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WALKING FOR HEALTH & WELLBEING: THE EFFECT OF STEP FREQUENCY

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Abstract

Walking as a mode of transport and recreation to get more active and stay fit. People of all ages can benefit from walking, evaluation of earlier research in this field shows that a study of walking specifically among those with different health challenges in Malaysia is lacking. This paper sets out to identified whether individual, environmental and social factors influence walking in neighbourhood, which is the objectives: to examine whether people in a neighbourhood walk during the week, to identify whether people who have health problems walk more or not at all, and to examine the relationship between people's frequency of walk and their physical wellbeing. Data from 410 adults of between 18 and 60 years of age are analysed using a multiple linear regression analysis technique. Overall, the findings reveal that the respondents regularly walk despite their health status as none of them (0.00%) have assessed their health as being poor to begin with. Nevertheless, there is a significant correlation between self-reported health states and walking ($X=22.519$, $p0.05$), and their frequency of walk ($X= 22.673$, $p0.05$). The results indicate that 19.40% of the respondents walk regularly on a weekday compared to 21.20% on the weekend only, and 18.20% during both weekday and weekend. This study suggests that the neighbourhood must be safe, and the built environment is conducive and appropriate for proper walking. These factors are pertinent considerations for both housing developers and state policies to implement to initiate and promote more walking for physical wellbeing, recreation as well as for transportation purposes.

Keywords: Walking, good health, step frequency, neighbourhood

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INTRODUCTION

Walking is a simple, affordable, and accessible form of physical activity. It can be easily incorporated into daily routines, such as walking to work or school, taking the stairs instead of the elevator, or going for a stroll during breaks. Numerous research has looked at how the environment affects walking (Hosseinzadeh, 2021). Behavioural theories associate physical activity influence with multiple factors including intrapersonal (demography and psychology), interpersonal (social support), environmental (distance to the facilities), and policy (laws and regulations) (Vancampfort et. al., 2019).

Not many of us know nonetheless that to maximize the benefits of walking for physical fitness and to combat diseases, people should aim for at least 150 minutes of moderate-intensity walking or 75 minutes of vigorous-intensity walking each week as recommended by WHO (2023). All 191 UN Member States have committed to working towards the 17 Sustainable Development Goals (SDGs), which contain 169 targets, by the year 2030. SDG 3 places a strong emphasis on health: the promotion of well-being for all people at all ages, supported by 13 aims that span the breadth of WHO's mission. A future free of poverty, hunger, sickness, and want is what the 17 Sustainable Development Goals, endorsed by world leaders in September 2015, set out to achieve.

According to World Population (2019) the highest prevalence of obesity among adults in South-east Asia is Malaysia (15.6%), followed by Brunei (14.1%), Thailand (10%) and Indonesia (6.9%) Malaysia's rising trend in weight gain accounted for 50.1% of adults who are 30.4% overweight and 19.7% who are obese (Chan et al., 2019). The rate of obesity and non-communicable diseases linked to physical inactivity has exponentially increased sedentary lifestyle over the last two decades in Malaysia (Cian et. al., 2016). The country has been identified as one of the least physically active countries in the world with over 60% of adults being essentially sedentary (Cian et al., 2016). According to the latest estimates from World Health Organization (WHO) 2019, Malaysia has the highest rate of obesity among Asian countries, with about 64% of male and 65% of female being either obese or overweight.

Additionally, some of the reasons adduced to this increase in the number of people living with obesity are changing lifestyles in terms of consumption of food with high sugar and fat concentration, popularly regarded as 'fast food' or 'junk food', sedentary lifestyle (i.e., inactivity), physical inactiveness, and changing work-related lifestyle by mechanization and computerization (Cheong et. al., 2010). Engaging in walking or other physical activities by the citizens is seen as some of the ways to address the problem of obesity in the country. This is predominantly because many Malaysians depend on private vehicle transportations to cater for their daily travel needs as high automobile-dependency for transportation is a common occurrence among the

urban population (Othman & Ali, 2020). Most people nowadays depend greatly on car travel. High car dependency not only creates and exacerbates traffic congestion on urban road networks, but it also seriously undermines the role of public transportation, which has become less cost effective and efficient due to reduced usage and increasing traffic congestion (Othman & Ali, 2020). In the smaller towns and villages most Malaysians still regularly walk as a form of transport, recreation and exercise as the air is fresher, there are fewer obstructions for walking about, and fewer vehicles used by motorists from home to farms, compared to commuting to school, shops, factories and offices by automobiles in the urban areas.

