Effects of Smartphone Usage on Physical and Cardiorespiratory Fitness in Millennials Cohort

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Abstract: Research aims: This study attempts to investigate the effects of smartphone's uses on physical and cardiorespiratory fitness among millennial's cohort. Methodology: This research uses quantitative and qualitative methods using questionnaires. Data are collected from the millennial generation, namely Vocational University students of Indonesia. Research Result: Pearson correlation test between duration using a smartphone and the bleep test mileage variable showed a significant number (p) value of p = 0,000 (p <0.05). This finding means that between the duration variable using a smartphone and the bleep test mileage variable had a significant relationship. The results are reinforced by the relationship between duration and distance variables having a correlation coefficient β -0,958, which means an increase in the duration of smartphone use will result in a decrease in bleep test mileage. Research implication: Based on the results of this study in accordance with existing research that the use of smartphones has a negative influence on the level of physical and cardiorespiratory fitness among the millennial generation. Conclusion: Smartphone use, like traditional sedentary behaviours, may disrupt physical activity and reduce cardiorespiratory fitness.

1 INTRODUCTION

In ordinary life, a person needs physical fitness. Physical fitness is different for each person and is a dynamic state, which requires maintenance and coaching. Someone can be considered to be fit if he can do his usual daily activities, his job, fulfilling his duties and responsibilities in family and society, and can enjoy recreation without feeling tired (Iagih et al., 2016). By exercising, the function of the body's organs can be optimised so that it can also optimise fitness. With excellent fitness, a person can carry out daily activities optimally, without feeling tired.

On the contrary, if a person's physical fitness is not functional, he will feel tired even if he does not do substantial activities. This difference in fitness depends on each individual in maintaining fitness. In order to get adequate body fitness, various ways can be done, including maintaining a good lifestyle, healthy diet, sufficient rest, and exercise regularly (Fitzgerald, 2017).

Currently, we are in the industry 4.0 era, which is dominated by online technology, especially the use of increasingly dominating smartphones. The use of smartphones today is not only intended as a two-way communication tool such as exchanging text messages or making calls but also changing into a digital lifestyle quickly. Of the total population in the world, it is estimated that almost 90% have access to the internet, primarily through smartphones and computers. This situation has been the consequence that social media is an everyday consumption, especially among millennials (Barkley and Lepp, 2016). Based on a survey conducted by Secure Envoy, a company specialising in digital passwords, which surveyed 1,000 people in the UK concluded that nowadays students experience nomophobia, which is anxiety and fear if they are not with their smart phonebook. The survey results show, 66 percent of respondents claimed they could not live without a smartphone. This percentage is prominent in respondents aged between 18 and 24 years. As many as 77 percent of respondents in this age group experienced nomophobia. For millennials, this digital lifestyle is used to access social media, stream various kinds of entertainment, and is used to shop on e-commerce (Bianchi and Phillips, 2005). With easy internet access on a smartphone, it is possible to spend hours in a state of motion (Barkley and Lepp, 2016). This condition will certainly cause health problems such as increased cholesterol in the blood and impaired glucose absorption, higher energy

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intake and waist circumference, and of course, a higher risk of death. Many studies show that the lack of physical activity caused by spending too much time playing smartphones have deteriorating health consequences that can disrupt physical activity behaviour and can contribute to suppressing cardiorespiratory health.

The purpose of this study was to assess the impact between smartphone use, physical activity, and physical fitness (e.g., Cardiorespiration fitness) with a sample of students in the Physiotherapy Study Program at the University of Indonesia Vocational Education Program. The hypothesis in this study is the use of smartphones will be positively associated with static activities and inversely proportional to the quantity of physical activity; in addition, the use of a smartphone will be inversely proportional to cardiorespiratory fitness. As such, we argue that the use of smartphones can affect physical activity, as well as cardiorespiratory fitness.

2 LITERATURE REVIEW

In general, what is meant by physical fitness is a person's ability to do daily work efficiently without excessive fatigue so that they can still enjoy free time (Carnethon, 2003).

Factors that influence physical fitness in connection with physical fitness, several factors need to be known, namely: 1) Health problems, such as health conditions, infectious and chronic diseases. 2) Nutrition problems, such as lack of protein, calories, low nutrition, and inadequate nutrition. 3) Physical exercise problems, such as the age of starting exercise, prelinguistic exercise frequency, training intensity, and exercise volume. 4) Problems with heredity, such as anthropometric and congenital abnormalities (Panahi et al., 2016).

The research instrument used was the Multi-Stage Fitness Test/Bleep Test. The aim is to measure the level of efficiency of the function of the heart and lungs (cardiorespiratory fitness), which is demonstrated through the measurement of maximum oxygen uptake (Carnethon, 2003).

Multi-Stage Fitness Test/Bleep Test is the right way to find out the components of endurance through testing. One form of field test used to determine VO2max is the Multi-Stage Fitness Test. Compared to other tests (Cooper and Blake tests), the implementation of this test is relatively easier and uses a less extensive area. This test can be done in a group. The procedure for carrying out the bleep test is as follows.

