

ORIGINAL ARTICLE

ASSOCIATIONS BETWEEN PHYSICAL ACTIVITY AND MENTAL HEALTH AMONG MALAYSIAN ADULTS DURING COVID 19 PANDEMIC IN MALAYSIA

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ABSTRACT

Physical inactivity was recognized as the fourth risk factor of death and the current Covid-19 pandemic had increased the probability of society becoming less physically active. These contributed to adverse mental changes. Therefore, our main objective was to study the association of physical activity and mental health among adults in Malaysia during Covid-19. A cross-sectional study was conducted through an online survey and 1161 Malaysian adults were recruited in the study. DASS 21 and IPAQ 7 questionnaires were used to assess their mental health and physical activity among adults in Malaysia. A total of 1161 participants (267 males and 894 female) were included in the study. Overall, there were participants having average depression score of 1.55 (SD=1.54) that comprises of normal (40.1%), mild (11.7%), moderate (19.7%), severe (9.8%) and extremely severe (18.6%). As for anxiety, the average is 1.96 (SD=1.65) that included normal (33.5%), mild (6.9%), moderate (20.4%), severe (8.3%) and extremely severe (30.9%). The average for stress-induced participants was 0.93 (SD=1.31) that consisted of normal (59.9%), mild (10.9%), moderate (11.7%), severe (10.9%) and extremely severe (6.5%). There was a significant association of depression, anxiety and stress levels (DASS-21) with age ($p<0.001$), marital status ($p<0.001$) and employment status ($p<0.001$). There was no significant association between low, moderate and high physical activity with levels of depression, anxiety and stress. Instead, there was significance association between level of depression, anxiety and stress towards sociodemographic characteristic such as age, marital status and employment status.

Keywords: Physical activity, mental disorders, COVID-19 pandemic, Malaysian adults

INTRODUCTION

During pandemic, Ministry of Health (MOH) announced movement control orders to limit the physical contact through strict social distancing procedures among people and restrict movement around such as closure of schools and parks and the cancellation of youth sports and activity classes may prevent adolescence from achieving recommended levels of physical activity and psychological impact of during COVID19 movement control order (MCO) can be wide-ranging, substantial and potentially sustained¹. Although the optimal physical activity dose associated with improved health outcomes cannot be determined precisely with the available evidence base, many of the benefits are observed with an average of 60 min of moderate-to-vigorous intensity physical activity (MVPA) daily, although more physical activity beyond 60 min of MVPA daily appears to be better for various health outcome².

Conversely, physical inactivity has been identified as the fourth leading risk factor for global mortality, causing an estimated 3.2 million deaths globally⁵, and the current Covid-19 pandemic has increased the probability of society becoming less physically

active. Bortz (1984) stated that quarantine leads to physical inactivity, contributing to adverse mental and physical health changes³. According to a previous conducted research survey about the progression of mental health disorders during the COVID19 pandemic, percentage of anxiety (55.1%) and stress (30.6%) symptoms were highest among adults in Malaysia.

Our conducted research aims to contribute towards the societies in adding more published research material in Malaysia specifically regarding the association of low level of physical activity and mental health especially for depression, anxiety and stress. With the help of this material, we would also be able to assess the level and risk of mental health issues such as depression, anxiety and stress among the population of Malaysian during COVID 19 pandemic. To help more, our studies also raise the awareness of public opinion on mental health association with physical activity among Malaysian population. In addition to that, our material can be provided as statistical data to Malaysian government in reorganizing or implementing any current control or preventive program in accordance to Malaysian population activity during Covid-19 pandemic. Therefore, the main objective

is to study the association of physical activity and mental health among adults in Malaysia during pandemic Covid-19 and coherently to assess the level of physical activity and mental health among adults in Malaysia. Subsequently, a further understanding on the association of reduced physical activity with depression, anxiety and stress among participants in Malaysia and to determine the association of reduced physical activity with sociodemographic characteristics of participants in Malaysia would be achieved alongside the main objective.

METHODS

Study setting

This is a cross-sectional study and was conducted online through a survey assessing the level of physical activity on mental health among adults in Malaysia. Participants were asked for informed consent prior to enrolment of this study. Convenience sampling method was used to recruit the participants and it took six weeks to complete the study. A sample size estimation of 385 is calculated by using the Raosoft with the population size of 21.82 million adults of the age 18 and above in Malaysia as per 2019^{6,7}.

