Original Article

IMPACT OF DIFFERENT PHYSICAL ACTIVITY DOMAINS ON BURNOUT AMONG PUBLIC HEALTHCARE WORKERS IN SELANGOR

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ABSTRACT

Healthcare workers (HCWs) are at risk of burnout due to the extremely stressful nature of the healthcare profession. Physical activity (PA) is acknowledged as one of the protective factors for mental health. This study aimed to investigate the associations between different PA domains (occupation-related PA (OPA), transportation-related PA (TPA), and leisure-time-related PA (LTPA)) and burnout among HCWs in Selangor. This is a cross-sectional study using the multi-stage stratified cluster random sampling method. The validated Global Physical Activity (GPAQ) and Copenhagen Burnout Inventory (CBI) instruments were used. A chisquare test was used to identify the association, and Spearman's rho correlations test was used to evaluate the strength and direction of the association between the PA domain and burnout. This study included a total of 302 HCWs and reported a prevalence of personal burnout (68.21%), work-related burnout (68.87%), and client-related burnout (76.16%). The study found that total PA was significantly associated with gender, education level, household income, profession, and smoking status, while OPA was associated with working station and chronic disease. TPA was influenced by marital status, household income, profession, working station, and years of service, whereas LTPA was primarily associated with gender, education level, working station, and smoking status. Both personal and work-related burnouts were inversely correlated with TPA (-0.247 to -0.226, p<0.001). The prevalence of burnouts among HCWs in Selangor was high. TPA, but not OPA or LTPA, was associated with a lower risk of personal and work-related burnout, suggesting that increased TPA would be beneficial to mental health.

KEYWORDS: physical activity, burnout, prevalence, mental health, healthcare workers

INTRODUCTION

Burnout, a psychological syndrome, is characterised by prolonged responses to persistent interpersonal stressors in the workplace, resulting in feelings of emotional exhaustion, negativism, and diminished professional efficacy. As per the Revision of the International Classification of Diseases (ICD-11), burnout is now classified as an occupational phenomenon by the World Health Organization (WHO)(1). Over the past few years, burnout has become a global health concern across various sectors, with healthcare workers being particularly vulnerable.

Burnout is linked to a variety of factors, including exposure to a high-pressured work environment, work-to-family conflict, unrealistic patient expectations, long working hours, excessive bureaucracy, poor work-life balance, personal issues, organisational issues, and poor communication among healthcare professionals (2,3). Healthcare workers are prone to burnout due to their continuous interaction with patients and their distress. It increases the likelihood of medical errors and negatively impacts patient safety, leading to higher patient dissatisfaction and more complaints from patients and families (3). Additionally, it causes physicians to become disengaged from their roles, less motivated to take on new challenges, and more susceptible to depression, substance abuse, and suicide (3,4).

A systematic review and meta-analysis published in JAMA Network Open revealed that the prevalence of burnout among physicians varied from 0% to 80.5% (5). A study carried out in the United States from 2018 to 2019 revealed that 54% of nurses experienced burnout, and 28% of nurses experienced high levels of burnout (6). The prevalence of burnout also high especially recently due to the COVID-19 pandemic, which estimated that around 52% of HCWs experienced burnout (7). The findings were almost identical in Malaysian settings, where a previous systematic review study reported that the overall prevalence of personal, work, and client-related burnout among HCWs was 53.8%, 39.1%, and 17.4%, respectively (7).

Physical activity (PA) is acknowledged as a protective factor for mental health and has demonstrated efficacy in alleviating the impacts of stress and exhaustion (8). A variety of favourable health outcomes, including enhanced mood, reduced anxiety, and improved overall mental health, have been associated with regular physical activity. PA is a multifaceted behaviour that consists of different domains, such as occupation-related PA (OPA), transportation-related PA (TPA), and leisure-time related PA (LTPA)(9). These PA domains differ by the nature of the PA, frequency, duration, and intensity.

