THE RELATIONSHIP BETWEEN EMOTIONAL WELL-BEING AND OUTCOME EXPECTANCIES WITH PHYSICAL ACTIVITY LEVEL AMONG UNDERGRADUATE STUDENTS DURING COVID-19 PANDEMIC

By

TAN YE LYN

A project report submitted to the Department of Allied Health Sciences
Faculty of Science
Universiti Tunku Abdul Rahman
in partial fulfillment of the requirements for the degree of
Bachelor of Science (Hons) Dietetics

October 2022

ABSTRACT

THE RELATIONSHIP BETWEEN EMOTIONAL WELL-BEING AND OUTCOME EXPECTANCIES WITH PHYSICAL ACTIVITY LEVEL AMONG UNDERGRADUATE STUDENTS DURING THE COVID-19 PANDEMIC

Tan Ye Lyn

The COVID-19 pandemic had impacted the university students both physically and mentally. The pre-existing problem of physical inactivity and poor emotional well-being among this vulnerable population was exaggerated by this situation. This study was a cross-sectional study conducted during March to June 2022 to determine the relationship between emotional well-being and outcome expectancies with physical activity level among undergraduate students during the COVID-19 pandemic. A total of 165 respondents were recruited for this study. A moderate physical activity level [1173.00 (1899.95) MET minutes/week.], good emotional well-being [positive affect = 32.66 $\pm$ 6.08; negative affect = 24.01 $\pm$ 7.55], and high self-evaluative outcome expectancies [21.00 (5)] and perceived outcome immediacy [25.87 ± 5.21] were found from the study. However, the PAL was relatively lower than pre-pandemic. There were also weak positive correlations found between positive affect (r=0.290, p=0.000), perceived outcome immediacies (r=0.278, p=0.000) with TPA. Out of the three dimensions of exercise outcomes, self-evaluative (r= 0.254, p=0.001) followed by physical (r=0.296, p=0.000) outcomes immediacy were significantly correlated to PAL but not for social outcomes. There was no

correlation found between outcome expectancies and PAL. However, there were weak positive correlation specifically between social outcome expectancies (r=0.177, p=0.023) and immediacy (r=0.277, p=0.000) with VPA. In conclusion, attention on the problem of increasing physical inactivity among the students and the importance of the PA on emotional well-being should be raised. It is also suggested to integrate the perceived outcome immediacy especially the self-evaluative and physical outcomes as a possible factor influencing the PAL of the students in the future PA interventions. Moreover, stressing on the social benefits of vigorous-intensity team sports and exercises can be a way to promote the PAL among the students as well due to the unique correlation between social outcomes and VPA.

ACKNOWLEDGEMENT

I would like to express my deepest appreciation to all those who assisted me throughout my final year project. A special gratitude I give to my supervisor, Mr. Muhammad Zulhusni Bin Suhaimi, whose contribution in stimulating suggestions and encouragement helped me a lot in conducting my research. His patient guidance, persistent help, and expertise greatly assisted me in coordinating and completing my project.

I would also like to express my gratitude to my family for comforting and motivating me which helped a lot to get rid of depressed emotions during the hardship of my final year project.

DECLARATION

I hereby declare that this final year project report 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.

Tan Ye Lyn

APPROVAL SHEET

This final year project report entitled "**THE RELATIONSHIP OF EMOTIONAL WELL-BEING AND OUTCOME EXPECTANCIES WITH PHYSICAL ACTIVITY LEVEL AMONG UNDERGRADUATE STUDENTS DURING COVID-19 PANDEMIC**" was prepared by TAN YE LYN and submitted as partial fulfillment of the requirements for the degree of Bachelor of Science (Hons) Dietetics at Universiti Tunku Abdul Rahman.

Approved by:

_____

(Mr. Muhammad Zulhusni)
Supervisor
Department of Allied Health Sciences
Faculty of Science
Universiti Tunku Abdul Rahman

Date: 5/9/2022

FACULTY OF SCIENCE

UNIVERSITI TUNKU ABDUL RAHMAN

Date: 5/9/2022

PERMISSION SHEET

It is hereby certified that **TAN YE LYN** (ID No: **19ADB7045**) has completed this final year project report entitled "THE RELATIONSHIP OF EMOTIONAL WELL-BEING AND OUTCOME EXPECTANCIES WITH PHYSICAL ACTIVITY LEVEL AMONG UNDERGRADUATE STUDENTS DURING COVID-19 PANDEMIC" under the supervision of Mr. Muhammad Zulhusni (Supervisor) from the Department of Allied Health Sciences, Faculty of Science.

I hereby give permission to the University to upload the softcopy of my final year project report in pdf format into the UTAR Institutional Repository, which may be made accessible to the UTAR community and public.

