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ABSTRACT

Academic stress is the emotional or mental state that students experience during their university life as they pursue their studies. Stress is known as a major factor that contributes to weight gain. The purpose of this study is to identify the relationship between stress level and body composition (BMI) of FSR Sports Science male and female undergraduate students. This is the causal-comparative study which involves female and male students of SR243 from the Faculty of Sport Science and Recreation, UiTM Shah Alam. The sample analysed was N = 291 consist of 148 female students and 143 male students. This study used PSS-14 questionnaire distributed among the sample to collect demographic details and body composition measured by BMI calculation data. The findings reported that there is no significant difference, p = > 0.05 between genders (male and female) on stress level but shows a significant difference, p = < 0.05 on Body Mass Index (BMI). Findings described a weak positive relationship between stress level and BMI among gender for female r = 0.102, and for the male is r=0.029. A weak positive correlation between stress level and body composition, r = 0.049. BMI has significant difference with female and male SR243 undergraduates' students and has no significant difference among gender on stress level. A weak positive linear relationship was found between stress level and body composition among gender in Faculty of Sports Science and Recreation.

Keywords: *Academic Stress, Mental state, Body Mass Index, Body Composition*

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INTRODUCTION

Everyone experiences different types of stress (Esia-Donkoh, 2014). Stress can be defined as individuals experiencing unpleasant changing new life circumstances. It may also refer to challenging unique conditions that are not precisely unpleasant but still needs attention (Dimsdale, 2008). According to Baum and Dougall (2011), a person experienced stress when "a negative emotional experience is accompanied by predictable biochemical, physiological, cognitive, and behavioural changes that are directed either toward altering the stressful event or accommodating to its effects." A prior study, 37.7% of the undergraduate students, may experience stress within their university life, with one out of three experiencing chronic stress (Jia & Loo, 2018).

In the process of growing and learning, the feeling of stress is a common part of the university student's life. Moreover, students may experience a form of stress, in both professional or academic background (Esia-Donkoh, Yelkpieri, & Esia-Donkoh, 2011). Academic stress is due to an academic environment such as course work, presentations and involvement in group projects as well as dealing with attitude problems, high expectations from parents or faculty and other external causes that may affect their academic performance and the academic result of that particular student (Ramli, Alavi, Mehrinezhad, & Ahmadi, 2018). Students who suffer from especially academic stress can deplete their levels of subjective well-being and resulting in lower grades and dropped courses (Karaman, Lerma, Vela, & Watson, 2019). According to Robertson (2018), long term chronic stress causes increased body weight as it leads those who suffer from stress to the "comfort eating phase," where they tend to eat high-calorie food resulting into higher Body Mass Index (BMI).

Many factors contribute to the influence of the increase in body composition, such as stress, inactive physical activity, overeating, and genetics (CDC, 2020). According to a Finnish study, it is known that overweight and obesity can contribute to chronic diseases such as cardiovascular disease, stroke, hypertension and type 2 diabetes. Moreover, it was shown that for each kilogram increase in body weight, the risk of death from cardiovascular disease also increases by 1% (Balentine, 2019). Another study by the National Osteoporosis

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Foundation, (2013) showed that lack of sleep increases the risk of gaining weight and developing obesity. Overeating some types of food leads to weight gain, especially foods that are high in fats and sugars (Brazier, 2018). Therefore, there are many factors influencing the increase in body composition (BMI) contributing to chronic diseases and non-communicable diseases.

METHOD

Study Population

A subject of 291 students from Faculty of Sport Science and Recreation, UiTM Shah Alam, age between 20 -25 years old. Each gender was included in this study which female (n=148) and male (n=143). The characteristics of the subject are listed in the table 1. We only excluded subjects diagnosed with chronic diseases. This research was approved by the UiTM ethic committee:600-IRMI (5/1/6).

Table 1: Subject Characteristic

Variables	Mean (SD)
Number of subjects	291
Sex (F/M)	148/143
BMI Female(kg.m^2)	22.27 ± 3.00
BMI Male(kg.m^2)	23.23 ± 3.44
Stress Level Score Female	28.43 ± 4.74
Stress Level Score Male	27.57 ± 4.86

STUDY DESIGN

The design used in this study were descriptive, Independent T-test and correlation design to identify relationship between stress level and body composition among students Faculty of Sport Science and Recreation. First, the recruitment of the students selected based

on the inclusion and exclusion criteria that was set by a researcher. Students were recruited during March 2020 to May 2020 academic session from Faculty of Sport Science and Recreation. Participants were given a Google Form via for data collection. There was a simple briefing on the study and questionnaire to provide further explanation regarding the study conducted via WhatsApp. Participants filled in the consent form and their demographic details attached to the questionnaire and answered the questionnaire carefully.