Aside from walking for numerous health benefits, several studies have examined associations between neighborhood characteristics and physical activity participation among older adults, such as walkability of neighborhoods (Choi et. al., 2022; Herbolsheimer et. al., 2020; Barnett et. al., 2017; Chudyk et. al., 2017; Mooney et. al., 2017). On the other hand, older adults who perceive their neighborhoods as less safe tend to engage in less activities outside the homes (Choi et. al., 2022; Gallagher, 2010). Older adults who perceive their neighbors to be helpful and their neighborhoods to be safe also tend to report better health conditions (Choi et. al., 2022; Cain et... al., 2018). Furthermore, many older adults are not physically active and physical activity level varies by racial/ethnic groups (Choi et al., 2022; Barnett et al., 2017). A community-based study in a historically African American neighborhood indicate that prosocial behaviors is positively and significantly linked with physical activity (Choi et. al., 2022; Moore et. al., 2020).

Although there is indication that people of all ages can benefit from walking, evaluation of earlier research in this field shows that a study of walking specifically among those with different health challenges in Malaysia is lacking. According to the research from National Institutes of Health Ministry of Health Malaysia (2017), about 33.5% of adults in Malaysia are reported to be physically inactive, with 38.30% and 28.90% of male and female respectively, within the age range of 18-59 years. Therefore, to address the knowledge gap this study investigates the walking behavior of adults with medical challenges in a selected residential neighborhood of Shah Alam in the state of Selangor. Indeed, communities and neighborhoods that encourage walking will intentionally boost physical activity and wellness among residents of that area. Studies on walking and walkability include a thesis by the author (forthcoming) that has identified whether individual, environmental and social factors influence walking in a Malaysian neighbourhood, either as a form of transport to work, shop and school, or for recreation. Among these factors is a study concerning walking for health and physical wellness, which is the main objective of this paper: (i) to examine whether people in a neighbourhood walk during the week, (ii) to identify whether

people who have health problems walk more or not at all, and (iii) to examine the relationship between people's frequency of walk and their physical wellbeing.

LITERATURE REVIEW

Walking In Neighbourhood

Impact of disease with regards to physical inability and chronic illnesses is inevitable. To address the problem, this study examines walking characteristics such as personal desire in walking, including amount, frequency, duration and period of walking. For example, earlier work with Auckland children shows that active travel is associated with destination accessibility on weekdays only, and differential relationships between activity, and built environment characteristics are also observed between weekends and weekdays (Smith et. al., 2019; Oliver et. al., 2016). In this study it is inferred that the convenience of the weekday and/or weekends as well as the walking environment in the living area have a significant impact on the reactions and daily walking activities of the residents, especially among the sickly and elderly.

Adults achieving $\geq 10,000$ pedometer steps per day are more likely to achieve recommended levels of physical activity (McCormack et al., 2006; Le-Masurier et. al., 2003) as well as experience improvement in bodyweight (Schneider et. al., 2006), stable blood pressure levels (Tully & Cupples, 2011; Swartz et. al., 2003), and glucose tolerance (Swartz et. al., 2003). The extent to which walkability indexes are associated with health outcomes at population scales is a key consideration in their utility to benchmark and guide planning and policy aimed at reducing population-levels of overweight and obesity (Mayne et. al., 2019, Grasser et. al., 2013).

Past research indicates that walking also reduces anxiety, depression and anger. Major chronic diseases such as diabetes, hypertension, obesity, inactivity, and depressive symptoms are often accompanied by a decline in the physiological reserves of all the organ functions in compromising homeostasis and resistance to disease. Insufficient physical activity has been linked to a wide range of diseases, including stroke, type 2 diabetes, cardiovascular disease, depression and cognitive decline (Brister, 2018; Kyu et. al., 2016; Rebar et. al., 2015). Studies have shown that participation in pedometer-facilitated physical activity interventions is associated with improved weight status among overweight and obese adults with both type II diabetes (Cian et. al., 2016) and without (Richardson et. al., 2008), reduced resting heart rate among sedentary workers (Chan et. al., 2004), reduced systolic blood pressure (Bravata et. al., 2007), improved positive affect (Baker et. al., 2008), and including improved physical function and decreased pain and disability among those with musculoskeletal disorders (Mansi et. al., 2014), (adapted from McCormack et. al. (2019).

Numerous past studies have also focused on age-related walking behaviors. Considering that the elderly carry out a large part of their activities by walking, and to support active living lie behind greater reliance on their local neighborhood amenities and social networks. Currently, the population of the developed world is steadily ageing. In the European Union, approximately 22% of persons are over 60 years of age and this was projected to increase to more than 27% by the year 2020. This problem has major implications for health care resources and for maintaining the productive workforce. Ageing population is also becoming a major challenge in developing countries such as Malaysia, with 7 percent of the population expected to be over 60 in 2020, and 11 percent by 2030 (Nordin & Nakamura, 2020). Soon it will emerge as a threat to government welfare policies and economic growth although several developed countries are starting to take an interest in the active living of the elderly (e.g., the EU's view of the silver economy and healthy aging in the US) (Kim, 2020). Active living among all age groups will significantly improve quality of life, increase physical fitness, reduce health problems and prolong life. Generally, people's physical functions deteriorate with age, making older people less active and less mobile (Milanovic et. al., 2013), which tends to lead to physical inactivity, as has been found in 48.8% of Malaysian men and women aged 60 years and above (Nordin & Nakamura, 2020; Chanet et. al., 2019). Other studies in the field include eating behaviour and age (young and old) (Achananuparp et. al., 2018); and age, income, gender, education, marital status, region, house locality, job characteristics, and medical conditions (Cheah & Poh, 2014).