Yours truly,

(TAN YE LYN)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

COVID-19	Coronavirus disease
HAPA	Health Action Process Approach
IQR	Interquartile range
IPAQ	International Physical Activity Questionnaire
IPAQ-SF	International Physical Activity Questionnaire short form
MCO	Movement Control Order
MET	Metabolic Equivalent of Task
MOEES	Multidimensional Outcome Expectations for Exercise Scale
MPA	Moderate-Intensity Physical Activity
NHMS	National Health and Morbidity Survey
OE	Outcome Expectancies
PANAS	Positive and Negative Affect Schedule
POI	Perceived Outcome Immediacy
PA	Physical Activity
PAL	Physical Activity Level
SCT	Social Cognitive Theory
SD	Standard Deviation
SPSS	Statistical Packages for Social Sciences
TPA	Total Physical Activity
US	United States
VPA	Vigorous-Intensity Physical Activity

CHAPTER 1

INTRODUCTION

1.1 Background

1.1.1 COVID-19 Pandemic in Malaysia

Coronavirus disease (COVID-19) is a contagious viral disease that has infected 590 million people worldwide in the last two years as of 15th August 2022. The severity of the COVID-19 pandemic and the increasing number of positive cases has caused the Malaysian government to enforce the Movement Control Order (MCO) national-wide starting on 18th March 2020 to curb the virus transmission. All government and private premises including educational institutions were closed, quarantine of infected individuals and social distancing was implemented, and movement and gatherings were restricted, except for those involved in the supply of essential goods and services (Vivien Fan and Ryan Cheong, 2020). The MCO order was extended multiple times and has switched between the Conditional Movement Control Order (CMCO), the Recovery Movement Control Order (RMCO), and the Enhanced Movement Control Order (EMCO). From 24th February 2021, the government has launched the National COVID-19 Immunisation Program (PICK). As of 15th August 2022, 84.1% of the total population was at least vaccinated with 2 doses (fully vaccinated). This has effectively curbed the rate of transmission of the virus.

Those fully vaccinated individuals were allowed more freedom in traveling and activity engagement (Anon, 2021b). Starting on 1st May 2022, Malaysia has entered the endemic phase with a national strategy named "Reopening Safely" and a set of relaxed standard operating procedures. All international borders reopened. Social distancing was no longer required and wearing masks was not mandated for outdoor spaces except for crowded areas and indoor spaces. However, masks could be removed if doing heavy exercise indoors, eating, drinking, speaking/presenting, or alone in a particular space (Ren et al., 2021; Priya, 2022).

The long period of social isolation has tremendously altered the lifestyles and social relationships of Malaysians. While these excessive restriction measures have been proven to be effective in modeling studies but it has greatly impacted public health both physically and mentally (Kissler et al., 2020; Nussbaumer-Streit et al., 2020). The COVID-19 pandemic hit society in waves with more virulent variants, instilling fear and anxiety in the public. Moreover, the prolonged public health crisis has caused "pandemic fatigue" in the populations where people are gradually demotivated to follow recommended protective behaviors due to the extended disruption and unresolved adversity in people's lives (WHO, 2020). A more comprehensive strategy and guidance on living life while reducing the risk of infection during this pandemic or any similar cases in the future should be developed to improve the quality of life of the people.

1.1.2 The Impact of the COVID-19 Pandemic on University Students both Physically and Mentally.

According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO), the COVID-19 pandemic has disrupted the education of more than three billion students (UNESCO, n.d.). Due to the alarming number of positive cases, the Ministry of Higher Education in Malaysia (MOHE) announced that all university lectures must be conducted online on the 27th of May 2020 with only a few exceptions allowed under strict regulation (Yiswaree, 2020). As the vaccination rate was increasing, this order was withdrawn with the announcement of MOHE on the 9th of February 2022 regarding the reopening of higher learning institutions to allow the return of fully vaccinated students to campuses for the academic sessions starting March 2022 (Bernama, 2022). Those with incomplete vaccinations were required to show a three-day prior negative RT-PCR result weekly before entering the campus. This movement was allowed only if the institution's capacities were able to accommodate physical classes, sports, and recreational activities with strict adherence to the SOP issued by the MOH. However, this COVID-19 pandemic has greatly impacted university students' lifestyles both physically and mentally (Al-Kumaim et al., 2021). Not to mention the pre-existing academic stress and prevalence of physical inactivity, during pandemics, there are many other factors such as campus close down, isolation from friends, movement restriction, online-based learning, the uncertainty of their studies, and academic routine disruption leading to the exaggeration of negative impact on emotional well-being and physical inactivity (American College Health Correlation, 2019; Bortel et al., 2016; Cao et al., 2020; Karthikeyan and Selvaganapathy, 2015;

Zhai and Du, 2020). Fear of returning to campus was also one of the concerns that increased the anxiety of university students during the COVID-19 pandemic as they were fearful of contracting the virus (Masha'al et al., 2022; Villani et al., 2021; Varol et al., 2022).

