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Relationship between smartphone usage, leisure-time physical activity and body mass index among young male adults

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Abstract
The purpose of the study was to assess the relationship between Smartphone usage, leisure time physical activity and BMI. The data on these variables were gathered using self-reported questionnaires. Since all three variables were continuous in nature and non-parametric, Spearman's rho was applied to examine the correlation. Results revealed a strong negative correlation between Leisure-time PA and Smartphone screen time (rs= -.864, p<.0.01). However, no correlation of BMI was observed with the variables leisure-time PA and smartphone screen time. The study concluded the excessive usage of smartphone results in less engagement in leisure time physical activity.

Keywords: Smartphone, leisure-time, physical activity, BMI

Introduction

Latest developments in digital technology have changed the current cell phones from a device of single feature to a multi-feature gadget with proficiencies comparable to a web-compatible computer. Modern cell phones let users access the internet for using social media (e.g., Facebook or Whats app), watch videos, play video games, and surf web. Generally, spending too much time on these activities is considered sedentary behaviour (Rosenberg *et al*., 2010) [2]. Moreover, too much engagement in sedentary behaviours is linked with many health concerns such as imbalanced lipid profiles and fat accumulation, raised waist circumferences, and higher mortality risk (Williams *et al*., 2008; Dunstan *et al*., 2010; Owen *et al*., 2010) [1, 3, 4]. More tendency to sedentary living is problematical even for those who fulfil weekly recommendations of physical activity. The people who fulfil daily physical activity requirement but spend more time being sedentary are termed as "active couch potatoes" (Lepp & Barkley, 2019) [6]. Comparing to active individuals who are also not sedentary ones, the "active couch potatoes" have imbalanced glucose metabolism and raised blood pressure inspite of their regular exercise routine (Owen *et al*., 2010; Healy *et al*., 2008) [4, 5]. Apart from these hazards, more usage of smartphone is also associated with the feeling of anxiety and depression (Gaur, 2019; Cheever *et al*., 2014; Tams *et al*., 2018) [9, 10]. As per existing studies, sticky or too much smartphone use brings up an individual to helplessness to stay away from mobile phone which, consequently, results in adverse effects in their routine life. Personal troubles include financial loss, sleep deprivation, attention problems and learning problems in academic settings, extreme sedentary living, and the worsening of interpersonal relationships (Billieux, 2012; Mendoza *et al*., 2018; Thomee *et al*., 2011) [12, 13, 14]. This study is aimed to assess the relationship between Smartphone screen time, BMI and Leisure time physical activity. The study was delimited to male young adults of age 20-25. The major limitation of the present study was self-reported data of all the variables.

Methods

A sample of 151 university students of age 20 to 25 years was recruited from Guru Nanak Dev University, Amritsar to participate in the study. They were asked to self-report their daily screen time on a smartphone in minutes. In addition, they were given a self-report questionnaire Global Physical Activity Questionnaire (GPAQ) recommended by WHO.

The participants were asked to recall their last seven-day physical activity engagement during their leisure time. The physical activity data was then computed in metabolic equivalents of tasks (METs). A value of 4 METs was assigned to moderate intensity activities such as jogging, walking fast, playing light intensity games like Badminton, Cricket, or moderate work out in gym etc. whereas the MET value of 8 was assigned to vigorous intensity activities such as running, cycling fast, intense work out at the gym etc. Total weekly MET values were then calculated by summing up both moderate and vigorous intensity activities. BMI was calculated by dividing the weight (Kgs) by height in meters squared.

Statistical analyses

SPSS version 21 was used to analyse data. Descriptive statistics for age, BMI and smartphone screen time were constructed through the "Explore" command of SPSS. Two approaches were used to test the normality of data for all variables, firstly by applying the Shapiro-Wilk test and secondly by constructing histogram charts. Since the data were not normally distributed, a non-parametric correlation of coefficient by Spearman was applied to observe the relationship between variables. The Alpha level was set at .05 cut point.