OPA refers to physical activity performed during work, such as standing for long hours, lifting heavy objects, or engaging in manual labor. While OPA contributes to overall energy expenditure, research suggests that prolonged occupational activity, especially in high-strain jobs, may not provide the same health benefits as other PA domains and could even contribute to increases the risk of all-cause mortality (10). TPA involves movement for commuting purposes, such as walking, cycling, or using active transport instead of motorised vehicles. Studies have shown that TPA is associated with lower stress levels and reduced burnout risk (11). Lastly, LTPA includes voluntary recreational activities, such as jogging, swimming, or engaging in sports during free time. LTPA has been widely recognised for its mental health benefits, including reducing symptoms of stress, anxiety, and depression (12,13).

Different PA domains contributed differently to human health in different ways. Nevertheless, research on physical activity concerning mental health has predominantly concentrated on overall PA (9), and only limited number of studies have explored whether identical health impacts are seen through different PA domains, which include OPA, TPA, and LTPA, especially among healthcare workers. In Malaysia, there are limited studies done comparing all three different PA domains with mental health status, especially burnout, among HCWs or even the general population. Based on this research and the knowledge gaps, this study aims to describe the prevalence of physical activity domain (OPA, TPA, and LTPA), three domains of burnout (work-, personal-, and client-related), and to determine factor and association between PA domains with burnout among public healthcare workers in Selangor, Malaysia.

MATERIALS AND METHODS

Study design and location of study

A cross-sectional study was conducted from February to April 2024 in the Selangor state of Malaysia. This study was conducted at six district health offices in Selangor, which are Pejabat Kesihatan Daerah Gombak, Pejabat Kesihatan Daerah Klang, Pejabat Kesihatan Daerah Petaling, Pejabat Kesihatan Daerah Kuala Selangor, Pejabat Kesihatan Daerah Sabak Bernam, and Pejabat Kesihatan Daerah Hulu Selangor. These six district health offices comprised a total of 56 public health clinics in Selangor.

Study design and location of study

The study population comprised all healthcare workers employed in public health settings registered with the selected six district health offices. The inclusion criteria were healthcare workers who were literate in either English or Malay, aged 18 years or older, and who provided consent to participate in the study. The exclusion criteria encompassed HCWs with pre-existing mental health illness diagnosed before the study period including any mental, behavioural, and developmental disorders under the International Classification of Disease (ICD-10), HCWs who were registered as Orang Kurang Upaya (OKU) with any disabilities, and pregnant women irrespective of the weeks of gestation.

Sample size determination

The total sample size was calculated using a single proportion for a finite population size (Modification for Cochran's Formula) with the formula as follows:

$$n = \frac{n_o}{1 + \frac{(n_o - 1)}{N}}$$
$$n_o = \frac{Z^2 pq}{e^2}$$

n = sample size for single proportion with finite population,

 n_o = sample size for single proportion with infinite population,

Z value is 1.96, when assuming a 95% confidence level and α = 0.05,

p is the estimated proportion of the population for the attribute in question, which in this study can be physical activity, burnout, depression, or anxiety,

q is 1 – p, e is the desired level of precision,

N = reference population size. Based on 2019 data, there are 27,944 HCWs in Selangor (14).

The method for sample size utilised a burnout prevalence reference of 52% (7). The calculated minimum sample size was 379, and after incorporating a 5% non-response rate, the requisite minimum sample size increased to 396 samples.

Sampling method

A multistage stratified cluster random sampling method was employed to ensure a representative sample of healthcare workers in Selangor. The first stage involved selecting the population cluster, specifically the district health offices under Selangor State Health Department (SSHD). The second stage was dividing the sampling units into two main strata based on profession groups. Participants were randomly selected from six out of 11 district health offices and further stratified into professional and non-professional groups to ensure a diversity of job functions and responsibilities. SPSS software was used to conduct a simple random sampling, selecting participants based on the name list of HCWs in each district health office.