METHODOLOGY

This study is conducted in Shah Alam which is the state capital of Selangor. Shah Alam City or the Central Business District (CBD) (year 1978) is usually the most expensive part of the city to live in, with a high concentration of office buildings, retail outlets, restaurants, and other businesses. According to MBSA, 2020, it is estimated that the total population of Shah Alam is 650,000. The three main racial groups are Malay that constitutes the largest percentage 42.80%, followed by Chinese 35.40%, and Indian 21.0%, and 0.80% of the other racial groups. The residential estate in Sections 1-14 in Shah Alam City that is selected for this study has a population of 95,254, with 49,677 males and 45,577 females (see Table 1). During the field work survey, the region surrounding the study area is found to be very well developed, and the study area itself is endowed with good accessibility, facilities, and infrastructure. That means that the environment is suitable, and it caters for its surrounding neighborhoods in terms of provision of necessary infrastructure, walk friendly urban/neighborhood design, and the potential social atmosphere that encourages walking and other physical activities. With regards private housing, the study area consists of three (3) types of

residential properties (low-cost housing, medium cost housing, and high-cost housing). The local community from the middle-income level lives in this study area.

Considering of a possible low response rate, a total of 410 questionnaires are distributed to the respondents who are selected based on a systematic sampling to equally represent the different housing categories. In some cases, the questionnaires are distributed to the respondents by hand to be answered and then picked up later. In this case, the researcher explained the procedure to these respondents before they began to answer their questionnaires. Normally in a study of this kind, neighbourhoods are chosen based on a high ageing population rate. However, to facilitate this research, respondents from the respective active neighbourhood associations are chosen instead. The targeted population are the heads of the respective households who reside in the research area consisting of three types of residential properties. These are the low cost, medium cost, and high-cost housing categories.

The target population are the residents living in Sections 1-14 of between 18 to below 60 years of age (refer to Table 1). The choice of these age categories is based on two things. First, those below age 18 are teenagers and may not be ill, and who are full of energy and are mostly likely to be playing and jumping around in school or in the neighbourhoods where they live without necessarily having to engage in a formal physical activity. Second, some of those above 60 years may be too weak or incapacitated due to sickness or old age to engage in any rigorous physical activity including regular or prolonged walking outdoors.

Table 1: Population of Sections 1-14, Shah Alam City

Section	Population	Male	Female
Section 1	1,664	831	833
Section 2	1,991	948	1,043
Section 3	1,332	644	688
Section 4	1,702	815	887
Section 5	-	-	-
Section 6	3,033	1573	1460
Section 7	44,646	23172	21474
Section 8	7,440	3712	3728
Section 9	6,403	3242	3161
Section 10	1,072	537	535
Section 11 & 12	3,586	2118	1468
Section 13	18,187	10073	8114
Section 14	4,198	2012	2186
Total Population	95,254	49,677	45,577

Source: Department of Statistics Malaysia, (2021)

This study investigates the nexus between frequency of walking and human wellbeing. However, caution should be accorded in interpreting the results displayed in Table 2 below, because this is not a clinical trial involving laboratory tests or investigations, rather it is a self-reported study comprising randomly selected respondents from the study area. As claimed in Mohd Talmizi et. al., (2022), whether they are young or old, people walk.

Table 2: Variables and Questions

Variables	Question asked in the survey
Health-Well being	How did you feel about your health?
Health Challenges	What causes your health challenges?
Health Problems	What are your most common health problems?
Self-rated Health	What is your self-rated health of life?

The main tool used to gather raw data from a group of respondents in this survey is a questionnaire. A questionnaire is a research instrument that is commonly used in market research as well as in the social and health sciences using questions to ask for feedback. Using a questionnaire for investigation is cheap, self-paced, easy to administer for a large group, and anonymous and suitable for a sensitive topic like the respondents’ personal health and their perceptions, attitudes, experiences, or opinions about walking as an exercise to mitigate any health challenges.

This study employs three (3) types of research methods to collect, process and analyze the raw data. They are qualitative, quantitative, and mixed mode. The mixed mode is a contemporary method that combines quantitative and qualitative approaches to provide additional perspectives, create a richer picture and present multiple findings based on the researcher’s personal experiences living in Malaysia and the audience. The sampling technique enables the numerical data obtained in the Questionnaire items to be tabulated using the Quantitative method that involves a variety of statistical tests of significance for ensuring validity and reliability of the results.