Results

Table 1: Descriptive statistics for each variable

Descriptive				
			Statistic	**Std. Error**
BMI	Mean		23.32	.14
	95% Confidence Interval for Mean	Lower Bound	23.02	
		Upper Bound	23.62	
	5% Trimmed Mean		23.33	
	Median		23.17	
	Variance		3.50	
	Std. Deviation		1.86	
	Minimum		18.26	
	Maximum		28.48	
	Range		10.23	
	Interquartile Range		2.72	
	Skewness		-.039	.197
	Kurtosis		-.133	.392
Leisure-time PA	Mean		1052.90	96.42468
	95% Confidence Interval for Mean	Lower Bound	862.39	
		Upper Bound	1243.44	
	5% Trimmed Mean		969.98	
	Median		480	
	Variance		1403955.44	
	Std. Deviation		1184.89	
	Minimum		0	
	Maximum		4280	
	Range		4280	
	Interquartile Range		1830	
	Skewness		.847	.197
	Kurtosis		-.604	.392
Smartphone screen time	Mean		204.44	10.219
	95% Confidence Interval for Mean	Lower Bound	184.24	
		Upper Bound	224.63	
	5% Trimmed Mean		198.50	
	Median		180.00	
	Variance		15769.17	
	Std. Deviation		125.56	
	Minimum		0	
	Maximum		630	
	Range		630	
	Interquartile Range		150	
	Skewness		.819	.197
	Kurtosis		.785	.392

Table 2: Normality test for each variable

Tests of Normality			
	Shapiro-Wilk		
	Statistic	**df**	**Sig.**
BMI	.994	151	.828
Leisure time PA	.828	151	.000
Smartphone screen time	.933	151	.000

Table 2 presents the test of normality for each variable. It can depicted form the above table that data for BMI was normally distributed (p>.05), however it was not normally distributed for Leisure time PA (p<.05) and Smartphone screen time (p<.05). On the basis of these results, it was decided to use non-parametric inferential statistics for testing relationship.