1.1.3 The Importance of Physical Activity during COVID-19 Pandemic and its Associated Psychosocial Factors

Maintaining a healthy physical activity (PA) level (PAL) is necessary to improve our health status (Kraemer and Ratamess, 2012; Sellami et al., 2018; Hagen et al., 2012). It is especially important during this COVID-19 pandemic as it has been shown to boost immunity and help decrease the risk of severe COVID-19 outcomes (Sallis et al., 202; Pelinski et al., 2020). However, the PAL status of Malaysian is low even before the pandemic and is further impacted negatively by the restriction and lifestyle changes due to lockdown (Martínez-de-Quel et al., 2020; MOH, 2019). Moreover, PA is a complex behavior influenced by several psychosocial factors. including emotional well-being and outcome expectancies (Mama et al., 2015; Bandura, 1986; Schultchen et al., 2019). To improve the PAL more effectively, these factors should be taken into consideration to modify the intervention of long-lasting PA behavioral changes (Nahas et al., 2003).

1.1.3.1 Emotional well-being

Emotional well-being is negatively affected during the COVID-19 pandemic, especially among vulnerable populations including university students (American College Health Correlation, 2019; Cao et al., 2020). This may exert a negative impact on PAL among them due to the strong link between PAL and emotional well-being bidirectionally (Schultchen et al., 2019). A higher negative affect such as stress was related to a reduction of PAL. Conversely, a higher PAL was associated with lesser negative affect (Schultchen et al., 2019; Stults-Kolehmainen and Sinha, 2014). (Hargreaves et al., 2021)

1.1.3.2 Outcome Expectancies of Physical Activity

According to Social Cognitive Theory, outcome expectancies (OE) are one of the psychosocial factors influencing the adoption of health behavior such as PA (Bandura, 1997). OE are known as the believed consequences resulting from an individual's behavior (Fasbender, 2019). A person may engage in a behavior if the positive OE outweighed the negative OE of that particular behavior (Bandura, 2001). This effect has been observed in the context of PA in several studies (Perrier et al., 2012; Zhang et al., 2007). Despite many people having realized the positive outcomes of PA during this pandemic, the prevalence of physical inactivity was still at an alarming rate. Therefore, focusing on the positive OE of PA may help promote PAL among university students during this pandemic.