The survey (see Figure 1) consists of two questionnaire formats, namely Semi structured Questionnaire and Self-administrated Questionnaire that includes a 5-point Likert scale section from strongly agree (5) to strongly disagree (1), multiple-choice questions section, but some questions have 4-point Likert scale formula to specify day of week they would normally walk or not at all on: 1- weekday, 2- weekend, 3- weekday and weekend, and 4- Not interested.

The self-administered questionnaire is designed explicitly to be completed by the respondents. It is bi-lingual (i.e., written in English and Malay) to give respondents who may not be able to read and write in English the opportunity to participate. The questionnaire is distributed by hand to the target

population in the study neighborhoods. According to Mohd Talmizi et. al., (2022), the best technique for analysing context-specific behaviours in population studies is self-report assessments

This combination of close-ended and open-ended questions will generate a multitude of quantitative and qualitative information. The quantitative data is numerical and measurable, while the qualitative data is non-numerical and should be analyzed further. Each data set that is collected is then analyzed to find answers for the research questions and to test the research hypotheses. Besides the basic demographic information, the respondents are asked in the questionnaire survey to state the four variables pertaining to their health and wellbeing as listed in Table 2 above.

A total of data from 410 respondents are collected and then coded into SPSS 20 software package for analysis. Multiple linear regression analytical technique is employed to test the relationship that exists between the respondents' walking behaviour (number of times spent on walking per day or per week) and their health status. Multiple linear regression analysis is a statistical technique that measures the relationship between the dependent variable and a set of independent variables (predictors). The idea is to produce a model of equation that explains the relationship and thus enables prediction of the outcome (dependent variable) in cases where it is unknown (Gallimore et. al., 1996).

FINDINGS

The present results focused on health challenges and frequency of walk per week, self-rated health and frequency of walk and frequency of walk and physical wellbeing.

Health Challenges and Frequency of Walk Per Week

Overall, the data reveal that not all the walkers have a chronic disease. Out of a total of 410 respondents, only nine (9) suffer from diabetes, 61 from insomnia, 30 from high blood pressure, and 25 from depression. The results in Table 3 demonstrate that out of the nine (9) respondents that suffer from diabetes, only three (3) (33.30%) walk at all during the week, while four (4) (44.4%) would walk during the weekday, and 11.10% during the weekend and all week (weekday and weekend).

Furthermore, of the 61 respondents who suffer from insomnia (sleeplessness), more than half of them 36 (59.00%) are mindful to walk during weekdays, and 12 (19.6%) during the weekday and weekend, compared to 11 (18.00%) who are not interested to walk at all. In addition, 13 (43.30%) out of the 30 respondents suffering from high blood pressure walk during weekdays while 8 (26.70%) do not engage in walk entirely. Only 25 respondents suffer from depression as found in the answers in the questions asked in Table 1. Out of this

number, only 2 (8.00%) do not walk. On the other hand, 18 among them (72.00%) frequently walk during the weekdays compared to 5 (20.00%) during both the weekdays and weekends. Data for obesity portray that 24 (52.20%) out 46 would walk to lose weight only during the weekdays, and 9 (19.60%) during weekdays and weekend, and 10 (21.70%) do not walk to keep fit (not interested). Analysis of the results point to more walking is required for fresh air, mobility, good exercise for health, as well as for fun and and recreation.

Table 3: Health Challenge and Frequency of Walk Per Week

Frequency of walk Per Week	Health Challenge				Total
	None		Diabetes		
	f	%	f	%	
Weekday	166	97.60	4	2.40	170
Weekend	51	98.10	1	1.90	52
Weekday and weekend	65	98.50	1	1.50	66
Do not walk (Not interested)	119	97.50	3	2.50	122
Total	401	97.80	9	2.20	410
		None		Insomnia	
Weekday	134	78.80	36	21.20	170
Weekend	50	96.20	2	3.80	52
Weekday and weekend	54	81.80	12	18.20	66
Do not walk (Not interested)	111	91.00	11	9.00	122
Total	349	85.10	61	14.90	410
		None		High blood pressure	
Weekday	157	92.40	13	7.60	170
Weekend	48	92.30	4	7.70	52
Weekday and weekend	61	92.40	5	7.60	66
Do not walk (Not interested)	114	93.40	8	6.60	122
Total	380	92.70	30	7.30	410
		None		Obesity	
Weekday	146	85.90	24	14.10	170
Weekend	49	94.20	3	5.80	52
Weekday and weekend	57	86.40	9	13.60	66
Do not walk (Not interested)	112	91.80	10	8.20	122
Total	364	88.80	46	11.20	410
		None		Depression	
Weekday	152	89.40	18	10.60	170
Weekend	52	100.00	0	0.00	52
Weekday and weekend	61	92.40	5	7.60	66
Do not walk (Not interested)	120	98.40	2	1.60	122
Total	385	93.90	25	6.10	410

* Frequency = f

As stated earlier, this study is not a clinical test; there could be other predisposing biases causing these chronic diseases although lack of physical

exercise in terms of walking may be among the major causes of some of the highlighted health challenges facing the urban population. In general, the results have shown that majority of the respondents who suffer from health issues such as diabetes, insomnia, high blood pressure, depression and obesity would walk quite frequently even on weekdays, presumably to mitigate their health issues.

