YEOH ZHE YI

PA, LEARNING STYLE AND ACADEMIC PERFORMANCE

2022

ASSOCIATION BETWEEN PHYSICAL ACTIVITY, LEARNING STYLE AND ACADEMIC PERFORMANCE AMONG UTAR HEALTH SCIENCE UNDERGRADUATES

YEOH ZHE YI

BACHELOR OF PHYSIOTHERAPY (HONOURS) UNIVERSITY TUNKU ABDUL RAHMAN

DECEMBER 2022

(This page is intentionally left blank.)

ASSOCIATION BETWEEN PHYSICAL ACTIVITY, LEARNING STYLE, AND ACADEMIC PERFORMANCE AMONG UTAR HEALTH SCIENCE UNDERGRADUATES

By

YEOH ZHE YI

A Research project submitted to the Department of Physiotherapy,
Faculty of Medical and Health Sciences, Universiti Tunku Abdul Rahman,
in partial fulfillment of the requirements for the degree of
Bachelor of Physiotherapy (Honours)
December 2022

ASSOCIATION BETWEEN PHYSICAL ACTIVITY, LEARNING STYLE AND ACADEMIC PERFORMANCE AMONG UTAR HEALTH SCIENCE UNDERGRADUATES

Kamala A/P Krishnan [1]

Yeoh Zhe Yi [2]

Author affiliation

1. Lecturer, Department of Physiotherapy, Faculty of Medicine and Health Sciences, Universiti Tunku Abdul Rahman, Malaysia.
2. Year 3 Bachelor of Physiotherapy (Honours) student, Faculty of Medicine and Health Sciences, Department of Physiotherapy, Universiti Tunku Abdul Rahman, Malaysia.

ABSTRACT

Background and Objective: Eastern and Western education systems have been compared due to their ideological difference which contrasts with each, in terms of learning. Eastern learners were found to struggle in their academics with concomitant stress, which was attributed to their learning way of rote memorization with a feeling of meaningless learning. This struggle was pronounced among health science students. As a coping method, physical activity (PA) and learning style (LS) are the potential mediators for the students to improve their academic performance (AP). In the event of PA, the volume of the hippocampus and brain cortical blood flow are increased and, thereby activating the brain for improving learning. Previous studies found that students learn better when education or self-learning material is delivered to suit their LS. Thus, this study aims to identify PA level and LS preference, and their relationship with academic performance among health science undergraduates at Universiti Tunku Abdul Rahman (UTAR) in Malaysia.

Methods: Cross-sectional study design is adopted in this study. The study population recruits UTAR health science undergraduates in Malaysia. International Physical Activity Questionnaire – Short form (IPAQ-SF) and Honey and Mumford's Learning Style Questionnaire (LSQ) – 40 items are used to evaluate PA level and LS respectively. AP is assessed by self-reported CGPA.

Results: Out of 202 participants, the majority of moderate PA level (39.1%) followed by high PA level (32.2%) was identified. Male (50%) was likelier to have high PA level than female (23.1%). Normal BMI (33.3%) was the highest proportion in those with low PA level. For LS, the majority with a single preferred style (66.9%) was notable in this study. Reflector style (30.3%) was the predominant LS among them. The activist style was shown to have the

highest proportion with a very strong preference (8.9%). Furthermore, there is no association between PA and AP. In LS, only the pragmatist score found a weak and negative association with AP (r = - 0.156, *p*-value = 0.027) whereas other LS found none.

Conclusion: There is high prevalence of moderate PA level among UTAR health science undergraduates. With a majority of single preferred LS, the reflector style is the dominant LS preferred by them. PA found no association with AP. However, the pragmatist style has weak and negative association with AP. Hence, PA and LS are not the determinants of AP, and those with pragmatist style, developing other LS is encouraged. Further investigation on determinants of improving academic performance could be established in order to find out the possible mediators for helping those students who struggle academically.

Keywords: International Physical Activity Questionnaire – Short form (IPAQ-SF), Honey and Mumford's Learning Style Questionnaire (LSQ), Academic Performance, Physical activity, Learning style

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to all those who gave me a helping hand and provided their support from the preparation of the research projection until its completion.

First, I would like to acknowledge the assistance and guidance from my supervisor, Ms. Kamala A/P Krishnan, which has held my hand throughout the research project and provided the necessary guidance and assistance with patience. She always respects my ideas and inspires me toward a better self. Nonetheless, the knowledge for conducting research by lecturers and the expertise in data analysis shared by Mr. Muhamad Noh Zulfikri bin Mohd Jamaliise are very much appreciated as well.

Next, I would like to thank the participants who responded to my research survey, facilitating of the completion of this research. Without whom, none of this would be possible. I really appreciate the time and effort you have provided.

Lastly, I would like to thank my family and friends for all their support and understanding towards me throughout this process of producing the research project.

APPROVAL SHEET

This Research project entitled "**ASSOCIATION BETWEEN PHYSICAL ACTIVITY, LEARNING STYLE AND ACADEMIC PERFORMANCE AMONG UTAR HEALTH SCIENCE UNDERGRADUATES"** was prepared by YEOH ZHE YI and submitted as partial fulfilment of the requirements for the degree of Bachelor of Physiotherapy (HONOURS) at Universiti Tunku Abdul Rahman.

Approved by:

_____

(Ms Kamala A/P Krishnan) Date:……..
Supervisor
Department of Physiotherapy
Faculty of Medicine and Health Sciences
Universiti Tunku Abdul Rahman

Approved by:

_____

(Mr. Muhammad Noh Zulfikri bin Mohd Jamali) Date:……..
Head of Department
Department of Physiotherapy
Faculty of Medicine and Health Sciences
Universiti Tunku Abdul Rahman

FACULTY OF MEDICINE AND HEALTH SCIENCES

UNIVERSITI TUNKU ABDUL RAHMAN

Date:

PERMISSION SHEET

It is hereby certified that **YEOH ZHE YI** (ID No: **20UMB06859**) has completed this Research project entitled "ASSOCIATION BETWEEN PHYSICAL ACTIVITY, LEARNING STYLE AND ACADEMIC PERFORMANCE AMONG UTAR HEALTH SCIENCES UNDERGRADUATES" under the supervision of MS KAMALA A/P KRISHNAN (Supervisor) from the Department of Physiotherapy, Faculty of Medicine and Health Sciences.

Yours truly,

(YEOH ZHE YI)

DECLARATION

I hereby declare that the Research project is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.

Name: YEOH ZHE YI

Date:

TABLE OF CONTENTS

ABSTRACT **II**

ACKNOWLEDGEMENTS **IV**

APPROVAL SHEET **V**

PERMISSION SHEET **VI**

DECLARATION **VII**

LIST OF TABLES **XI**

LIST OF FIGURES **XII**

LIST OF ABBREVIATIONS **XIII**

CHAPTERS

1 INTRODUCTION **1**

1.1 Background 1

1.2 Research Question 6

1.3 Research Objectives 6

1.4 Hypothesis 7

1.5 Operational Definition 7

1.6 Rationale 8

1.7 Scope of Study 9

2 LITERATURE REVIEW **10**

2.1 Physical Activity 10

2.2 Learning Style 11

2.2.1 Honey and Mumford's LSQ 11

2.3 Academic Performance 12

2.4 Relationship Between Physical Activity and Academic Performance 12

2.5 Association Between Learning Style and Academic Performance 16

2.6 Association Between Physical Activity, Learning Style And Academic Performance 17

3 METHODOLOGY **20**

3.1 Study Design 20

3.2 Setting 20

3.3 Population 20

3.4 Sample Size 20

3.5 Sampling Method 21

3.6 Inclusion criteria 21

3.7 Exclusion criteria 21

3.8 Instrument 21

3.9 Procedure 25

3.10 Statistical analysis 26

3.11 Ethical approval 26

RESULT **27**

4.1 Demographic Data of the Participants 27

4.2 Physical Activity Level 35

4.3 Learning Style 39

4.4 Association between Physical Activity, and Academic Performance 51

4.4.1 Chi-square test of Independence 51

4.5 Association between Learning Style and Academic Performance 52

4.5.1 Normality test 52

4.5.2 Spearman’s correlation test 53

5 DISCUSSION **55**

5.1 Level of Physical Activity among UTAR Health Science Undergraduate 55

5.2 Learning Style Preference among UTAR Health Science Undergraduates 57

5.3 Association between Physical Activity and Academic Performance 59

5.4 Association between Learning Style and Academic Performance 60

5.5 Significance of the study 61

5.6 Limitation of the study 62

5.7 Recommendation 63

6 CONCLUSION **64**

BIBLIOGRAPHY **66**

APPENDIX A – ETHICAL APPROVAL LETTER **77**

APPENDIX B - KREJCIE AND MORGAN (1970) TABLE **79**

APPENDIX C – INFORMED CONSENT FORM & PERSONAL DATA PROTECTION STATEMENT **80**

APPENDIX D – DEMOGRAPHIC DATA **83**

APPENDIX V – IPAQ-SF **85**

APPENDIX E – HONEY AND MUMFORD'S LSQ **87**

APPENDIX F – TURNITIN REPORT **90**

LIST OF TABLES

Table		Page
3.1	Criteria for Category of PA level in IPAQ-SF	23 - 24
3.2	Cut-Off Points for Extent of LS Preference based on LS Scores in Honey and Mumford's LSQ	25
4.1	Demographic Data of Participants	28
4.2	Findings of IPAQ-SF	35
4.3	PA Level of Participants based on Demographic Data	37
4.4	Findings of Honey and Mumford LSQ	39 - 40
4.5	LS of Participants based on Demographic Data	47 - 48
4.6	Result of Pearson Chi-Square Test on Association between PA and AP	51
4.7	Result of Shapiro – Wilk Normality Test for LS score	52
4.8	Result of Spearman's Correlation Test on Association between LS and AP	53

LIST OF FIGURES

Figure		Page
4.1	Age Group distribution of Participants	29
4.2	Gender of Participants	30
4.3	BMI Category for Participants	31
4.4	Programme of Participants	32
4.5	History of Attending Clinical Posting of Participant	33
4.6	CGPA of Participants	34
4.7	PA Level of Participants	36
4.8	Distribution of Predominant Learning Styles of Participants	41
4.9	Preference of Pragmatist Style Among Participants	43
4.10	Preference of Theorist Style Among Participants	43
4.11	Preference of Reflector Style Among Participants	44
4.12	Preference of Activist Style Among Participants	44

LIST OF ABBREVIATIONS

Abbreviations	
AP	Academic Performance
BMI	Body Mass Index
CGPA	Cumulative Grade Point Average
IPAQ-SF	International Physical Activity Questionnaire – Short Form
LS	Learning Style
LSQ	Learning Style Questionnaire
PA	Physical Activity
UTAR	Universiti Tunku Abdul Rahman

CHAPTER 1

INTRODUCTION

1.1 Background

Under the ideology of the East Asian education system, learning is a process of committing knowledge to memorize and is meaningless (Li, 2013). With the concept ingrained, those learners in East Asia emphasized the learning style of rote memorization for the perfecting of self. This was attributed to, at the first, their purpose of learning being to contribute to society in harmony with a collective and interpersonal orientation (Li, 2013). They learn without exploring the meaning and nature of learning. In contrast with Western education, the learners pursued satisfaction of their natural curiosity and interest (Li, 2013). The process was full of enjoyment and creativity (Li, 2013). Their intention of learning was to fulfil personal goals and achieve self-actualization (Li, 2013). Malaysia, as an East Asian country, the eastern style education system is being applicated and may be modified but somehow the fundamental of the eastern education system will not be altered. Therefore, students in Malaysia still tend to memorize knowledge to acquire higher scores in the examination due to the fact that exam scores reflect their academic success and serve as a commandment of their level of self-perfection. The problem derived from it was, students, especially those in college or university, may struggle to improve their academic performance (AP), along with concomitant stress or anxiety, in order to achieve increased competitiveness and prove their worth in dedicating to society. This phenomenon was prominent among health science undergraduates due to its necessity of possessing a wealth of knowledge, which

to support their high quality of practice in current learning or the future. Indeed, in the findings of Jailani (2020), academic performance was one of the factors that contribute to stress in university students. This may be attributed to that the next milestone of most university students after graduation is to step into society and work.

In this context, learning style (LS) could be acted as a mediator for students to have better adaption in their learning process. Learning style is the way of processing new information that an individual prefers, to achieve efficient learning (Huston & Huston, 1995). Based on Hu et al. (2007), evidence-based research prescribed effectiveness of learning is enhanced when education is delivered and organized to better suit each student's learning style. On the other hand, facilitating the learning process is always served as the critical primary intention of teaching (Ramsden, 2003). Moreover, Guraya (2014) stated that students can possess a better learning experience in self-directed learning (SDL) by preparing the appropriate learning materials if they know their learning style. Despite college students tend to develop different learning style preferences in different situations or environments, there is always a positive effect brought by recognizing their learning style preference regardless of time or situation (Khan et al., 2019). In previous, a relationship between learning style and academic performance had been reported (Sharif et al.,2010; Tahir, 2020). Some studies found only certain learning styles from each varied learning style theories associated with higher academic performance, for instance, Theorist learning style in Honey and Mumford's approach (Ardila & Gómez-Restrepo, 2021). Historically, there were a variety and wealth of

learning styles in different dimensions from varied theories of learning styles (İlçin et al., 2018; Khan et al., 2019). However, Honey and Mumford's approach is one of the theories refined from Kolb's experiential learning theory, which is a useful and widely applicated instrument in higher education, particularly in the health science aspect. It documented the four-learning style based on Kolb's experiential learning cycle (Honey & Mumford, 1986; Honey & Mumford, 2006). The four learning styles are "Activist", "Theorist", "Pragmatist" and "Reflector". Honey and Mumford's Learning Style Questionnaire (LSQ) has been widely conducted on Malaysia's university health science students to identify their learning styles (Mohammed et al., 2011; Aziz et al., 2013; Lee & Sidhu, 2013; Nurumal et al., 2019).

As another mediator for university student to deal with the struggles, physical activity is encouraged and preferable to facilitate their learning and cope with stress. The advantages of students involved in physical activity had been reported previously, which helps in improving overall health physically and mentally as well as thinking and learning abilities (World Health Organization [WHO], 2020). Hillman et al. (2008) and Sallis (2010) stated that the body of evidence proving the improving students' learning abilities and cognition with involvement in physical activity were increasing. This circumstance may be further explained by Coe et al. (2006) and Biddle & Asare (2011). According to their findings, students being physically active have been shown to have a better self-concept, cognition, concentration, sleep quality, and stabilize mood as well as reduce boredom and stress. Physical activity for university students was recommended to perform at moderate intensity for at

least 30 minutes per session and 5 days per week, at least a total of 150 minutes a week (WHO, 2020). In fact, previous studies, Al-Drees et al. (2016) and Chung et al. (2018) reported a finding of higher GPA among university students who were physically active. The association between physical activity and academic performance can be elaborated through physiological and psychological mechanisms (Angevaren et al., 2008; Lees & Hopkins, 2013; Ardoy et al., 2014). Davis et al. (2011) and Erickson et al. (2011) reported that raising volume of brain-derived neurotrophic factors (BDNF) in hippocampus and brain cortical blood flow in the event of physical activity activates the brain. This may stimulate learning, improve intelligence as well as enhance reasoning ability as BDNF is the main molecule involved learning and memory (Gligoroska & Manchevska, 2012; Davis et al., 2011; Erickson et al., 2011). Furthermore, structural changes following physical activity, including increased frontal and hippocampal regions' grey matter volume and decreased grey matter damage, were found that related to academic achievement when compared to sedentary individuals (Donnelly et al., 2016; Chaddock-Heyman et al., 2014; Lees & Hopkins, 2013; Erickson et al., 2011; Colcombe et al., 2006). Thus, physical activity shows its potential in behaviour changes, in terms of self-efficacy, self-concept, enjoyment, intentions and attitude, and thereby helps students to confront their struggles with concomitant positive outcomes (Eather et al., 2013).

Based on previous students, along with an extensive search, there are only extremely few studies that were conducted the way of investigating multiple variables, which are physical activity, learning style and academic performance in the same population. Among them, only one study was revealed

in Western and no study in East Asia (Ardila, & Gómez-Restrepo, 2021). Physical activity and learning style were only well-studied as a single variable in the past. Furthermore, limited studies within these 10 years had conducted among university students which specifically targeted the population of medical and health science undergraduates (Franz & Feresu, 2013; Wilkinson et al.,2014; Al-Drees et al, 2016; Chung et al., 2018; Xu & Sansgiry, 2018; Ardila, & Gómez-Restrepo, 2021). Besides, most of them investigated only the association between either physical activity or learning style with academic performance. Thus, there is still a lack of such research among university students from the healthcare sector in East Asian countries with combined variables of physical activity, learning style and academic performance. Moreover, previous studies implemented Honey and Mumford's LSQ more commonly in Western countries for studying the association between learning style and academic performance, compared to in Asian or Eastern countries, which are not that common but have been applied in a few studies. The discrepancy between Asian and Western education as well as between different ethnicities makes more possibilities that can be discovered comprehensively in this study. Hence, a study on the relationship between physical activity, learning style and academic performance among university students who currently taking any medical and health science programme in Malaysia exhibits the significance and worth to be investigating in this context.