1.2 Conceptual Framework

The yellow highlighted boxes are the variables of this research study

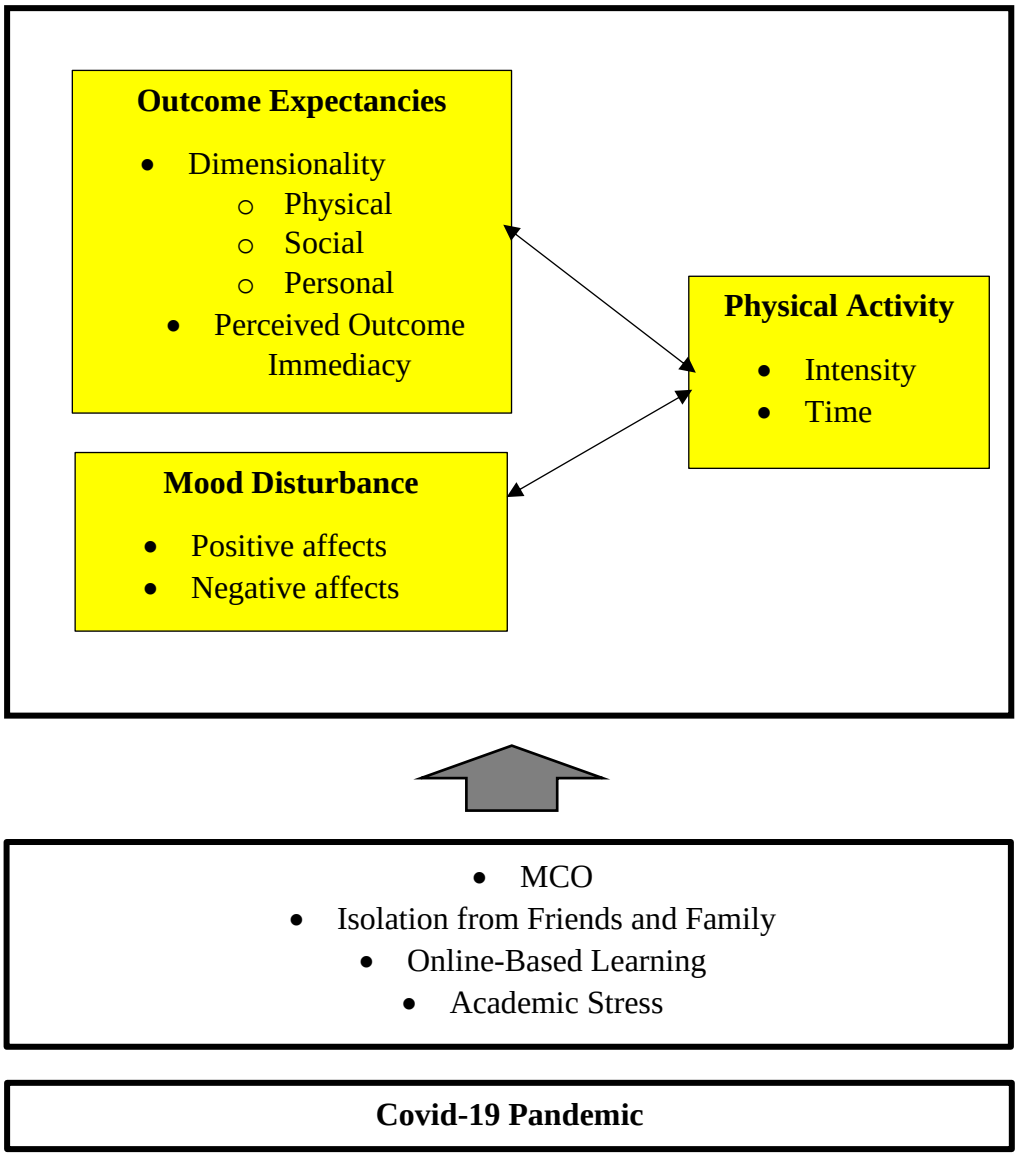


Figure 1.1: Conceptual Framework

1.3 Problem Statement

The COVID-19 pandemic has greatly impacted the lifestyle of people both physically and mentally. University students were one of the most vulnerable populations being affected greatly by the COVID-19 pandemic as they needed to adapt to the new online-learning style and were isolated from friends during this period (Cao et al., 2020; Arumugam et al., 2021). Studies have indicated that PAL of university students during the COVID-19 pandemic has dropped significantly imposing a risk of adverse health outcomes especially non-communicable diseases (Coakley et al., 2021; Ahmad, 2021; Varela et al., 2021; Puccinelli et al., 2021; Wilke et al., 2021). Moreover, mental health also deteriorated due to the COVID-19 pandemic despite the pre-existing high academic stress (Al-Kumaim et al., 2021; Son et al., 2020; Coakley et al., 2021). So far, most studies have been done during the earlier period of the COVID-19 pandemic, targeting the immediate impact on the health of the population. Only a few studies focusing on the long-term influence of the pandemic or the situation after reopening have been found (Xiao et al., 2022; H. Tan et al., 2021; Massar et al., 2022). Moreover, the existing research on psychological distress due to the COVID-19 pandemic mainly focused on anxiety, depression, and stress level; the effect of mood state is still under-examined. It is important to maintain a balance positive and negative mood during stressful situation for individuals to adapt to the environment. OE are also included as a psychosocial factor. Despite that there are multiple literatures available examining the relationship between OE and PA, most of them did not consider the perceived outcome immediacy and dimensionality of OE, yielding inconsistent results (Williams et al., 2005). Therefore, in this current research, these two aspects of

OE will be taken into account to improve the reliability of the result. Due to the unpredictable pandemic recurrence, a more comprehensive intervention should be developed to reduce the physical and mental health risk of university students during COVID-19 pandemic. In order to improve the current research data and the prediction of PAL in Malaysia that is found to be lacking, this study includes psychosocial factors namely, emotional well-being and OE to examine their correlation with the PAL among university students (Khoo et al., 2020).

1.4 Objectives

1.4.1 General objective:

To investigate the relationship between emotional well-being, outcome expectancies with physical activity level among undergraduate students during the COVID-19 pandemic

1.4.2 Specific objectives:

1. To determine the relationship between physical activity level and emotional well-being among UTAR students during the COVID-19 pandemic.
2. To determine the relationship between physical activity level and outcome expectancies among UTAR students during the COVID-19 pandemic.

1.5 Research Hypothesis

1. $H0_A$: There is no significant relationship between physical activity level and emotional well-being.

   $H1_A$: There is a significant relationship between physical activity level and emotional well-being.
2. $H0_B$: There is no significant relationship between physical activity level and outcome expectancies.

   $H1_B$: There is a significant relationship between physical activity level and outcome expectancies.