Study instruments

A set of self-administered questionnaires, provided in both English and Malay, was disseminated to chosen participants. The questionnaire was developed in Google Forms format, and the link was provided and given only to selected HCWs. The questionnaire consists of a patient information sheet (PIS), which provides the invitation, summary information about the study, and information about confidentiality measures protecting participants. Participants were given instructions to tick the box to signify their consent prior to responding to the questions. The questionnaire consisted of three distinct sections.

Section A consists of sociodemographic, socio-economic, occupational, and health characteristics of the participants. Section B comprises 16 items using the Global Physical Activity Questionnaire (GPAQ) which concerns the physical activity of participants in three domains (occupation-, transportation-, and leisure-time related) as well as sedentary behaviours. The GPAQ is preferred in this study mainly because: (1) it has three PA domains (OPA, TPA, and LTPA), (2) has demonstrated good to very good test-retest reliability with time intervals ranging from three days to two weeks (15,16), (3) it has a validated Malay version (17,18), and (4) the Cronbach's alphas were good with 0.81, 0.84, and 0.76 for the GPAQ (Occupation-, Transportation-, and Leisure-time related), respectively (17). Total PA is computed by adding OPA, TPA, and LTPA. According to the WHO 2020 PA guidelines, individuals should engage in at least 150-300 minutes of moderate-intensity PA, 75-150 minutes of vigorous-intensity PA, or an equivalent combination (9,19). Participants were divided into two groups: (1) those who met the WHO 2020 PA guidelines (a total of 150 minutes of physical activity in a typical week) and (2) those who did not.

Section C covered the assessment for burnout using the Copenhagen Burnout Inventory (CBI). The CBI contains 19 items distributed across three main domains: personal burnout, work burnout, and patient burnout. For each of the domains, the total score is the average of the scores of the corresponding items (20) and the cut-off score for detecting burnout is a score \geq 50 (21). The CBI is preferred in this study mainly because: 1. It categorises burnout into personal, work, and patient factors, which is particularly pertinent for this study's purpose, 2. It focuses more on the source of burnout than on its symptoms, which better matched the study's purpose, 3. It is an open-access instrument and has high validity and reliability with Cronbach's alphas of 0.91, 0.87, and 0.83 for CBI (personal-, work-, patient-related), respectively (22,23), and 4. It has a validated Malay version (24,25).

Statistical Analysis

The data was input and analysed using Windows-based Statistical Package for Social Sciences (SPSS) version 27 software. Descriptive statistics were used to describe the sociodemographic, socioeconomic, occupational, health characteristics, physical activity level, and burnout level composition and distribution of the participants. The categorical data were reported as absolute

numbers and percentages (%). The numerical data were given as mean and standard deviation for normally distributed data.

Chi-square test analysis was used to evaluate the association between factors and burnout, and to determine the preliminary factors and significant values associated with burnout. The Spearman's rho correlations test was used to evaluate the strength and direction of association between the PA domain (OPA, TPA, and LTPA) with burnout. All tests will be considered statistically significant at a p-value < 0.05 (two-tailed) at a confidence level of 95%.

RESULTS

Participants Characteristics

A total of 302 HCWs were involved, including 215 (71.2%) female and 87 (28.8%) males, were included in the study as shown in Table 1. Most of the participants were between 35 and 44 years old (n = 145, 48.0%), Malay (n = 264, 87.4%), married (n = 246, 81.5%), had tertiary education (n = 267, 88.4%), and belonged to a middle-income group (n = 165, 54.6%).