As was described above, therefore, the aims of this study were to explore the learning style preference and level of physical activity of UTAR health

science undergraduates and to investigate the association between physical activity, learning style and academic performance.

1.2 Research Question

1. What is the learning style among UTAR health science students?
2. What is the level of physical activity among UTAR health science students?
3. Is there any association between physical activity and academic performance among health science students in UTAR?
4. Is there any association between learning style and academic performance among health science students in UTAR?

1.3 Research Objectives

1. To identify the level of physical activity among UTAR health science student
2. To find out the learning style among UTAR health science students
3. To determine the association between physical activities and academic performance among UTAR health science students
4. To determine the association between learning style and academic performance among UTAR health science students

1.4 Hypothesis

H10: There is no association between physical activities and academic performance among UTAR health science students

H1A: There is significant association between physical activities and academic performance among UTAR health science students

$H2_{0:}$ There is no association between learning style and academic performance among UTAR health science students

$H2_{A}$: There is significant association between learning style and academic performance among UTAR health science students

1.5 Operational Definition

1. Physical Activity: Based on the definition by World Health Organization (WHO), physical activity refers to an activity requiring energy expenditures in bodily movements that are driven by skeletal muscle (WHO, 2020)

2. Learning Style: A way that an individual prefers and feels efficient in processing new data or information (Huston & Huston, 1995). Based on the Honey and Mumford theory, learning style preference can be classified into four, which are “Activist, Theorist, Pragmatist, Reflector” (Stander et al., 2019).

3. Academic Performance: Academic performance is defined as a grade point average (GPA) or cumulative grade point average (CGPA) in the past semester (Elmore et al., 2017; Masrom & Usat, 2015). In UTAR, the grade ranges from 0 to 4.0.

4. UTAR Health Science Undergraduates: Students pursuing undergraduate programme under M. Kandiah Faculty of Medicine and Health Science in Universiti Tunku Abdul Rahman, which includes Bachelor of Medicine and Bachelor of Surgery (M.B.B.S), Bachelor of Nursing (Honours), Bachelor of Chinese Medicine (Honours), Bachelor of Physiotherapy (Honours)

1.6 Rationale

Improving awareness of physical activity among the public is always the emphasis that the public health sector focused on, to reduce physical inactivity, the risk factor ranked as the fourth leading cause of death in the world (WHO, 2020). Health care providers, as physical activity role models, played an important role to counsel and encourage their patients to be physically active in achieving the recommendation. A high level of physical activity is an important "hardware" that healthcare providers should possess, as it helps them to convincingly promote the importance of physical activity to their patients and raise their awareness. The previous evidence proved that physically active health care providers tend to provide better motivating and credible preventive counseling, as well as to have more frequency of counselling (Lobelo & de

Quevedo, 2016). Learning style preference is good to know for every student and even for lecturers. This study establishes to provide feedback for students to acquire a deeper understanding of their learning style. For lecturers, in recognizing the dominant learning style in the university, teaching strategies or education programs can be modified to become more effective and efficient in imparting knowledge to the students.

The association between physical activity, learning style and academic performance have worth to be investigated as it may be a guide for students to decide whether they need some change during their journey of studying, in terms of learning style and physical activity. This study may improve the students' academic performance to an extent.

1.7 Scope of Study

This study focused on identifying learning style and physical activity level among health science undergraduate students in Sungai Long campus Universit Tunku Abdul Rahman (UTAR). These findings were essential in determining the association between each independent variable with academic performance within the same study population.

CHAPTER 2

LITERATURE REVIEW

2.1 Physical Activity

Physical activity is an activity that involved all body movement and brings energy expenditures, for example, walking and sports (WHO, 2020). In fact, there are numerous benefits of involving in moderate or vigorous physical activity actively, such as improving overall health physically and mentally as well as preventing noncommunicable diseases (WHO, 2020). Based on the report from WHO, 1 out of 4 male adults and 1 out of 3 female adults have shown physical inactivity which increased 20% or 30% the risk of death compared to normal individuals (WHO, 2020). In a global study, by Hallal et al. (2012) collected physical activity worldwide through International Physical Activity Questionnaire (IPAQ) and Global Physical Activity Questionnaire (GPAQ) among 88.9% of the world's population in 122 countries. This study discovered a total of 31.1% of adults in worldwide who were physically inactive and females are more inactive than males (Hallal et al., 2012). 17% in frequency of inactivity in southeast Asia was found in this study (Hallal et al., 2012). Malaysia, one of the countries in Southeast Asia, has shown the frequency of inactivity of more than 50 % (Hallal et al., 2012).

2.2 Learning Style

The definition of "Learning styles" is "characteristic cognitive, affective and psychosocial behaviours that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (page 4) (Keefe, 1979). In a systemic review by Stander et al. (2019) included 15 articles with the intention of exploring the learning style of physiotherapists. The majority of the population in all the reviewed studies were undergraduate students (Stander et al., 2019). This review stated the various theories regarding learning style applied by those reviewed studies, including Kolb's experiential learning theory (ELT), Gregorc model of cognition as well as Honey and Mumford's approach. Outcome measures of learning style included different versions of Kolb's Learning Style Inventory (LSI), Gregorc style delineator, the visual-aural-read/write-kinesthetic (VARK) questionnaire, Felder Silverman's Index of Learning Survey, and Honey and Munford's Learning Style Questionnaire (LSQ) (Stander et al., 2019). Most commonly used learning style questionnaires included Marshall & Merritts' Learning Style Inventory (LSI), Kolb's LSI and Honey & Mumford's Learning Style Questionnaire (LSQ) (Wessel et al., 1999; Mountford et al., 2006; Zoghi et al., 2010).

2.2.1 Honey and Mumford's LSQ

Honey and Mumford 's LSQ is used by several previous studies in Malaysia and is known as suited for the healthcare sector in identifying learning styles (Coffield et al., 2004; Mohammed et al., 2011; Aziz et al., 2013; Lee & Sidhu, 2013; Nurumal et al., 2019). Besides, its satisfactory validity and reliability had been reported (Honey & Mumford 1986; Allinson & Hayes, 1988;

Fung et al., 1993; Sadler-Smith, 2001; Alonso et al., 2012). Among four learning style documented by Honey and Mumford, which is "Activist, Theorist, Pragmatist, Reflector", Reflector is the most common learning style among university students, particularly health science students (Aziz et al., 2013; Nurumal et al., 2019).

2.3 Academic Performance

Academic performance is measured by grade point average (GPA) or cumulative GPA (CGPA) in the past semesters based on students' self-reporting (Elmore et al., 2017; Masrom & Usat, 2015). Self-reported GPA was a valid and reliable outcome measure and was commonly used in tertiary institutions (Masrom & Usat, 2015; Kuncel et al., 2005).

2.4 Relationship Between Physical Activity and Academic Performance

Few previous studies had conducted the investigation of relationship between physical activity and academics from different perspectives, in terms of country, age as well as programme.

Al-Drees et al. (2016) was a cross-sectional study and conducted in College of Medicine, King Saud University in Riyadh, Saudi Arabia during academic year 2012-2013, targeting medical students to evaluate their physical activity habits and determine its correlation with academic achievement. 409 medical students completed a self-administered questionnaire, which included the questions about GPA and type, frequency and duration of physical activity

(Al-Drees et al., 2016). According to Al-Drees et al. (2016), a high GPA was found among the 47% of 409 medical students who were active in physical activity and performed at least 30 minutes of physical activities in one session for 5 days per week (Al-Drees et al., 2016). Association between normal BMI and high GPA had been found in this study as well (Al-Drees et al., 2016). Thus, this study concluded that physical activity positively associated with academic achievement.

In another study, Franz & Feresu (2013) intended to determine the relationship between physical activity and/or BMI and academic performance among students in biochemistry course at University of Nebraska in Lincoln, United States. Questionnaire was done by 98 biochemistry students to collect height weight, GPA and profile of exercises (Franz & Feresu, 2013). According to Franz & Feresu (2013), physical activity was measured and determined based on whether the students meet or did not met the recommendation for physical activity by the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM). The finding of Franz & Feresu (2013) was similar to Al-Drees et al. (2016), in which high GPA was significantly shown in normal BMI college students instead of in overweight students.

A local study, Chung et al. (2018) investigated the undergraduate medical and health sciences students at Cyberjaya University College of Medical Sciences (CUCMS), Malaysia, with an aim of discovering their health

status, including their level of physical activity and therefore determining the relationship of this health status to their academic achievement and self-determination level. This study was cross-sectional, and 276 students aged between 18 to 38 were chosen through a multisatage cluster random sampling method to complete a self-administrated questionnaire that included the short form of the International Physical Activity Questionnaire (IPAQ-SF) and the third version of the Behavioural Regulation in Exercise Questionnaire (BREQ-3) (Chung et al., 2018). 52% of males and 25% of females were found to have PA achieving the WHO recommended PA level in this study, which is HEPA. This study also found a positive relationship between PA level and academic performance. Twice of odds of possessing a good GPA score were revealed among HEPA students compared to non-HEPA students

Xu & Sansgiry (2018) was a cross-sectional study aimed to recognize the physical activity behaviour in second- and third-year students at University of Houston who taking Doctor of Pharmacy (PharmD) degree programs and its influences on GPA. 140 students who had done and returned the self-report survey questionnaire that consisted of IPAQ-SF and question of cumulative GPA, height, weight, learning capacity were eventually included into the data analyses. Majority of the students were Asian (54.4%) and aged between 20 and 25 (59.3%). This study found that GPA having negative correlation with time spent on walking, and another finding which physical activity failed to become a significant predictor of GPA (Xu & Sansgiry, 2018). These findings were contrary to previous studies which reported the positive association between physical activity and GPA (Al-Drees et al., 2016; Chung et al., 2018). However,

they still found that GPA positively correlated to lower BMI and higher learning capacity (Xu & Sansgiry, 2018). In Xu & Sansgiry (2018) participating in moderate and vigorous physical activity only help in enhancing the learning capacity and lowering the BMI (Xu & Sansgiry,2018).

Another study, Whitford (2021) was similar to Xu & Sansgiry (2018), which investigate the correlation between physical activity and self-reported GPA among undergraduate college students at the Florida State University. 200 college students had done the anonymous Qualtrics survey during 2019 to collect their reported GPA and answer from questions of physical activity (Whitford, 2021). This study found that approximately 80% of students participated in vigorous and moderate physical activities, however, physical activity had no significant association with GPA (Whitford, 2021). Thus, this study was aligned with Xu & Sansgiry (2018).

There was still existing argument on the relationship between physical activity and academic performance among Asian, as well as between present studies and previous studies (Al-Drees et al., 2016; Franz & Feresu, 2013; Chung et al., 2018; Xu & Sansgiry,2018; Whitford, 2021). Some of the studies shown the limitation on data collection of physical activity by using a self-reported survey or self-administrated questionnaire (Al-Drees et al, 2016; Franz & Feresu, 2013).

2.5 Association Between Learning Style and Academic Performance

In study of Sharif et al. (2010), first year pharmacy undergraduates in the University of Manchester were recruited to examine the learning style among them and its relationship with academic performance. In this study, Chemistry students were also recruited as the control group. Learning style was evaluated through Honey and Munford's LSQ while academic performance was based on examination' score. The results from this study were pharmacy students with higher reflector score and lower activist score. A significantly positive relationship between learning style and academic performance was also found.

In a local cross-sectional study that in line with Sharif et al. (2010), Tahir (2020), 142 non-accounting students who enrolled for the Financial and Management Accounting (ACC466) course and from the Faculty of Administrative Science and Policy in University Teknologi MARA (UiTM), Seremban Campus, Malaysia were recruited to the study. The study aimed to investigate learning style among them and its impact on academic performance. Honey and Mumford's LSQ was used as the instrument for determining their learning style. The finding from this study was significant relationship between learning style and academic performance. Besides, pragmatist and theorist learning style was found to have higher odds of success in academic performance when compared to others two styles.

However, another study was found a finding that against Sharif et al. (2010) and Tahir (2020). 276 first year students, majority of medical and

minority of dental students in Queen's University Belfast were involved in the study by Wilkinson et al (2014), to explore these students' learning style and its influence on academic performance. They chose Honey and Mumford Learning Style Questionnaire as their instrument for collecting data. According to Wilkinson et al (2014), Reflector learning style was discovered as the dominant style preference, which account for 65 % of students, followed by theorist with 11% of student. The significant finding was no influence of learning style on academic performance

Study of learning style and academic performance among health science students was significantly limited as well as in Asian country. Furthermore, instruments for identifying the learning style were numerous and various measurement in different dimension of learning style (Stander at al., 2019; Wilkinson et al., 2014). In other word, numerous derivations of outcome measure of LS lead to massive of various results. Moreover, Honey and Mumford's LSQ was used in East Asia not common as in Western country. There still lack of knowledge in this aspect of study in Eastern country.

2.6 Association Between Physical Activity, Learning Style And Academic Performance

A cross-sectional study, Ardila & Gómez-Restrepo (2021) was to determine the association between physical activity habit, learning style and academic performance among 218 dental students at the University of Antioquia in Colombia. They voluntarily participated in the CAMEA40 questionnaire,

which used for identification of leaning style and included questions to obtain their record physical activity while GPA was acquired from administrative dataset of Faculty officially (Ardila, & Gómez-Restrepo, 2021). According to Ardila, & Gómez-Restrepo (2021), classification of learning style was based on the recommendation by Honey and Mumford theory which is Activist, Reflector, Pragmatist and Theorist. In the results of Ardila, & Gómez-Restrepo (2021), 60% students who active in physical activity were found to have higher GPA compared to students who inactive in physical activity. For the findings of learning style preference, the number of students for each learning style was quite equivalent. However, both Theorist and Reflector style were still found to be the dominant learning style regardless of level of physical activity, with slightly higher number of students (Ardila, & Gómez-Restrepo, 2021). This study then found a positive correlation between Theorist learning style and higher GPA (Ardila, & Gómez-Restrepo, 2021). Despite the same questionnaire was used, Ardila & Gómez-Restrepo (2021) and Wilkinson et al. (2014) found the different result in dominant learning style, which Reflect style was significant dominant (60%) in Wilkinson et al (2014) and almost equivalent in each learning style in Ardila & Gómez-Restrepo (2021). In addition, Ardila & Gómez-Restrepo (2021) found association between learning style and academic performance whereas Wilkinson et al. (2014) reported no association of that.

There is lacking studies in the context of physical activity, learning style and academic performance in any population (Ardila, & Gómez-Restrepo, 2021). In addition, the situation of previous studies using same questionnaire, Honey and Mumford's LSQ implemented in health science students in different area

producing different result of learning style preferences and the association between learning style and academic performance indicate the possibilities of more studies on different population to be conducted from current to future (Ardila & Gómez-Restrepo, 2021; Wilkinson et al., 2014).

Chapter 3

Methodology

3.1 Study Design

The study design for this study was cross-sectional study design as this study aims to explore the learning style of UTAR health science students and determine the association between physical activity, learning style and academic performance among UTAR health science students.

3.2 Setting

This study was carried out in Universiti Tunku Abdul Rahman (UTAR), Sungai Long Campus in Kajang in Selangor, Malaysia.

3.3 Population

The targeted study population was undergraduates at M. Kandiah Faculty of Medicine and Health Science (MK FMHS) in UTAR Sungai Long Campus.

3.4 Sample Size

Krejcie and Morgan (1970) Table (Appendix B) was used in this study to determine sample size. The population was approximate in 600. Thus, the sample size was 234, including 5 % error.

3.5 Sampling Method

Convenient sampling method was used in this study. This method is select participants who readily available (Taherdoost, 2016). Less time consuming and low cost are the significant considerations in choosing this sampling method.

3.6 Inclusion criteria

1. Both male and female
2. Student who taking undergraduate programme under MK FMHS in UTAR Sungai Long campus, which is Bachelor of Medicine and Bachelor of Surgery (M.B.B.S), Bachelor of Nursing (Hons), Bachelor of Physiotherapy (Hons) and Bachelor of Chinese Medicine (Hons)

3.7 Exclusion criteria

1. Students from other faculties in UTAR Sungai Long campus
2. Other campus or universities students

3.8 Instrument

Questionnaire which consists of 3 sections was implemented in this study. Before the sections, brief description regarding the study, personal fata protection statement and consent form (Appendix C) were included in first and second page of Google Forms, to ensure the participants read and understood the information given and provided consent for willing to participate in the study.

Section 1 (Appendix D) gathered the information of UTAR health science students' demographic data, clinical posting experience, and cumulative grade point average (CGPA). Section 2 (Appendix E) was International Physical Activity Questionnaire Short Form (IPAQ-SF) which collect their profile of physical activity. Section 3 (Appendix VI) was Learning Styles Questionnaire (LSQ, which used in this study as a means to identify their learning style preference.

Information of clinical posting experience was used to divide participant into two group, in-campus learning group and out-campus learning group. For CGPA, a cut-off point of 3 was used to categorise each participant's CGPA score as either "good" (≥ 3.0000) or "poor" (<3.0000), which was consistent with the requirements for good academic standing among the majority of undergraduate programmes approved by the Malaysian Ministry of Higher Education (MOHE) with Malaysian Qualification Agency (MQA) accreditation (Malaysia Qualifications Agency, 2011).