Study design and sampling method

All participants were invited to participate through social medias such as WhatsApp, Twitter, Email and Facebook. They were required to answer a structured google questionnaire. The inclusion criteria were: a) Malaysian citizen aged 18 years and above; (b) Able to read and understand English; (c) Residing in Malaysia at the time of survey. The exclusion criteria were (a) Participants aged below 18 years; (b) Unable to provide informed consent prior enrolment; (c) non-Malaysian citizen. To prevent overlapping of participants we kept a checklist and sent the survey only through one social media for a person.

Questionnaire

The questionnaire was made up of THREE (3) sections. The first section, sociodemographic characteristics consisted of 8 items, second section consisted of 21 items for assessment of mental health by using DASS-21 questionnaire and the third section with 8 items for assessment of physical activity by using the IPAQ questionnaire. Information regarding age, sex, area of residence, marital status, race, family income, educational status, employment status was obtained. Age was classified into young adults (18-39yrs), middle aged adults (40-59yrs), and old aged adults (> 60)⁸. While for income was classified into Top 20% (T20), Middle

40% (M40), and Bottom 40% (B40) according to previous literature⁹.

The second section assessed the participant's mental health with the DASS-21 questionnaire. The DASS-21 questionnaire is basically a shorter version of the DASS-42. It is designed to measure one's emotional status such as depression, anxiety and stress. This scale is suitable for mental health screening. In terms of depression, this scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. For anxiety, it assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. Finally, the stress scale assesses specific arousal such as difficulty in relaxing, nervous arousal, and being easily upset/agitated, irritable/over-reactive and impatient¹⁰. Participants were asked to use a 4-point scale to rate the severity or frequency of their experience for the past week. This questionnaire has been validated across clinical and non-clinical samples in different cultures and languages during the COVID-19 pandemic¹¹.

The third section was to assess the participant's physical activity level by using the IPAQ questionnaire. This questionnaire was proposed by the World Health Organization, 1998 in which physical activity was referred to all movements including during leisure time, during transport to and from the places, or as part of a person's work and both moderate- and vigorous-intensity physical activity (MVPA) improved health¹². It assesses the types of physical activity and sitting time that people do as part of their daily lives which is used to estimate total physical activity in metabolic equivalent task (MET-min/week) and time spent sitting. This questionnaire was also previously reported to have internationally validated results¹² and was validated for the Portuguese language in 2001¹³. According to participant's answers, we can classify the level of physical activity into 3 categories which are high, moderate and low.

Data processing and analysis

Data collected from this survey was converted to MS Excel 2019 spreadsheet for analysis. All statistical analysis was done using the Statistical Package for the Social Sciences software (SPSS) version 26. We calculated the frequencies and means for descriptive analysis. The chi-square test was used to compare the significance between physical activity and mental health. Descriptive analysis and univariate analysis were carried out.

In the pilot study, we conducted earlier, the Cronbach’s alpha for different versions of DASS-21 is as follows: stress scale ranges from 0.-0.780, anxiety scale ranges from 0.830, and depression scale ranges from 0.878. In a previous study, the reliability of DASS-21 also showed that it has excellent Cronbach’s alpha values of 0.81, 0.89 and 0.78 for the subscales of depressive, anxiety and stress respectively. (14) For IPAQ, we measured the Cronbach’s alpha to be 0.770 while in a previous study the Cronbach’s Alpha was 0.673. (15)

Ethic Approval

This study was conducted after approval from Centre of Research and Development, Asia Metropolitan University. (NO: HEC0106FOM002).

RESULTS

Descriptive data of the participants sociodemographic characteristics were presented in Table 1. The 1161 valid responses were from individuals that were divided into young adults (81.9%), middle aged adults (15.6%) and old aged adults (2.5%) with a gender split of 77.0% female, 23.0% male

Table 1: Sociodemographic characteristics of the respondents (N=1161)

