EF International Language Centres
University Preparation Abroad

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Lecturer's Comments and Advice

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Marking Scheme	
80-100	A*
70-79	A
60-69	B
50-59	C
40-49	D
35-39	Narrow Fail (NF)
10-34	Clear Fail (CF)
0-9	Unclassified (U)

1st Marker initials _____

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2nd Marker initials _____

Date _____

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Introduction

Research Purpose

Skin temperature is mostly the result of heat movement from peripheral vascular system, internal body organs, and environment temperature to the surface of the skin, especially when there is no contact with other surfaces. The temperature of the skin plays crucial and fundamental role in controlling body temperature by giving thermoregulatory system supplementary feedback in both positive and negative direction(Galan-Carracedo et al., 2019). . There are possibilities that stress can influence people's skin temperature and between males and females, which divided into two patterns. Stress exposure led to changes in skin temperature that followed a gradient-like pattern with followed by a declining pattern at distal skin areas like the fingertip and finger base and unchanged skin temperature at procimal regions(Vinkers et al., 2013).

The purpose of this research is to examine the differences between male and female skin temperatures after spending at least one hour of study and investigates the other factors underlying behind this mechanism. Although there is a vast amount of research related to this, it is little known about the difficultness in study subject can influence other factors related to stress and psychological. Previous research has shown that the pattern in skin temperature is dependent with physical activity which led to stress in different part of body. However, there is no clear research about the skin temperature related to the student who take a lengthy lecture. This study will contribute to our understanding of the relationship between lengthy course and people skin temperature and compare the means of two group to determine this process has actually influences the population. The remainder of the paper will provide a detailed of the research hypothesis and

questions, theoretical framework, literature review, results, discussion, and findings of the effect of lengthy course on student's body temperatures.

Research Hypothesis

- H_0: There is no difference between the average body temperature of males and females, who has studied for about an hour
- H_1: The skin temperature of females increases more than that of males after studying for an hour

Research Questions

- RQ_0: Does studying for one hour affect body temperature differently in males and females ?
- RQ_1: what is the effect of studying for one hour on skin temperature in males and females ?

Theoretical Framework

Skin temperature is the temperature of the outer layer of the skin and it is mostly affected by body's thermoregulatory mechanism (Binek et al., 2022). In common situation, the skin temperature is measured by infrared thermography, which capture skin's surface to detect changes in skin temperature. Skin temperature is affected by the internal or external factors and between male and female it is very different especially when they take a rest or have activities; female are having lower temperature while taking a rest and the most significant difference is appear when they receive a lot pressure and it will connect to contribution of skin vasodilation to the removal

of excess heat generated by active muscles(Binek et al., 2022). In addition, the benefits of the thermos gun are that there is no limitation to measure people's temperature, because it can measure in different body sites and forehead is the most typical body part measurement (Piccinini, Martinelli and Carbonaro, 2021).

Literature Review

The Stress Effect on People's Temperature

The objective of the literature review get the data from their participants, such as healthy individuals from 18 to 26 years old. It is focused on the physiological mechanism which involved in temperature regulation and the effects of stress on temperature regulation(Vinkers et al., 2013). The relationship between stress and body temperature may depend on various factors such as type and intensity of the stress, duration of stress, and individuals such as males and females. Besides that, age groups also play role in this research. These stress circumstances effect some peripheral temperature in some parts of the body, based on the measurement from (Vinkers et al., 2013) finger tip and finger base shows a significant difference In different condition,which shows about 0.4 celsius in between. In addition, on the other parts of body, it shows only a slight differences in some specific timeframe, for example in forehead skin temperature the temperature is fluctuate, however it only has differences of about 0.1 celsius after they received stress(Vinkers et al., 2013).

Stress effect human skin temperature and it depends on its ability to increase heat loss via sweating and cutaneous vasodilation. In some cases, this process can be affected by the use of certain medications. Additionally, diseases can also alter thermal afferent signaling, central integration of thermal afferents, efferent signaling, and/or thermoregulatory end-organ function, thus affecting the body's ability to regulate its temperature under stress (Cramer et al., 2022).

Gender Differences in Skin Temperature

physiological control of thermoeffector responses during heat stress varies due to several intrinsic factors, such as age and biological sex. Morphological features can also influence variability through passive effects on heat loss (surface area) and heat storage (mass, tissue composition). 5 highlights that physiological control of cutaneous vasodilation and sweat production relies on appropriate communication of thermal afferents to the central nervous system (CNS), integration of thermal afferent information within the CNS, efferent signaling to cutaneous arterioles and eccrine sweat glands, and thermoeffector end-organ function. Structural or functional alterations to components of the active thermoregulatory system due to, for example, different physiological traits (e.g., age and biological sex), disease, or injury, can profoundly affect human temperature regulation (Cramer et al., 2022).