Self-Rated Health and Frequency of Walk

The focus of this study is based solely on frequency of walk among all the respondents surveyed regardless of their medical history. The act and frequency of walking per week is self-reported or admitted by the respondents. That is not to say that they claimed, or the study results indicate that infrequent or lack of walking for exercise is the cause and/or cure for their existing health issues. The results obtained (see Table 4) indicate that more than 70.00% of respondents rated their state of health as good while about 0.50% rated it as poor health. A closer look at the number of times the respondents who actively walked (frequency of walk per week) shows that those who did so during the weekday have a better health condition 83.50% in contrast to those who walked exclusively on the weekend 71.20%. Recall that all respondents who initially said they would walk during weekday and weekday/weekend never rated their health status as being poor (0.00%). The Chi-square statistics in Table 4 demonstrate that there is a significant association between self-assessed state of health and high frequency of walk ($X=22.519$, $p<0.05$).

Table 4: Self-Rated Health and Frequency of Walk

Frequency of Walk Per Week	Self-Rated Health								Total	Chi-Square X	P
	Excellent		Good		Fair		Poor				
	f	%	f	%	f	%	f	%			
Weekday	17	10.00	142	83.50	11	6.50	0	0.00	170		
Weekend	7	13.50	37	71.20	7	13.50	1	1.90	52		
Weekday and weekend	18	27.30	38	57.60	10	15.20	0	0.00	66	22.519	.007
Do not walk (Not interested)	20	16.40	87	70.30	14	12.50	1	0.80	122		
Total	62	15.10	304	74.10	42	10.20	2	0.50	410		

* Frequency = f

Frequency of Walk and Physical Wellbeing

The results in Table 5 also found that about 49.20% of the respondents who did not engage in walking at all claimed that they would wake up feeling refreshed only occasionally. Also, those who said that they woke up every time feeling fresher and more rested consist of 19.40% who walked on weekdays, 21.20% on

weekend and 18.20% all week. As evident in the Chi-square statistics, there is a positive correlation between frequency of self-reported wellbeing and frequency of walk among the respondents ($X= 22.673$, $p<0.05$). That means the persons who walked regularly on any day of the week felt healthier and more refreshed than those who did not engage in walk at all. This is a good sign that the very act and amount of walking any day of the week is beneficial for both mental and physical wellbeing.

Table 5: Frequency of Walk and Physical Wellbeing

Frequency of Walk Per Week	Wake up feeling fresh and rested										Total	Chi-Square X	P
	Every time		Almost every time		Occasionally		Almost never		Never				
	f	%	f	%	f	%	f	%	f	%			
Weekday	33	19.40	44	25.90	63	37.10	21	12.40	9	5.30	170		
Weekend	11	21.20	20	38.50	19	36.50	2	3.80	0	0.00	52		
Weekday and weekend	12	18.20	19	28.80	27	40.90	6	9.10	2	3.00	66	22.673	.031
Do not walk	16	13.10	40	32.80	60	49.20	6	4.90	0	0.00	122		
Total	72	17.60	123	30.00	169	41.20	35	8.50	11	2.70	410		

* Frequency = f

Similarly, the correspondence between self-reported state of wellbeing and frequency of walk (see Table 6) revealed that the percentage of respondents who said that they felt more active and vigorous is higher for both that walked on a weekday 14.70% as well as during the weekend 19.20%, compared to 11.50% who did not walk. On the other hand, about 51.60% of persons who did not walk at all claimed that they felt active and vigorous only occasionally, while 38.20% during the weekdays and 42.3% on weekends felt robust and energetic. The chi-square test demonstrates a significant relationship between frequency of walk and always feeling well and active after an exercise by walking ($X= 24.102$, $p<0.05$).

Table 6: Frequency of Walk and Wellbeing Active

Frequency of Walk Per Week	Felt active and vigorous										Total /f	Chi-Square X	P
	Every time		Almost every time		Occasionally		Almost never		Never				
	f	%	f	%	f	%	f	%	f	%			
Weekday	25	14.7	51	30.0	65	38.2	21	12.4	8	4.7	170		
Weekend	10	19.2	18	34.6	22	42.3	2	3.8	0	0.0	52		
Weekday and weekend	8	12.1	27	40.9	23	34.8	6	9.1	2	3.0	66	24.102a	.020
Do not walk	14	11.5	41	33.6	63	51.6	4	3.3	0	0.0	122		
Total 100%	57	13.9	137	33.4	173	42.2	33	8.0	10	2.4	410		

* Frequency = f

CONCLUSION

When and how often people walk would depend on day of week, availability of time, convenience, urgency, personal preference as well as knowledge of exercise to maintain fitness and health. Firstly, as can be seen from the results in this study that frequency of walk, no walk at all, and day of the week walking are not closely related. Nevertheless, walking anytime has numerous benefits for both physical and mental well-being. According to Mohd Talmizi et. al., (2022), walking as a kind of recreation for people encourages healthy living.