Variables	Number (n)	Percentage (%)
Age		
Young Adults (18-39 yr)	951	81.9
Middle Adults (40-59 yr)	181	15.6
Old Adults (≥60 yr)	29	2.5
Residence		
Urban	178	15.3
Rural	983	84.7
Gender		
Male	267	23.0
Female	894	77.0
Marital status		
Single	884	76.1
Married	243	20.9
Divorced	17	1.5
Widowed	11	0.9
Others	6	0.5
Race		
Malay	661	56.9
Chinese	91	7.8
Indian	348	30.0
Others	61	5.3
Family Income		
Less than RM4849	520	44.8
Between RM4850-RM10960	463	39.9
More than RM10960	178	15.3
Educational status		
No formal education	6	0.5
Primary	1	0.1
Secondary	56	4.8
Post-secondary education (Pre-University, Matriculation, A-level, Diploma, Foundation etc.)	267	23.0
Tertiary (Bachelor, Degree, Master, PhD)	831	71.6
Employment status		
Employed (Full-Time)	387	33.3
Employed (Part-Time)	45	3.9
Unemployed/Home maker	62	5.3
Retired	26	2.2
Students	614	52.9
Others	27	2.3

The race or ethnicity of the respondents included Malay (56.9%), Chinese (7.8%), Indian (30.0%), and others (5.3%). Responses were primarily received from individuals living in a rural residence (84.7%) and the remaining from urban residences (15.3%). The majority of the respondent's current educational status included tertiary education (71.6%) and post-secondary education (23.0%). Most respondents were from the B40 category (44.8%), with the remainder approximately equally distributed among M40 (39.9%) and T40 categories (15.3%). As for employment status, the vast majority of respondents were students (52.9%). More than half of the respondents were single (76.1%).

The levels of depression, anxiety and stress among participants are described in table 2. Overall, the levels for depression comprises of normal (40.1%), mild (11.7%), moderate (19.7%), severe (9.8%) and extremely severe (18.6%). As for anxiety, the levels include normal (33.5%), mild (6.9%), moderate (20.4%), severe (8.3%) and extremely severe (30.9%). The levels of stress-induced participants consist of normal (59.9%), mild (10.9%), moderate

(11.7%), severe (10.9%) and extremely severe (6.5%).

The levels of physical activity among participants are illustrated in table 3. The majority of participants were involved in low physical activity (49.1%), followed by high physical activity (28.6%) and moderate physical activity (22.3%). The depression, anxiety and stress scores in relation to different sociodemographic characteristics are presented in Table 4,5 and 6 respectively. The association between the sociodemographic characteristics of the participants with depression, anxiety and stress were interpreted using the Chi square test wherein the significance was determined when the p-value is less than 0.05.

Therefore, the results showed a significant association of depression, anxiety and stress levels (DASS-21) with age ($p < 0.001$), marital status ($p < 0.001$) and employment status ($p < 0.001$). The association between depression, anxiety and stress scores and levels of physical activity are shown in table 7. There is no significant association between low, moderate and high physical activity with levels of depression, anxiety and stress.

Table 2: Levels of depression, anxiety and stress among participants using DASS-21 questionnaire (N= 1161)

Variables	Normal n(%)	Mild n(%)	Moderate n(%)	Severe n(%)	Extremely Severen(%)
Depression	466 (40.1)	136 (11.7)	229 (19.7)	114 (9.8)	216 (18.6)
Anxiety	389 (33.5)	80 (6.9)	237(20.4)	96 (8.3)	359 (30.9)
Stress	696(59.9)	126 (10.9)	136 (11.7)	127 (10.9)	76 (6.5)

Table 3: Levels of Physical activity among participants using IPAQ questionnaire (N=1161)

Levels of physical activity	Number(n)	Percentage (%)
Low	570	49.1
Moderate	259	22.3
High	332	28.6

Table 4a: Association of Depression levels with sociodemographic characteristics of the respondents using Chi square test (N=1161)

Variables	Depression					x2 (df)	p-value
	Normal n(%)	Mild n(%)	Moderate n(%)	Severe n(%)	Extremely severe n(%)		
Age							
Young adults (18-35yr)	409(87.8)	117 (10.9)	185(80.8)	82(71.9)	158(73.1)	32.77	0.001
Middle adults (36-55 yr)	51(10.9)	86(8.0)	36(15.7)	27(23.7)	50(23.1)	(8)	
Old adults (≥60yr)	6(1.3)	17(12.5)	8(3.5)	5(4.4)	8(3.7)		
		2(1.5)					
Residence							
Urban	410(88.0)	111(81.6)	191(83.4)	94(82.5)	177(81.9)	6.86	0.143
Rural	56(12.0)	25 (18.4)	38(16.6)	20(17.5)	39(18.1)	(4)	