Perceived Stress Scale -14 (PSS-14)

PSS was developed by Cohen, Kamarck and Mermelstein in 1983 and is still used today to estimate the stress level of an individual (Ganesan et al., 2018). PSS is proven to have adequate reliability to measure the stress level of an individual where their life is considered as stressful in terms of feeling in control (1471-2458-13-828) and have Cronbach's alpha between 0.78 to 0.91 (Finch & Tomiyama, 2015). PSS-14 consist of 14 items to measure how unpredictable, uncontrollable and overloaded individuals find their life circumstances. PSS-14 scores are obtained by reversing the scores on the seven positive items, e.g., 0=4, 1=3, 2=2, etc., and then summing across all 14 items. Items 4, 5, 6, 7, 9, 10, and 13 are the positively stated items. Individual rate items on a 5-point Likert scale range from 0 = "Never" to 4 = "Very Often" (Lee, 2012). The higher the score means that the higher the individual experience stress.

Body Composition Measures (BMI)

Body composition is a distribution of muscle mass, bone mass, water and the percentage of body fat in human body. Scientifically, body composition is defined as the percentage of the adipose, body water volume and also the lean body masses (Stefanaki et al., 2018). One of the methods used to calculate body composition is by measuring Body Mass Index (BMI). Following metric measurement, BMI is calculated by determining an individual weight in kilogram then divided by height in meter square.

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STATISTICAL ANALYSIS

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 26. Descriptive analysis used to describe the demographic data. Independent T-test was used to identify the significance difference of stress level and body composition. The Pearson correlation was used to identify the relationship between stress level and body composition of FSR Sports Science undergraduates' students. All data was presented in mean and standard deviation with significant level set at $p< 0.05$.

RESULTS AND DISCUSSION

Stress score categories are divided by four quartiles consisting of mild, moderate, severe and extremely severe (Andreou et al., 2011). The stress score for mild is below 14, the stress score for moderate is between 15 – 28, the stress score for severe is between 29 – 42 and for extremely severe is between 43 – 56. According to the table above, for female students, mild ($N = 1$, $M = 8.00$), for moderate ($N = 72$, $M = 25.35$), for severe ($N = 72$, $M = 31.14$) and for extremely severe ($N = 3$, $M = 44.00$). For male students, mild ($N = 4$, $M = 13.00$), for moderate ($N = 81$, $M = 25.49$), for severe ($N = 58$, $M = 31.47$) and for extremely severe, there is no student involve.

The number of differences between female and male SR243 undergraduate students. For the underweight category, the percentage of female students is 6.76% and male students are 2.10%. Next, the percentage of healthy category for female students is 77.7% and male students is 68.53%. The percentage of female students are 14.19% and male students are 27.97% for overweight category. Other than that, the percentage for the obese category for female students is 1.35% and male is only 0.7%. Lastly, for extreme obese category, total percentage is 0.7%, which consists of male students only. Based on the table above, data recorded shows that female students have a higher percentage for the overweight and obese category rather than male students.

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Table 2: Demographic Data for Stress Score Level and BMI

	Gender	N	Mean	Std. Deviation
Stress Level Score	Female	148	28.43	4.74
	Male	143	27.57	4.86
	SR243	291	28.00	4.81
BMI	Female	148	22.27	3.00
	Male	143	23.23	3.44
	SR243	291	22.75	3.22

T-Test Result

Based on the table below, p =.13 > 0.05, its shows that the significant level for stress level score is larger than p-value which means there is no significant for stress level score against female and male FSR Sports Science undergraduate students. However, the stress level mean score for female students is slightly higher than male students which indicates female students experience more stress than male students. Moreover, based on Table 3, p = < 0.05, which is slightly smaller than the p value. It shows that it is significant for BMI against gender. However, BMI mean for male students is slightly higher than female students where male students are heavier than female students.