In general, the results have shown that majority of the respondents who suffer from health issues such as diabetes, insomnia, high blood pressure, depression and obesity would walk more frequently as those who have no existing health problems. This study also shows that the percentage of respondents who felt more active and vigorous is higher for those who engage in walk regularly during weekdays and weekends compared to those who do not walk at all, and who then felt active and vigorous only occasionally. This demonstrates a significant association between frequency of walk and physical wellbeing. In conclusion, this paper contributes to public awareness about walking for health and fitness. In addition, as this paper is confined to walking in a residential neighbourhood, the results will assist the local authorities and housing developers to provide proper walkways and modern infrastructure that will support and encourage people to walk comfortably and safely for transport, recreation and exercise every day of the week. Walking is a popular and accessible form of physical activity that offers numerous benefits for overall wellbeing. Whether people engage in brisk walks or leisurely strolls, incorporating walking as a daily routine can positively impact one's physical, mental, and emotional health.

REFERENCES

- Achananuparp, P., Lim, E. P., & Abhishek, V. (2018). Does journaling encourage healthier choices? Analyzing healthy eating behaviors of food journalers. *ACM International Conference Proceeding Series*, 35–44. <https://doi.org/10.1145/3194658.3194663>.
- Baker, G., Gray, S. R., Wright, A., Fitzsimons, C., Nimmo, M., Lowry, R., Mutrie, N., & Scottish Physical Activity Research Collaboration (SPARColl) (2008). The effect of a pedometer-based community walking intervention "Walking for Wellbeing in the West" on physical activity levels and health outcomes: a 12-week randomized controlled trial. *The international journal of behavioral nutrition and physical activity*, 5, 44. <https://doi.org/10.1186/1479-5868-5-44>
- Barnett, D. W., Barnett, A., Nathan, A., Van Cauwenberg, J., Cerin, E., & Council on Environment and Physical Activity (CEPA) – Older Adults working group (2017). Built environmental correlates of older adults' total physical activity and walking: a systematic review and meta-analysis. *The international journal of behavioral nutrition and physical activity*, 14(1), 103. <https://doi.org/10.1186/s12966-017-0558-z>.

- Bravata, D. M., Smith-Spangler, C., Sundaram, V., Gienger, A. L., Lin, N., Lewis, R., Stave, C. D., Olkin, I., & Sirard, J. R. (2007). Using pedometers to increase physical activity and improve health: a systematic review. *JAMA*, 298(19), 2296–2304. <https://doi.org/10.1001/jama.298.19.2296>.
- Brister, M. (2018). *Systematic Review on the Role of Exercise in Cardiovascular Disease*. Doctoral dissertation.
- Cai Lian, T., Bonn, G., Si Han, Y., Chin Choo, Y., & Chee Piau, W. (2016). Physical Activity and Its Correlates among Adults in Malaysia: A Cross-Sectional Descriptive Study. *PloS one*, 11(6), e0157730. <https://doi.org/10.1371/journal.pone.0157730>.
- Cain, A. A., Edwards, M. E., & Still, J. D. (2018). An exploratory study of cyber hygiene behaviors and knowledge. *Journal of Information Security and Applications*, 42, 36–45. <https://doi.org/10.1016/j.jisa.2018.08.002>.
- Chan, C. B., Ryan, D. A., & Tudor-Locke, C. (2004). Health benefits of a pedometer-based physical activity intervention in sedentary workers. *Preventive medicine*, 39(6), 1215–1222. <https://doi.org/10.1016/j.ypmed.2004.04.053>.
- Chan, Y. Y., Sooryanarayana, R., Mohamad Kasim, N., Lim, K. K., Cheong, S. M., Kee, C. C., Lim, K. H., Omar, M. A., Ahmad, N. A., & Mohd Hairi, N. N. (2019). Prevalence and correlates of physical inactivity among older adults in Malaysia: Findings from the National Health and Morbidity Survey (NHMS) 2015. *Archives of gerontology and geriatrics*, 81, 74–83. <https://doi.org/10.1016/j.archger.2018.11.012>.
- Cheah, Y. K., & Poh, B. K. (2014). The determinants of participation in physical activity in Malaysia. *Osong public health and research perspectives*, 5(1), 20–27. <https://doi.org/10.1016/j.phrp.2013.12.002>.
- Choi, A., Blanco, L., & Hays, R. D. (2022). Race and Ethnicity Differences in Walking and Associations with Neighborhood Perceptions among Older Adults in California. *Journal of applied gerontology: the official journal of the Southern Gerontological Society*, 41(12), 2499–2510. <https://doi.org/10.1177/07334648221118902>.
- Othman, A. G., & Ali, K. H. (2020). Transportation and quality of life. *Planning Malaysia*, 18(3), 35–50. <https://doi.org/10.21837/PM.V18I13.774>.
- Smith, M., Amann, R., Cavadino, A., Raphael, D., Kearns, R., Mackett, R., Mackay, L., Carroll, P., Forsyth, E., Mavoa, S., Zhao, J., Ikeda, E., & Witten, K. (2019). Children's Transport Built Environments: A Mixed Methods Study of Associations between Perceived and Objective Measures and Relationships with Parent Licence for Independent Mobility in Auckland, New Zealand. *International journal of environmental research and public health*, 16(8), 1361. <https://doi.org/10.3390/ijerph16081361>.
- Kim, H. (2020). *Wearable sensor data-driven walkability assessment for elderly people*. Sustainability (Switzerland), 12(10). <https://doi.org/10.3390/SU12104041>.
- Cheong, S. M., Kandiah, M., Chinna, K., Chan, Y. M., & Saad, H. A. (2010). Prevalence of obesity and factors associated with it in a worksite setting in Malaysia. *Journal of community health*, 35(6), 698–705. <https://doi.org/10.1007/s10900-010-9274-1>.
- Chudyk, A., McKay, H.A., Winters, M. *et al.* Neighborhood walkability, physical