1. The bleep test is done by running a distance of 20 meters back and forth, which starts with a slow run in stages that gets faster and faster until the athlete is unable to keep up with the rhythm of running time, meaning his maximum ability at that level of back and forth.
2. Time for each level is 1 minute.
3. Level 1 a distance of 20 meters is taken in 8.6 seconds in 7 trips.
4. Level 2 and 3 a distance of 20 meters are taken in 7.5 seconds in 8 trips.
5. Level 4 and 5 a distance of 20 meters are taken in 6.7 seconds in 9 times back and forth.
6. After a distance of 20 meters travelled, a sound signal will be heard once at the end of each level.
7. The start is done by standing, and both feet behind the starting line. With the signal "ready yes", athletes run in accordance with the rhythm towards the boundary line until one foot crosses the boundary line.
8. If the sound signal has not been heard, the athlete has crossed the boundary line, but to run back must wait for the audio signal. Conversely, if there has been a sound signal, the athlete has not reached the boundary line, the athlete must speed up to run past the boundary line and immediately run back in the opposite direction.
9. If two consecutive athletes are not able to follow the rhythm of running time means that their maximum ability is only at that level and feedback.
10. If an athlete is unable to keep up with the rhythm of running time, the athlete may not stop, but continue to run slowly for 3-5 minutes to cool down (Cooper Institute for Aerobics Research, 1999).

Table 1: Normal bleep test.

Level	Back and forth	Prediction VO2 Max	Level	Back and forth	Prediction VO2 Max
1	1	17,2	**2**	1	20,0
	2	17.6		2	20,4
	3	18,0		3	20,8
	4	18,4		4	21,2
	5	18,8		5	21,6
	6	19,2		6	22,0
	7	19,6		7	22,4
				8	22,8
1	1	17,2	**2**	1	20,0
	2	17.6		2	20,4
	3	18,0		3	20,8
	4	18,4		4	21,2
	5	18,8		5	21,6
	6	19,2		6	22,0
	7	19,6		7	22,4
				8	22,8
3	1	23,2	**4**	1	26,4
	2	23,6		2	26,8
	3	24,0		3	27,2
	4	24,4		4	27,2
	5	24,8		5	27,6
	6	25,2		6	28,0
	7	25,6		7	28,7
	8	26,0		8	29,1
				9	29,5
5	1	29,8	**6**	1	33,2
	2	30,2		2	33,6
	3	30,6		3	33,9
	4	31,0		4	34,3
	5	31,4		5	34,7
	6	31,8		6	35,0
	7	32,4		7	35,4
	8	32,6		8	35,7
	9	32,9		9	36,0
				10	36,4
7	1	36,8	8	1	40,2
	2	37,1		2	40,5
	3	37,5		3	40,8
	4	37,5		4	41,1
	5	38,2		5	41,5
	6	38,5		6	41,8
	7	38,9		7	42,0
	8	39,2		8	42,2
	9	39,6		9	42,6
	10	39,9		10	42,9
				11	43,3
9	1	43,6	10	1	47,1
	2	43,9		2	47,4
	3	44,2		3	47,7
	4	44,5		4	48,0
	5	44,9		5	48,4
	6	45,2		6	48,7
	7	45,5		7	49,0
	8	45,8		8	49,3
	9	46,2		9	49,6
	10	46,5		10	49,9
	11	46,8		11	50,2
11	1	50,5	12	1	54,0
	2	50,8		2	54,3
	3	51,1		3	54,5
	4	51,4		4	54,8
	5	51,6		5	55,1
	6	51,9		6	55,4
	7	52,2		7	55,7
	8	52,5		8	56,0
	9	52,8		9	56,3
	10	53,1		10	56,5
	11	53,4		11	56,8
	12	53,7		12	57,1
13	1	57,4	14	1	60,8
	2	57,6		2	61,1
	3	57,9		3	61,4
	4	58,2		4	61,7
	5	58,5		5	62,0
	6	58,7		6	62,2
	7	59,0		7	62,5
	8	59,3		8	62,7
	9	59,5		9	63,0
	10	59,8		10	63,2
	11	60,0		11	63,5
	12	60,3		12	63,8
	13	60,6		13	64,0
15	1	64,3	16	1	67,8
	2	64,4		2	68,0
	3	64,8		3	68,3
	4	65,1		4	68,5
	5	65,3		5	68,8
	6	65,6		6	69,0
	7	65,9		7	69,3
	8	66,2		8	69,5
	9	66,5		9	69,7
	10	66,7		10	69,9
	11	66,9		11	70,2
	12	67,2		12	70,5
	13	67,5		13	70,7
				14	70,9
17	1	71,2	18	1	74,6
	2	71,4		2	74,8
	3	71,6		3	75,0
	4	71,9		4	75,3
	5	72,2		5	75,6
	6	72,4		6	75,8
	7	72,6		7	76,0
	8	72,9		8	76,2
	9	73,2		9	76,5
	10	73,4		10	76,7
	11	73,6		11	76,9
	12	73,9		12	77,2
	13	74,2		13	77,4
	14	74,4		14	77,6
				15	77,9