Profile of physical activity was collected by IPAQ-SF, to identify the level of physical activities among UTAR health science students. IPAQ-SF included 7 items, which asked the frequency of days and duration in vigorous intensity, moderate intensity, walking and sitting respectively. MET of each activity are 3.3 MET in walking, 4 MET in moderate intensity activity and 8 MET in vigorous activity. Any bouts of activity which leas then 10 minutes will be counted Metabolic equivalent (MET) minutes will be calculated through

multiplying MET of the activity by minutes and days. Interpretation was based on the criteria for categories 1, 2 and 3, which is low, moderate and high PA level respectively. The criterion for high scoring is either at least 3 days of vigorous intensity activity with at least 1500 metabolic equivalent (MET) minutes a week or 7 or more days of any combination of walking, moderate or vigorous intensity activities with at least 3000 MET minutes a week. For moderate level scoring, 3 criteria are either achieved. First is 3 or more days engaging in vigorous intensity activity and/or at least 30 minute per day of walking. Second is 5 or more days of moderate intensity activity and/or at least 30 minutes per day of walking. Third is 5 or more days of any combination of walking, moderate or vigorous intensity activity with at least 600 MET minutes a week. Low level of physical activity means that fail to meet the criteria of moderate or vigorous level of physical activity. Craig et al. (2003) and van der Ploeg (2010) had reported the validity and reliability of IPAQ.

Table 3.1: *Criteria for Category of PA level in IPAQ-SF*

Low	Fail to meet Moderate or Vigorous level of PA
Moderate	≥ 3 days engaging in Vigorous intensity activity and/or ≥ 30 minute per day of Walking. **OR** ≥ 5 days of Moderate intensity activity and/or ≥ 30 minutes per day of Walking. **OR** ≥ 5 days of any Combination of walking, moderate or vigorous intensity activity with ≥ 600 MET minutes a week.

Table 3.1: *Criteria for Category of PA level in IPAQ-SF (Cont')*

High	≥ 3 days of vigorous intensity activity with ≥ 1500 metabolic equivalent (MET) minutes a week **OR** ≥ 7 days of any combination of walking, moderate or vigorous intensity activities with ≥ 3000 MET minutes a week.

To recognize the learning style among UTAR health science undergraduates, Learning Styles Questionnaire (LSQ) by Honey and Mumford was used to figure out the students' learning styles based on the 4 main learning style preference, which are "Activist", "Theorist", "Pragmatist", and "Reflector". These 4 key learning styles were based on Kolb's experiential learning cycle to describe and modified (Honey & Mumford, 1986; Honey & Mumford, 2006). "Activist" tends to experience and enjoy new changes, good in brainstorming and tend to act first then only consider consequences. "Reflector" is thorough and careful in analysing, which prefer to observe and think before action. "Theorist" keen on theories model as well as systemic thinking and tends to be approach problem in logical and sequential way with refusing the concept that is uncertain. "Pragmatist" tends to learn something from demonstration and like to look at how a technique work or implement, followed by practicing. LSQ have 40 items with statements that correspond to each learning style. Each learning style has 10 corresponded statements. Then the score learning style will be counted and multiplied by two to find out the extent of preference for each learning style, which is sated in Table 5.7.2 below. Honey and Mumford's LSQ is chosen because its satisfactory validity and reliability (Honey & Mumford

1986; Allinson & Hayes, 1988; Fung et al., 1993; Sadler-Smith, 2001; Alonso et al., 2012). Besides, it had been used in several studies in Malaysia and was known as suited for healthcare sector in identifying learning style (Coffield et al., 2004; Mohammed et al., 2011; Aziz et al., 2013; Lee & Sidhu, 2013; Nurumal et al., 2019).

Table 3.2: *Cut-Off Points for Extent of LS Preference based on LS Scores in Honey and Mumford's LSQ*

	Extent of LS Preference				
	Very Strong	Strong	Moderate	Low	Very Low
Score					
Pragmatist	17 - 20	15 - 16	12 - 14	9 - 11	0 - 8
Theorist	16 - 20	14 - 15	11 - 13	8 - 10	0 - 7
Reflector	18 - 20	15 - 17	12 - 14	9 - 11	0 - 7
Activist	13 - 20	11 - 12	7 - 10	4 – 6	0 - 3

3.9 Procedure

The questionnaire was converted into Google Form. Then it delivered to UTAR Sungai Long campus student via Microsoft Team, Facebook, WhatsApp, Instagram or face-to-face approach. Consent form was included in questionnaire and participants were in anonymous. After data being completely collected, I checked the data to exclude the error or incomplete data. Then I proceeded to data analysis and interpretation.

3.10 Statistical analysis

In this study, all collected data through questionnaire were analyzed by using the software, IBM Statistical Package for the Social Sciences (SPSS) Statistics 20 and Microsoft Excel. Descriptive analysis was used for finding out the frequency and percentage for demographic data including age, gender, BMI category, programme, experience of clinical posting and CGPA, as well as the level of physical activity and learning style preferences. Chi-square test and Spearman correlation test were used to evaluate the association between physical activity and learning style with academic performance respectively.

3.11 Ethical approval

This study was subjected to the ethical approval from UTAR Scientific Ethical Review Committee (SERC) (Appendix A). Information sheet and consent forms were included in the first and second page of Google form.

CHAPTER 4

RESULT

4.1 Demographic Data of the Participants

With four weeks of data collection, a total of 202 participants were successfully recruited via online platform (WhatsApp, Facebook, Instagram), Microsoft Team, and by face-to-face approach, to respond the online questionnaire. Then, the responses proceeded to the data analysis through SPSS 20 version software and the response rate of the study is 86.3%.

The frequency and percentage for demographic data including age, gender, BMI category, programme, history of attending clinical posting as well as CGPA of all the participants are illustrated in Table 4.1.1 below.

Table 4.1: *Demographic Data of Participants*

Variables	Frequency (%)
Age Group (18-28)	
18 - 20	71 (35.1)
21 - 23	124 (61.4)
24 - 28	7 (3.5)
Gender	
Male	68 (33.7)
Female	134 (66.3)
BMI Category	
Underweight	44 (21.8)
Normal weight	114 (56.4)
Overweight	33 (16.3)
Obese	11 (5.4)
Programme	
M.B.B.S	52 (25.7)
Nursing	14 (6.9)
Physiotherapy	122 (60.4)
Chinese Medicine	14 (6.9)
History of clinical posting attended (Have you attended clinical posting?)	
Yes	104 (51.5)
No	98 (48.5)
CGPA	
Good (>= 3.0000)	123 (60.9)
Poor (<3.0000)	79 (39.1)

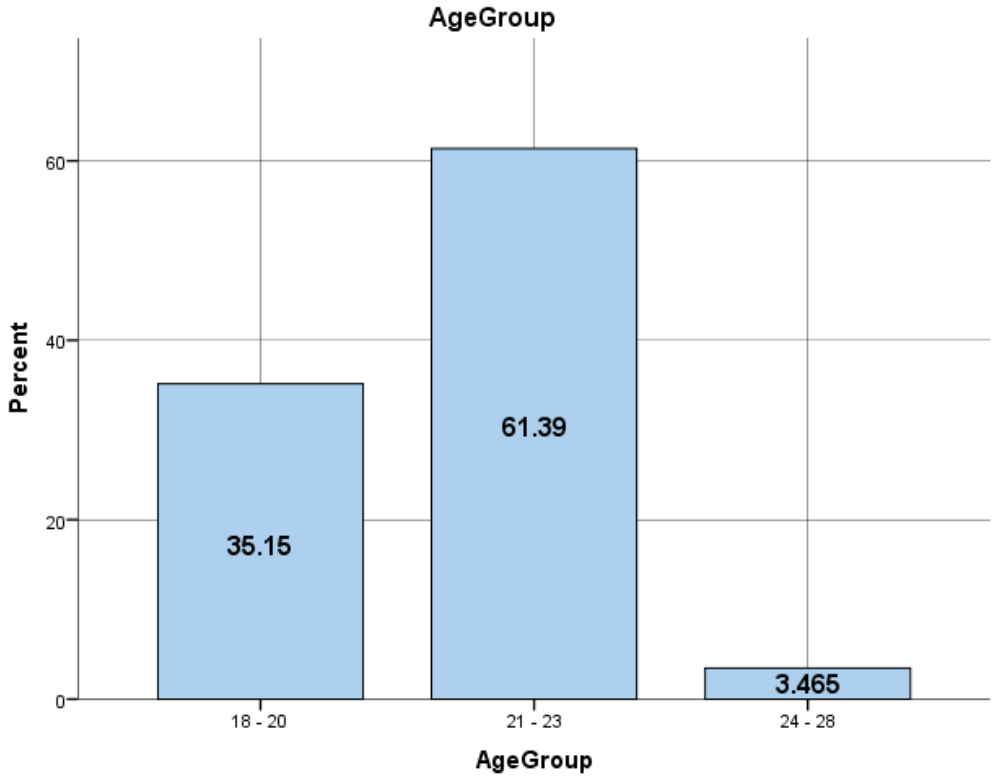

Figure 4.1: *Age Group distribution of Participants*

Referring to demographic data of participants (Table 4.1), the range of age was from 18 years old to 28 years old. Based on Table 4.1 and Figure 4.1, majority of them was age group of 21 to 23, with 124 (61.4%) among 202 (100%). The second most was age group 18 to 21, occupied 71 (35.1%). Last, age group of 24 to 28 were represented by 7 (3.5%) students.

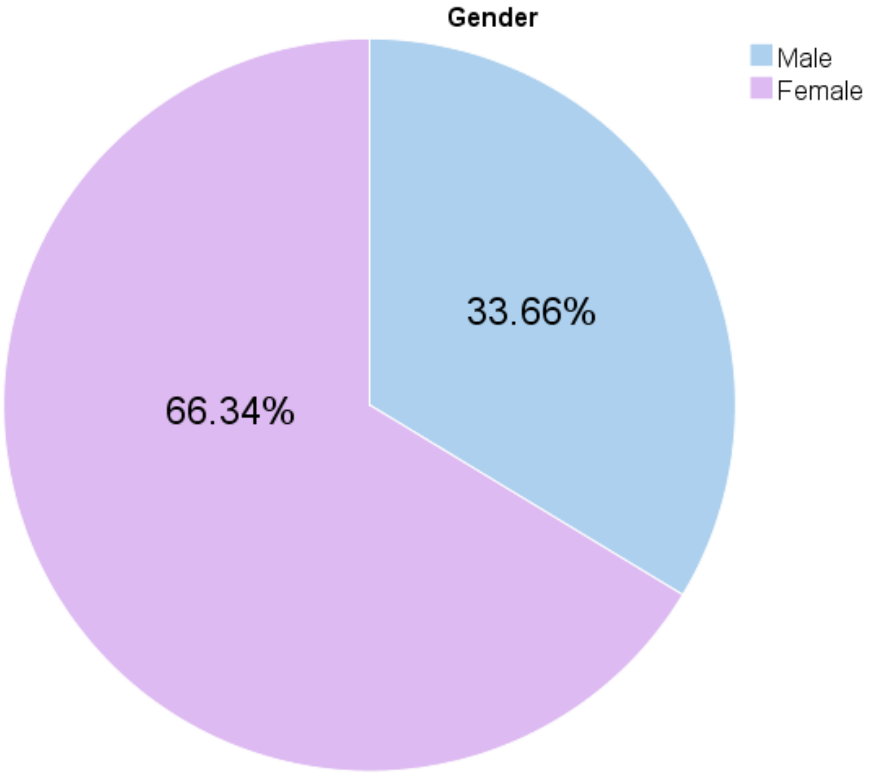

Figure 4.2: *Gender of Participants*

Figure 4.2 shows the gender of participants in this study. Among 202 participants (100%), female was the majority which make up 66.3% with 134 persons and 68 male was accounted for 33.6%.

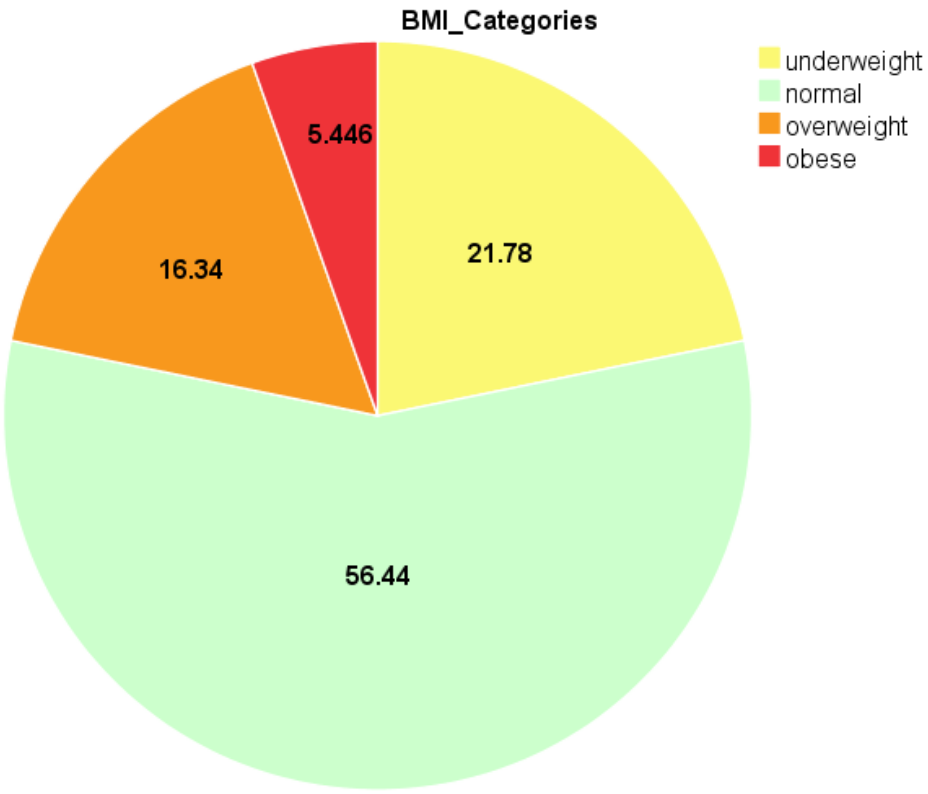

Figure 4.3: *BMI Category for Participants*

BMI category demonstrated in Figure 4.3 was classified as underweight, normal weight, overweight and obese. The classification is referred to the recommended BMI cut-off point of less than 18.49, 18.5 to 22.99, 23 to 27.49, and more than 27.5 in Malaysia (Shamsul, 2020). BMI was calculated as weight in kg divided by height in meter square, which collected from the questionnaire.

Most of them were normal weight, accounting for 56.4% with 114 students, followed by 21.8% or 44 students with underweight. There were 33 students or 16.3% who having overweight and 11 or 5.4% obese participants.

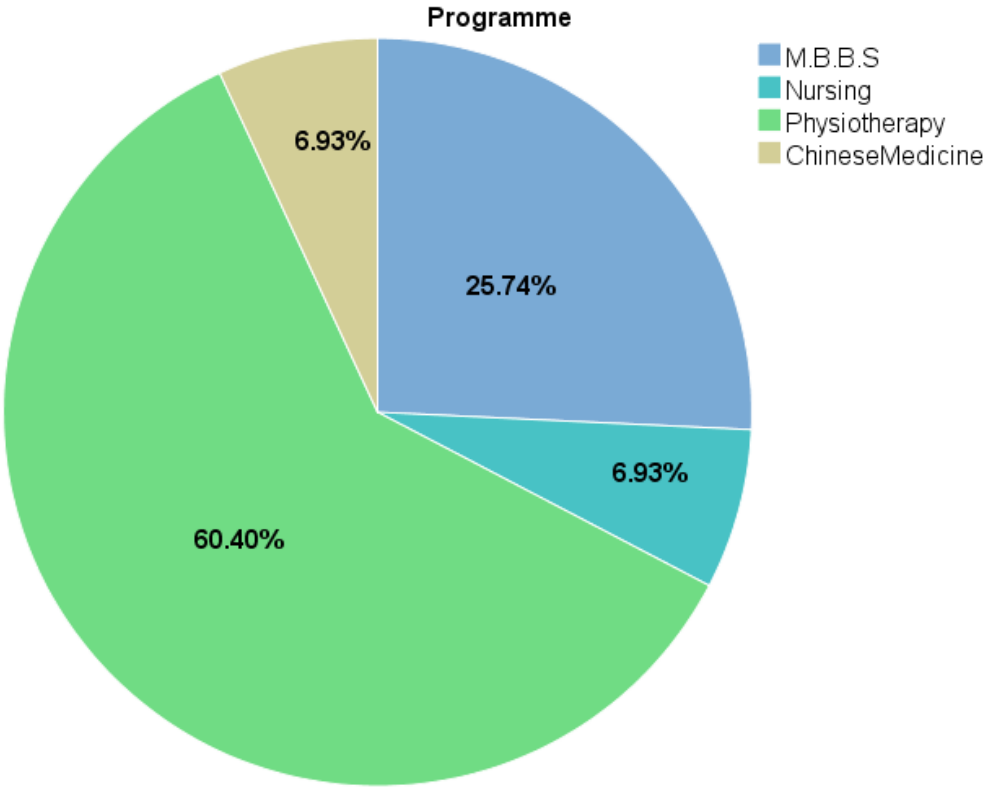

Figure 4.4: *Programme of Participants*

The distribution for programme of participants is presented in Figure 4.4. All participants are met the inclusion criteria, which is currently pursuing undergraduate programme under MK FMHS at UTAR Sungai Long campus. Majority of the participants were from Physiotherapy, which is 60.4% or 122 out of 202. The second most was M.B.B.S, having 25.7% with 52 participants. Nursing and Chinese Medicine were having an equal number of participants, 14 or 6.9%.