Sociodemographic Cl	haracteristics		
Age	Mean age in years (SD)	36	.99 (7.10)
		n	%
	18 – 24	1	0.3
	25 – 34	114	37.7
Age group (years)	35 – 44	145	48.0
	45 – 54	38	12.6
	55+	4	1.3
Candar	Female	215	71.2
Gender	Index open years (cory) 18 - 24 25 - 34 35 - 44 45 - 54 55+ Female Male Malay Indian Chinese Others Status Single Widow/Divorced Yes	87	28.8
	Malay	264	87.4
Page	Indian	20	6.6
Race	Chinese	14	4.6
	Others	4	1.3
	Single	49	16.2
Marital Status	Married	246	81.5
	Widow/Divorced	7	2.3
Children	Yes	252	83.4
Children	No	50	16.6

Table 1. Descriptive information on respondents (n = 302)

Socio-economic Chara	cteristics		
	No formal education	0	0
Education	Primary	0	0
Education	Secondary	35	11.6
	Tertiary (diploma/degree/postgraduate)	267	88.4
	Low Income (< RM4,000)	72	23.8
Household Income	Middle Income (RM4,000 - RM9,999)	165	54.6
	High Income (≥ RM10,000)	65	21.5
Occupational Characte	ristics		
	Management & professional	96	31.8
Profession groups	Paramedic & Auxilliary	175	57.9
	Implementer	31	10.3
	Specialist	8	2.6
	Medical Officer	68	22.5
	Pharmacist	20	6.6
	Assistant Medical Officer	28	9.3
	Assistant Environment Health Officer	5	1.7
	Nurse (Matron/Sister/SN/JM)	106	35.1
	Medical Laboratory Technologist	8	2.6
Profession	Radiographer	3	1.0
	Assistant Pharmacist	5	1.7
	Occupational Therapist	10	3.3
	Physiotherapist	8	2.6
	Health Attendant	6	2.0
	Clerk	6	2.0
	Dietitian	2	0.7
	Others	19	6.3
	Outpatient Department (OPD)	153	50.7
Working station/ department	Maternal & Child Health (MCH)	104	34.4
-	Others	45	14.9

	< 5	46	15.2
Years of service (years)	service $5-10$	90	29.8
(years)	> 10	166	55.0
Health Characteristics			
	Non-smoker	276	91.4
Smoking status	Occasional smoker	20	6.6
	Current/Daily smoker	6	2.0
Chronic Discoso	No	224	74.2
	Yes	78	25.8
	Underweight (BMI < 18.5kg/m2)	10	3.3
Body Mass Index (BMI)	Normal (BMI 18.5 – 22.9 kg/m2)	117	38.7
	Overweight/Obese (BMI ≥ 23.0kg/m2)	175	57.9

Levels of physical activity domain (OPA, TPA, and LTPA) among the respondents

As shown in Table 2, 173 (57.3%) respondents met the 2018 PA guidelines recommendation for total PA (\geq 150 minutes/week). The respondents mean total PA was 255.38 minutes per week. In addition, 105 (35.4%), 33 (10.9%), and 39 (12.9%) respondents achieved the recommendations of OPA, TPA, and LTPA, respectively. For personal burnout, 120 (39.7%) of the respondents scored a moderate level, while 6 (2.0%) scored a severe level, as illustrated in Table 2. In terms of work-related burnout, 116 (38.4%) of the respondents scored at a moderate level, while 5 (1.7%) scored at a severe level. A total of 106 (35.1%) of the respondents reported a moderate level of client-related burnout, while 20 (6.6%) reported a severe level.

Physical Activity			
	Mean in minutes (SD)	255.38	(321.64)
		n	%
TOLATPA	Not achieved	129	42.7
	Achieved (≥ 150min/week)	173	57.3
	Mean in minutes (SD)	135.48	(188.36)
		n	%
OPA	Not achieved	195	64.6
	Achieved (≥ 150min/week)	105	35.4
	Mean in minutes (SD)	45.93	(168.08)
тра		n	%
IFA	Not achieved	269	89.1
	Achieved (≥ 150min/week)	33	10.9
	Mean in minutes (SD)	73.97	(120.73)
		n	%
LIPA	Not achieved	263	87.1
	Achieved (≥ 150min/week)	39	12.9
Burnout			

 Table 2. Physical activity and burnout status among the respondents (n = 302)

		n	%
	Normal/low	96	31.8
Personal-related Burnout	Moderate	120	39.7
	High	80	26.5
	Severe	6	2.0
		n	%
	Normal/low	94	31.1
Work-related Burnout	Moderate	116	38.4
	High	87	28.8
	Severe	5	1.7

Client-related Burnout		n	%
	Normal/low	72	23.8
	Moderate	106	35.1
	High	104	34.4
	Severe	20	6.6

Abbreviations: SD = Standard deviation; Total PA = Total Physical activity; OPA = Occupation-related physical activity; TPA = Transportation-related physical activity; LTPA = Leisure-time related physical activity.