Table 3: T-Test Result

Parameters	Levene's Test for Equality Of T-Test for Variances					
		F	Sig	t	df	Sig. (2-tailed)
Stress Level Score	Equal Variances Assumed	0.45	0.83	-1.53	289	0.13
BMI	Equal Variances Assumed	1.99	0.16	2.53	289	0.012

Correlation between Stress Level and BMI

This study reported, there is very weak positive correlation of stress level and BMI among SR243 undergraduate students as r (291) = 0.049, p > 0.05. The BMI versus stress level score for males has a very weak positive linear relationship which indicates a weak correlation of BMI and stress level score with the range of 0.029 of coefficient range, r (143) = 0.029, p > 0.05. The BMI versus stress level score for female have a weak positive linear

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relationship which indicates a weak correlation of BMI and stress level score with the range of 0.102 of coefficient range, r (148) = 0.102, p = > 0.05. Here as shown the data points are slightly closer together and shows that there is a relation exist between these two variables, but shows very weak positive correlation (Figure 1, Figure 2, Figure 3)

Table 4: Correlation between Stress Level and BMI for Female, Male and SR243

Variables	Correlation	*P* value
Female BMI (Kg.m²) and Stress Level Score	0.102	0.218
Male BMI (Kg.m²) and Stress Level Score	0.029	0.728
SR243 BMI (Kg.m²) and Stress Level Score	0.049	0.403

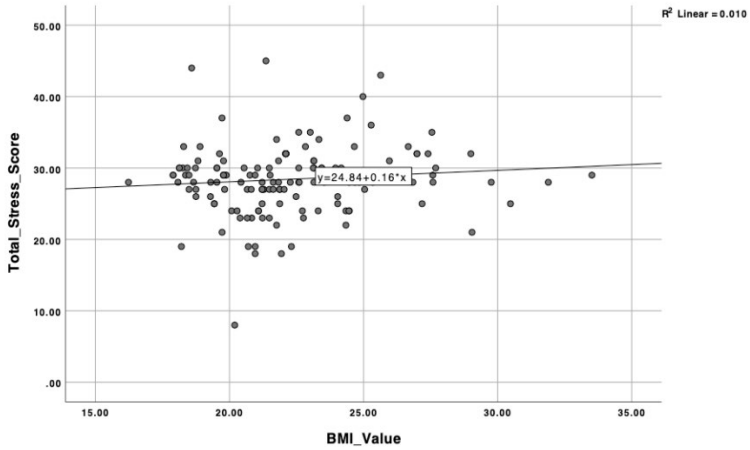

Figure 1: Scatter plot of female BMI (Kg.m²) and Stress Level Score

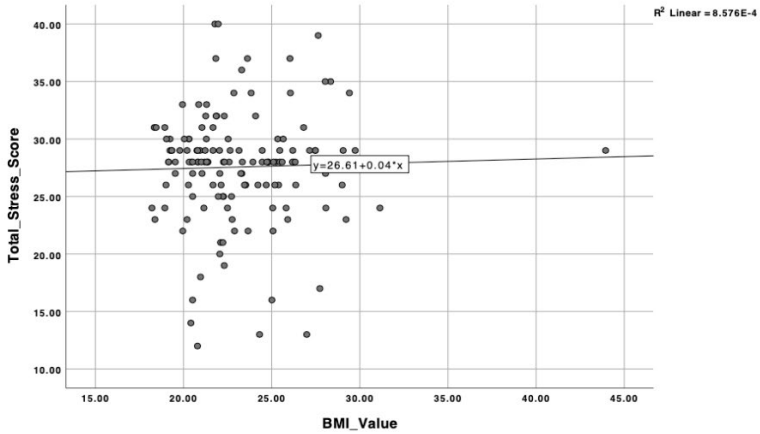

Figure 2: Scatter plot of male BMI (Kg.m²) and Stress Level Score

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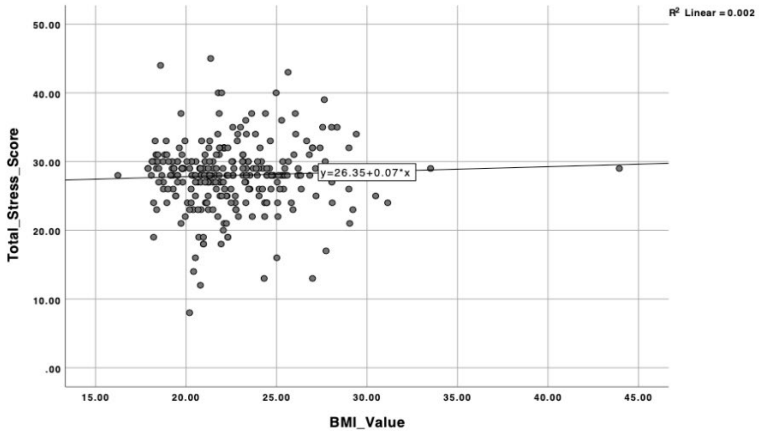

