	8 (4%)
week 7	18 (9%)	139 (69.5%)	50 (25%)	4 (2%)	3 (1.5%)
week 8	23 (11.5%)	128 (64%)	40 (20%)	5 (2.5%)	4 (2%)
week 9	19 (9.5%)	175 (87.5%)	4 (2%)	1 (0.5%)	1 (0.5%)
week 10	9 (4.5%)	180 (90%)	9 (4.5%)	1 (0.5%)	1 (0.5%)
week 11	7 (3.5%)	108 (54%)	80 (40%)	3 (1.5%)	2 (1%)
week 12	20 (10%)	131 (65.5%)	40 (20%)	9 (4.5%)	0 (0%)
Total/average	211	1715	413	49	26

Discussions

This section of this study discusses the results in relationship to similar researches that were done prior. The main purpose of this research was to investigate walked healthy recommended steps per day among university students in Katima Mulilo of Zambezi Region, Namibia. The study results shows that under the category of sedentary in 12 weeks or (3 months) only a total of n = 211 students walked less than < 5,000 steps/day which is also equivalent to ≤ 3 to 4 km. These study results are supported by Tudor-Locke et al (2011) whose findings alludes that though a detailed world-wide figure of people who are sedentary is not available, several data indicate a substantial percentage of the world population is sedentary, with countless people walking less than 5,000 steps a day, which is also approximately less than 3 to 4 kilometres on average. Moreover, these results above coincides with a report by Blanton (2025) which found that In a Belgian 12.9% people took fewer than 5,000 steps per day, whilst in exact Australian try out, records were approximately 6.2% to 8.2% for young people. Moreover, in Indonesia reports shows that the country has lowest national averages, at roughly 3,531 steps per day. According Galvin (2025) mentioned

that people who walk less than 3,000 to 4,000 steps per day are prone to numerous chronic diseases linked with a sedentary lifestyle, often described to as "sitting disease". These illnesses and health dangers include: cardiovascular diseases, metabolic and weight-related conditions, cancers, bone, muscle and joint health, mental and cognitive health. The results of this study shows that under the category of low active in 12 weeks or 3 months, the large number of n = 1715 of participants walked between 5,000 to 7,499 steps per day which is equivalent to 5 to 6 km. These results are supported by Michalopoulou et al (2011) whose results suggest that the arrangement of 5,000 to 7,499 steps per day is broadly regard as to be a "low active" daily life, agreeing to a generally used indicator in research. This range predictably shows daily activity not including specific sports or defined exercise. Moreover, the results are further supported by Aranyavalai et al (2020) whose study outcomes emphasised that walking 5,000 to 7,499 steps per day is reflected as "low active" and offers substantial health advantages, such as decreased danger of chronic diseases such as diabetes, heart disease, and cancer, as well as enhancements in mood, blood sugar levels, and overall death. At this level of activity research suggest it is much better in comparison to sedentary lifestyle and gives several of the similar advantages as the higher-step suggestions, notably involving cardiac and psychological health. This study results shows that under the category of somewhat active in 12 weeks or 3 months the second highest number of n = 413 students walked between 7,500 - 9,999 steps per day, equivalent to 7 to 8 km. These study results correspond with Molumphy (2024) whose's findings revealed that walking 7,500 to 9,999 steps per day give substantial profits, with better cardiovascular health, a lesser danger of chronic sicknesses such as type 2 diabetes and dementia, improved mood, and better weight control. This level of activity can similarly lead to boosted long life and better brain health, whereas building power and stability.

The study results shows under the category of active in 12 weeks or 3 months a less total of n = 49 participants walked ≥ 10,000 steps per day, equivalent to 8 to 9 km. These results correspond to Nuffield Health (2023) walking ≥10,000 steps a day gives several health advantages, like enhanced cardiac and psychological health, weight control, and improved sleep quality. It can decrease the danger of stroke, certain cancer, dementia, and heart disease, whilst also improving energy, mood, and blood sugar regulation.

Lastly, this study results shows under the category of high active in a period of 12 weeks or 3 months a few n = 26 participants walked 12,500 steps per day, equivalent to more than ≥10,000 km. These results align with Chiang et al (2019)whose reserch outcomes suggest that walking 12,500 steps per day offers important physiological and psychological health related advantages, these includes ability to appropriately control weight, decrease danger of long-lasting diseases such as stroke, type 2 diabetes and heart disease, and enhanced attitude and strength levels. Research show that at this high level of activity, the benefits also enhance cardiovascular capability, bolsters muscles and bones, and can reduce body mass index (BMI) and body fat.

Conclusion

An everyday step target is a easy, successful basis for decent health. The initial advantage is enhanced cardiovascular health, which improves the heart and decreases illness danger. Regular walking assists in controlling and managing body weight by using and burning calories and increasing metabolic rates. Thus, the world of research shows that physical activity also aids control cholesterol levels and blood pressure. Moreover, beyond physiological health, normal walking can boost mental well-being, raise mood and aid to relieve anxiety and stress. Therefore, daily regular exercising contributes to muscle growth, build stronger bones, decrease the probability of injuries and osteoporosis. It can as well lead to better sleep quality and enhanced power levels through the day. Determining and realizing a daily walking habit is an honest routine with deep, long-term health benefits, making it a greatly suggested activity for all.