Gender differences in skin temperature refer to the differences in skin temperature between males and females. Generally, it has been found that females have lower skin temperatures than males at rest , and have a greater increase in skin temperature in response to exercise. However, no significant difference in skin temperature was observed in men and women after exercise (Binek et al., 2022).

Methodology

Temperature Measurement

First and foremost, Best ways to approach this temperature are use thermometer, because it is effective and in some point it has infrared point which require the researcher to do contactless. Moreover, it can reduces the risk of infection transmission and during this pandemic situation it can prevent this kind of disease.

Descriptive Analysis

First and foremost, Descriptive analysis is used to summarize and describe the dataset in this research. It can help us to gain the researcher's ability in exploratory data analysis step. Moreover, it can gain the insight into the data before conducting the advanced analysis. Informative in this research such as mean, median, mode, standard deviation and variance are the most important to get the general description about the data. Then, I can see the patterns such as outlers in both male and female categories to investigate the further investigation.

Statistical Analysis

The object of this research are male and female, so using t-test in statistical analysis is the best way to approach to show the significance point of these categories. These research subjects have 2 type of gender and the most suitable statistical approach is referring to t-test, so, it has general rules which related to P. $P < 0.05$, it means that the researcher can reject the null hypothesis and $P>0.05$, they cannot reject the null hypothesis. This data distribution are two tails and it has a male and female. This research is being process with t-test to get the comparison between male and female skin temperature. Inferential statistical t-test is used to examine whether or not the difference between two groups is statistically significant or not. Moreover, since it has two samples of gender groups, the researcher decided to use two samples t-test model. A t-test may also yield a p-value in addition to the t-value, which is a measure of the likelihood that the observed difference between the means is the result of chance. Based on the t-value and the degrees of freedom, the p-value is determined (which are determined by the sample size). The observed difference between the means is statistically significant if the p-value is smaller than the selected significance level, which is often 0.05 or 0.01.

Ethics Approval Statement

The teaching coordinator in Education First in Cambridge approved the ethics statement in this research. The ethics statement is using physical form to gather the data, because this purpose of the research is about measure people's temperature. I conducted the declaration of the research by following the instruction in Education First Cambridge.

Results and Discussion

Subjects

Our research groups were divided into two groups, male and female, and come from Education First School. Firstly, the male group was consisted of 20 individuals and all of them were over 17 years old. Secondly, the female group has 15 people. This sample was chosen and split into three classes, general English class, undergraduate university preparation and pre-master. The goal of the study was to determine how long-term coursework affected students' skin temperatures.

During the participants' classes, non-interactive temperature sensors were used to measure the participants' skin temperatures. To calculate the average skin temperature for each group and track temperature changes during the course of the class, the data was evaluated. Female skin temperatures is higher at 36.62 celsius and the male skin temperature average at 36.55 celsius, according to the data, which demonstrated that extended coursework had a substantial impact on participants' skin temperatures. These results imply that prolonged exposure to academic stress can result in physiological alterations that may be harmful to general health and wellbeing. The importance of this knowledge for educators and students cannot be overstated, as it emphasises the need for methods to lessen the detrimental impacts of lengthy coursework on health and wellbeing.

Results

According to the descriptive analysis, the mean and standard deviation for *how_lesson_have_you_gone_through?* is about 1.885714 and 0758149. While the body_temperature variables has 36.58 for average and 0.208355 for standard deviation. Having these, independent variables and dependent variables in this research had more than 0.5, specifically at 0.525064. It checked using heating maps on python.

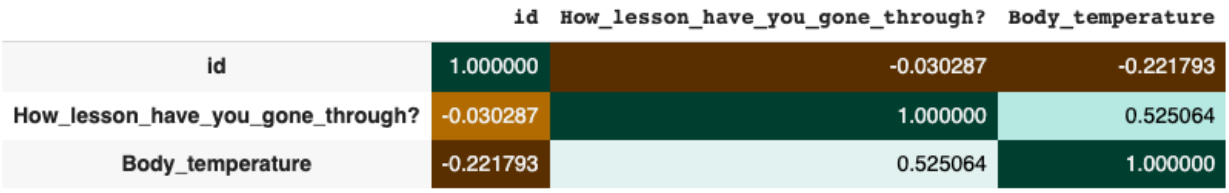

Figure 1: Boxplot

Results have been showed using inferential statistical analysis using t-test model to compare the skin temperature in sample. There were 20 men and 15 women in the sample, and neither nor missing data were present. Men's average skin temperature was 36.55 celsius, while women's average was 36.62 celsius. The t-test illustrates a significant difference in skin temperature between them with t-value -0.983121, with female had higher temperature than male. The effect of the size, in this case we interpretate as Cohen's d and it has 0.3358, indicating some effect. However, we acknowledge that there are a lot of element that may influence people's skin temperature such as room condition.