Table 4b: Association of Depression levels with sociodemographic characteristics of the respondents using Chi square test (N=1161)

Variables	Depression					x2 (df)	p-value
	Normal n(%)	Mild n(%)	Moderate n(%)	Severe n(%)	Extremely severe n(%)		
Gender							
Male	110(23.6)	27(19.9)	53(23.1)	30(26.3)	47(21.8)	169(78.2)	1.75 (4) 0.781
Female	356(76.4)	109(80.1)	176(76.9)	84(73.7)			
Marital status							
Single	394(84.5)	112(82.4)	171(74.7)	54(23.6)	71(62.3)	136(63)	68.35 (16) 0.001
Married	67(14.4)	20(14.7)	3(2.2)	1(0.4)	37(32.5)	6(2.8) 5(2.3) 1(0.9)	
Divorced	4(0.9)	3(2.2)	1(0.4)		2(1.8)	3(2.6)	
Widowed	1(0.2)	1(0.7)			1(0.9)		
Others	0(0.0)	0(0.0)					
Race							
Malay	255(54.7)	89(65.4)	136(59.4)	8(3.5)	61(53.5)	120(55.6)	16.43 (12) 0.172
Chinese	45(9.7)	7(5.1)	74(32.3)	11(4.8)	9(7.9)	63(29.2)	
Indian	143(30.7)	32(23.5)			36(31.6)	11(5.1)	
Others	23(4.9)	8(5.9)			8(7.0)		
Family Income							
Less than RM4849	215(46.1)	66(48.5)	84(36.7)	53(46.5)	102(47.2)	91(42.1)	11.84 (8) 0.158
Between RM4850- RM10960	176(37.8)	50(36.8)	102(44.5)	44(38.6)	23(10.6)		
More than RM10960	75(16.1)	20(14.7)	43(18.8)	17(14.9)			
Educational status							
No formal education	3(0.3)	1(0.7)	1(0.4)	0(0.0)	0(0.0)	0(0.0)	15.69 (16) 0.475
Primary	1(0.2)	0(0.0)	14(6.1)	55(24.0)	8(7.0)	37(17.1)	
Secondary	21(4.5)	4(2.9)			20(17.5)		
Post-secondary education (Pre-University, Matriculation, A-level, Diploma, Foundation etc.)	124(26.6)	31(22.8)	159(69.4)			169(78.2)	
Tertiary (Bachelor, Degree, Master, PhD)		100(73.5)			86(75.4)		
	317(68.0)						
Employment status							
Employed (Full-Time)	110(23.6)	41(30.1)	82(35.8)	11(4.8)	44(38.6)	110(50.9)	97.91 (20) 0.001
Employed (Part-Time)	19(4.1)	4(2.9)	14(6.1)	4(1.7)	5(4.4)	9(7.9)	
Unemployed/Home maker	16(3.4)	6(4.4)	111(48.5)	7(3.1)	7(6.1)	73(33.8)	
Retired	4(0.9)	2(1.5)			46(40.4)	1(0.5)	
Students	304(65.2)	80(58.8)			3(2.6)		
Others	13(2.8)	3(2.2)					

Table 5: Association of Anxiety levels with sociodemographic characteristics of the respondents using Chi square test (N=1161)