- activity, and walking for transportation: A cross-sectional study of older adults living on low income. *BMC Geriatr* **17**, 82 (2017). <https://doi.org/10.1186/s12877-017-0469-5>.
- Department Statistics Malaysia (DOSM) (2021). Retrieved August 25, 2022. <https://www.dosm.gov.my/portal-main/landingv2>.
- Draf Rancangan Tempatan (MBSA) (2020). Retrieved October 21, 2019.
- Gallagher, M. (2010). Are schools panoptic? *Surveillance & Society* **7**(3/4), 262-272. Retrieved October 22, 2022. <http://www.surveillance-and-society.org>.
- Gallimore, P., Fletcher, M., & Carter, M.J. (1996). Modelling the influence of location on value. *Journal of Property Valuation and Investment*, **14**, 6-19.
- Grasser, G., Van Dyck, D., Titze, S., & Stronegger, W. (2013). Objectively measured walkability and active transport and weight-related outcomes in adults: a systematic review. *International journal of public health*, **58**(4), 615–625. <https://doi.org/10.1007/s00038-012-0435-0>.
- Herbolsheimer, F., Mahmood, A., Michael, Y. L., & Chaudhury, H. (2020). Everyday Walking Among Older Adults and the Neighborhood Built Environment: A Comparison Between Two Cities in North America. *Frontiers in public health*, **8**, 564533. <https://doi.org/10.3389/fpubh.2020.564533>.
- Hosseinzadeh, A. (2021). What affects how far individuals walk? *SN Applied Sciences*, **3**(3), 1-10.
- Kyu, H. H., Bachman, V. F., Alexander, L. T., Mumford, J. E., Afshin, A., Estep, K., Veerman, J. L., Delwiche, K., Iannarone, M. L., Moyer, M. L., Cercy, K., Vos, T., Murray, C. J., & Forouzanfar, M. H. (2016). Physical activity and risk of breast cancer, colon cancer, diabetes, ischemic heart disease, and ischemic stroke events: systematic review and dose-response meta-analysis for the Global Burden of Disease Study 2013. *BMJ (Clinical research ed.)*, **354**, i3857. <https://doi.org/10.1136/bmj.i3857>.
- Le Masurier, G. C., Sidman, C. L., & Corbin, C. B. (2003). Accumulating 10,000 steps: does this meet current physical activity guidelines?. *Research quarterly for exercise and sport*, **74**(4), 389–394. <https://doi.org/10.1080/02701367.2003.10609109>.
- Mansi, S., Milosavljevic, S., Baxter, G. D., Tumilty, S., & Hendrick, P. (2014). A systematic review of studies using pedometers as an intervention for musculoskeletal diseases. *BMC musculoskeletal disorders*, **15**, 231. <https://doi.org/10.1186/1471-2474-15-231>.
- Mayne, D. J., Morgan, G. G., Jalaludin, B. B., & Bauman, A. E. (2019). Area-Level Walkability and the Geographic Distribution of High Body Mass in Sydney, Australia: A Spatial Analysis Using the 45 and Up Study. *International journal of environmental research and public health*, **16**(4), 664. <https://doi.org/10.3390/ijerph16040664>.
- McCormack, G., Giles-Corti, B., & Milligan, R. (2006). Demographic and individual correlates of achieving 10,000 steps/day: use of pedometers in a population-based study. *Health promotion journal of Australia: official journal of Australian Association of Health Promotion Professionals*, **17**(1), 43–47. <https://doi.org/10.1071/he06043>.