CHAPTER 2

LITERATURE REVIEW

2.1 Physical Activity Level (PAL) among University Students during COVID-19 Pandemic

Physical activity is defined as "any bodily movement produced by skeletal muscles that require energy expenditure". According to National Health and Morbidity Survey (NHMS) 2015, it is recommended that adults aged 16 years and above should obtain a minimum of 600 MET- minutes/week to be defined as physically active (MOH, 2015). Those who do not fulfill the requirements are considered inactive. Undoubtedly, PA has contributed to various important health outcomes which apply to all body systems including hormonal, immunological, respiratory, and musculoskeletal (Kraemer and Ratamess, 2012; Sellami et al., 2018; Hagen et al., 2012). Of all, the cardiovascular system had the most benefits as exercise improves blood lipid profiles, and reduced blood pressure and vascular resistance (Nystoriak and Bhatnagar, 2018).

Despite the well-established PA guideline, there were still 25.1% of Malaysians were physically inactive according to NHMS 2019 and this has become a major public health issue in Malaysia (MOH, 2019). This was probably due to the

devaluation of the importance or desirability of PA as a leisure-time pursuit among Malaysians (Lian et al., 2016). Low PA has contributed to 16.4% of the country's deaths via the increased vulnerability to non-communicable diseases such as obesity, diabetes, and cardiovascular disease (Lee et al., 2012; MOH, 2016). This phenomenon has also been observed among university students. A 2015 study has shown that 14.0% of male and 30.0% of female undergraduate students were low in PAL (Karthikeyan and Selvaganapathy, 2015). Moreover, PA patterns during student years have been proven to have carryover effects in adulthood (Sparling and Snow, 2013). The university environment was unique and effective in that spreading and promoting PA information can be delivered to a vast number of young adults before they enter the workforce. Therefore, the PAL of university students should be paid more attention to.

To practice social distancing, all business activities, public places, and exercise facilities were closed during MCO which has further affected the physical behavior of the people, especially the active group community who used to participate in community fitness programs such as yoga, aerobic dance, tai chi, etc. in wellness centers or outdoor parks (Piotrowski and Piotrowska, 2021). Not until recently on September 17, 2021, sports and recreational activities with physical contact are allowed under Phase Two and Three of the National Recovery Plan limiting to fully vaccinated individuals (Keertan, 2021). Despite the advocation of indoor physical exercise to keep active at home (e.g. The WHO's campaign "healthy at home"), there were still barriers to PA among Malaysian young adults during MCO, including the "lack of energy", "lack of willpower" and "lack of resource" (Yao et al., 2021; WHO, n.d.). Undoubtedly,

university students were one of the victims due to the adoption of online-based learning methods as they were restricted from traveling to school and sports activities engagement (Martínez-de-Quel et al., 2020). Physical inactivity is a major health concern especially during the COVID-19 pandemic as it affects the immune system and increases the risk for severe COVID-19 outcomes (Sallis et al., 2021). A review study has shown that PA is potentially a tool to help the immune system against COVID-19 (Pelinski et al., 2020).

Several studies have examined PAL during the COVID-19 pandemic in different countries. There were many pieces of literature have found that PA was decreasing in adults due to the restriction of movement (Puccinelli et al., 2021; Wilke et al., 2021) In the United States (US), the prevalence of high PA (61.6%) among adults (≥18 years old) was more than during normal period (data from 2015-2016: 25.2%) despite there was an increase in population sitting more > 8 hours per day (42.5% vs 25.7%) (Meyer et al., 2020). The explanation for this increment was the increase in leisure time allocated from the commuting time allowing more opportunities for them to be engaged in PA as the only outlet of socialization. Similar PA patterns were observed between sex. Another interesting finding was that age might influence the PAL. The younger population (18-34 years old) reported the most sitting time while their PAL dichotomously fell into the inactive or highly active group. Conversely, older adults (75+ years old) have more consistent PAL that is at least sufficiently active. Young adults also reported higher physical inactivity than older adults (Meyer et al., 2020). In the United Kingdom, 75.0% of the adults were physically active which was higher than before (58.0%-66.0%) and was associated with sex (men lower than women), age (young adults lower than

older adults), and house income (low income lower than high income) (Smith et al., 2020). The findings of the first two factors (sex and age) were contradicting those during the non-COVID-19 pandemic period when younger men were reported to be more active. This would be contributed to the extra discretionary time during lockdown and people would use exercise as an excuse to leave their homes. In Spain, the prevalence of physical inactivity increased among adults (73.9% of total participants were university students) during the lockdown in a longitudinal study (Martínez-de-Quel et al., 2020). Interestingly, participants that were active before lockdown experienced a greater impact in the PAL as well as other health parameters (e.g., sleep quality, and self-perceived well-being) but those that were inactive before showed no significant difference.