References:

1. Hall, K.S., Hyde, T.E., Bassett, D.R., Carlson, S.A., Carnethon, M.R. (2020). Systematic review of the

prospective association of daily step counts with risk of mortality, cardiovascular disease, and dysglycemia. International Journal of Behavioral Nutrition and Physical Activity., 2:14.
2. American Council on Exercise. (2015). Fun facts about walking. USA: American Council on Exercise.
3. American Institute for Cancer Research. (2017). Globally, The Average Person Walks About 5,000 Steps Per Day. American Institute for Cancer Research.
4. Aranyavalai, T., Jalayondeja, W., Pichaiyongwongdee, S., Kaewkungwal, J., Laskin, J.J. (2020). Association between walking 5000 step/day and fall incidence over six months in urban community-dwelling older people. BMC Geriatrics , 2-11.
5. Banach, M., Lewek, J., · Surma, S. (2023). The association between daily step count and all-cause and cardiovascular mortality: a meta-analysis. Eur J Prev Cardiol, 30:1975-1985.
6. Bassett, Jr., Toth, L.P., LaMunion, S.R. . (2017). Step counting: a review of measurement considerations and health-related applications. Sports Med, 47:1303-1315.
7. Blanton, K. (2025). Scientists Say Walking This Much Cuts Your Cardiovascular Disease Risk. United Kingdom: Prevention hearst magazine.
8. Cheng, S.W.M., Alison, J.A., Stamatakis, E., Dennis, S.M., Mckeough, Z.J. (2023). Validity and Accuracy of Step Count as an Indicator of a Sedentary Lifestyle in People With Chronic Obstructive Pulmonary Disease. Archives of Physical Medicine and Rehabilitation., 108(8):1243-1252.
9. Chiang, T., Chen, C., Hsu, C., Lin, Y., Wu, H. (2019). Is the goal of 12,000 steps per day sufficient for improving body composition and metabolic syndrome? The necessity of combining exercise intensity: a randomized controlled trial. BMC Public Health, 19: 2-9.
10. Ding, D., Lawson, K.D., Kolbe-Alexander, T.L. (2016). The economic burden of physical inactivity: a global analysis of major non-communicable diseases. Lancet, 388:1311-1324.
11. Ding, D., Mutrie, N., Bauman, A. (2020). Physical activity guidelines 2020: comprehensive and inclusive recommendations to activate populations. Lancet, 396:1780-1782.
12. Ding, D., Nguyen, B., Nau, T., Lou, M., Cruz, B., Dempsey, P.C. (2025). Daily steps and health outcomes in adults: a systematic review and dose-response meta-analysis. The Lancet Public Health, 10(8):E668-E681.
13. Galvin, G. (2025). Getting under 10,000 daily steps? Researchers identify the best walking habits for heart health. Euronews.
14. Greenword, V. (2025). The Surprising Power of a 10-Minute Walk. USA: Time.
15. Jayedi, A., Gohari, A., Shab-Bidar, S. (2022). Daily step count and all-cause mortality: a dose-response meta-analysis of prospective cohort studies. Sports Med., 52:89-99.
16. Katzmarzyk, P.T., Friedenreich, C., Shiroma, E.J. (2022). Physical inactivity and non-communicable disease burden in low-income, middle-income and high-income countries. Br J Sports Med, 56:101-106.
17. Kraus, W.E., Janz, K.F., Powell, K.E. (2019). Daily step counts for measuring physical activity exposure and its relation to health. Med Sci Sports Exerc., 51:1206-1212.
18. Lal, M. (2023). How Many Steps Do People Take Per Day on Average? Healthline Media LLC.
19. Lefferts, E.C., Saavedra, J.M., Song, B.K., Brellenthin, A.G., Pescatello, L.S., Lee, D. (2023). Increasing Lifestyle Walking by 3000 Steps per Day Reduces Blood Pressure in Sedentary Older Adults with Hypertension: Results from an e-Health Pilot Study. Journal of Cardiovascular Development and Disease., 10(8):317. doi: 10.3390/jcdd10080317.
20. Liu, Y., Sun, Z., Wang, X. (2022). Dose-response association between the daily step count and all-cause mortality: a systematic review and meta-analysis. J Sports Sci., 40:1678-1687.
21. Michalopoulou, M., Ageloussis, N., Drolapa, L., Exarchopoulou, S. (2011). Number of steps per day and physical activity levels of adults in Greece. Exercise and Quality of Life, 8(495): 1-9.
22. Molumphy, N. (2024). How to Get More Benefits from 10,000 Steps per Day. Movement & Exercise. Lifestyle Medicine., 1-10.

23. Nuffield Health. (2023). The truth behind walking 10000 steps a day. London: Nuffield Health.
24. Stamatakis, E., Ahmadi, M., Murphy, M.H. (2023). Journey of a thousand miles: from 'Manpo-Kei' to the first steps-based physical activity recommendations. Br J Sports Med, 57:1227-1228.
25. Tudor-Locke, C., Crag, C.L., Brown, W.J. (2011). How many steps/day are enough? International journal of behavioral nutrition and physical activity, 8:79.
26. World Healt Organisation. (2024). The Recommended Daily Step Count: A Critical Review of Public Health Guidelines and Emerging Research. Geneva: W.H.O.
27. World Health Organisation. (2020). WHO guidelines on physical activity and sedentary behaviour. Geneva: W.H.O.