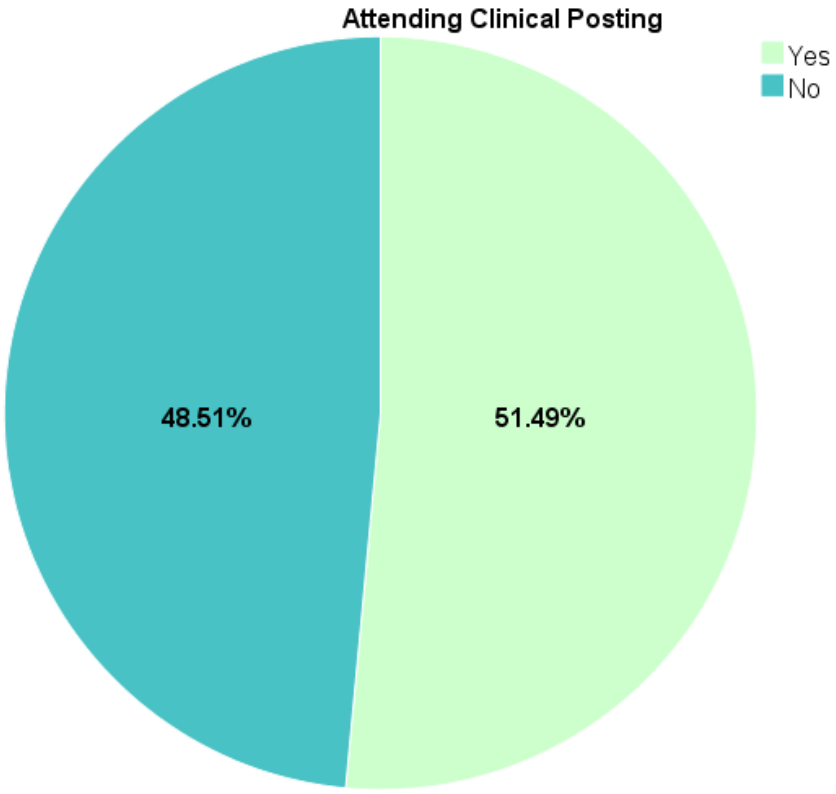

Figure 4.5: *History of Clinical Posting Attended of Participant*

Figure 4.5 shows the history of clinical posting atteded. Almost half of the participants, 104 persons or 51.5%, have attended clinical posting before. For the other 48.5% or 98 students, they did not have attended clinical posting yet.

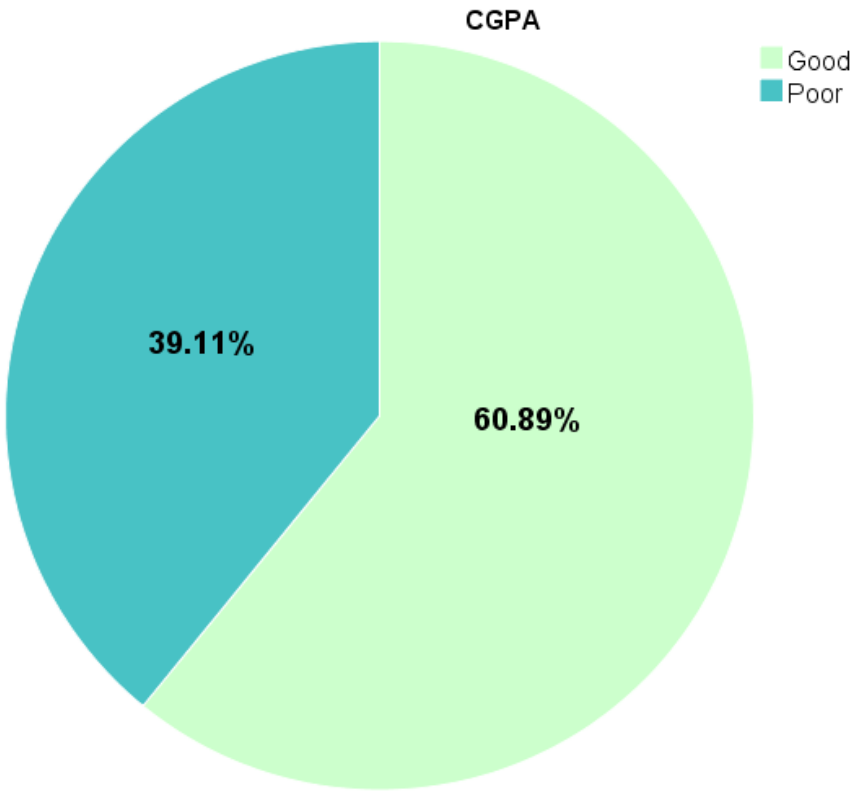

Figure 4.6: *CGPA of Participants*

Figure 4.6 displays the grading for CGPA of participants, in good or poor. The grading is referred to cut-off point of 3.0000. Good represents CGPA more than or equal to 3.0000 whereas poor indicates CGPA lower than 3.0000.

Of the 202 students, 123 or 60.9% students were getting good CGPA. Students who having poor CGPA were accounted for 39.1% with 79 persons.

4.2 Physical Activity Level

PA level of participants was investigated and determined through IPAQ-SF with 7-items in current study. Data collected were used to calculate the MET-minutes/week which representing the total PA level in a week and classified the participants' PA level were based on the criteria stated in IPAQ-SF. These were done by IPAQ calculator from Cheng (2016).

Table 4.2: *Findings of IPAQ-SF*

	Frequency (%) (N=202)	**Mean (SD)**
IPAQ-SF		
MET-Minutes/Week		2062.75 (2000.96)
PA Level		
Low	58 (28.7)	
Moderate	79 (39.1)	
High	65 (32.2)	

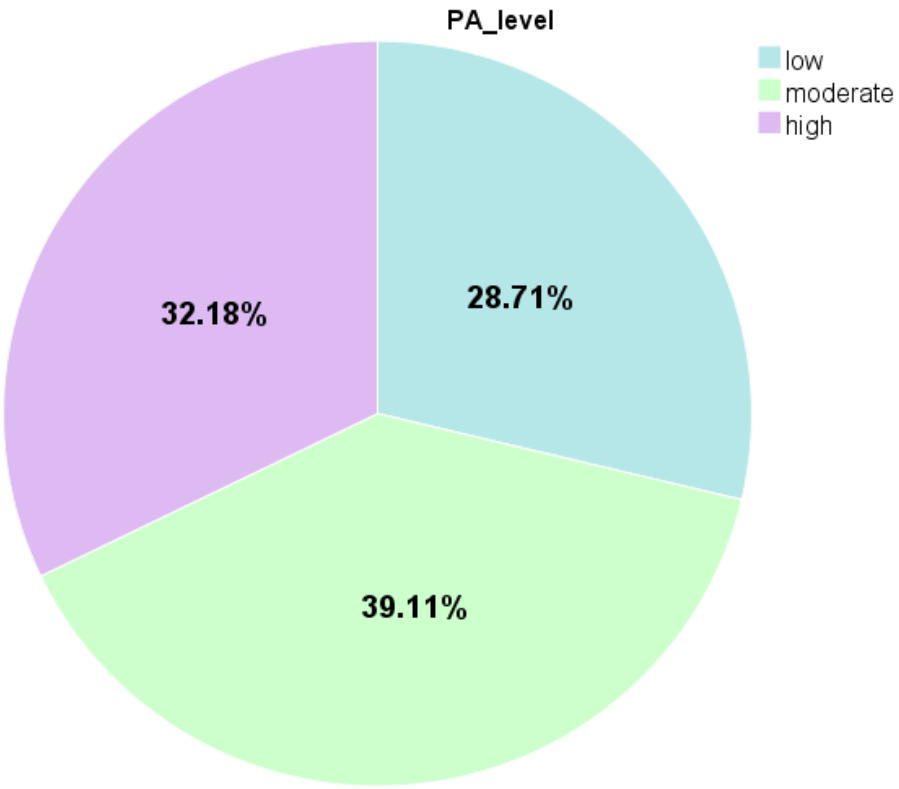

Figure 4.7: *PA Level of Participants*

Table 4.2 demonstrates the mean and standard deviation of MET-minutes/week. The average of MET-minutes/week was 2062.75, with standard deviation of 2000.96.

Figure 4.7 above displays the PA level of the participants. There were three PA level, low, moderate, and high. These three-level were referred or known as insufficiently active, minimally active and health-enhancing PA (HEPA) respectively in IPAQ-SF. Out of 202, a slightly higher in number, 79 (39.1%), was indicated in moderate PA level, followed by high PA level with 65 (32.2%) and low PA level with 58 (28.7%).

Table 4.3: *PA Level of Participants based on Demographic Data*

	PA Level			Total
	Low n (%)	Moderate n (%)	High n (%)	
Gender				
Male	16 (23.5)	18 (26.5)	34 (50)	100%
Female	42 (31.3)	61 (45.5)	31(23.1)	100%
BMI Category				
Underweight	12 (27.3)	23 (52.3)	9 (20.5)	100%
Normal weight	38 (33.3)	35 (30.7)	41 (36)	100%
Overweight	6 (18.2)	14 (42.4)	13 (39.4)	100%
Obese	2 (18.2)	7 (63.6)	2 (18.2)	100%
Programme				
M.B.B.S	15 (28.8)	24 (46.2)	13 (25)	100%
Nursing	5 (35.7)	6 (42.9)	3 (21.4)	100%
Physiotherapy	31 (25.4)	46 (37.7)	45 (36.9)	100%
Chinese Medicine	7 (50)	3 (21.4)	4 (28.6)	100%
History of Clinical Posting Attended				
	35 (33.7)	33 (31.7)	36 (34.6)	100%
Yes	23 (23.5)	46 (45.9)	29 (29.6)	100%
No				
CGPA				
	37 (30.1)	46 (37.4)	40 (32.5)	100%
Good	21 (26.6)	33 (41.8)	25 (31.6)	100%
Poor				

Table 4.3 shows PA level of participants based on gender, BMI category, programme, and history of attending clinical posting.

In gender, males with high PA level were accounted for 34 (50%), followed by 18 (26.5%) with moderate PA level and 16 (23.5%) with low PA level. Comparing to males, females had lower proportion of high PA level with 31 (23.1%), while higher proportion in moderate and lower PA level, which 61 (45.5%) and 42 (31.3) respectively.

In BMI category, underweight participants with high PA level were the least, 9 (20.5%) persons, and those with moderate PA level were the most. 23 (52.3%), followed by 12 (27.3%). For normal weight group, they were almost equally distributed into low, moderate and high PA level group, with number of 38 (33.3%), 35 (30.7%) and 41 (36%) respectively. There were 13 (39.4%) overweight students having in high PA level, 14 (42.4%) with moderate and 6 (18.2%) with low. Obese students were shown to have 7 (63.6) in high PA level, 2 (18.2%) in moderate and 2 (18.2%) in low.

Relating to programme, M.B.B.S students had higher proportion in moderate PA level with 24 (46.2%), then 15 (28.8%) in low and 13 (25%) in high PA level. In nursing students, those with low, moderate, and high PA level were made up of 5 (35.7%), 6 (42.6%) and 3 (21.4%). For physiotherapy student, there were 45 (36.9%) and 46 (37.7%) students in high and moderate PA level group respectively, followed by those in low PA level with 31 (25.4%). Half of Chinese Medicine students, 7 (50%) were with low PA level, and the others, 3 (21.4%) with moderate and 4 (28.6&) with high.

Moving to the frequency and percentage of students who have or have not attended clinical posting in each PA level, there were similar proportion in low, moderate and high PA level, which were 35 (33.7%), 33 (31.7%) and 36 (34.6%) separately. For those who have not attended clinical posting, 46 (45.9%) were moderately physically active, and 29 (29.6%) and 23 (23.5%) were in high and low PA level group separately.

In variable of CGPA, 37 (30.1%), 46 (37.4%) and 40 (32.5%) students having good CGPA were distributed into low, moderate and high PA level respectively. 21 (26.6%), 33 (41.8%) and 25 (31.6%) students with poor CGPA were in low, moderate and high PA level separately.

4.3 Learning Style

Table 4.4: *Findings of Honey and Mumford LSQ*

	Frequency (%)	**Mean (SD)**
Honey and Mumford's LSQ		
Score (0-20)		
Pragmatist		7.9 (3.74)
Theorist		8.3 (4.1)
Reflector		9.5 (4.49)
Activist		6.8 (4.02)
Predominant LS		
Single	135 (66.9)	
Pragmatist	26 (12.9)	
Theorist	26 (12.9)	
Reflector	61 (30.2)	
Activist	22 (10.9)	
Combined	67 (33.1)	
PT	7 (3.5)	
PR	8 (4)	
PA	5 (2.5)	
TR	10 (5)	
TA	5 (2.5)	
RA	6 (3)	
RT	2 (1)	
PTR	6 (3)	
PTA	4 (2)	
PRA	2 (1)	
TRA	4 (2)	
PTRA	8 (4)	

Note: PT = Pragmatist + Theorist; PR = Pragmatist + Reflector; PA = Pragmatist + Activist; TR = Theorist + Reflector; TA = Theorist + Activist; RA = Reflector + Activist; RT = Reflector + Theorist; PTR = Pragmatist + Theorist + Reflector; PTA = Pragmatist + Theorist + Activist; PRA = Pragmatist + Reflector + Activist; TRA = Theorist + Reflector + Activist; PTRA = Pragmatist + Theorist + Reflector + Activist

Table 4.4: *Findings of Honey and Mumford LSQ (Cont')*

	Frequency (%)	**Mean (SD)**
Extent of Preference		
Pragmatist		
Very Low	123 (60.9)	
Low	45 (22.3)	
Moderate	27 (13.4)	
Strong	3 (1.5)	
Very Strong	4 (2)	
Theorist		
Very Low	81 (40.1)	
Low	79 (19.1)	
Moderate	17 (8.4)	
Strong	12 (5.9)	
Very Strong	13 (6.4)	
Reflector		
Very Low	98 (48.5)	
Low	25 (12.4)	
Moderate	58 (28.7)	
Strong	8 (4)	
Very Strong	13 (6.4)	
Activist		
Very Low	34 (16.8)	
Low	81 (40.1)	
Moderate	62 (30.7)	
Strong	7 (3.5)	
Very Strong	18 (8.9)	

Table 4.4 above was the summary of findings from Honey and Mumford's LSQ, including the mean and standard deviation of LS scores, the frequency and percentage of predominant LS and extent of preference for each. The mean and standard deviation of the score for each learning style were 7.9 and 3.74 in pragmatist, 8.3 and 4.1 in theorist, 9.5 and 4.49 in reflector, and 6.8 and 4.02 in activist.

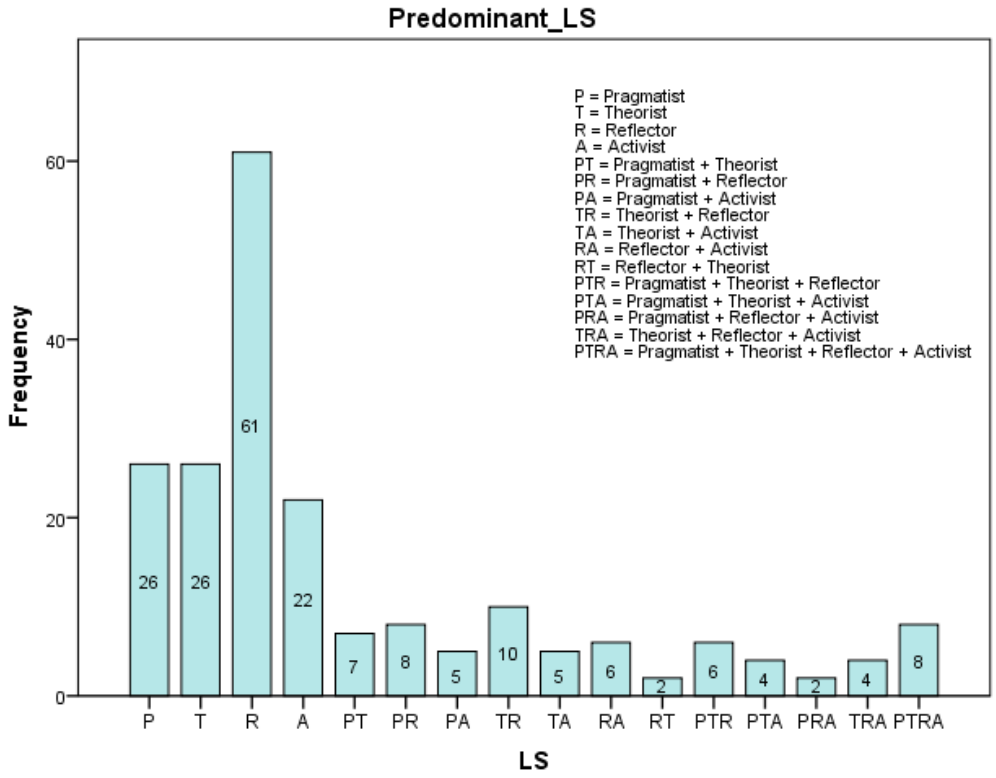

Figure 4.8: *Distribution of Predominant Learning Styles of Participants*

Figure 4.8 demonstrates the distribution of predominant learning styles of the participants. There are single and combined predominant learning styles. Single learning style was dominant with 66.9 % (n= 135). Among it, reflector was the remarkable and preponderant learning style in 61 (30.2 %) students,

followed by 26 (12.9%) pragmatists, 26 (12.9%) theorists and 22 (10.9%) activists.