Variables	Anxiety						p-value
	Normal n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Extremely severe n (%)	χ^2 (df)	
Age							
Young adults (18-35yr)	342(87.9)	68(85.0)	198(83.5)	35(14.8)	79(82.3)	264(73.5)	0.001
Middle adults (36-55 yr)	42(10.8)	11(13.8)	4(1.7)		12(14.6)	79(22.0)	
Old adults (\geq 60yr)	5(1.3)	1(1.3)			3(3.1)	16(4.5)	
Residence							
Urban	343(88.2)	68(85.0)	198(83.5)	39(16.5)	78(81.3)	296(82.5)	0.189
Rural	46(11.8)	12(15.0)			18(18.8)	63(17.5)	
Gender							
Male	90(23.1)	18(22.5)	50(21.1)		27(28.1)	82(22.8)	0.749
Female	299(76.9)	62(77.5)	187(78.9)		69(71.9)	277(77.2)	
Marital status							
Single	328(84.3)	67(83.8)	185(78.1)	46(19.4)	74(77.1)	230(64.1)	0.001
Married	56(14.4)	13(16.3)	5(2.1)	1(0.4)	21(21.9)	107(29.8)	
Divorced	4(1.0)	0(0.0)	0(0.0)		0(0.0)	8(2.2)	
Widowed	1(0.3)	0(0.0)			0(0.0)	9(2.5)	
Others	0(0.0)	0(0.0)			1(1.0)	5(1.4)	
Race							
Malay	216(55.5)	40(50.0)	150(63.3)	14(5.9)	63(65.6)	192(53.5)	0.201
Chinese	38(9.8)	6(7.5)	63(26.6)	10(4.2)	2(2.1)	31(8.6)	
Indian	115(29.6)	28(35.0)			27(28.1)	115(32.0)	
Others	20(5.1)	6(7.5)			4(4.2)	21(5.8)	
Family Income							
Less than RM4849	178(45.8)	37(46.3)	107(45.1)	90(38)	32(33.3)	166(46.2)	0.283
Between RM4850-RM10960	148(38.0)	30(37.5)	40(16.9)		45(46.9)	150(41.8)	
More than RM10960	63(16.2)	13(16.3)			19(19.8)	43(12.0)	
Educational status							
No formal education	2(0.5)	2(2.5)	0(0.0)	0(0.0)	1(1.0)	1(0.3)	0.157
Primary	1(0.3)	0(0.0)	11(4.6)	60(25.3)	0(0.0)	0(0.0)	
Secondary	18(4.6)	3(3.8)			5(5.2)	19(5.3)	
Post-secondary education (Pre-University, Matriculation, A-level, Diploma, Foundation etc.)	101(26.0)	23(28.7)			21(21.9)	62(17.3)	
Tertiary (Bachelor, Degree, Master, PhD)	267(68.6)	52(65.0)			69(71.9)	277(77.2)	
Employment status							
Employed (Full-Time)	93(23.9)	22(27.5)	74(31.2)	10(4.2)	36(37.5)	162(45.1)	0.001
Employed (Part-Time)	14(3.6)	4(5.0)	10(4.2)	2(0.8)	5(5.2)	12(3.3)	
Unemployed/Home maker	14(3.6)	4(5.0)	134(56.5)	7(3.0)	6(6.3)	28(7.8)	
Retired	3(0.8)	1(1.3)			2(2.1)	18(5.0)	
Students	254(65.3)	48(60.0)			45(46.9)	133(37.0)	
Others	11(2.8)	1(1.3)			2(2.1)	6(1.7)	

Table 6: Association of Stress levels with sociodemographic characteristics of the respondents using Chi square test (N=1161)