In Malaysia, a study done specifically among university students during MCO Phase 3 (15 to 31 December 2020) indicated only 20.4% of the students were inactive which was lower than the data from NHSM 2019 (25.1%) (S. T. Tan et al., 2021). Hence, the study population was notably more active during lockdown despite about half of the Malaysians (57.8%) increasing in weight with a range of less than 5.0 kg. A study comparing the PAL among undergraduate university students before and after MCO 1.0 reported that there was a significant decrease of 28.1% in the overall PA group (Ahmad, 2021). Most females were engaged in home activity and exercise via technological applications while males prefer outdoor activities. Conversely, another study done among a similar population has shown no significant difference between PA and gender during MCO Phase 3 (October to December 2020) and the

population was moderately active. This may be due to that both genders were exposed to similar conditions and the SOP was looser during that period with non-contact outdoor PA allowed (Avinna et al., 2021). In another cross-sectional study done during MCO Phase 4 (27 April to 3 May 2020), MCO encouraged most of the respondents (80.0%) to be physically active during the COVID-19 pandemic. They also observed a slight difference in terms of behavior between genders whereby females reported to be more positive towards PA than males (Fathynah et al., 2021). There was a gender difference in the form of exercise but the difference was insignificant for the frequency of exercise. In July 2021 (National Recovery Plan- Phase 1), another cross-sectional study conducted among medical university students also has shown that 38.98% of students were high in PAL and only 23.7% of participants were low in PA without any significant correlation between age, gender, ethnicity, and BMI (Huat et al., 2021).

Interestingly, many pieces of literature reported an increment in PA among the study population during the COVID-19 pandemic including Malaysia. This was explained by the increase in free time to do exercise or in-home maintenance activities. Moreover, people might use exercise as an excuse to leave home or to socialize during the lockdown period. Besides, females tended to be more active than males because of the gender difference in the preference for the type of exercise (home-workout vs outdoor activities). Different phases of lockdown were also shown to impact the PAL of the population differently. When it came to the recent phase of lockdown, whereby the SOP was less strict, the PAL of the population might increase.

2.2 Emotional well-being among University Students during COVID-19 Pandemic

Emotional well-being is defined by the degree of positive affect experienced versus negative affect and satisfaction with life (Bryant and Veroff, 1982; Diener, 1984; Magyar and Keyes, 2019). In another word, a person has good emotional well-being if they have a high degree of positive affect and less negative affect as well as a high degree of satisfaction with their life.

Affect is the collective term of the feeling states one experienced including emotions and moods. It can be classified as positive or negative by pleasure and arousal. Pleasure refers to the hedonic properties of the state. One affect can be determined as unpleasant to pleasant. Arousal, it is referred to the level of engagement or alertness of the state, from deactivated to activated (Abrams et al., 2013). It is considered positive if the individual experiences a combination of high pleasantness and high arousal such as active, interested, joy, etc. Positive affect may have an inverse effect on the cortisol awakening response, which is associated with mental distress and may play a protective role in the development of diseases such as hypertension, diabetes mellitus, and respiratory tract infections (Rickard et al., 2015; Richman et al., 2005). A stable and optimistic emotion usually indicates good mental health and emotional well-being.

Contrarily, it is negative if the experience is unpleasant with low feelings of fear, anxiety, distress, etc. (Diener, 1984; Magyar and Keyes, 2019). Based on this

concept, one's emotional well-being can be measured with positive and negative affectivity. Negative affect may cause individual and social behavior disturbance and compromise mental health, increasing the susceptibility to stress-associated physiological disorders and immune malfunction (Gao, 2009).

However, positive and negative affect are independent of each other rather than being at the opposite end of a bipolar emotional scale (Diener, 1984; Folkman and Moskowitz, 2000). They have found little or insignificant association between these two affects and they can co-exist simultaneously. For instance, one can experience positive affect while in a stressful situation.

Due to the global health emergency caused by the COVID-19 pandemic, people inevitably may face negative emotions. The experience of boredom, frustration, misinformation, fear,and financial concerns during the COVID-19 pandemic is possibly the stressors that negatively influence mood and harm mental health (Brooks et al., 2020). A weekly assessment of the mood done in the United Kingdom on the YouGov website showed a significant decrease in the feeling "happy" from 50.0% in early March 2020 to 26.0% in the following month, while the feeling "scared", "bored", "stressed" had increased from 11.0% to 34.0%, 19.0% to 34.0%, 41.0% to 48.0% respectively (Anon, 2021a)**.**

Dr. Tedros Adhanom Ghebreyesus, the Director-General of WHO has raised the alarm on the impact of the COVID-19 pandemic on mental health due the isolation, fear of contagion, losing family members, and financial issues (WHO,

2020). This negative psychological impact was especially prevalent among university students whose academic distress was already high under normal circumstances and was exacerbated during the COVID-19 pandemic (American College Health Correlation, 2019; Cao et al., 2020). Emotion has a significant influence on academic performance. It has been shown that negative emotions impacted learning negatively (Febrilia et al., 2011). Such relationships may be moderated by the positive emotion experienced by students (Khuram et al., 2021).