Factors associated with the Physical Activity domain (Occupation-related, Transportation-related, Leisure-time related PA), and burnout among the respondents

Table 3 displays the levels of physical activity domains (OPA, TPA, and LTPA) and their associated factors among respondents. Five factors associated with total physical activity were gender ($\chi 2 = 24.228$; p < 0.001), education level ($\chi 2 = 6.380$; p = 0.017), household income ($\chi 2 = 10.770$; p = 0.004), profession ($\chi 2 = 12.387$; p = 0.002), and smoking status ($\chi 2 = 14.450$; p < 0.001). Seven factors associated with OPA were gender ($\chi 2 = 8.814$; p = 0.002), education level ($\chi 2 = 10.446$; p = 0.002), household income ($\chi 2 = 11.204$; p = 0.003), profession ($\chi 2 = 16.308$; p < 0.001), working station ($\chi 2 = 9.698$; p = 0.008), smoking status ($\chi 2 = 20.096$; p < 0.001), and chronic disease ($\chi 2 = 5.635$; p = 0.018).

Furthermore, five factors associated with TPA were marital status ($\chi 2 = 16.078$; p = 0.002), household income ($\chi 2 = 12.90$; p < 0.01), profession ($\chi 2 = 10.322$; p = 0.006), working station ($\chi 2 = 11.325$; p = 0.003), and years of service ($\chi 2 = 13.348$; p = 0.001). Four factors associated with LTPA were gender ($\chi 2 = 8.656$; p = 0.005), education level ($\chi 2 = 12.067$; p = 0.002), working station ($\chi 2 = 8.054$; p = 0.017), and smoking status ($\chi 2 = 27.228$; p < 0.001).

		Cases	Total Phys	sical Activity	Total Oco Related	Total Occuptation- Related PA (OPA)Total Transportation- Related PA (TPA)		Total Leisure-Time Related PA (LTPA)		
		(n)	X2	P value	X2	P value	X2	P value	X2	P value
			Sociodem	ographic Cha	aracteristic	s				
	18 – 24	1								
	25 – 34	114							3.721	
(voare)	35 – 44	145	1.205	0.413	2.059	0.301	1.919	0.629		0.384
(years)	45 – 54	38								
	55+	4								
Gender	Male	87	24 228	<0.001	8 814	0.002	0.043	0.844	8 656	0.005
Gender	Female	215	24.220	-0.001	0.014	0.002	0.040	0.044	0.000	0.000
	Malay	264								
Race	Indian	20	1 646	0.202	8 805	0.200	5 333	0 150	1 281	0 765
Nace	Chinese	14	4.040	0.202	0.000	0.290	5.555	0.150	1.201	0.705
	Others	4								
	Single	49								0.506
Marital Status	Married	246	8.450	0.110	5.455	0.061	16.078	0.002	1.567	
	Widow/divorced	7								
Children	Yes	252	1 300	0.276	0.008	0.524	0.071	0.804	0 452	0.646
Cillidien	No	50	1.300	0.276	0.000	0.524	0.071	0.804	0.452	0.040
	·		Socio-ec	onomic Char	acteristics					
Education	Secondary	35	6.380	0.017	10.446	0.002	1.571	0.244	12.067	0.002
	Tertiary	367						0.244		0.002
	Low Income (<rm4,000)< th=""><td>72</td><td></td><td></td><td rowspan="2">11.204</td><td rowspan="3">0.003</td><td rowspan="3">10.338</td><td rowspan="3">0.005</td><td rowspan="3">0.353</td><td rowspan="3">0.872</td></rm4,000)<>	72			11.204	0.003	10.338	0.005	0.353	0.872
Household income (RM)	Middle Income (RM4,000 - RM9,999)	165	10.770	0.004						
	High Income (≥RM10,000)	65								
	•		Occupa	tional Chara	cteristics					
	Management & professional	96								
Profession	Paramedic & Auxilliary	175	12.387	0.002	16.308	<0.001	10.322	0.006	3.653	0.163
	Implementer	31	1							
	OPD	153								
Working station/	мсн	104	0.023	0.987	9 698	0.008	11.325	0.003	8 054	0.017
department	Others	45								
	< 5	46								1
Years of service	5 – 10	90	2.297	0.312	4.968	0.083	13.348	0.001	3.940	0.147
(years)	> 10	166	1							0.111
			Hea	Ith Character	ristics		1			
	Non-smoker	276								
Smoking status	Occasional smoker	20	14.450	<0.001	20.096	<0.001	1.075	0.583	27.228	<0.001
	Current/Daily smoker	6	1						27.225	
Chanada Dissa	No	224	0.004	0.005	E 005	0.040	4.000	0.007	0 477	
Chronic Disease	Yes	78	2.281	0.085	5.635	0.018	1.099	0.297	0.177	0.703
	Underweight	10					2.399			
BMI	Normal	117	0.699	0.712	3.108	0.218		0.301	2.727	0.252
	Overweight	175	1	-						