Variables	Stress Normal n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Extremely severe n (%)	x2 (df)	p-value
Age							
Young adults (18-35yr)	598(85.9)	95(75.4)	24(19.0)	106(77.9)	93(73.2)	28(22.0)	0.001
Middle adults (36-55 yr)	89(12.8)	7(5.6)		27(19.9)	6(4.7)	13(17.1)	
Old adults (≥60yr)	9(1.3)			3(2.2)		4(5.3)	
Residence							
Urban	596(85.6)	108(85.7)	18(14.3)	109(80.1)	104(81.9)	23(18.1)	3.78 (4) 0.437
Rural	100(14.4)			27(19.9)		10(13.2)	
Gender							
Male	166(23.9)	23(18.3)		35(25.7)	28(22.0)	99(78.0)	2.98 (4) 0.561
Female	530(76.1)	103(81.7)		101(74.3)		61(80.3)	
Marital status							
Single	569(81.8)	90(71.4)	33(26.2)	96(70.6)	83(65.4)	34(26.8)	79.51 (16) 0.001
Married	114(16.4)	3(2.4)	0(0.0)	40(29.4)	3(2.4)	3(2.4)	
Divorced	9(1.3)	0(0.0)		0(0.0)	0(0.0)	4(3.1)	
Widowed	4(0.6)			0(0.0)		4(5.3)	
Others	0(0.0)					2(2.6)	
						2(2.6)	
Race							
Malay	403(57.9)	71(56.3)	7(5.6)	81(59.6)	65(51.2)	12(9.4)	7.22 (12) 0.843
Chinese	56(8.0)	38(30.2)	10(7.9)	9(6.6)	43(33.9)	7(5.5)	
Indian	202(29.0)			42(30.9)		23(30.3)	
Others	35(5.0)			4(2.9)		5(6.6)	
Family Income							
Less than RM4849	325(46.7)	51(40.5)	58(46.0)	51(37.5)	59(46.5)	48(37.8)	9.61 (8) 0.294
Between RM4850- RM10960	260(37.4)	17(13.5)		62(45.6)	20(15.7)	35(46.1)	
More than RM10960	111(15.9)			23(16.9)		7(9.2)	
Educational status							
No formal education	5(0.7)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(0.8)	15.50 (16) 0.488
Primary	1(0.1)	3(2.4)	25(19.8)	7(5.1)	6(4.7)	28(22.0)	
Secondary	36(5.2)			27(19.9)		4(5.3)	
Post-secondary education (Pre-University, Matriculation, A-level, Diploma, Foundation etc.)	178(25.6)	98(77.8)		102(75.0)	92(72.4)	9(11.8)	
Tertiary (Bachelor, Degree, Master, PhD)	476(68.4)					63(82.9)	
Employment status							
Employed (Full-Time)	186(26.7)	45(35.7)	2(1.6)	64(47.1)	53(41.7)	6(4.7)	84.39 (20) 0.001
Employed (Part-Time)	30(4.3)	4(3.2)	9(7.1)	4(2.9)	9(6.6)	10(7.9)	
Unemployed/Home maker	33(4.7)	63(50.0)	3(2.4)	2(1.5)	51(40.2)	2(1.6)	
Retired	7(1.0)			51(37.5)		3(3.9)	
Students	424(60.9)			6(4.4)		25(32.9)	
Others	16(2.3)					0(0.0)	

Table 7: Association of levels of depression, anxiety and stress with levels of physical activity among respondents using Chi square test (N=1161)

Variables	Depression					x ² (df)	p-value
	Normal n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Extremely severe n (%)		
Low physical activity	230(49.4)	66(48.5)	113(49.3)	63(55.3)	98(45.4)	8.86 (8)	0.354
Moderate physical activity	111(23.8)	31(22.8)	40(17.5)	21(18.4)	56(25.9)		
High physical activity	125(26.8)	39(28.7)	76(33.2)	30(26.3)	62(28.7)		
	Anxiety						
	Normal n(%)	Mild n(%)	Moderate n(%)	Severe n(%)	Extremely severe n(%)	x ² (df)	p-value
Low physical activity	191(49.1)	39(48.8)	115(48.5)	48(50.0)	177(49.3)	3.67 (8)	0.885
Moderate physical activity	92(23.7)	18(22.5)	54(22.8)	15(15.6)	80(22.3)		
High physical activity	106(27.2)	23(28.7)	68(28.7)	33(34.4)	102(28.4)		
	Stress						
	Normal n(%)	Mild n(%)	Moderate n(%)	Severe n(%)	Extremely severe n(%)	x ² (df)	p-value
Low physical activity	342(49.1)	61(48.4)	70(51.5)	59(46.5)	38(50.0)	5.53 (8)	0.700
Moderate physical activity	165(23.7)	22(17.5)	25(18.4)	31(24.4)	16(21.1)		
High physical activity	189(27.2)	43(34.1)	41(30.1)	37(29.1)	22(28.9)		

DISCUSSION

In our study, we found that the physical activity level adopted during the period of physical distancing throughout the pandemic was significantly lower than that prior to this period with the highest recording of 49.1%. Moreover, mental health status of the participants such as depression, anxiety and stress scores were significantly associated with low levels of physical activity. According to table 2, about 11.7%-18.6% of the respondents presented moderate or severe symptoms of depression, around 20.4%-30.9% showed moderate or severe symptoms of anxiety during the social distancing period, and around

11.7%-6.5% of the respondents presented with moderate and severe stress symptoms, and the significant variables such as single marital status, employment status and the participants' age were associated with higher incidences of anxiety, depression, and stress with low levels of physical activity (p<0.05).