Students were uncertain due to the sudden disruption of the semester, research projects, internships, and delays in graduation. Previous studies have proposed that university students were likely to have collective negative emotions during the school "closure" which even led to poor mental health due to academic routine disruption (Bortel et al., 2016; Zhai and Du, 2020). Grade insecurities, inadaptability, unfamiliarity with the new online learning method, worries about the health of oneself or loved ones, lack of PA, etc. may further increase the mental stress among university students during COVID-19 (Al-Kumaim et al., 2021; Son et al., 2020; Coakley et al., 2021). Since youth can be asymptomatic carriers of COVID-19, the anxiety of getting infected and transferring the virus to closely-contacted people or older family members put them at a higher stress level (Pan et al., 2020; Zhai and Du, 2020). A study done among university students in Malaysia showed that the COVID-19 pandemic has heightened their stress and anxiety level which negatively affected their academic performance, especially among students with lower GPA scores (Arumugam et al., 2021). Based on the research done in 2011 which examined the impact of academic

disruptions on students, students were more likely to face the problems of demotivation towards studies, higher dropout rates, pressures from independent learning, and abandonment of daily routines (Wickens, 2011). Thus, the COVID-19 pandemic has exerted an unprecedented mental health burden on students that requires immediate intervention.

A longitudinal study done among college students in China indicated that negative affect increased but no significant difference for positive affect after two weeks of confinement (Li et al., 2020). It was predicted by insufficient supplies of hand sanitizers, higher academic year, and higher scores on anxiety and depression. Undergraduates had higher negative affect levels than lower grade (two- and three-year) students whereby higher academic levels might impose more stress on the students. Another study compared the psychosocial impact of the COVID-19 pandemic on higher education institutions (teachers, administrative staff, and undergraduate and postgraduate students) suggesting that students were the most affected group with the highest negative affect score and lowest positive affect score (negative affect prevailed) probably due to a higher level of negative work-home interaction, the adverse impact of teleworking, and temporary employment regulation (Romeo et al., 2021). In terms of the sex of students, the emotion of women was more negatively impacted by the COVID-19 pandemic which could be explained by the greater emotional expressiveness, and lesser tolerance of uncertainty especially if the female students face body dissatisfaction. Those with the highest level of positive affect were shown to have a low level of negative work-home interaction (Romeo et al., 2021).

Similar age and sex significant differences were observed in a study done among the Spanish population were young adults (18-35 years), and women showed the highest increase in negative affect (Gismero-gonzález et al., 2020). Moreover, maintaining the same weight, moderate PA, and adhering to a routine were protective measures from the negative impact on mood. Another study has shown that the positive affect level was moderate while the negative affect level was moderately low during the COVID-19 pandemic but overall was worse than in the general period among university, and college students (Wang et al., 2020). This may be due to those undergraduate students being shallow in experience, therefore more prone to express intense emotions when facing difficulties. Moreover, high academic qualification, health literacy, and students in medical programs were shown to have higher positive affect levels as this group of students had a comprehensive knowledge of the COVID-19 pandemic, and were more active when facing problems raised by this pandemic.

Therefore, the emotional well-being of the students was greatly impacted by the COVID-19 pandemic with women, and students with higher academic levels were more vulnerable to this situation. The protective factors were maintaining a healthy lifestyle (e.g., maintaining weight, moderate PA, and following a routine), and acquiring high health literacy.

2.3 Bidirectional Relationship between Emotional Well-Being, and Physical Activity Level

2.3.1 Emotional Well-Being Affects Physical Activity Level

Under stressful situations, people tended to adopt unhealthy behaviors or less tiring activities such as reducing PA to manage stress (Rodriquez et al., 2017; Teisala et al., 2014). Moreover, much literature has shown a negative impact of stress on PAL (Stults-Kolehmainen and Sinha, 2014). Instead of using PA to cope with stress, unhealthy behavior such as smoking, overeating, drinking, and physical inactivity were more likely to become emotion-focused coping methods. Among student populations, academic stress has been correlated to higher physical inactivity (Wunsch et al., 2017; Stults-Kolehmainen and Sinha, 2014). Therefore, with the increase in mental burden during the COVID-19 pandemic, PAL is potentially being affected.

Emotional well-being may affect the PAL. In a study done among university students, negative mood due to academic stress has been shown to adversely impacted the practice of health behaviors including fruit, and vegetable intake, sweet consumption, and PA, especially among overweight/ obese individuals (Annesi, 2020). This correlation was due to the reduction of health behavior self-regulation when under stress. In another intervention study on the male population, a positive emotional outlook on life was related to higher moderate-to-vigorous PAL and higher stages of change for PA (more ready to adopt positive change in PA) (Seaton et al., 2018). The study suggested that this effect may be due to that positive emotion may increase one's ego-resilience as the result of a higher self-regulatory capacity. Simultaneously, a higher ego-

resilience was shown to predict a higher PAL. This correlation between emotional well-being and PA was also observed among older adults (≥ 50 years) in an 11-year prospective study (Kim et al., 2017). The result indicated that psychological well-being was associated with attaining and maintaining higher PAL independent of their health status and depression over the 11 years.