The other 33.1% or 67 students were combined learning styles, which combined theorist and reflector was the highest ranks in 10 (5%) students among it. There were 8 (4%) students with combined pragmatist and reflector, followed by 7 (3.5%) combined pragmatist and theorist. Combined reflector and activist have 6 (3%) students, same as combined pragmatist, theorist and reflector. Combined pragmatist and activist were same with combined theorist and activist, which having 5 (2.5%) students. 4 (2%) students with combined pragmatist, theorist and activist were equal to that of combined theorist, reflector and activist. The most least frequent learning styles were combined reflector and theorist, and combined pragmatist, reflector and activist, in 2 (1%) respectively. Last, only 8 (4%) students were combined of all four learning styles.

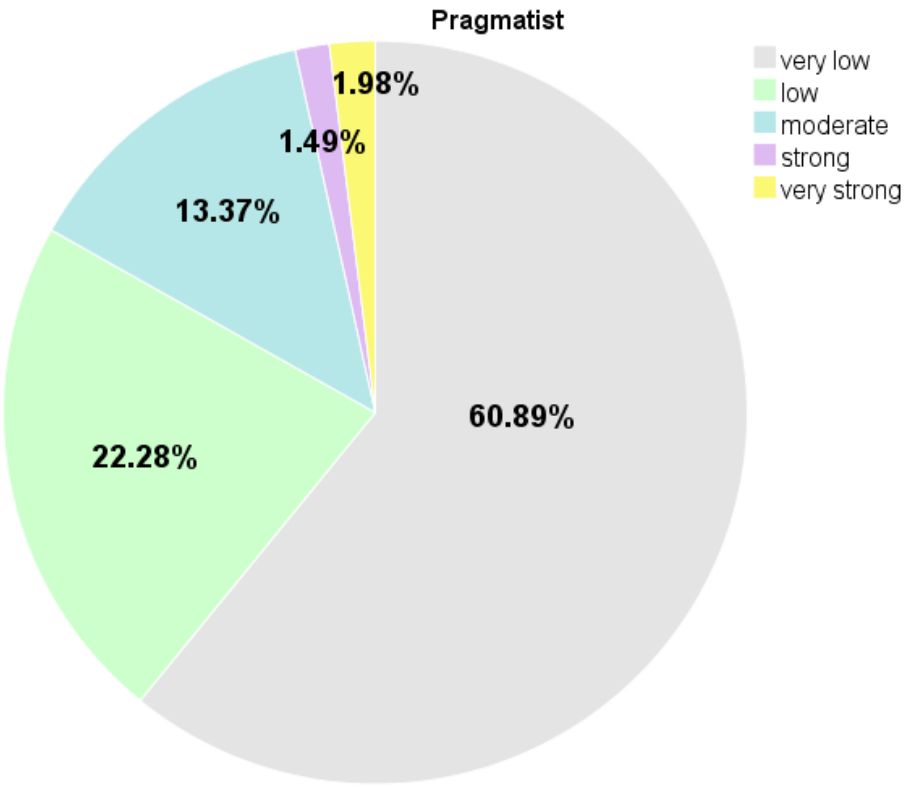

Figure 4.9: *Preference of Pragmatist Style Among Participants*

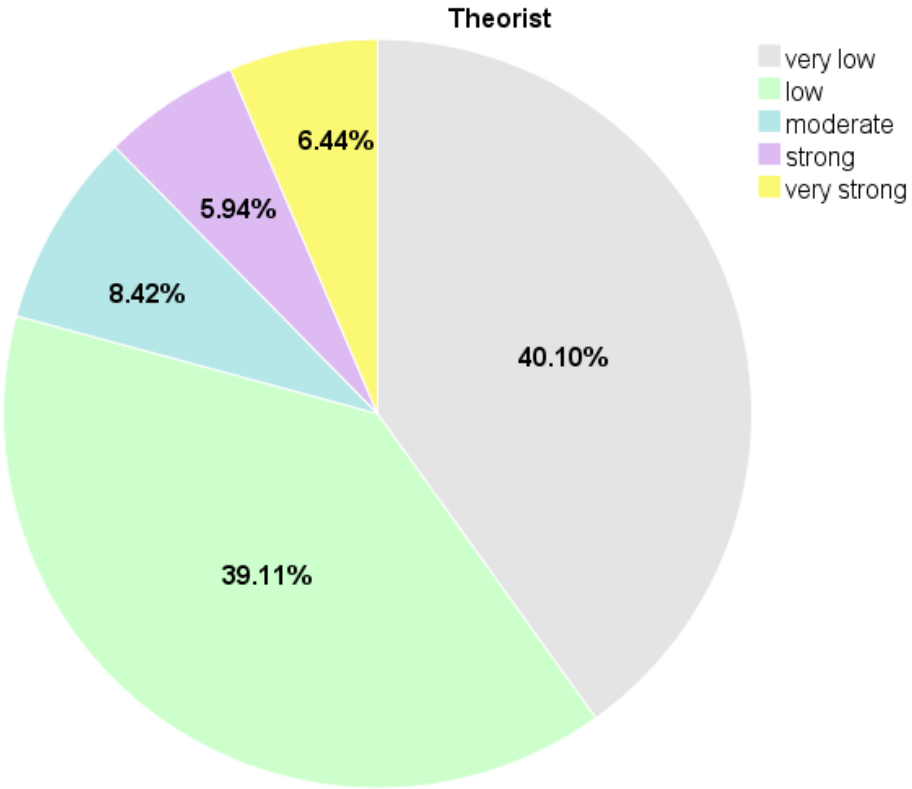

Figure 4.10: *Preference of Theorist Style Among Participants*

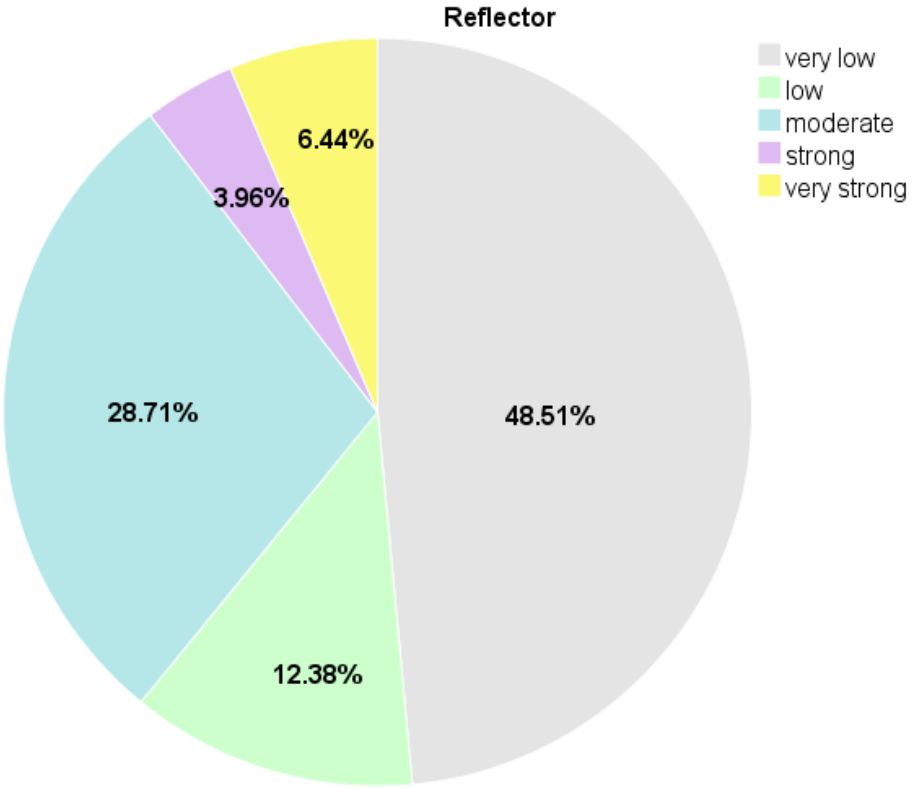

Figure 4.11: *Preference of Reflector Style Among Participants*

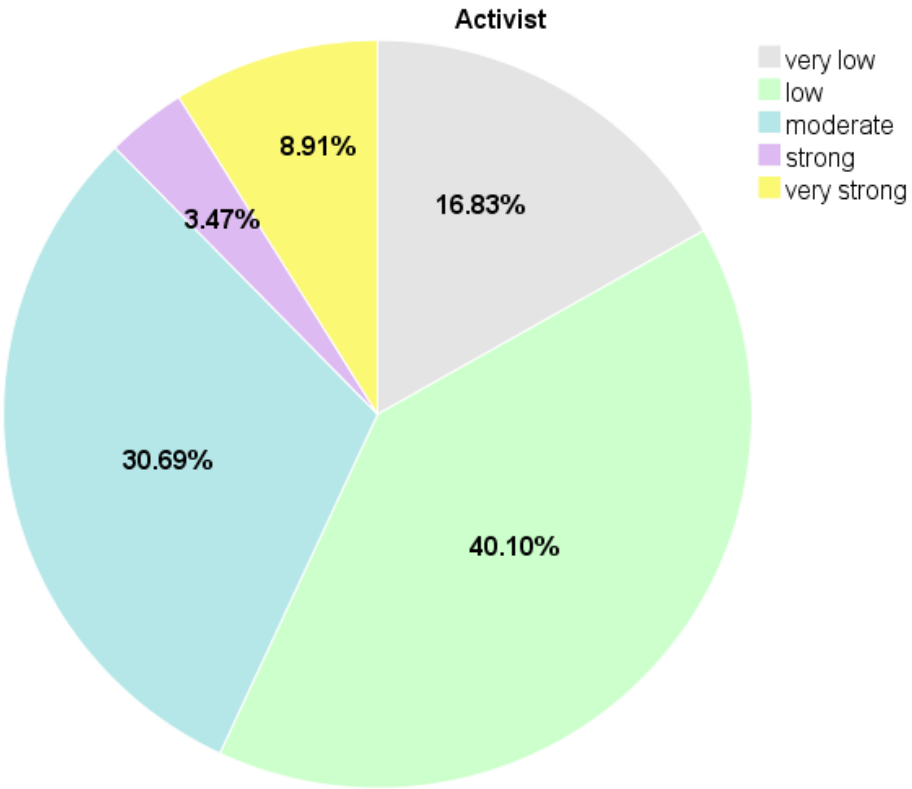

Figure 4.12: *Preference of Activist Style Among Participants*

Strength of preference on each learning stye, pragmatist, theorist, reflector and activist are shown in Figure 4.9 to Figure 4.12 respectively and reported generally in Table 4.4. The strength of preference was divided into very low, low, moderate, strong and very strong. Each learning style have different cut-off point, which referred to the Honey and Mumford LSQ.

In pragmatist style, out of 202 (100%), there only had 7 (3.5%) students with strong or very strong preference, which was made up of 3 (1.5%) students with strong preference and 4 (2.0%) with very strong preference. Students having very low preference were the higher proportion, which was 60.9% (n = 123), followed by 45 (22.3%) with low preference and 27 (13.4%) with moderate preference.

In theorist style, there was 12 (5.9%) with strong preference and 13 or 6.4% with very strong preference. The most student, 40.1% (n=81) students, have very low preference, followed by the second most, 79 (39.1%) with low preference. The remaining 17 (8.4%) students have moderate preference,

In reflector style, students with very strong preference had 13or 6.4% and with strong preference were 8 (4%). There were 98 (48.5%) students who having very low preference, 25 (12.4%) with low preference and 58 (28.7%) with moderate preference.

In activist style, students with very strong preference and with strong preference were made up of 18 (8.9%) and 7 (3.5%) respectively. Among the other students, 34 (16.8%) students were those with very low preference, followed by 81 (40.1%) with low preference and 62 (30.7%) students have moderate preference.

Table 4.5: *LS of Participants based on Demographic Data*

	Predominant LS						**Total**
	Single					Combined* n (%)	
	Pragmatist n (%)	Theorist n (%)	Reflector n (%)	Activist n (%)	Total n (%)		
Gender							
Male	10 (14.7)	8 (11.8)	18 (26.5)	10 (14.7)	46 (67.6)	22 (32.4)	100%
Female	16 (11.9)	18 (13.4)	43 (32.1)	12 (9)	89 (66.4)	45 (33.6)	100%
BMI Category							
Underweight	7 (15.9)	5 (11.4)	14 (31.8)	5 (11.4)	31 (70.5)	13 (29.5)	100%
Normal weight	14 (12.3)	15 (13.2)	36 (31.6)	10 (8.8)	75 (65.8)	39 (34.2)	100%
Overweight	3 (9.1)	4 (12.1)	7 (21.2)	6 (18.2)	20 (60.6)	13 (39.4)	100%
Obese	2 (18.2)	2 (18.2)	4 (36.4)	1 (9.1)	9 (81.8)	2 (18.2)	100%
Programme							
M.B.B.S	11 (21.2)	6 (11.5)	11 (21.2)	2 (3.8)	30 (57.7)	22 (42.3)	100%
Nursing	1 (7.1)	0 (0)	6 (42.9)	0 (0)	7 (50)	7 (50)	100%
Physiotherapy	14 (11.5)	16 (13.1)	41 (33.6)	19 (15.6)	90 (73.8)	32 (26.2)	100%
Chinese Medicine	0 (0)	4 (28.6)	3 (21.4)	1 (7.1)	8 (57.1)	6 (42.9)	100%

Table 4.3.2: *LS of Participants based on Demographic Data (Cont')*

	Predominant LS						**Total**
	Single					Combined* n (%)	
	Pragmatist n (%)	Theorist n (%)	Reflector n (%)	Activist n (%)	Total n (%)		
History of Clinical Posting Attended							
Yes	13 (12.5)	13 (12.5)	39 (37.5)	10 (9.9)	75 (72.1)	29 (27.9)	100%
No	13 (13.3)	13 (13.3)	22 (22.4)	12 (12.2)	60 (61.2)	38 (38.8)	100%
CGPA							
Good	16 (13)	13 (10.6)	40 (32.5)	14 (11.4)	83 (67.5)	40 (32.5)	100%
Poor	10 (12.7)	13 (16.5)	21 (26.6)	8 (10.1)	52 (65.8)	27 (34.2)	100%

*Combined means the predominant LS of one participant that more than one

Table 4.5 illustrates the preferred learning style of participants according to gender, BMI category, programme, history of attending clinical posting and CGPA.

There were 46 (67.6%) males having single preferred LS while the other 22 (32.4%) with predominant combined LS. The single LS was consisted of 10 (14.7%) pragmatists, 8 (11.8%) theorists, 18 (26.5%) reflectors and 10 (14.7%) activists. For females, 89 (66.4%) had single predominant LS while 45 (33.6%) had combined LS. Among the single LS, there were 16 (11.9%) pragmatists, 18 (13.4%) theorists, 43 (32.1%) reflectors and 12 (9%) activists. Both the males and females have higher proportion in single LS and reflector style.

In BMI category, single LS and combined LS among underweight students were made up of 31 (70.5%) and 13 (29.5%). Among the single LS, there were 7 (15.9%) pragmatists, 5 (11.4%) theorists, 14 (31.8%) reflectors and 5 (11.4%) activists. Among normal weight students, 75 (65.8%) have single preferred LS, which consisted of 14 (12.3%) pragmatists, 15 (13.2%) theorists, 36 (31.6%) reflectors and 10 (8.8%) activists. The others 39 (34.2%) were combined LS. Out of 20 (60.6%) overweight students with single LS, 3 (9.1%) were pragmatists, with 4 (12.1%) theorists, 7 (21.2%) reflectors and 6 (18.2%) activists. The remaining overweight students, 13 (39.4%), were combined LS. In obese group, 9 (81.8%) were single LS and 2 (18.2%) were combined LS. In term of single LS, there were 2 (18.2%) pragmatists, 2 (18.2%) theorists, 4

(36.4%) reflectors and 1 (9.1%) activist. Overall, single LS was the majority and reflector style was predominant among it.

Moving to programme, M.B.B.S students were 30 (57.7%) with trend of single LS while 22 (42.3) with combined LS. Of the single LS, 11 (21.2%) pragmatists, 6 (11.5%) theorists, 11 (21.2%) reflectors and 2 (3.8%) activists. Among nursing, there were half of them with preferred single and combined LS, which are 7 respectively. Only 1 (7.1%) pragmatist and 6 (42.9%) reflectors in the single LS of nursing. For physiotherapy, 90 (73.8%) of them were single LS, which was made up of 14 (11.5%) pragmatist, 16 (13.1%) theorists, 41 (33.6%) reflectors and 19 (15.6%) activists, while other 32 (26.2%) were combined LS. Chinese medicine students had the trend of 8 (57.1%) with single LS, consisting of 4 (28.6%) theorists, 3 (21.4%) reflectors and 1 (7.1%) activist. The other 6 (42.9%) were with combined LS. In general, single LS was the trend with higher proportion and among it, reflector style was dominant, except of Chinese medicine student which having slightly more theorists.