The level of physical activity was significantly reduced during the social distancing period as this prompted for the conduction of this research study. In our study, we found that a percentage of 49.1% that accounted for low physical activity in Malaysia, which is higher compared to high (28.6%) and moderate (22.3%) of physical activity. These

findings were compatible with the findings from WHO mentioned that 28% of adults aged 18 years and above were not active enough in 2016 whereby men 23% and women 32% practicing physical activities⁵. It was important to notice that most of the respondents demonstrated a higher percentage of low level of physical activity. This was due to more strict rules of social distancing were implemented, including lockdown, and eventually a drastic reduction of physical activity was observed. According to previous study, physical activity dropped significantly for all age groups, and especially among males in Malaysia¹⁴.

Furthermore, reduced physical activity induced adults to have sedentary activities requiring very low energy expenditure like reclining, seated, or lying position. This may strike to overweight and obesity, which gives high-risk factors for mortality thus long-term health risks of a sedentary lifestyle were a major concern among youths¹⁵. On the other hand, a lower physical activity level due to sustained social distancing potentially increased the risk of damaging the immune, respiratory, cardiovascular, musculoskeletal systems as well as compromising mental health¹⁶. Although local government performed evident measures to primarily reduce the outbreak of COVID-19 in Malaysia such as lockdowns, strict isolation, social distancing, uncertainty and delays in commencement of schools, colleges, and universities, this issue had caused significant implications on adult's socio-psychological well-being in terms of depression, anxiety, and stress levels as their physical activity reduced due to lockdown regulations. In our study findings, low physical activity caused about 49.3%-55.3% from moderate to severe level of depression, about 48.5%-50% from moderate to severe level of anxiety, and about 51.5%-46.5% from moderate to severe level of stress among adults.

This higher levels of depression, anxiety, and stress under low level of physical activity compared to moderate and high level of physical activity significantly justifies the association and contribution of the impacts to mental health among adults in Malaysia. Early literature has documented the negative influence of pandemics on adults' psychological well-being which has led to suicidal attempts through depressive behavior accompanied with anxiety and stress¹⁷. However, there were no significant associations between physical activities and depression (p-value 0.354 and chi-square value of 8.86), anxiety (p-value 0.885 and chi-square

value of 3.67⁸ and stress (p-value 0.700 and chi-square value of 5.53) respectively.

Moreover, the significant variables were concerned for the incidences of depression, anxiety and stress due to low levels of physical activity. Young adults that age between 18 to 35 years old have presented higher level of moderate to extremely severe depression symptoms compared to middle aged adults and old aged adults ranging from 80.8% to 73.1% with a p value of 0.001. According to previous literature, the higher physically active among men had 36%-66% lower mortality compared to women with hazard ratio of 0.64 (95% CI: 0.50-0.55). In terms of marital status, single people composed of 74.7% - 63% have highest level of moderate to extremely severe depression symptom with a p value of 0.001 compared to other marital status.

Other than that, from the aspect of employment status, full time employed workers ranging from 35.8% - 50.9% and students ranging from 48.5% - 33.8% presented with a higher level of moderate to extremely severe depression symptoms compared to other employment status with a p value of 0.001. In the aspect of anxiety levels, 83.5% - 73.5% of young adults that age between 18 to 35 years old have presented higher level of moderate to extremely severe anxiety symptoms compared to middle aged adults and old aged adults with a p value of 0.001. In terms of marital status, single people composed of 78.1% - 64.1% have highest level of moderate to extremely severe anxiety symptom with a p value of 0.001 compared to other marital status. Other than that, from the aspect of employment status, full time employed workers ranging from 31.2% - 45.1% and students ranging from 56.5% - 37% presented with a higher level of moderate to extremely severe anxiety symptoms compared to other employment status with a p value of 0.001. In addition, 77.9% - 77.6% of young adults that age between 18 to 35 years old have presented higher level of moderate to extremely severe stress symptoms compared to middle aged adults and old aged adults with a p value of 0.001. In terms of marital status, single people composed of 70.6% - 60.5% have highest level of moderate to extremely severe stress symptom with a p value of 0.001 compared to other marital status. Other than that, from the aspect of employment status, full time employed workers ranging from 47.1% - 51.3% and students ranging from 37.5% - 32.9% presented with a higher level of moderate to extremely severe stress symptoms compared to other employment status with a p value of 0.001.