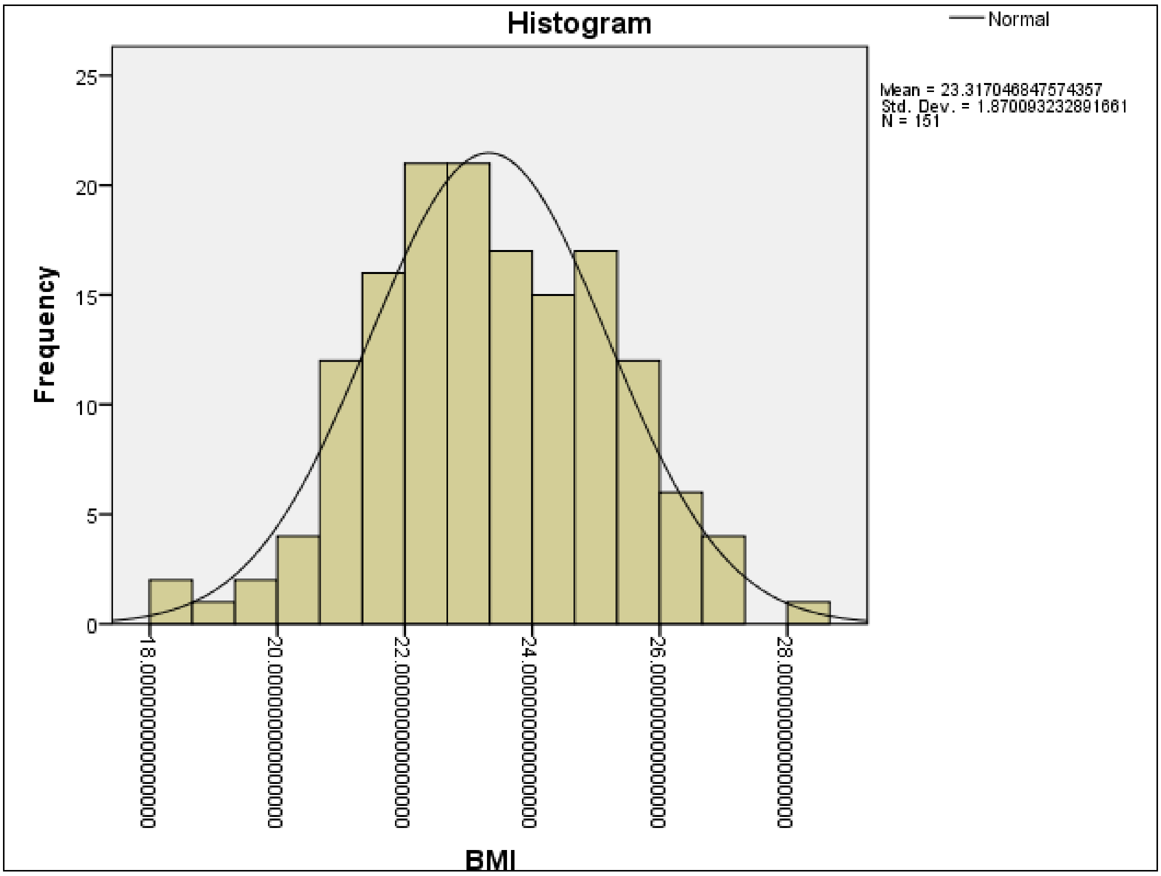

Fig 1: Histogram chart of BMI

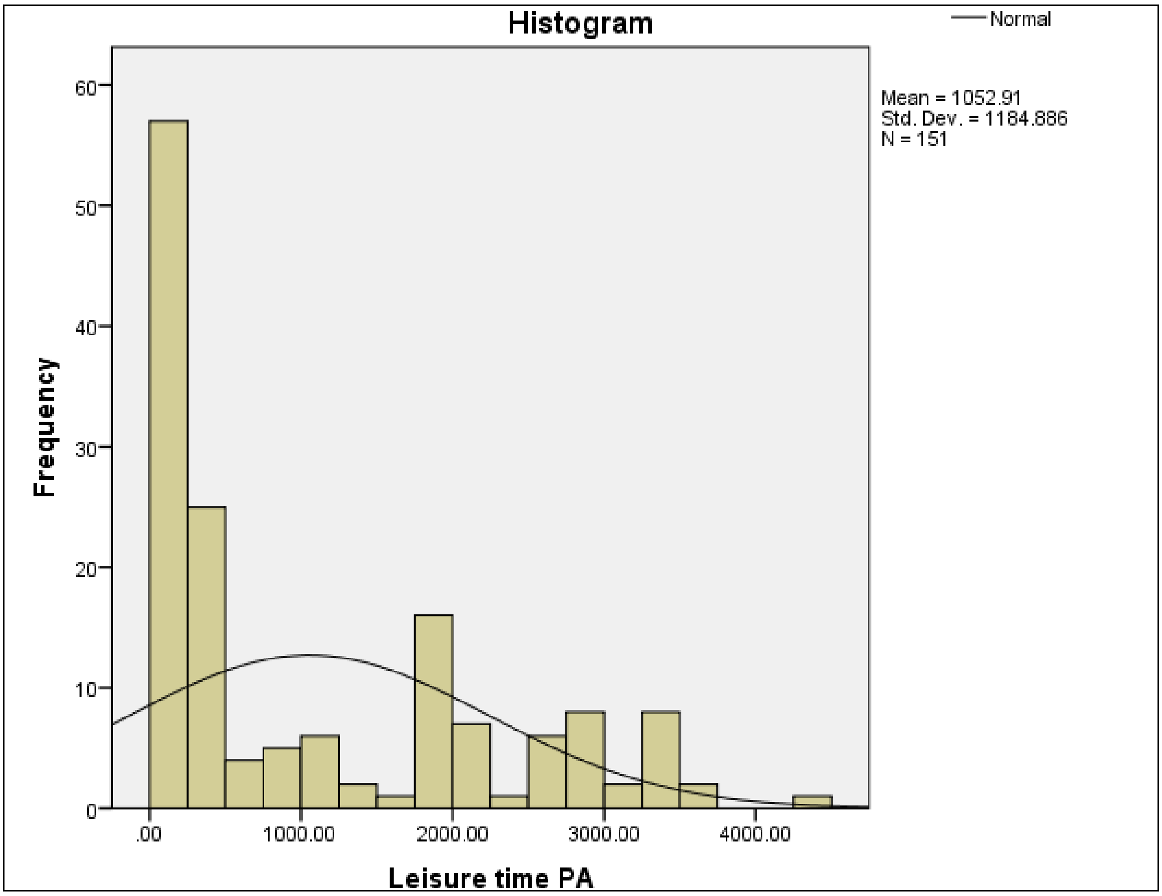

Fig 2: Histogram chart of Leisure-time PA

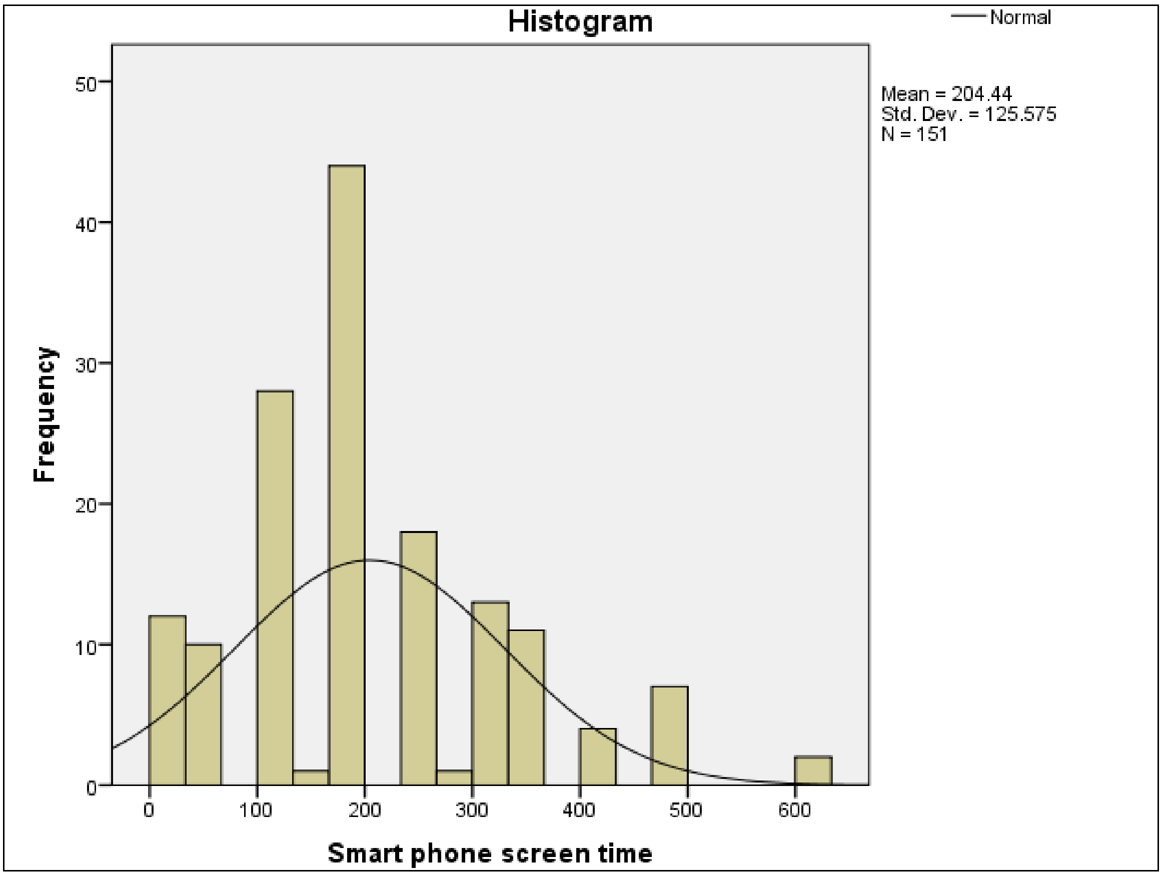

Fig 3: Histogram chart of Smartphone screen time

Table 3: Correlation matrix of all variables

Correlations					
			Leisure time PA	**BMI**	**Smartphone screen time**
Spearman's rho	Leisure time PA	Correlation Coefficient	1.000	.085	-.864**
		Sig. (2-tailed)	.	.298	.000
		N	151	151	151
	BMI	Correlation Coefficient	.085	1.000	-.109
		Sig. (2-tailed)	.298	.	.182
		N	151	151	151
	Smartphone screen time	Correlation Coefficient	-.864**	-.109	1.000
		Sig. (2-tailed)	.000	.182	.
		N	151	151	151
**. Correlation is significant at the 0.01 level (2-tailed).					