Table 3. Levels of physical activity domains (OPA, TPA, and LTPA) and their associated factors among the respondents

Abbreviations: OPD = outpatient department; MCH = maternal & child health; BMI = body mass index. BOLD values: p<0.05

Association between the PA domains (OPA, TPA, and LTPA) with burnout among the respondents

Furthermore, the respondents' physical activities were divided into four categories (0, 1-149, 150-299, and \geq 300 min/week) (9) in order to evaluate the potential dose-response relationship between the respondents' physical activity domains and their levels of burnout, as illustrated in Table 4. In terms of total PA, 31.5% of HCWs achieved more than 300 minutes/week of PA, while 28.8% were engaged for 1–149 minutes/week. Inversely, the majority of respondents failed to achieve the recommended PA levels for the respective domains.

Table 5 presents Spearman's rho correlations between PA domains and burnout. A weak, negative correlation was found between TPA and personal burnout (rs = -0.247, p < 0.001) and work-related burnout (rs = -0.226, p < 0.001). However, no significant correlations were observed between PA domains and client-related burnout.

	TOTAL PA			ΟΡΑ		ТРА		LTPA	
-	n	%	n	%	n	%	n	%	
0 min/week	42	13.9	127	42.1	225	74.5	99	32.8	
1 - 149 min/week	87	28.8	68	22.5	44	14.6	164	54.3	
150 - 299 min/week	78	25.8	54	17.9	17	5.6	27	8.9	
≥ 300 min/week	95	31.5	53	17.5	16	5.3	12	4.0	

Table 4. Levels of PA domains (OPA, TPA, and LTPA) (n = 302)

Abbreviations: Total PA = Total Physical activity; OPA = Occupation-related physical activity; TPA = Transportation-related physical activity; LTPA = Leisure-time related physical activity.