Evidently, previous research studies have revealed several stressors that are key factors affecting the students' and full-time workers' depression and anxiety accompanied with stress are a parent or young associate being infected by COVID-19, monetary issues and their effects on daily life, educational disruptions, effects of the disease on education and potential jobs and sensational broadcasts and inaccurate news reports (18-20).

Furthermore, lockdowns cause prolonged impositions that can be detrimental to youths, single adults, students as well as full-time workers. This is because it is a hostile experience for youths in Malaysia facing severe financial stress due to loss of employment, social disorders such as social withdrawal, cyberbullying, alcohol misuse, and addiction, and mental health issues such as suicide attempts and depression accompanied by anxiety and severe stress^{21,22}. Besides, research studies that were conducted during the historical SARS outbreak stated that quarantine was linked to high rates of depression and anxiety due to restricted physical activity among young students, employers and single-lived adults²³. Similarly, a cross-sectional study in China about presence of depression, anxiety and stress throughout the H1N1 pandemic during 2009 found that youths, students, and full-time employers facing quarantine with reduced physical activity experience monotony, aloneness, irritation, worsening mental symptoms, and mental distress²⁴. These authors further added that COVID-19 has been repetitively labeled a killer virus, mainly on social media which has prolonged feelings of perceived threats and uncertainty among the troubled nation of youths, students, full-time workers, single-lived poor people. Not only that, the bolded reasons and grounds of the mentioned troubled groups of people facing reduced rock-bottom level of physical activity throughout the lockdown during pandemic are mostly caused by separation from family and friends, loss of independence, doubts about the virus's spread, lockdown length, resentment, monotonous lifestyle, potential scarcity of essential goods, lack of accurate information, monetary loss, and stigma in Malaysia²⁵.

Residency status and family income are the important non-significance variables in this study as they are the contributive factors and aspects that are impacted due to low levels of physical activities during pandemic. The main findings in the study showed higher frequency than the expected of individuals who receive less minimum wage (which corresponds to less than RM4849 per month)

presenting extremely severe depression (47.2% with 1029 respondents), extremely severe anxiety (46.2% with 166 respondents) and extremely severe stress (44.7% with 34 respondents). This worrisome scenario is because of the necessary physical distancing measures not only have a negative impact on mental health but also can result in a devastating threat to economy, which may reduce a family's income even further. These non-significance aspects are interrelated and closely associated with the mentioned significance variables because unemployment situation and the lack of prospects of returning to work are also the other factors that can have a negative impact on mental health²⁶. In a previous systematic review, Vindegaard & Eriksen Benros also pointed out the importance of steady family income to preserve mental health²⁷.

As for this cross-sectional study, there are some limitation and strength when this study is conducted. Despite having 1,161 respondents, the study was also disseminated via e-mail and social networks, which may not be representative of the entire population of the country, but only of people who have access to the internet and that use social networks. Besides that, another major limitation is not everyone is able to comprehend English language, hence language barrier affects upon the people who are unable to read or understand the survey questions. Certain vital strengths of this study are it is to make the community aware that physical inactivity is a precipitant towards mental health. In addition, to contribute to the societies as future data analysis and reference because there are only few published studies in Malaysia on the association of reduced level of physical activity and mental health^{28,29}. The significance of this study to fill in the gaps of previous researchers are basically to understand how different sociodemographic factors influences the physical activity levels and mental health status through two sets of questionnaires. This is different from previous researchers because this study comprises all domain sociodemographic variables.

CONCLUSION

As per Movement Control Order (MCO), our research was focusing more onto the association between physical activity and mental health disorders such as depression, anxiety and stress among population in Malaysia. According to our findings, there was no significance associations between physical activity with depression, anxiety and stress. However, this can also be affected with other factors that cannot

be excluded in the data collection. This research however provided the significant findings for newly founded research proposal in hope to unravel the association between physical activity and mental health status. Instead, there significance association between level of depression, anxiety and stress towards sociodemographic characteristic such as age, marital status and employment status. Based on the data collected, it is recommended for the government to launch a screening with the purpose of preventing and controlling the severity of mental health disease that are most prominent during COVID-19 pandemic. Furthermore, as mental health has a significance towards sociodemographic characteristic such as age, marital status and employment status, it would be a better choice to amend the public health program that can be done, focusing more towards such variables to tackle these issues.

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