Table 1: t-test result

	T	Degree of Freedom	Alternative	P-Value	CI 95 %	Cohen-d	BF10	Power
T-test	-0.983121	33	Two-sided	0.332701	[-0.21, 0.07]	0.3358	0.476	0.159168

There are three points that become the most important aspect from this research

1. P-value is less than critical value in both cases. So the differences between male and female skin tempratures is not zero, by having this statement the null hypothesis is rejected
2. T-statistic value is less than critical value, so there is significance difference between skin temperature in women and men. Then, the null hypothesis is rejected
3. Based on the table number 1, cohen's D value only have 0.3358 and it in between the range of small and medium.

Conclusions

Findings

Overall, this research find the differences between people temperature in celsius after studying a lengthy course. Female groups are higher with around 36.62 C^o. Meanwhile the male has 36.55 C^0. This findings also were supported by the t-test value such as t-value, p-value , and cohen's d. Additionally, I found that the data has no outliers in both groups.

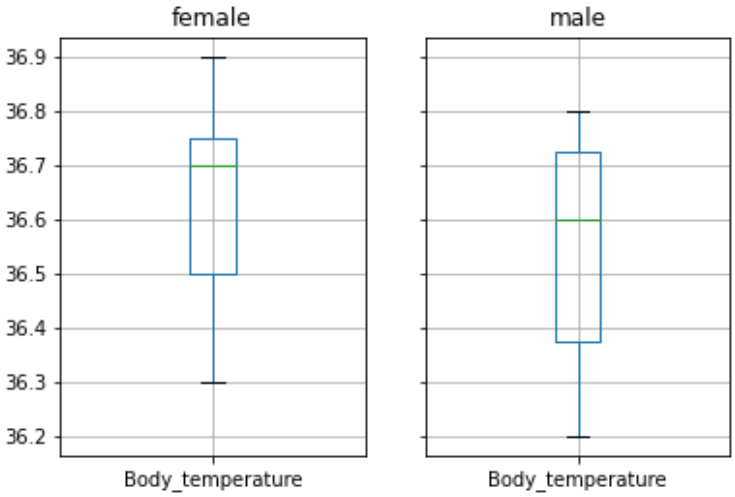

Figure 2: Boxplot

It means that the data is fit to analyst because it has no outliers, so the researcher do not need to handle the outliers. The boxplot picture is compose of Q1,Q3, IQR, Upper fence, and lower fence. Q1 is the first quartile, which represents 25% of dataset, in this case it has 36.4 celsius. After that, Q3 is the third quartile and it contains about 75% of dataset, in this research it has 36.75 celsius. Then, the interquartile range, which represents the spread of the middle 50% of the data, has 0.35. The upper fence and lower fence have 37.275 and 35.875 celsius respectively. Although it has good components of the data, it has no normal distribution. The researcher find that using Q-Q plot, the variances of the that deviates significantly from a straight line and it more likely that the distribution not normal.