Figure 3: Scatter plot of SR243 BMI (Kg.m²) and Stress Level Score

Female students stress level mean score is higher than male students. According to the cut-off point, female students have experience high stress as their stress score mean is above 28. According to a study females students experience higher stress, depression, frustration and anxiety compare to males students during their university life (Calvarese, 2015). Another study also stated that female students have higher rate of academic stress and general stress compared with male students (Liu & Umberson, 2015). According to a study by Anbumalar et al. (2017), females reported to have higher feelings of anxiety, fear, crying and depression than males students, while males students reported higher expression of anger, smoking and thinking ways about finding ways to solve the problem. Previous study reported, male students have lesser stress level score than female students (Aiyegbusi & Akinbo, 2015). Apart from this, female Sports Science possibly experience more feelings of depression, frustration and anxiety at foreseeable times with the highest possibility causes of academic stress and resulting from preparing for tests and exams, achieving good grades and completing large amount of assessment before due date. To add up, there is another findings stated that anxiety turned out to be the most prevalent and serious issue for college students, especially for female students rather than academic stress (Gao, Ping, & Liu, 2019). Additionally, female students experience more stress than male students are because of financial problems, inadequate resources and overload hours every semester as most of them are involve in high performance sports (Yikealo, Yemane, & Karvinen, 2018). Briefly, female Sports Science students experience more academic stress, they are easily affected by the stress and energy of their surroundings and tend to cope more emotionally than male

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while male deal with stress and frustration on a rational non-emotional level (Yikealo et al., 2018).

The main component used in this study is Body Mass Index (BMI), frequently used to determine the body composition of an individual. The calculation of BMI is weight divided by height square (kg/m^2) is often used to determine the distribution of body weight and classification of non-communicable disease (Leitzmann et al., 2011). According to National Institute of Health, 2017), BMI classification can be used to estimate body fat and assuming the risk of chronic diseases. In this study conducted, the percentage of normal BMI classification for female students is 39.52% and male students are 33.68 %, normal BMI is considered when the amount is between 18.5 to 24.9 based on Ministry of Health Malaysia. The number reported for female students in the overweight and obese category is 7.22% and 0.69 %. For male students, the overweight category is only 13.74 %, obese and extreme obese is only 0.34 % respectively. To sum up, the total number of abnormal BMI is 26.8 %. Based on this study reported, there is a significant difference between female and male body composition of FSR Sports Science undergraduate students' $p = .012 < 0.05$, where it shows that male students tend to be heavier than female students.

In addition, the percentage number students with abnormal classification BMI is 26.8 % of overall students that participated in this study were overweight, obese and extreme obese which their BMI is more than > $25kg/m^2$. Based on previous study, the percentage of university students are classified overweight or obese from 20.3% to 35.1% by end of sophomore year (Gropper, Simmons, Connell, & Ulrich, 2012). According to Huang et al., (2003), 27% to 35% of university students will be overweight and obese. There is findings stated that university students have the BMI more than $25kg/m^2$ are about 22% according to Pengpid & Peltzer, (2014), and there is another finding also stated that 35% the prevalence of overweight and obesity among university students is high Lowry et al., (2000), comparable to the study conducted. In this case, the number of students with abnormal BMI is considerably high and almost reach that amount percentage from previous study.

Interestingly, the result of this study is consistent with Pengpid & Peltzer, (2014), male students were significantly more overweight or obese than female students. Moreover, another findings shows that male students significantly tend to be overweight and obese rather than female students, as female students tend to lose weight to improve their look (Kumah, Akuffo, Abaka-Cann, Affram, & Osae, 2015). Furthermore, there were few more previous study by Vijayalakshmi et al., (2017), stated that male undergraduates are significantly tend to have higher BMI than female undergraduates. According to Beaudry et al., (2019) study, the findings of this research stated that female and male students have different patterns of body weight and body composition, but male students gains significant amount body weight than female students. A contradicting study by Gropper et al. (2012), reported that female students have higher BMI than male students in university and found a higher prevalence of cardiovascular disease and non-communicable disease. Based on another study conducted by Lemamsha et al., (2019), stated that female students tend to have higher BMI compared to male students. There are however divergent findings in previous studies where prevalence rates of overweight and obesity among male students were higher than female students but, based on the previous finding, it also stated that female student tend to be heavier and be categorised as overweight and obese than male students.