Table 3 depicts the coefficients of correlation between BMI, Leisure time PA and Smartphone screen time. Spearman'rho between Leisure-time PA and BMI was .085 and it was statistically insignificant (p=0.298). Similarly, no significant correlation was found between BMI and Smartphone screen time (rs= -.109, p=.182). On the contrary, a strong negative correlation was found between Leisure-time PA and Smartphone screen time (rs= -.864, p<0.01).

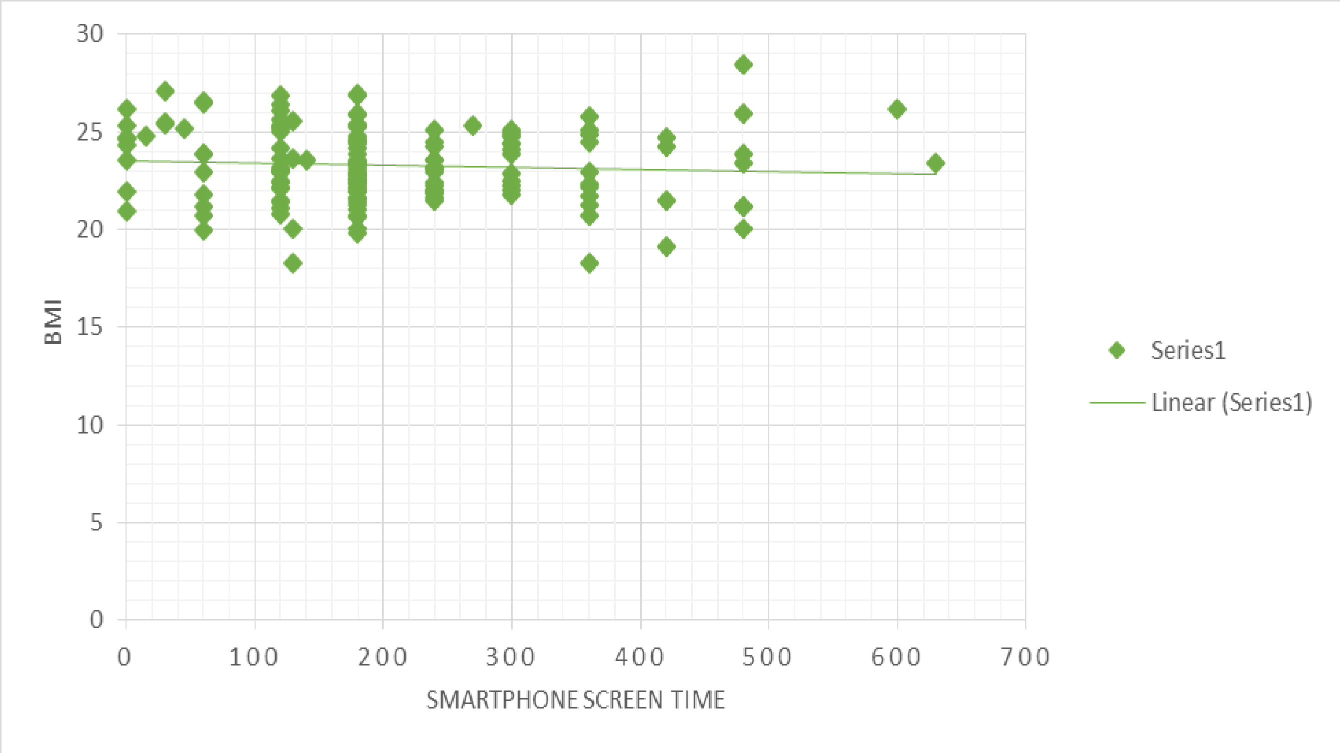

Fig 4: Scatterplot of BMI and Smartphone screen time

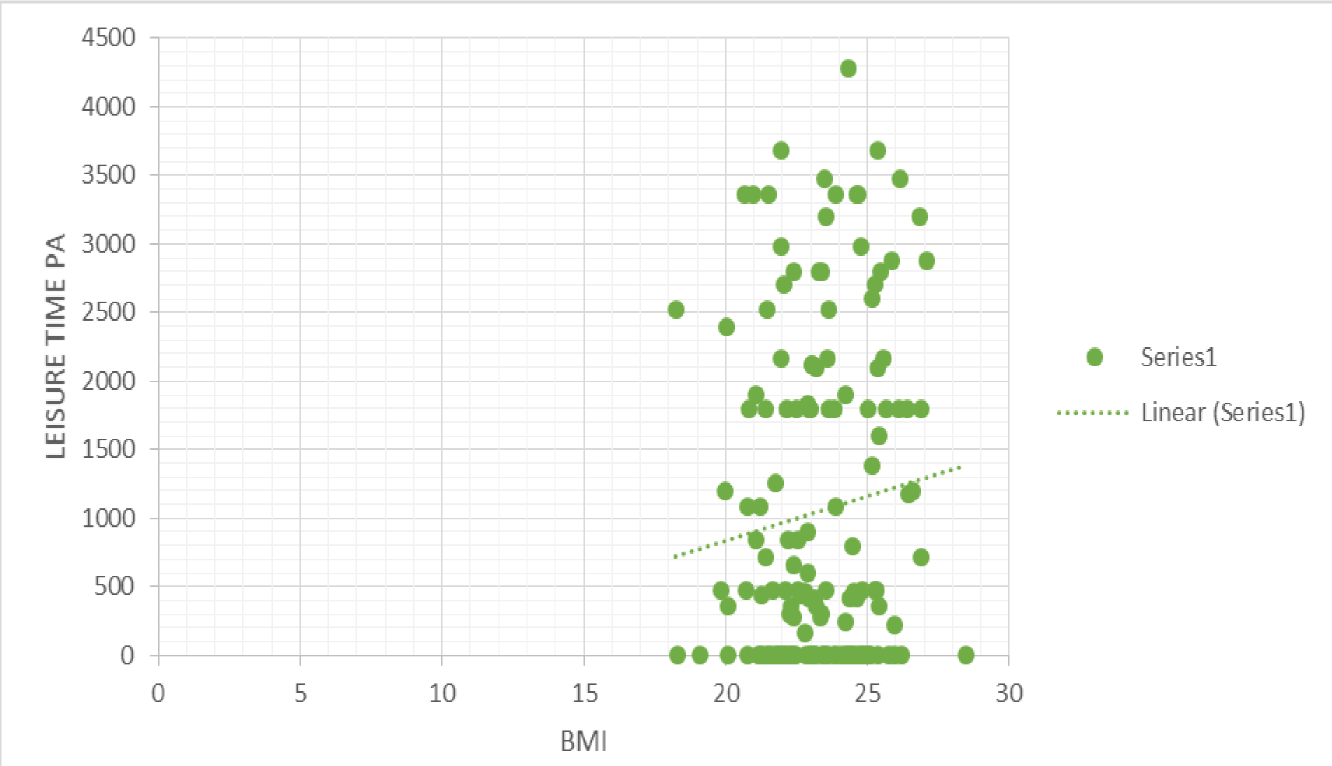

Fig 5: Scatterplot of Leisure time PA and BMI

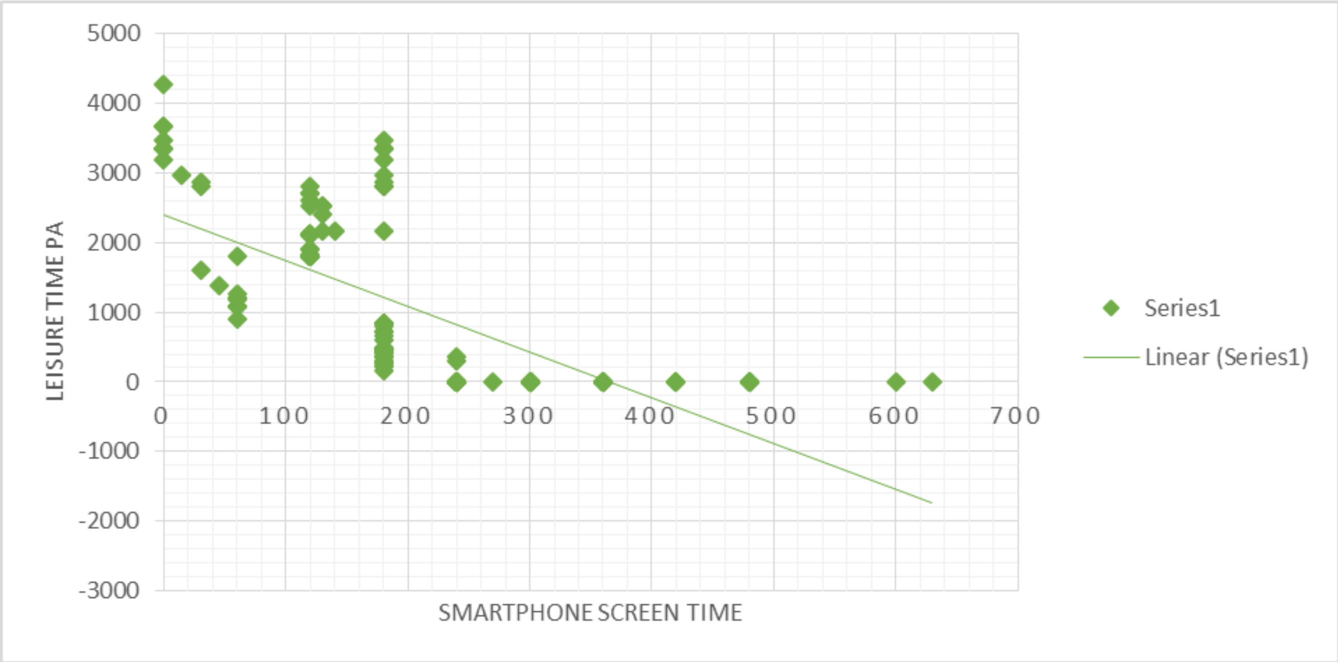

Fig 6: Scatterplot of Leisure time PA and Smartphone screen time

Discussion

The study was conducted to find out the relationship between BMI, Leisure time PA and Smartphone screen time. The mean and standard deviation of BMI was 23.32 