Of the students who have attended clinical posting, there were 75 (72.1%) and 29 (27.9%) with single and combined LS respectively. Single LS of them were made up of 13 (12.5%) pragmatists, 13 (12.5%) theorists, 39 (37.5%) reflectors and 10 (9.9%) activists. On the contrary, those with no attended clinical posting, single LS was accounted for 60 (61.2%) while combined LS was 38 (38.8%). the single LS were consisted of 13 (13.3%) pragmatists, 13 (13.3%) theorists, 21 (26.6%) reflectors and 8 (10.1%) activists. With or without

history of attending clinical posting, they still had a majority of dominant single LS and reflector style in single LS.

Students with good CGPA, 83 (67.5%) and 40 (32.5%) were in single and combined preferred LS separately. Among the single LS, 16 (13%), 13 (10.6%), 40 (32.5%) and 14 (11.4%) were pragmatists, theorists, reflectors and activists respectively. For student with poor CGPA, 52 (65.8%) of them were single LS while the remaining 27 (34.2) were combined LS. There were 10 (12.7%) pragmatists, 13 (16.5%) theorists, 21 (26.6%) reflectors and 8 (10.1%) activists in the single LS group. Same with other variables, single LS was the predominant as well as the reflector style among it.

4.4 Association between Physical Activity, and Academic Performance

Since both of PA level and CGPA are categorical variables, Chi-square test will be used for investigating the association between these two variables.

4.4.1 Chi-square test of Independence

Table 4.6: *Result of Pearson Chi-Square Test on Association between PA and AP*

	X^2/FET	df	*p*-value
PA Level	0.452	2	0.799
CGPA	0.452	2	0.799

Note: df = degree of freedom; X^2/FET = Chi-square value

Table 4.6 shows the result of Person Chi-Square test on association between physical activity and academic performance. PA level and CGPA were the indicator of outcomes for both variables above respectively. The result was X^2/FET = 0.452 and *p*-value = 0.799. The *p*-value was greater than 0.05, which indicating that the null hypothesis was failed to reject. Hence, there is no significant association between physical activity and academic performance.

4.5 Association between Learning Style and Academic Performance

4.5.1 Normality test

Table 4.7: *Result of Shapiro – Wilk Normality Test for LS score*

	Shapiro-Wilk		
	Statistic	df	*p*-value
LS scores			
Pragmatist Score	0.959	202	< 0.0001*
Theorist Score	0.956	202	< 0.0001*
Reflector Score	0.967	202	< 0.0001*
Activist Score	0.947	202	< 0.0001*

*Significant at *p*-value < 0.05

Table 4.7 above displays the normality test for learning style scores. The results of *p*-value < 0.05 for LS scores indicate that all the data were not normally distributed. Thus, non-parametric tests will be used for determining the association.

Since the LS scores is a continuous variable that not normally distributed and CGPA is a categorical variable, Spearman's correlation test will be used for determining the association between these two variables.

4.5.2 Spearman's correlation test

Table 4.8: *Result of Spearman's Correlation Test on Association between LS and AP.*

		CGPA
Pragmatist Score		
	r	-0.156
	p-value	0.027*
Theorist Score		
	r	-0.04
	p-value	0.572
Reflector Score		
	r	-0.087
	p-value	0.217
Activist Score		
	r	0.035
	p-value	0.624

*Significant at *p*-value < 0.05

Note: r = correlation coefficient

Table 4.8 shows the result of Spearman's Correlation test on association between learning style and academic performance. Learning style score, including pragmatist, theorist, reflector and activist, were the indicator of outcomes for learning style. The result of pragmatist score paired with CGPA was r = -0.156 and p-value = 0.027. The p-value of less than 0.05 represented that the null hypothesis was rejected. Hence, there is significant negligible and

negative association between learning style of pragmatist and academic performance. When theorist score paired with CGPA, correlation coefficient of -0.04 and *p*-value of 0.572 ($p > 0.05$) indicates that null hypothesis was failed to reject, which reflects no association between theorist learning style with academic performance. The result of r = -0.087 and *p*-value = 0.217 ($p > 0.05$) is also indicating that null hypothesis was failed to reject and there is no association between reflector learning style between academic performance. Paring activist score and CGPA showed a result of r = 0.035 and *p*-value = 0.624 ($p > 0.05$), which again reflecting null hypothesis was failed to reject and there is no association between activist learning style and academic performance.

CHAPTER 5

DISCUSSION

5.1 Level of Physical Activity among UTAR Health Science Undergraduates

In current study, out of 202 health science undergraduates, the highest proportion was moderate level of PA, with 39.1% (n=79), followed by 32.2% (n= 65) of high PA level. This finding was in line with Shetty et al. (2019). Their study was also found that medical university students in Malaysia tend to have moderate PA level. Some finding regarding gender in current study was revealed as well. Among those with moderate PA level, the majority is female, accounting for 45.5 % (n= 61). Whereas there is half of the male possessed high level of PA compared to only 23.1% (n= 31) in female. These indicates that male is more physically active than female, as similar to previous studies' findings (Chung et al., 2018; Mabry et al., 2010; Azevedo et al., 2007; Sisson & Katzmarzyk, 2008; Bauman et al., 2009). These finding may be explained by participation choice of male more depended on physical exertion when compared to female. Further explanation on this is that they are embedded with sex role stereotypes since childhood, which boys always playing more physically active sports in group whereas girls engaging in conversation and socializing (Hands et al., 2016). This situation become more pronounced with age or when parent's expectation involved. Besides, the male-female distribution for those with high PA level is almost exact to findings from Chung et al. (2018), which higher than estimates of that from the 2015 NHMS report on the prevalence of health-enhanced physical activity (HEPA) active among male and female with 34% and 16%

respectively. In other word, there is increasing trend of both males and females becoming more likely to engage in HEPA. Similar finding was also shown in a cohort study, Morseth & Hopstock (2020) and could be attributed to the widespread of important of physical activity in term of health, which in turn increased the awareness and attention on it.

Current study has found that students with normal weight that fall within the range of BMI from 18.599 to 22.999kg/m^2 have higher proportion (33.3%) in low PA level when comparing to underweight (27.3%), overweight (18.2%) and obese (18.2%) groups. This finding is corresponded to Hemmingsson & Ekelund (2007), which reported weak association between PA and BMI among non-obese group. Besides, Godoy-Cumillaf et al. (2020) reported that physical activity as an intervention has no effect on reduction of BMI without adding diet intervention. Even though both interventions are combined, it only has effect on obese or overweight population. This statement not only further supports the statement of weak association between PA and BMI on non-obese group, but also explain that diet may be the key factor to maintain the BMI among normal weight group instead of PA.

Physiotherapy was found to have highest proportion in high PA level (36.9%) and lowest number with low PA level (25.4%) among all the health science programmes. This finding is consistent to Kgokong & Parker (2020), which 37.5% of physiotherapy student having high PA level. However, the study did not compare with other programmes. This occurrence may be attributed to

physiotherapist played the key role in preventive and education therapies and PA-related health promotion (Kgokong & Parker, 2020). With the benefit of high PA level related to physical performance, they could be a more effective model with more excellent performance in practicing among promoting PA and obtaining behavioural changes on PA of patients. On the contrary, for those who have attended clinical posting, they were found to have more physical active but also more with inactive, compared to those without experiencing clinical posting. To my best knowledge, there is no study to report or investigate on this topic on existing study. However, Ferreira Silva et al. (2022) reported that lack of time and motivation were the major barriers which stopping the high school and university students to participate in PA. This support that those with high PA level may break through the barrier of lacking motivation, as a result of evoked awareness of PA related to health in clinical. For those with low PA level, it is possible that they lack leisure time for engaging in PA after a busy day or due to massive of assignment. Nevertheless, there is no remarkable difference between students with good and poor CGPA. This may be due to the findings of a meta-analysis from Lei, Cui & Zhou (2018), which they reported overall student engagement in behaviourally, cognitively and emotionally were positively correlated to academic performance.

5.2 Learning Style Preference among UTAR Health Science Undergraduates

Current study found that most of the health science undergraduate students have single preferred LS (66.9%). Among it, Reflector is the most predominant LS (30.3%), based on the style they gained the highest

score among four LS. Mean score of reflector style is also found to be the highest whereas pragmatist were the least. When based on gender, programme, and history of clinical posting attended, it is also consistent the findings mentioned above, which reflector is the most dominant LS. Sopian et al. (2013) also reported that there is no difference in learning style between gender and different fields of programme or course, which are Arabic Language students, Business studies diploma program, Diploma in Hospitality and Tourism studies in Universiti Teknologi Mara, Malacca Campus in Malaysia. Their finding was shown in line with this study finding, which no different when based on characteristics of the study population such as gender and study field.

A cohort study by Wilkinson et al. (2014), reported the similar findings as this current study among medicine and dentist students, which is predominant reflector style along with highest mean score in reflector and least in pragmatist. Idris (2020) targeting medical laboratory students also supported with most preferred LS of reflector whereas least preference in pragmatist style. Kularathne et al. (2020) also reported the least preferred LS was pragmatist among physiotherapy students. A longitudinal study by Fleming et al. (2011) also revealed the consistence of nursing undergraduates with preferred reflector style from their first year until final year. This finding also further explains that why no changes of LS happened among clinical posting group and non-clinical posting group. Even though changing from in-campus learning in first year to clinical posting learning mode in final year, which is the path of all health science students, those nursing students also consistent with their reflector LS.

Besides, another finding in this present study is that activist is shown to have highest proportion of very strong preference (8.9%) compared to other LS, which in line with previous studies (Fleming et al., 2011; Wilkinson et al., 2014; Kularathne et al., 2020: Yadav et al., 2020; Idris, 2020). Even though the local study of Lee & Sidhu (2015) was conducted among engineering university students, the activist was also the most with very strong preference.

5.3 Association between Physical Activity and Academic Performance

The present study evaluated the association between PA and CGPA and found no significant association between them with *p*-value of 0.799. This finding is shown in contrast with previous local study by Chung et al. (2018), which physically active students achieved the WHO' recommendation for PA have a good GPA (more than 3.00) than the inactive group. Al-Drees et al. (2016) also found a similar finding among medical students. Franz & Feresu (2013) reported that biochemistry students' PA habit were found no correlation with academic achievement, however, they used the recommendation for physical activity by the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) as PA criteria instead of IPAQ criteria. On the contrary, another study, Xu & Sansgiry (2018) has the findings in line with this current study. They suggested the PA failed to be a significant predictor of GPA among students studying Doctor of Pharmacy (PharmD). Similar finding of the current study is also shown in Whitford (2021), which found no correlation between physical activity and self-reported GPA among

undergraduate college students, however, self-administrated questionnaire was used in the study for evaluating PA level instead of IPAQ-SF.

The possible explanation may be only longer-term exercise that improves fitness would be more likely to increase cognitive capacities and raise likelihood of success in academic (Taras, 2005). This may be attributed to covid-19 pandemic which significant affected individuals' physical activity due to quarantine and restricted movement, resulting in lifestyle changes.

5.4 Association between Learning Style and Academic Performance

In current study findings, LS scores are not associated with CGPA, except of pragmatist style score, which is found to have weak and negative association with CGPA (r = - 0.156, *p*-value = 0.027). In other word, there is little odds of students with higher pragmatist score tending to have poor CGPA. This finding is consistent with Wilkinson et al. (2014) which among medical and dentist student. Their study also reported the students with high score of pragmatists not having better score even in examination with large practical component. This statement was strongly agreed by this present study as well, in addition, poor CGPA slightly related to high pragmatist score is further found in the current study.

Fleming et al. (2011), a longitudinal study also reported that LS not significantly associated with academic performance but associated with age among nursing undergraduates. However, the relationship between LS and age is not considered in this current study. Furthermore, a systemic review study,

Childs-Kean et al. (2020) stated that majority of 31 studies finding correlation between LS and learning outcome have found no significant correlation.

5.5 Significances of the study

To our best knowledge, this study is the first investigating PA and LP, and its association with academic performance among health science undergraduates in Malaysia. Thus, this study was established to provide more comprehensive views on it. It is important for health science undergraduates to be aware of their PA in term of being better PA models in future for counselling patients with convincing and motivating. In this study, the result shows that the prevalence of PA level among the health science students was highest in moderate level of PA, with 39.1% (n=79), followed by high PA level with 32.2% (n= 65). There is a notable increasing trend found in this study, from the prevalence of with high level of PA in 2015 NHMS report with 34% males and 16% females to current study's finding of 50% of male and 23.1% female. Although raise of awareness is noted, however, this current study brings out a message that targeting themselves toward the PA level of HEPA is still necessary and encouraged.

The finding of the majority of predominant reflectors LS in this current study which consistent with local studies and similar population indicates that Malaysia' general education and teaching strategies or self-directed learning for health science students could try to have some modifications based on this reflector LS.

In this study, the association between PA and LS with academic performance are found none, which means that PA and LS should not be considered as the key and direct mediators for improving students' CGPA. This encourages students to put more effort on studying and lecturers to always concern more on students' learning progression, instead of focus on or treat LS and PA as the coping mechanism when students struggle academically. However, their significance on other aspects should not be neglected. Besides, the finding of pragmatist inversely and weakly associated with academic performance could remind the students to avoid the only orientation on this pragmatist style and try on developing their preference on others learning style. Nevertheless, the need of investigating other determinants that related to academic performance should be conducted and focused on.

5.6 Limitations of the study

There are several limitations that should be acknowledged in this current study. First, the casual relationship between the variables is also unascertained in this study. Moreover, this study's findings unable to be generalized, as a result of the smaller sample size. This is due to that the population of health science undergraduates in only one university is insufficiently represent to that of all the universities in Malaysia.

5.7 Recommendations

Prospective longitudinal study can be further used for evaluating the relationship between PA and LS with academic performance to establish and assess the causal relationship, in order to generate a convincing result. Moreover, larger sample size should be targeted for approximately closer to true population and higher accuracy of the results. Besides, local study in Malaysia should be conducted in term of enhancing or demolishing the evidence. This is due to that there is insufficient studies for this topic to have more comprehensive views on PA, LS and AP and to further establish the conclusion with majority of agreements. Nevertheless, other determinants of improve academic performance could be further studied in future regardless nation, in order to establish the other possible mediators for students who struggling in their academic.

CHAPTER 6

CONCLUSION

There was majority of health science undergraduates in UTAR with moderate level of physical activity. Male more likely to engage in high level physical activity than female was notable in this study as well. Some findings were found based on characteristics among health science undergraduates, including BMI category, programme, history of clinical posting attended and CGPA. Surprisingly, normal BMI group was shown to have higher proportion of low physical activity level. No difference physical activity was shown between good and poor CGPA among them. Hence, higher prevalence of moderate PA level among UTAR health science undergraduates shows the need of increasing their awareness of PA, or else, increasing motivation.

For learning style, single learning style is found in this study with highly preferred, and among it, reflector style was dominant with highest mean score, In spite of the highest proportion of very strong preference on activist style when compared to other learning style, it shows no influence on high prevalence of reflector style among UTAR health science undergraduates in this current study.

Association between physical activity and academic performance in current study was found none in this study. For relationship between learning style and academic performance, only pragmatist score reported weak and

negative association with academic performance, whereas other learning styles were found none. Therefore, no relationship between physical activity and learning styles with academic performance indicate that both could not be the determinants in term of improving GPA. However, for pragmatists, they are encouraged to develop other learning styles. Since the studies of this context were lacking in Malaysia, these findings were shown their significance as different from previous local studies' findings. The evidence needs to be further enhanced or demolished in Malaysia in the future since lack of studies in this aspect in Malaysia.

BIBLIOGRAPHY

Ardila, C. M., & Gómez-Restrepo, Á. M. (2021). Relationship Between Physical Activity, Academic Achievement, Gender, And Learning Styles in Students of A Latin American Dental School: A Cross-Sectional Study. *Journal of education and health promotion*, 10, 149.

Al-Drees, A., Abdulghani, H., Irshad, M., Baqays, A. A., Al-Zhrani, A. A., Alshammari, S. A., & Alturki, N. I. (2016). Physical Activity and Academic Achievement Among The Medical Students: A Cross-Sectional Study. *Medical teacher*, *38*(sup1), S66-S72.

Allinson, C. W., & Hayes, J. (1988). The learning styles questionnaire: an alternative to Kolb's inventory?. *Journal of Management studies*, *25*(3), 269-281.

Alonso, C., Gallego, D., & Honey, P. (2012). Learning styles: Diagnostic and improvement procedures. *Bilbao: Ediciones Mensajero*.

Angevaren, M., Aufdemkampe, G., Verhaar, H. J., Aleman, A., Vanhees L. (2008). Physical activity and enhanced fitness to improve cognitive function in older people without known cognitive impairment. *Cochrane Database Syst Rev 16*(2):CD005381. DOI: 10.1002/14651858.

Ardoy, D. N., Fernández-Rodríguez, J. M., Jiménez-Pavón, D., Castillo, R., Ruiz, J. R., & Ortega, F. B. (2014). A physical education trial improves adolescents' cognitive performance and academic achievement: the EDUFIT study. *Scandinavian journal of medicine & science in sports*, *24*(1), e52-e61.