Additionally, using BMI classification can result inaccurate assessment of adiposity, because the calculation does not determine the muscle mass and fat mass (Gurunathan & Myles, 2016). Muscular athletes may have higher BMI because of extra muscle mass; therefore, they are miscategorised as overweight or obese, perhaps those students are miscategorised too. According to National Institute of Health, BMI classification have flaws on estimating body fat in athletes or people who have muscular body figure. Moreover, other findings stated that, BMI classification are inaccurate certain individual may have higher fat mass than lean mass but categorised as normal BMI. Hence, BMI does not identify the fat distribution of an individual, a significant factor in developing the chronic metabolic disease (Buss, 2014). As most Sports Science students, some of them are physically active that may cause them to have higher lean body mass. Hence, it is not accurate to use BMI classification on athletic figure people as they may have more lean muscle mass than fat mass. In a nutshell,

it can be concluded that most of the active students that participate in these studies might be miscategorised for having higher lean mass than fat mass.

Based on previous finding shows that there was no relationship between stress level and body composition among undergraduates. There was a study done by Ziser et al., (2019), there was no association among perceived stress and BMI found among individuals. Another finding also stated that stress was not related to BMI among individuals but associated with depressive symptoms (Lincoln, 2019). Another study by Shimanoe et al., (2015) there is no association were detected between stress and BMI in either male and female. Contradicting study shows stress does lead to overweight and obesity and stress are commonly experienced by students. According to a research done among the Malaysian university students, it shows that stress is among the highest contributor to overweight and obesity among university students (Radzi et al., 2019). There is also another finding among Chinese students determined where stress is highly associated with overweight and obesity besides family income, home region gross and domestic products (GDP) and university underemployment (Jiang et al., 2018). Besides that, another study in Nigeria revealed that there was a relationship between stress level and body composition among undergraduates students as BMI increase accordingly to stress level (Aiyegbusi A, Akinbo S, 2015). There was also another findings stated that there is association among stress level and increasing BMI points, and should be taken to control the obesity rate among young undergraduates (Rizvi, Shaikh, Ahmed, Farooq, & Serafi, 2015).

Although the stress level score of both female and male are moderate, the correlation of stress level and BMI are positively weak. There are several factors that may contribute to the findings of this study. Horiuchi, Tsuda, Aoki, Yoneda, & Sawaguchi, (2018) stated that coping is able to control the effect of stressors. Not only that, according to a study by Buss, (2012), stress could also promotes eating healthy when one line of duty is to maintain their health status as the stress is making an individual to cope better. For the students of FSR, the results of this study could be directed by their ability to cope with stress as they are physically active and stress are not affecting their eating behaviour that leads to increase in BMI.

Moreover, Sports Science undergraduates are required to be physically active and maintain the lifestyle throughout their entire study program. Engaging in health and well-being activities mediates stress due to the self-determination and the group support (Kimball & Freysinger, 2003). As it is proven, engagement in physical active helps university student to maintain a better mental health (Bowe et al., 2019). Other than that, according to Matud (2004), Jackson (2013) and Lok et al. (2017), involving in physical activity frequently is proven to be beneficial in reducing stress. In addition, engaging in physical activity helps in maintaining healthy BMI (American Addiction Centers, 2020). Hence, there is no association of stress and BMI for FSR Sports Science undergraduates student as it is compulsory to engage in physical activity, formal and informal recreational opportunities such as intramural sports, fitness programs and aerobic dance classes, thus it increase the engagement of physical activity among university students which result in students experience less stress and maintaining a healthy BMI.

This study is limited by the small sample size. A larger study is necessary to confirm the findings in this study. In addition, future study should be conduct to high performance athlete population to test whether BMI is a practical measure to use on them.

CONCLUSION

According to the result and analysis, this research can conclude that body composition is significant to the gender, meanwhile stress level is not significant among female and male FSR undergraduate students. Not only that, the sample size of this study mostly falls on the moderate and severe sub-scale of stress. The finding from this study may suggest that stress do not affect genders differently, however both genders are shown to be affected on their body composition significantly.

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