Level	Back and forth	Prediction VO2 Max	Level	Back and forth	Prediction VO2 Max
19	1	78,1	20	1	81,5
	2	78,3		2	81,8
	3	78,5		3	82,0
	4	78,8		4	82,2
	5	79,0		5	82,4
	6	79,2		6	82,6
	7	79,5		7	82,8
	8	79,7		8	83,0
	9	79,9		9	83,2
	10	80,2		10	83,5
	11	80,4		11	83,7
	12	80,6		12	83,9
	13	80,8		13	84,1
	14	81,0		14	84,3
	15	81,3		15	84,5
				16	84,8

Source: (Cooper Institute for Aerobics Research, 1999)

3 METHODOLOGY

This research is a quantitative study using pre-post preliminary examination data about the bleep test as an examination that represents the quality of physical activity and cardiorespiratory fitness, and survey and analysis of descriptive data using a questionnaire as the main instrument of data collection. The aim is to obtain information about several respondents who are considered to represent the millennial population. The population of this research is 78 students of the Vocational Education Program of UI Physiotherapy Study Program.

4 RESULT

In this study, the examination of functional abilities was carried out using a measuring instrument in the form of a bleep test. A Heart Rate (HR) Pre Test is performed first before a bleep test procedure. A calculation of distance during and after the analysis was carried out. After the bleep test, the post HR test was taken (Table 1). In addition to the fitness test, the sample also completes a questionnaire to assess how long they use the smartphone and for what it is used. Table 2 illustrates descriptive data from the results of the questionnaire given to the sample.

The table above explains the descriptive data of the research conducted. Of the 78 samples tested, it can be seen that the distance travelled in the test carried out the most is 960 meters (6/7 = 35.5), the lowest distance is 220 meters (2/4 = 21.2). The lowest HR Pre is 50 bpm, and the highest is 120 bpm, while the lowest HR Post is at 52 bpm and the highest is 292 bpm. The questionnaire given to the sample aims to assess how long it takes to use a smartphone in one day, the result is the lowest duration is 70 minutes, and the highest is at 190 minutes, with an average of 163.97 minutes.

Table 2: Average HR values, Mileage/distance, and Duration of smartphone usage.

Variable	N	Min	Max	Average±SD
HR Pre test	78	50	120	90.00±17.456
HR Post test	78	52	292	131.10±44.368
Mileage/distance	78	220	960	395.90±172.480
Duration of using smart phone / day	78	70	190	163.97±33.227

Table 3: Questionnaire for smartphone use.

Question	The answer	Frequency
Do you use a smartphone to monitor health?	No	33
	Yes	45
Does using a smartphone increase or decrease your physical activity?	No	25
	Yes	53

The table above illustrates descriptive data from the questionnaire filled in by the samples. Examination and questionnaire data were analysed to obtain the correlation between the duration of using a smartphone in one day with the distance when doing a bleep test.

Table 4: Pearson correlation test results between duration and distance travelled.

	N	Average ± SD	Significant (p)
Duration	78	163.97±33.227	0.000*
Distance	78	395.90±172.480	

* Significant with a value of $p < 0.05$

The correlation test was performed using the Pearson correlation test. The significance number (p) shows the value of $p = 0.000$ (Table 3). This result means that the duration variable using a smartphone and the bleep test mileage variable have a significant correlation. The strength of the relationship between research variables is indicated by Pearson coefficient values contained in table 4.

Table 5: Correlation coefficient values between duration and distance travelled.

	Duration	Distance
Duration	1	-0,958*
Distance	-0,958*	1

* Have a strong relationship if the value close to 1

The relationship between duration and distance variables has a correlation coefficient of -0.958. The negative coefficient value illustrates that the two variables have an inversely proportional relationship; in other words, an increase in the duration of smartphone use will result in a decrease in bleep test mileage.

5 CONCLUSION

In conclusion, this study identified the impact of smartphone use on cardiorespiratory physical activity and fitness. The negative relationship between smartphone use and physical fitness and cardiorespiratory can be explained as follows: first, excessive cellphone use can reduce the time to do physical activities especially with the use of smartphones with high frequency. Our findings showed that high-frequency users are more likely to be more minimal in physical activity compared to low-frequency users (Strekalova, 2017). The users used their cellphones for more static activities such as Facebook, Twitter, video games, applications, and surfing the internet. Second, the relatively high level of smartphone usage can serve as a marker for broader patterns of leisure behaviour that are not dependent on cellphone use, such as watching television, playing video games, and using computers (Myers et al., 2002). Given that cellphones are always present on campuses and their most common uses such as sending text messages, updating social networking sites, and surfing the internet are common. The negative relationship between cellphone use and fitness illustrated here deserves further attention as Cardiorespiratory fitness (mirror VO2 max) is an excellent indicator of an individual's risk for several health problems (Carnethon et al., 2003).

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