Table 5. Spearman's rho correlations between PA domains (OPA, TPA, and LTPA) and Burnout (Personal, Work-related, and Client-related) (n = 302)

	Burnout	Spearman's Rho	TOTAL PA	ΟΡΑ	ТРА	LTPA
_		Correlation coefficient	-0.034	-0.52	-0.247	-0.008
	Personal Burnout	sig. (2 tailed)	0.557	0.37	<0.001	0.892
		N	302	302	302	302
	Work-related burnout Client-related burnout	Correlation coefficient	0.053	0.046	-0.226	0.107
		sig. (2 tailed)	0.359	0.43	<0.001	0.063
		N	302	302	302	302
-		Correlation coefficient	-0.065	-0.064	-0.095	0.107
		sig. (2 tailed)	0.261	0.265	0.098	0.063
		Ν	302	302	302	302

Abbreviations: Total PA = Total Physical activity; OPA = Occupation-related physical activity; TPA = Transportation-related physical activity; LTPA = Leisure-time related physical activity. BOLD values: p<0.05, considered as statistically significant.

DISCUSSION

This is one of the few studies that have evaluated the association between burnout and various PA domains among healthcare workers in Malaysia. In Malaysia, the prevalence of burnout among healthcare workers is a growing concern, especially in the wake of recent challenges that have tested the limits of the nation's health services. Healthcare workers faced immense pressure to care for an overwhelming number of patients, often without sufficient rest or support.

This study found a significant burden of personal burnout (68.21%), work-related burnout (68.87%), and client-related burnout (76.16%) among HCWs in Selangor. This figure is alarming and points to an urgent need for systemic changes within the Malaysian healthcare environment. This is consistent with previous studies done in Malaysia and other Asian countries, which reported similarly high levels of burnout among HCWs due to the stressful nature of healthcare work (26,27).

In addition, this study found that the prevalence of inactive HCWs in Selangor, 42.7% was almost similar to previous studies done in Perak, 45.6% (28) and Putrajaya, 37.6% (29). This study also found a high prevalence of OPA (64.6%), TPA (89.1%) and LTPA (87.1%) inactivity among HCWs in Selangor. Previously, a similar study found 19.3% OPA inactivity among HCWs in Denmark (30), 74.3% TPA inactivity among HCWs in Spain (31), and 47.9% LTPA inactivity among HCWs in Brazil (32).

Furthermore, our findings indicate that burnout prevalence remains a significant issue among HCWs, with specific PA domains showing varying associations with burnout. Notably, TPA showed a protective effect against burnout, while OPA and LTPA had more limited impacts. These findings highlight the importance of addressing the role of PA domains in reducing burnout, particularly in the high-stress environment faced by HCWs in Malaysia and other Asian countries.

Our results regarding TPA are consistent with previous research, suggesting that active commuting, such as walking or cycling to work, provides significant mental health benefits, including the reduction of stress and burnout (33,34). In addition, previous longitudinal studies revealed that active commuting by walking and cycling was associated with improvements in psychological well-being, and the benefits include mental distress reduction and enhanced overall mental health over times (35). Given the heavy traffic and commuting challenges faced in urban areas such as Selangor, incorporating active commuting into daily routines may offer an accessible and effective intervention to alleviate burnout among HCWs.

OPA did not show significant association toward burnout in our study. This result aligns with studies showing that OPA, particularly in high-demand jobs like healthcare, can exacerbate physical and mental strain. The high-stress nature of healthcare work, where OPA often involves standing for extended periods, performing repetitive tasks, and coping with emotionally-charged situations, may contribute to burnout rather than mitigate it. Several hypotheses exist regarding the potential mechanism underlying the OPA health paradox, including its often-low intensity, prolonged duration without adequate recovery, lack of worker control, and potential to increase inflammation, all of which may limit its cardiovascular and fitness benefits (36). In addition, many systematic and randomised control trial studies have reported that OPA increases the risk of all-cause mortality, cardiovascular diseases, and carcinomas (10,37). Previous studies also reported that OPA increases the risk of long-term sickness absence (38). This suggests that OPA in healthcare may not provide the same mental health benefits as other forms of PA, particularly in environments that are already physically and emotionally demanding.

Meanwhile, LTPA also did not demonstrate any significant association with burnout in our study. The potential benefits of LTPA in improving mental health should not be discounted. Previous studies have consistently demonstrated the positive effects of leisure-time physical activity on mental health, particularly in reducing emotional exhaustion and improving overall well-being (12,13,39). Although our study did not find a strong association between LTPA and burnout, encouraging HCWs to incorporate enjoyable leisure activities into their routines could still offer long-term mental health benefits.