Azevedo, M. R., Araújo, C. L. P., Reichert, F. F., Siqueira, F. V., da Silva, M. C., & Hallal, P. C. (2007). Gender differences in leisure-time physical activity. *International journal of public health*, *52*(1), 8-15.

Aziz, Z., Yi, T. X., Alwi, S., & Jet, C. N. (2013). Learning style preferences of pharmacy students. *The European Journal of Social & Behavioural Sciences*.

Bauman, A., Bull, F., Chey, T., Craig, C. L., Ainsworth, B. E., Sallis, J. F., ... & Pratt, M. (2009). The international prevalence study on physical activity: results from 20 countries. *International journal of behavioral nutrition and physical activity*, *6*(1), 1-11.

Biddle, S. J., & Asare, M. (2011). Physical activity and mental health in children and adolescents: a review of reviews. *British journal of sports medicine*, *45*(11), 886-895.

Chaddock-Heyman, L., Erickson, K. I., Holtrop, J. L., Voss, M. W., Pontifex, M. B., Raine, L. B., ... & Kramer, A. F. (2014). Aerobic fitness is associated with greater white matter integrity in children. *Frontiers in human neuroscience*, *8*, 584.

Cheng, H. L. (2016). A simple, easy-to-use spreadsheet for automatic scoring of the International Physical Activity Questionnaire (IPAQ) Short Form (Updated November 2016). *ResearchGate, editor*.

Childs-Kean, L., Edwards, M., & Smith, M. D. (2020). Use of Learning Style Frameworks in Health Science Education. *American journal of pharmaceutical education*, *84*(7), ajpe7885. https://doi.org/10.5688/ajpe7885

Chung, Q. E., Abdulrahman, S. A., Khan, M., Sathik, H., & Rashid, A. (2018). The Relationship between Levels of Physical Activity and Academic Achievement among Medical and Health Sciences Students at Cyberjaya University College of Medical Sciences. *The Malaysian journal of medical sciences: MJMS*, *25*(5), 88–102. https://doi.org/10.21315/mjms2018.25.5.9

Coe, D. P., Pivarnik, J. M., Womack, C. J., Reeves, M. J., & Malina, R. M. (2006). Effect of physical education and activity levels on academic achievement in children. *Medicine and science in sports and exercise*, *38*(8), 1515.

Coffield, F., Moseley, D., Hall, E., & Ecclestone, K. (2004). Should we be using learning styles? What research has to say to practice.

Colcombe, S. J., Erickson, K. I., Scalf, P. E., Kim, J. S., Prakash, R., McAuley, E., ... & Kramer, A. F. (2006). Aerobic exercise training increases brain volume in aging humans. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, *61*(11), 1166-1170.

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., ... & Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine and science in sports and exercise*, *35*(8), 1381-1395.

Davis, C. L., Tomporowski, P. D., McDowell, J. E., Austin, B. P., Miller, P. H., Yanasak, N. E., ... & Naglieri, J. A. (2011). Exercise improves executive function and achievement and alters brain activation in overweight children: a randomized, controlled trial. *Health psychology*, *30*(1), 91.

Donnelly, J. E., Hillman, C. H., Castelli, D., Etnier, J. L., Lee, S., Tomporowski, P., ... & Szabo-Reed, A. N. (2016). Physical activity, fitness, cognitive function, and academic achievement in children: a systematic review. *Medicine and science in sports and exercise*, *48*(6), 1197.

Elmore, W. M., Young, J. K., Harris, S., & Mason, D. (2017). The relationship between individual student attributes and online course completion. In *Handbook of Research on Building, Growing, and Sustaining Quality E-Learning Programs* (pp. 151-173). IGI Global.

Erickson, K. I., Voss, M. W., Prakash, R. S., Basak, C., Szabo, A., Chaddock, L., ... & Kramer, A. F. (2011). Exercise training increases size of hippocampus and improves memory. *Proceedings of the national academy of sciences*, *108*(7), 3017-3022.

Erickson, K. I., Voss, M. W., Prakash, R. S., Basak, C., Szabo, A., Chaddock, L., ... & Kramer, A. F. (2011). Exercise training increases size of hippocampus and improves memory. *Proceedings of the national academy of sciences*, *108*(7), 3017-3022.

Eather, N., Morgan, P. J., & Lubans, D. R. (2013). Social support from teachers mediates physical activity behavior change in children participating in the Fit-4-Fun intervention. *International Journal of Behavioral Nutrition and Physical Activity*, *10*(1), 1-15.

Ferreira Silva, R. M., Mendonça, C. R., Azevedo, V. D., Raoof Memon, A., Noll, P. R. E. S., & Noll, M. (2022). Barriers to high school and university students' physical activity: A systematic review. *PloS one*, *17*(4), e0265913.

Fleming, S., McKee, G., & Huntley-Moore, S. (2011). Undergraduate nursing students' learning styles: a longitudinal study. *Nurse education today*, *31*(5), 444–449. https://doi.org/10.1016/j.nedt.2010.08.005

Franz, D. D., & Feresu, S. A. (2013). The Relationship Between Physical Activity, Body Mass Index, and Academic Performance and College-Age Students.

Fung, Y. H., Ho, A. S., & Kwan, K. P. (1993). Reliability and validity of the Learning Styles Questionnaire. *British Journal of Educational Technology, 24*(1), 12-21.

Gligoroska, J. P., & Manchevska, S. (2012). The effect of physical activity on cognition - physiological mechanisms. *Materia socio-medica*, *24*(3), 198–202. https://doi.org/10.5455/msm.2012.24.198-202

Godoy-Cumillaf, A., Fuentes-Merino, P., Díaz-González, A., Jiménez-Díaz, J., Martínez-Vizcaíno, V., Álvarez-Bueno, C., & Cavero-Redondo, I. (2020). The Effects of Physical Activity and Diet Interventions on Body Mass Index in Latin American Children and Adolescents: A Systematic Review and Meta-Analysis. *Nutrients*, *12*(5), 1378. https://doi.org/10.3390/nu12051378

Guraya, S. S., Guraya, S. Y., Habib, F. A., & Khoshhal, K. I. (2014). Learning styles of medical students at Taibah University: Trends and implications. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences,* 19(12), 1155–1162. https://doi.org/10.4103/1735-1995.150455

Hallal, P. C., Andersen, L. B., Bull, F. C., Guthold, R., Haskell, W., Ekelund, U., & Lancet Physical Activity Series Working Group. (2012). Global physical activity levels: surveillance progress, pitfalls, and prospects. *The lancet*, *380*(9838), 247-257.

Hands, B. P., Parker, H., Larkin, D., Cantell, M., & Rose, E. (2016). Male and female differences in health benefits derived from physical activity: implications for exercise prescription. *Journal of Women's Health, Issues and Care*, *5*(4).

Hemmingsson, E., & Ekelund, U. (2007). Is the association between physical activity and body mass index obesity dependent?. *International journal of obesity*, *31*(4), 663-668.

Hillman, C. H., Erickson, K. I., & Kramer, A. F. (2008). Be smart, exercise your heart: exercise effects on brain and cognition. *Nature reviews neuroscience*, *9*(1), 58-65.

Hu, P. J. H., Hui, W., Clark, T. H., & Tam, K. Y. (2007). Technology-assisted learning and learning style: A longitudinal field experiment. *IEEE Transactions on Systems, Man, and Cybernetics-Part A: Systems and Humans*, 37(6), 1099-1112.

Huston, J. L., & Huston, T. L. (1995). How learning style and personality type can affect performance. *The Health Care Supervisor*, *13*(4), 38-45.

Honey, P. & Mumford, A. (1986). The Manual of Learning Styles. *Maidenhead: Peter Honey.*

Honey, P & Mumford, A. (2006). The Learning Styles Helper's Guide. *Maidenhead: Peter Honey Publications Limited.*

Idris, A. K. M. (2020). *Assessing of the Students Learning Style using Honey and Mumford Questionnaire and Determining Psychometric Properties among Medical Students University of Gezira-Sudan 2020* (Doctoral dissertation, University of Gezira).

İlçin, N., Tomruk, M., Yeşilyaprak, S. S., Karadibak, D., & Savcı, S. (2018). The relationship between learning styles and academic performance in TURKISH physiotherapy students. *BMC medical education*, *18*(1), 1-8.

Jailani, O., Adli, A. H. T., Amat, M. A. C., Othman, S. M., Deylami, N., & Rahim, N. S. A. (2020). The Self-Perceived Problems among Malaysian Pre-University Students: Implications for College Counselling. *Asian Journal of University Education*, *16*(3), 112-124.

Keefe, J. W. (1979). Learning style: An overview. *Student learning styles: Diagnosing and prescribing programs*, *1*(1), 1-17.

Kgokong, D., & Parker, R. (2020). Physical activity in physiotherapy students: Levels of physical activity and perceived benefits and barriers to exercise. *The South African journal of physiotherapy*, *76*(1), 1399. https://doi.org/10.4102/sajp.v76i1.1399

Khan, S. A., Arif, M. H., & Yousuf, M. I. (2019). A Study of Relationship between Learning Preferences and Academic Achievement. *Bulletin of Education and Research*, *41*(1), 17-32.

Kularathne, W. N. I., Bandara, E. M. I. A., & Prasanna, A. L. I. (2020). Learning style preferences and academic performance of undergraduate physiotherapy students.

Kuncel, N. R., Credé, M., & Thomas, L. L. (2005). The validity of self-reported grade point averages, class ranks, and test scores: A meta-analysis and review of the literature. *Review of educational research*, *75*(1), 63-82.

Lees, C., & Hopkins, J. (2013). Peer reviewed: effect of aerobic exercise on cognition, academic achievement, and psychosocial function in children: a systematic review of randomized control trials. *Preventing chronic disease*, *10*.

Lee, C. K., & Sidhu, M. S. (2013). Engineering students learning styles preferences using Honey and Mumford Learning Styles Questionnaire: A Case study in Malaysia. *International Journal of Information Technology & Computer Science*, *9*(1), 107-114.

Lee, C. K., & Sidhu, M. S. (2015). Engineering students learning preferences in UNITEN: Comparative study and patterns of learning styles. *Journal of Educational Technology & Society*, *18*(3), 266-281.

Lei, H., Cui, Y., & Zhou, W. (2018). Relationships between student engagement and academic achievement: A meta-analysis. *Social Behavior and Personality: an international journal*, *46*(3), 517-528.

Li, J. (2013). Eastern and Western learning styles: The paradox of Asian learners.

Lobelo, F., & de Quevedo, I. G. (2016). The evidence in support of physicians and health care providers as physical activity role models. *American journal of lifestyle medicine*, *10*(1), 36-52.

Mabry, R. M., Reeves, M. M., Eakin, E. G., & Owen, N. (2010). Evidence of physical activity participation among men and women in the countries of the Gulf Cooperation Council: a review. *Obesity reviews*, *11*(6), 457-464.

Malaysia Qualifications Agency. (2011). Guidelines: Malaysian Qualification Statement (MQS). Putrajaya, Malaysia. Retrieved from: https://www2.mqa.gov.my/QAD/garispanduan/GGP-Malaysia%20Qualification%20Statement.pdf

Masrom, M., & Usat, S. (2015). Use of online social networking and academic performance of students. In *Encyclopedia of Information Science and Technology, Third Edition* (pp. 2654-2661). IGI Global.

Mohammed, Z., Narayanasamy, S., Mutalib, H. A., Kaur, S., & Ariffin, S. R. (2011). Learning styles preferences among third year optometry students of Universiti Kebangsaan Malaysia. Procedia-Social and Behavioral Sciences, 18, 384-387.

Morseth, B., & Hopstock, L. A. (2020). Time trends in physical activity in the Tromsø study: An update. *PLoS One*, *15*(4), e0231581.

Mountford, H., Jones, S., & Tucker, B. (2006). Learning styles of entry-level physiotherapy students. *Advances in Physiotherapy*, *8*(3), 128-136.

Nurumal, M. S., Salahuddin, M. A., Daud, A., Shahadan, S. Z., Abdul-Mumin, K., & Shorey, S. (2019). Learning styles of Malaysian Generation 'Y'healthcare undergraduates. *Enfermeria clinica*, *29*, 471-475.

Ramsden, P. (2003). *Learning to teach in higher education*. Routledge.

Sadler-Smith, E. (2001). Does the learning styles questionnaire measure style or process? A reply to Swailes and Senior (1999). International Journal of Selection and Assessment, 9, 207- 214. Google Scholar Crossref

Sallis, J. F. (2010). We do not have to sacrifice children's health to achieve academic goals. *The Journal of pediatrics, 156*(5), 696-697.

Shamsul, A. A. (2020). *Obesity in Adult.* Retrieved from: http://www.myhealth.gov.my/en/obesity-in-adult/

Sharif, S., Gifford, L. A., Morris, G. A., & Barber, J. (2010). The relationship between learning styles, attendance and academic performance of Pharmacy undergraduates. *Pharmacy Education*, *10*.

Shetty, C. K., Aung, M. M. T., San San, O. O., & Simbak, N. (2019). Physical activity among medical students of university sultan zainal abidin (UniSZA), Malaysia. *Indian Journal of Forensic and Community Medicine*, *6*(3), 125-129.

Sisson, S. B., & Katzmarzyk, P. T. (2008). International prevalence of physical activity in youth and adults. *Obesity reviews*, *9*(6), 606-614.

Sopian, A., Ahmad, S., Abu Bakar, K. A., Jamsari, E. A., & Zin, H. M. (2013). Study on learning styles among Arabic language students at Universiti Teknologi Mara, Malacca Campus. *IOSR Journal of Humanities and Social Science*, *15*(4), 38-40.

Stander, J., Grimmer, K., & Brink, Y. (2019). Learning styles of physiotherapists: a systematic scoping review. *BMC medical education*, *19*(1), 1-9.

Taherdoost, H. (2016). Sampling methods in research methodology; how to choose a sampling technique for research. *How to Choose a Sampling Technique for Research (April 10, 2016).* https://dx.doi.org/10.2139/ssrn.3205035

Tahir, W. (2020). The Relationship between Students' Learning Styles and Academic Performance in Accounting. *Academic Journal Of Business And Social Sciences, 4*(1), 1-8.

Taras, H. (2005). Physical activity and student performance at school. *Journal of school health*, *75*(6), 214-218.

van der Ploeg, H. P., Tudor-Locke, C., Marshall, A. L., Craig, C., Hagströmer, M., Sjöström, M., & Bauman, A. (2010). Reliability and validity of the international physical activity questionnaire for assessing walking. *Research quarterly for exercise and sport*, *81*(1), 97-101

Wessel, J., Loomis, J., Rennie, S., Brook, P., Hoddinott, J., & Aherne, M. (1999). Learning styles and perceived problem-solving ability of students in a baccalaureate physiotherapy programme. *Physiotherapy theory and practice*, *15*(1), 17-24.

Whitford, T. C. (2021). A correlational study on physical activity and GPA among college students. *The Owl–Florida State University's Undergraduate Research Journal*, *11*(2), 59-69.

Wilkinson, T., Boohan, M., & Stevenson, M. (2014). Does Learning Style Influence Academic Performance In Different Forms Of Assessment?. *Journal of anatomy*, *224*(3), 304-308.

World Health Organization. (2020). Physical Activity. Retrieved from https://www.who.int/news-room/fact-sheets/detail/physical-activity

Xu, Q., & Sansgiry, S. S. (2018). Association between physical activity and grade point average among a cohort of pharmacy students in didactic years. *Currents in Pharmacy Teaching and Learning*, *10*(3), 333-339.

Yadav, S. K., Kalra, R., Naeem, R., Verma, A., Gupta, R., Sarin, N., & Singh, S. (2020). Honey-Mumford's learning styles of medical laboratory students: An observational study with implications for laboratory efficiency. *Archives of Medicine and Health Sciences*, *8*(1), 107.

Zoghi, M., Brown, T., Williams, B., Roller, L., Jaberzadeh, S., Palermo, C., ... & Holt, T. A. (2010). Learning style preferences of Australian health science students. *Journal of allied health*, *39*(2), 95-103.

APPENDIX A – ETHICAL APPROVAL LETTER

UNIVERSITI TUNKU ABDUL RAHMAN
Wholly Owned by UTAR Education Foundation (Company No. 578227-M)

Re: U/SERC/224/2022

4 November 2022

Mr Muhammad Noh Zulfikri Bin Mohd Jamali
Head, Department of Physiotherapy
M. Kandiah Faculty of Medicine and Health Sciences
Universiti Tunku Abdul Rahman
Jalan Sungai Long
Bandar Sungai Long
43000 Kajang, Selangor

Dear Mr Muhammad Noh,

Ethical Approval For Research Project/Protocol

We refer to your application for ethical approval for your students' research project from Bachelor of Physiotherapy (Honours) programme enrolled in course UMFD3026. We are pleased to inform you that the application has been approved under Expedited Review.