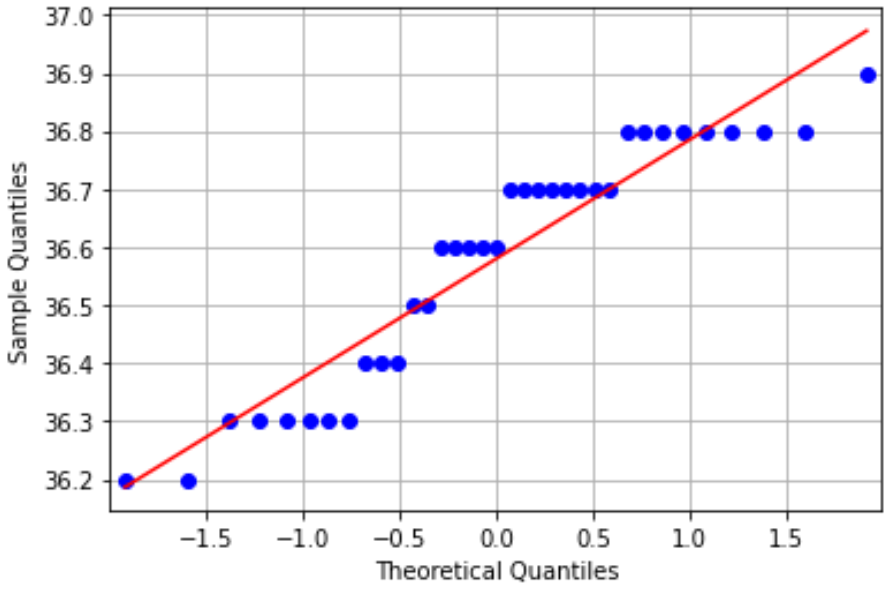

Figure 2 : Q-Q plot for male and female

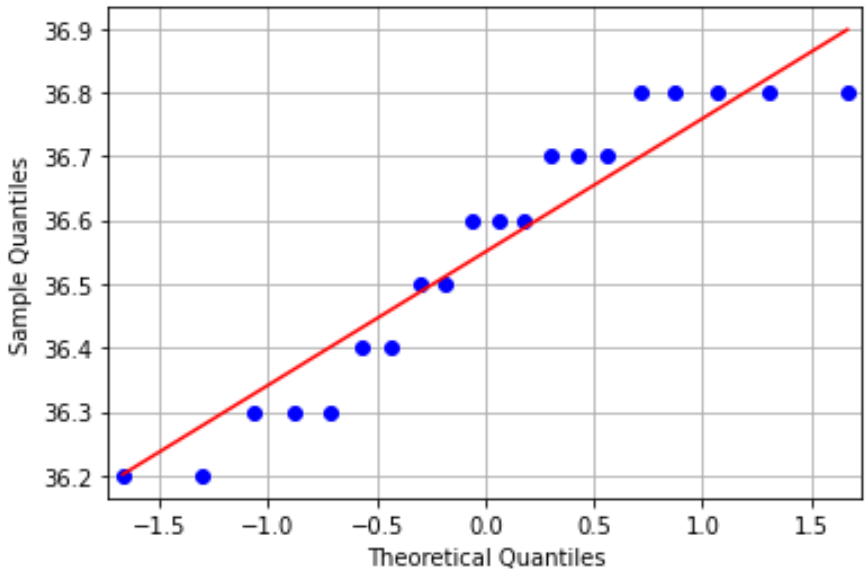

Figure 3 : Q-Q plot for male

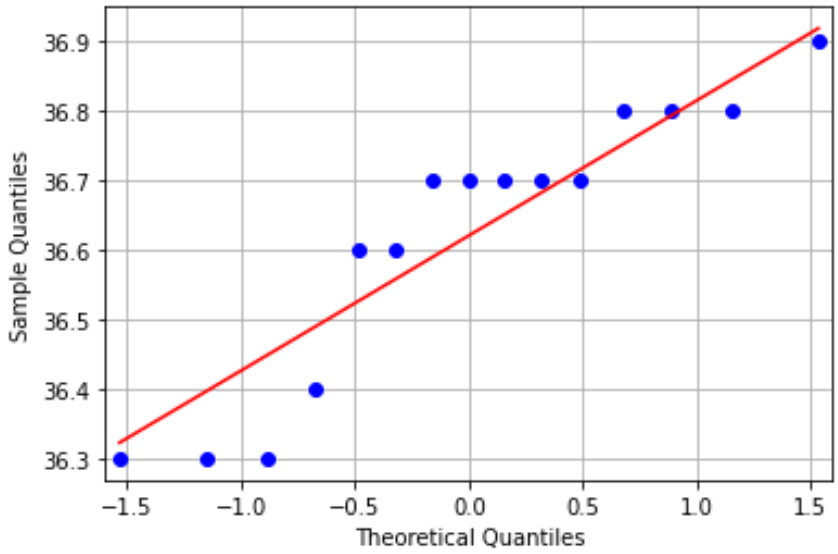

Figure 4: Q-Q Plot for female

Evaluation of the study and Recommendations

The sampling from the data included 35 people, which is 10% from Education first population. The participants were chose by looking the suitable schedule and the most important thing that the

researcher chose the ones who have morning classes. Generally, it can answering the questions, however the samples are not vary that's the reason why the distribution is not normal.

Data collection and measurement of the participants is adequate and appropriate because it is using Cross-sectional study research method, the data were collected in the the one point and the researcher can see the temperature increasement. The researcher was using infrared thermograph, because it is effective and fast. However, it can be temporary affected by any kind environment like frost, sunlight, and dust. Lastly, the study will contribute to our understanding of the potential factors that related to skin temperatures, because stress is one of the factors that related to studying.

Based on the results of this study the differences between males and females skin temperature after study, I urge the introduction of sex-specific temperature reference ranges in clinical practise recommendations as well as consideration of sex variations in future research on temperature management.

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