and 1.86 respectively. The median and interquartile range of leisure time PA was 480 and 1830 respectively. The mean minutes of smartphone screen time was 204.44 with a standard deviation of 125.56. Results revealed no significant relationship of BMI with leisure-time physical activity and Smartphone usage. Meanwhile, a very strong negative relationship (r_s= -.864) was found between physical activity and smartphone screen time. It can be interpreted from the results that as smartphone usage is increased, the level of leisure time physical activity is decreased among the young male adults. A previous study revealed that people with smartphone addiction tend to be less engaged in walking for each day. Specifically, smartphone addiction can negatively impact physical health because of cutting down the time devoted to physical activity, causing a rise in fat mass and a reduction in muscle mass which is linked to adverse health consequences (Kim *et al*., 2015) [7]. Another study by Lepp *et al*. (2013) [8] suggested that similar to other sedentary behaviours, smartphone usage can upset the physical activity engagement. A study by Fennell *et al*. (2019) [11] argued that cell phone usage is a major contributor to sedentary behaviour as compare to TV and computer, which cuts down the timings devoted to physical activity. Another comprehensive systematic review of twenty-six studies disclosed that physical activity is negatively related to all types of sedentary behaviour such job-related sitting, TV watching, computer sitting, video gaming, driving, etc. (Mansoubi *et al*., 2014) [15]. Results of this study are similar to the discussed studies. The present study also concluded that more usage of the smartphone makes individuals physically inactive.

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