The details of the research projects are as follows:

No	Research Title	Student's Name	Supervisor's Name	Approval Validity
9.	Association Between Physical Activity, Learning Style and Academic Performance Among UTAR Health Science Undergraduates	Yeoh Zhe Yi	Ms Kamala a/p Krishnan	4 November 2022 – 3 November 2023

Kampar Campus : Jalan Universiti, Bandar Barat, 31900 Kampar, Perak Darul Ridzuan, Malaysia
Tel: (605) 468 8888 **Fax:** (605) 466 1313
Sungai Long Campus : Jalan Sungai Long, Bandar Sungai Long, Cheras, 43000 Kajang, Selangor Darul Ehsan, Malaysia
Tel: (603) 9086 0288 **Fax:** (603) 9019 8868
Website: www.utar.edu.my

The conduct of this research is subject to the following:

(1) The participants' informed consent be obtained prior to the commencement of the research;

(2) Confidentiality of participants' personal data must be maintained; and

(3) Compliance with procedures set out in related policies of UTAR such as the UTAR Research Ethics and Code of Conduct, Code of Practice for Research Involving Humans and other related policies/guidelines.

(4) Written consent be obtained from the institution(s)/company(ies) in which the physical or/and online survey will be carried out, prior to the commencement of the research.

Kampar Campus : Jalan Universiti, Bandar Barat, 31900 Kampar, Perak Darul Ridzuan, Malaysia
Tel: (605) 468 8888 **Fax:** (605) 466 1313
Sungai Long Campus : Jalan Sungai Long, Bandar Sungai Long, Cheras, 43000 Kajang, Selangor Darul Ehsan, Malaysia
Tel: (603) 9086 0288 **Fax:** (603) 9019 8868
Website: www.utar.edu.my

Should the students collect personal data of participants in their studies, please have the participants sign the attached Personal Data Protection Statement for records.

Thank you.

Yours sincerely,

Professor Ts Dr Faidz bin Abd Rahman
Chairman
UTAR Scientific and Ethical Review Committee

c.c Dean, M. Kandiah Faculty of Medicine and Health Sciences
Director, Institute of Postgraduate Studies and Research

APPENDIX B - KREJCIE AND MORGAN (1970) TABLE

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

N = Population size

S = Sample size

APPENDIX C – INFORMED CONSENT FORM & PERSONAL DATA PROTECTION STATEMENT

Association between Physical Activity, Learning Style and Academic Performance among UTAR Health Science Undergraduate

Dear participant,
You are invited to participate in a research student conducted by Yeoh Zhe Yi, from Bachelor of Physiotherapy (Hons), Universiti Tunku Abdul Rahman (UTAR), Sungai Long Campus.
This research is conducted under the supervision of Ms Kamala A/P Krishnan, lecturer of the Department of Physiotherapy in the M. Kandiah Faculty of Medicine and Health Science (MK FMHS) at UTAR, Sungai Long Campus.

This study purposed to identify physical activity level and learning style among UTAR health science undergraduate and to determine its association with academic performance.

Before you proceed with this questionnaire, please make sure that you fulfill the following criteria:

1. Undergraduates in UTAR Sungai Long Campus and taking programme under the M. Kandiah Faculty of Medicine and Health Science (MK FMHS)(*including Bachelor of Medicine and Bachelor of Surgery (M.B.B.S), Bachelor of Chinese Medicine (Honours), Bachelor of Nursing (Honours), Bachelor of Physiotherapy (Honours)*)

This questionnaire consists of three (3) parts:

- Section 1 - To collect demographic data and Cumulative Grade Point Average (CGPA)
- Section 2 - To assess physical activity level
- Section 3 - To evaluate learning style preference

Note:
This questionnaire will take approximately 5 to 10 minutes.
Your participation in this study is completely voluntary and withdrawal from this study is allowed at any time.
Your response will be **anonymous** and your **email will not be recorded**.

'Personal Data Protection Act (PDPA) 2010'
Your information and data will be kept confidential.

If you have any quire regarding this study, you may contact me, Yeoh Zhe Yi at 012-603 0058 or zheyiyeoh@1utar.my

Thanks for your time and participation.

Are you currently pursuing these programmes under M. Kandiah Faculty of Medicine and Health Science (MK FMHS): *

- Bachelor of Medicine and Bachelor of Surgery (M.B.B.S),
- Bachelor of Chinese Medicine (Honours)
- Bachelor of Nursing (Honours)
- Bachelor of Physiotherapy (Honours).

If yes, please feel free to participate.

- ◯ Yes
- ◯ No

Personal Data Protection Statement

Please be informed that in accordance with Personal Data Protection Act 2010 ("PDPA") which came into force on 15 November 2013, Universiti Tunku Abdul Rahman ("UTAR") is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal information.

1. Personal data refers to any information which may directly or indirectly identify a person which could include sensitive personal data and expression of opinion. Among others it includes:
a) Name
b) Identity card
c) Place of Birth
d) Address
e) Education History
f) Employment History
g) Medical History
h) Blood type
i) Race
j) Religion
k) Photo
l) Personal Information and Associated Research Data

2. The purposes for which your personal data may be used are inclusive but not limited to:
a) For assessment of any application to UTAR
b) For processing any benefits and services
c) For communication purposes
d) For advertorial and news
e) For general administration and record purposes
f) For enhancing the value of education
g) For educational and related purposes consequential to UTAR
h) For replying any responds to complaints and enquiries
i) For the purpose of our corporate governance
j) For the purposes of conducting research/ collaboration

3. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

4. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.

5. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:
1. By submitting this form you hereby authorise and consent to us processing (including disclosing) your personal data and any updates of your information, for the purposes and/or for any other purposes related to the purpose.

2. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfill our obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.

3. You may access and update your personal data by writing to us at zheyiyeoh@1utar.my

Consent *

- [ ] I have read and understood the above statement, and agree to participate in this study.

APPENDIX D – DEMOGRAPHIC DATA

Section 1 - Demographic Data and CGPA

Please provide the following demographic information for analytic purpose.

Age *

Your answer

Gender *

- ◯ Male
- ◯ Female

Weight (in kg) *

Your answer

Height (in cm) *

Your answer

Programme *

- ◯ M.B.B.S
- ◯ Nursing
- ◯ Physiotherapy
- ◯ Chinese Medicine

Have you attended clinical posting? *

- ◯ Yes
- ◯ No

Which of the following range is your Cumulative Grade Point Average (CGPA)? *

- ◯ ≥ 3.0000
- ◯ < 3.0000

APPENDIX V – IPAQ-SF

Section 2 - International Physical Activity Questionnaire Short Form (IPAQ-SF)

This section will find out the kinds of physical activities that you do as part of their everyday lives. 7 questions will ask you about the time you spent being physically active in **last 7 days.**

1. During the last 7 days, on how many days did you do **vigorous** physical activities? *

** Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. E.g. heavy lifting, digging, aerobics or fast bicycling*

	0	1	2	3	4	5	6	7	
If 0, Skip to Question 3	◯	◯	◯	◯	◯	◯	◯	◯	days

2. How much time did you usually spend doing **vigorous** physical activities on one of those days? (eg. 30 mins)

Hr Min Sec

__ : __ : __

3. During the last 7 days, on how many days did you do **moderate** physical activities? *

**Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Eg. carrying light loads, bicycling at a regular pace.*
NOT INCLUDED WALKING.

	0	1	2	3	4	5	6	7	
If 0, Skip to Question 5	◯	◯	◯	◯	◯	◯	◯	◯	days

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

Hr Min Sec

__ : __ : __

5. During the last 7 days, on how many days did you **walk** for at least 10 minute at a time? *

	0	1	2	3	4	5	6	7	
If 0, Skip to Question 7	○	○	○	○	○	○	○	○	days

6. How much time did you usually spend **walking** on one of those days?

Hr Min Sec

__ : __ : __

7. During the last 7 days, how much time did you spend **sitting** on a week day? *

Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

Hr Min Sec

__ : __ : __

APPENDIX E – Honey and Mumford's LSQ

Section 3 - Honey and Mumford's Learning Style Questionnaire (LSQ)

This section will help to identify your learning style preference.

Tick the statements as many as you *agree* with.
There are
no right or wrong answers.
The accuracy of the result depends on how honest you can be.

After completed the questions below, You may refer to Scoring of LSQ & Definition of Learning Style to find your predominant learning style and each learning style's definition.

Pragmatist

- [ ] I tend to have a 'no-nonsense' direct style
- [ ] The key factor in judging proposed ideas or solutions is whether they work in practice or not.
- [ ] When I hear about a new idea or approach, I like to start working out how to apply it in practice as soon as possible.
- [ ] In meetings I tend to go straight to the point.
- [ ] I judge people's ideas on their practical merits.
- [ ] In meetings, I get impatient when people lose sight of the objective.
- [ ] People in meetings should be realistic, keep to the point and avoid indulging in fancy ideas.
- [ ] Usually I think the ends justify the means.
- [ ] Group objectives and targets should take precedence over individual feelings and objections.
- [ ] I do whatever is needed to get the job done.

Theorist

- [ ] I tend to solve problems using a step by step approach, avoiding fanciful ideas
- [ ] I like to follow a self-disciplined approach, with clear routines and logical thinking patterns.
- [ ] I get on best with logical, analytical people and less well with spontaneous 'irrational' people.
- [ ] I dislike situations that I can't fit into a pattern.
- [ ] I like to relate my actions to general principles.
- [ ] People who don't take things seriously enough irritate me.
- [ ] In meetings I think I am objective and unemotional.
- [ ] I like exploring underlying theories and principles.
- [ ] I like methodical meetings, sticking to the agenda.
- [ ] I steer clear of subjective/ambiguous topics.

Reflector

- [ ] I take pride in doing a thorough, methodical job
- [ ] I take care over the interpretation of data available to me, and avoid jumping to conclusions.
- [ ] I like to reach a decision carefully, after weighing up many alternatives.
- [ ] I prefer to have as many sources of information as possible – the more, the better.
- [ ] I dislike tight deadlines – need more time to think.
- [ ] I get irritated by people who rush into things.
- [ ] I think decisions based on thorough analysis are sounder than those based on intuition.
- [ ] I like to ponder alternatives before deciding.
- [ ] At meetings I'm more likely to keep in the background rather than taking the lead.
- [ ] On balance I prefer listening to talking.

Activist

- [ ] I often take reasonable risks if they're justified
- [ ] I often find that actions based on feelings are as sound as those based on thoughts and analysis
- [ ] I'm attracted more to new, unusual ideas than to practical ones.
- [ ] I prefer to respond to events on a spontaneous, flexible basis, rather than planning things out.
- [ ] The present is more important than the past or the future.
- [ ] I enjoy contributing ideas just as they occur to me.
- [ ] On balance I tend to talk more than I should.
- [ ] I like telling others my ideas and opinions.
- [ ] I get bored with detailed, methodical work.
- [ ] I enjoy the drama/excitement of a crisis.

APPENDIX F – Turnitin Report

Association between Physical Activity, Learning Style and Academic Performance among UTAR Health Science Undergraduates

by Yeoh Zhe Yi

Submission date: 23-Dec-2022 11:38PM (UTC+0800)
Submission ID: 1986165306
File name: FYP_CHAPTER_1_to_6_for_Turnitin.docx (277.29K)
Word count: 11095
Character count: 59738

ORIGINALITY REPORT

13%	10%	7%	6%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.mjms.usm.my Internet Source	1%
2	Submitted to Universiti Tunku Abdul Rahman Student Paper	1%
3	www.researchgate.net Internet Source	1%
4	journalarticle.ukm.my Internet Source	1%
5	study.utar.edu.my Internet Source	<1%
6	bmcmededuc.biomedcentral.com Internet Source	<1%
7	Abdulmajeed Al-Drees, Hamza Abdulghani, Mohammad Irshad, Abdulsalam Ali Baqays et al. "Physical activity and academic achievement among the medical students: A cross-sectional study", Medical Teacher, 2016 Publication	<1%

8	Barbara Apostolou, Jack W. Dorminey, John M. Hassell, James E. Rebele. "Accounting education literature review (2017)", Journal of Accounting Education, 2018 Publication	<1 %
9	Submitted to Universiti Teknologi MARA Student Paper	<1 %
10	Submitted to Flinders University Student Paper	<1 %
11	worldwidescience.org Internet Source	<1 %
12	Horyeh Sarbazvatan, Abolghasem Amini, Nayyereh Aminisani, SeyedMorteza Shamshirgaran, Saeideh Ghaffarifar. "Learning Style and Academic Achievement among Students at Tabriz University of Medical Sciences, Iran", Research and Development in Medical Education, 2018 Publication	<1 %
13	www.sralab.org Internet Source	<1 %
14	Submitted to Open University Malaysia Student Paper	<1 %
15	Submitted to University of Queensland Student Paper	<1 %

16	"Does Learning Style Predict Academic Performance of Engineering and Technology Students in India?", International Journal of Recent Technology and Engineering, 2019 Publication	<1%
17	eprints.uwe.ac.uk Internet Source	<1%
18	www.clinicaltrials.gov Internet Source	<1%
19	digitalcommons.library.tmc.edu Internet Source	<1%
20	fdocuments.in Internet Source	<1%
21	www.duo.uio.no Internet Source	<1%
22	www.sfu.ca Internet Source	<1%
23	Ali Sarabi-Asiabar, Mehdi Jafari, Jamil Sadeghifar, Shahram Tofighi, Rouhollah Zaboli, Hadi Peyman, Mohammad Salimi, Lida Shams. "The Relationship Between Learning Style Preferences and Gender, Educational Major and Status in First Year Medical Students: A Survey Study From Iran", Iranian Red Crescent Medical Journal, 2014 Publication	<1%

24	Submitted to University of Dundee Student Paper	<1 %
25	www.iosrjournals.org Internet Source	<1 %
26	Submitted to Hong Kong Baptist University Student Paper	<1 %
27	ir.uitm.edu.my Internet Source	<1 %
28	trace.tennessee.edu Internet Source	<1 %
29	uknowledge.uky.edu Internet Source	<1 %
30	www.tdx.cat Internet Source	<1 %
31	ia801802.us.archive.org Internet Source	<1 %
32	library.iugaza.edu.ps Internet Source	<1 %
33	Nina Pološki Vokić, Ana Aleksić. "Are Active Teaching Methods Suitable for All Generation Y students?—Creativity as a Needed Ingredient and the Role of Learning Style", Education Sciences, 2020 Publication	<1 %

34	Submitted to University of Cape Town Student Paper	<1%
35	Submitted to University of Hull Student Paper	<1%
36	Ariff Aizuddin Azlan, Muhamad M. N. Nadzri. "Parliamentary motions under a semi-authoritarian regime: evidence from Malaysia", Parliaments, Estates and Representation, 2022 Publication	<1%
37	Submitted to Brigham Young University Student Paper	<1%
38	Submitted to University of KwaZulu-Natal Student Paper	<1%
39	core.ac.uk Internet Source	<1%
40	web.stanford.edu Internet Source	<1%
41	www.medrxiv.org Internet Source	<1%
42	www.nature.com Internet Source	<1%
43	Submitted to Higher Ed Holdings Student Paper	<1%

44	Submitted to Kaplan International Colleges Student Paper	<1%
45	Submitted to Liverpool John Moores University Student Paper	<1%
46	es.scribd.com Internet Source	<1%
47	espace.library.uq.edu.au Internet Source	<1%
48	Submitted to American Public University System Student Paper	<1%
49	Submitted to Florida State University Student Paper	<1%
50	cronfa.swan.ac.uk Internet Source	<1%
51	eprints.usm.my Internet Source	<1%
52	openarchive.ki.se Internet Source	<1%
53	pdfs.semanticscholar.org Internet Source	<1%
54	researchspace.ukzn.ac.za Internet Source	<1%

55	www.skillsyouneed.com Internet Source	<1 %
56	Marta Regina Pinheiro Flores. "Poder discriminatório de medidas faciais fotoantropométricas", Universidade de Sao Paulo, Agencia USP de Gestao da Informacao Academica (AGUIA), 2019 Publication	<1 %
57	docksci.com Internet Source	<1 %
58	moam.info Internet Source	<1 %
59	scholarcommons.usf.edu Internet Source	<1 %
60	Richard Tucker. "Getting old and heading south: the academic success of Southerner learners in design cohorts", Higher Education Research & Development, 2009 Publication	<1 %
61	en.irct.ir Internet Source	<1 %
62	eprints.utar.edu.my Internet Source	<1 %
63	link.springer.com Internet Source	<1 %

64	qspace.library.queensu.ca Internet Source	<1%
65	vuir.vu.edu.au Internet Source	<1%
66	who.int Internet Source	<1%
67	www.emeraldinsight.com Internet Source	<1%
68	www.emjreviews.com Internet Source	<1%
69	www.ijtsrd.com Internet Source	<1%
70	www.science.gov Internet Source	<1%
71	"Occupational and Environmental Safety and Health", Springer Science and Business Media LLC, 2019 Publication	<1%
72	Abhinav Singh. "Evaluation of Global Physical Activity Questionnaire (GPAQ) among Healthy and Obese Health Professionals in Central India", Baltic Journal of Health and Physical Activity, 01/01/2011 Publication	<1%

73	Punam Kumari Mandal, Namita Yangden, Bhumika Rai, Menuka Bhandari, Susan Paudel. "Physical Activity among Nursing Students of Tribhuvan University during COVID-19 Pandemic", Research Square Platform LLC, 2022 Publication	<1%
74	Swapnajeet Sahoo, Arzoo Suman, Aseem Mehra, Ritu Nehra, Ashish Bhalla, Goverdhan Dutt Puri, Sandeep Grover. "Cognitive Deficits in Patients with COVID-19 Infection during Their Hospital Stay: An Exploratory Study", Journal of Neurosciences in Rural Practice, 2022 Publication	<1%