- McCormack, T., O'Connor, E., Cherry, J., Beck, S. R., & Feeney, A. (2019). Experiencing regret about a choice helps children learn to delay gratification. *Journal of experimental child psychology*, 179, 162–175. <https://doi.org/10.1016/j.jecp.2018.11.005>.
- Milanović, Z., Pantelić, S., Trajković, N., Sporiš, G., Kostić, R., & James, N. (2013). Age-related decrease in physical activity and functional fitness among elderly men and women. *Clinical interventions in aging*, 8, 549–556. <https://doi.org/10.2147/CIA.S44112>.
- Mooney, S. J., Joshi, S., Cerdá, M., Kennedy, G. J., Beard, J. R., & Rundle, A. G. (2017). Contextual Correlates of Physical Activity among Older Adults: A Neighborhood Environment-Wide Association Study (NE-WAS). *Cancer epidemiology, biomarkers & prevention: a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology*, 26(4), 495–504. <https://doi.org/10.1158/1055-9965.EPI-16-0827>.
- Moore, S. A., Faulkner, G., Rhodes, R. E., Brussoni, M., Chulak-Bozzer, T., Ferguson, L. J., Mitra, R., O'Reilly, N., Spence, J. C., Vanderloo, L. M., & Tremblay, M. S. (2020). Impact of the COVID-19 virus outbreak on movement and play behaviours of Canadian children and youth: a national survey. *The international journal of behavioral nutrition and physical activity*, 17(1), 85. <https://doi.org/10.1186/s12966-020-00987-8>.
- National Institutes of Health Ministry of Health Malaysia (2017). *In: National Health and Morbidity Survey (NHMS)*.
- Mohd Talmizi, N., Haji Ali, N. E., & Mokhtar, S. (2022). The Effect of Socio-Demographic Attributes on Walking Behaviour of Residents in Shah Alam City, Malaysia. *Planning Malaysia*, 20(21). <https://doi.org/10.21837/pm.v20i21.1110>.
- Nordin, N., & Nakamura, H. (2020). *The Influence of the Objective and Subjective Physical Neighbourhood Environment on the Physical Activity of Older Adults: A Case Study in the Malaysian Neighbourhoods of Johor Bahru*. <https://doi.org/10.3390/su12051760>.
- Oliver, M., Parker, K., Witten, K., Mavoia, S., Badland, H. M., Donovan, P., Chaudhury, M., & Kearns, R. (2016). Children's Out-of-School Independently Mobile Trips, Active Travel, and Physical Activity: A Cross-Sectional Examination from the Kids in the City Study. *Journal of physical activity & health*, 13(3), 318–324. <https://doi.org/10.1123/jpah.2015-0043>.
- Rebar, A. L., Stanton, R., Geard, D., Short, C., Duncan, M. J., & Vandelanotte, C. (2015). A meta-meta-analysis of the effect of physical activity on depression and anxiety in non-clinical adult populations. *Health psychology review*, 9(3), 366–378. <https://doi.org/10.1080/17437199.2015.1022901>.
- Richardson, C. R., Newton, T. L., Abraham, J. J., Sen, A., Jimbo, M., & Swartz, A. M. (2008). A meta-analysis of pedometer-based walking interventions and weight loss. *Annals of family medicine*, 6(1), 69–77. <https://doi.org/10.1370/afm.761>.
- Schneider, P. L., Bassett, D. R., Jr, Thompson, D. L., Pronk, N. P., & Bielik, K. M. (2006). Effects of a 10,000 steps per day goal in overweight adults. *American journal of health promotion: AJHP*, 21(2), 85–89. <https://doi.org/10.4278/0890-1171-21.2.85>.

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- Swartz, A. M., Strath, S. J., Bassett, D. R., Moore, J. B., Redwine, B. A., Groer, M., & Thompson, D. L. (2003). Increasing daily walking improves glucose tolerance in overweight women. *Preventive medicine*, 37(4), 356–362. [https://doi.org/10.1016/s0091-7435\(03\)00144-0](https://doi.org/10.1016/s0091-7435(03)00144-0).
- Tully, M. A., & Cupples, M. E. (2011). UNISTEP (university students exercise and physical activity) study: a pilot study of the effects of accumulating 10,000 steps on health and fitness among university students. *Journal of physical activity & health*, 8(5), 663–667. <https://doi.org/10.1123/jpah.8.5.663>.
- Vancampfort, D., Van Damme, T., Firth, J., Smith, L., Stubbs, B., Rosenbaum, S., Hallgren, M., Hagemann, N., & Koyanagi, A. (2019). Correlates of physical activity among 142,118 adolescents aged 12-15 years from 48 low- and middle-income countries. *Preventive medicine*, 127, 105819. <https://doi.org/10.1016/j.ypmed.2019.105819>.
- World Health Organization (WHO) (2019). <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/when-and-how-to-use-masks>.

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