The protective effect of TPA in our study underscores the potential of promoting active transportation as a strategy for reducing burnout among HCWs. This is particularly relevant in Malaysia, where urbanisation and sedentary lifestyles have been linked to higher levels of burnout and stress among healthcare workers (29). Active commuting not only provides physical health benefits but also serves as a form of regular, moderate-intensity PA that may help mitigate the negative effects of occupational stress. However, commuting time is an important factor associated with burnout. Previous studies revealed that commuting time longer than 50 minutes was associated with personal burnout (PB). However, long commuting time was not associated with work-related burnout (WB) (40). In a regional context, countries such as Thailand have implemented public health policies encouraging active commuting as a way to promote mental well-being among urban workers, with promising results in terms of reduced work-related stress (41).

The discussion section interprets key findings, comparing them with existing literature to highlight consistencies or discrepancies. It explains the significance of results, their theoretical or practical implications, and how they advance knowledge. Strengths and novel contributions are emphasized, while limitations, such as methodological constraints or biases, are acknowledged. Recommendations for future research address gaps and suggest methodological improvements. Finally, a concise conclusion reinforces the study's main contribution and real-world relevance without introducing new data or speculation.

Strengths & limitations

The primary strength of this study lies in its incorporation of a well-established and comprehensive theoretical framework. This foundation ensures that the research is based on robust academic principles and provides a clear lens through which the data can be interpreted. In addition, the methods employed for data collection have been rigorously tested and validated, guaranteeing their reliability. Combining a strong theoretical basis and dependable data collection techniques enhances the credibility and trustworthiness of the study's findings.

A significant limitation of this study is its reliance on a cross-sectional design. This design captures data simultaneously, offering only a brief snapshot of variables, such as physical activity, burnout, depression, anxiety prevalence, and potential risk factors. While this approach can illuminate current associations among these factors, it cannot inherently track changes or developments over time. Consequently, any observed relationships between these variables cannot be interpreted as causal. In other words, while the author may identify correlations within this data, the author cannot ascertain whether one factor directly influences or leads to changes in another.

In addition, this study has some methodological limitations. First, this study employed a multistage stratified cluster sampling method to ensure a representative sample, the design effect (DE) was not explicitly incorporated into the sample size calculation. Adjusting for DE may have required a larger sample size to account for potential clustering effects within the strata. However, our final sample size of 302 participants remains sufficient for meaningful statistical analysis, and the prevalence estimates observed in this study align with findings from previous research. Future studies should consider adjusting for DE to enhance statistical precision.

Furthermore, although the single proportion formula is typically used for simple random sampling, this study applied stratified sampling to ensure balanced representation across healthcare worker groups. While this approach improved representativeness, it did not affect the validity of our sample size estimation. Future research may refine this by using alternative methods that account for stratification effects.

Despite these limitations, this research findings provide valuable insights into the relationship between physical activity and burnout among healthcare workers. Future studies should consider longitudinal designs and larger sample sizes for greater generalisability.

CONCLUSION

In conclusion, our findings highlight the distinct roles that different PA domains play in influencing burnout among HCWs in Selangor. TPA emerged as a significant protective factor against burnout, whereas OPA and LTPA had more limited effects in this context. These results suggest that public health interventions aimed at promoting active transportation may be particularly effective in reducing burnout among HCWs. Future research should explore the mechanisms underlying these associations and consider culturally and contextually relevant interventions to promote PA across all domains, especially in high-stress professions like healthcare. Additionally, longitudinal studies across Malaysia and other Asian countries are needed to further validate these findings and inform targeted strategies to reduce burnout and improve the mental well-being of HCWs.

Supplementary Materials: The Supplementary Material for this article can be found online at: https://shorturl.at/MIVhM

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