2.3.2 Physical Activity Level Affects Emotional Well-Being

On the other hand, PAL may also influence the mood state. A negative relationship between PA and depressive and anxiety disorders have been proven in a study in the US (Goodwin, 2003). A review study has shown that high exercise levels exerted fewer health issues when facing stress (Gerber and Pu, 2009). One of the most common immediate mental health benefits of PA is the "runner's high" during the euphoria episode after an endurance run credited to the endorphin secretion (Tikka et al., 2021). Endorphin is a chemical in the brain mediating the release of affective components (e.g., adrenaline and glucagon) in response to stress (Amir et al., 1980).

Adults that maintained continuous PA before and during the COVID-19 pandemic reported a higher level of positive mood and lower level of depressive symptoms (Zach et al., 2021). Active individuals experienced significantly more positive moods than inactive individuals. The decrease in PAL during the COVID-19 pandemic was also shown to increase depression risk. However, the study did not indicate any causal link between the variables. Another study examining the effect of PA on health-related outcomes (sleep quality, well-

being, and affectivity) among students during the academic stress period suggested that PA may buffer the deteriorating effect of stress on the mentioned health-related outcomes (Wunsch et al., 2017). The study reported an increase in negative affect and a decrease in positive affect due to academic stress. However, more active students had a higher positive affect and lower negative affect than inactive students. However, in the same 11-year prospective study mentioned above, higher baseline PAL did not show either an increase in or a slower rate of deterioration of psychological well-being over time (Kim et al., 2017).

Nevertheless, there is also a study showing no bidirectional relationship between PA and mental health. A prospective cohort study done among Canadian secondary school students to examine this bidirectional correlation between different genders indicated that there was a sex difference in the result (Buchan et al., 2021). For males, the higher the moderate-to-vigorous PA, the lower the symptoms of anxiety and depression. Conversely, higher symptoms of the mental problem were observed among females who had higher moderate-to-vigorous PA. PAL was also shown to be unaffected by mental health. These sex-based differences could be due to the study population being adolescence who are experiencing puberty and developmental timing.

Hence, stress, negative emotional outlook, and low psychological well-being may influence the mood adversely, leading to the failure to maintain health PAL. This is probably due to the malfunction of self-regulation under the negative

affect. From the opposite side of view, PA has a protective effect on the mood and psychological well-being of individuals especially when they are under a stressful situation. However, there are studies denying the bi-directional relationship between emotional well-being and PAL suggesting that different study populations may experience different effects from the interaction between emotional well-being and PA.

2.4 The Psychosocial Factor of Physical Activity - Outcome Expectancies

PA is a complex behavior mediated by various psychosocial factors including social support, motivational readiness, self-efficacy, decisional balance, perceived stress, attitude or mood, etc. (Mama et al., 2015). Understanding the psychological factors involved in the motivations and decisions of university students during the COVID-19 pandemic to be involved in PA is necessary before planning interventions. A study has pointed out that by understanding the importance of PA and simply requesting or suggesting others to increase PA was unable to develop long-lasting PA behavioral changes (Nahas et al., 2003). This reveals other indirect factors (e.g., psychosocial variables) are needed to be considered to improve the outcome of PA interventions. For instance, there was a difference in the motivation factors between genders. Men were more motivated by the performance and ego-oriented aspects while women were influenced by their perceived appearance and health-related benefits (Pauline, 2013). Hence, considering the individual-specific motivation factors when planning an intervention may increase its efficacy rather than the conventional direct promotion.

Bandura's (1986) social cognitive theory (SCT) has been one of the most prevalent models adopted to study the acquisition and retention of health behavior (Rhodes and Conner, 2010; Wójcicki et al., 2009). SCT is a learning theory that proposed that the environment one grows up in is vital in molding one's behavior without denying the importance of the person (e.g., cognition) as well. People learn by observing others with the behaviors (e.g., actions), personal factors (e.g., thoughts, emotions, and biological properties), and social environments (e.g., social influences and physical structures within the environment) as the primary factors influencing the development in triadic, dynamic, and reciprocal relationships (Bandura, 1986). In other words, each facet has a bi-directional relationship whereby changing one of these three factors may affect the other two. However, the influential strength of each factor is different for different health behavior. For PA, the key SCT factors are self-efficacy, self-regulation, social support, and OE (Bandura, 1997).

OE are defined as the believed likelihood of the consequences of a person's behavior (Fasbender, 2019). According to SCT, one must believe that positive outcomes outweigh negative outcomes to engage in a particular behavior. Human behavior is driven by forethought which is expressed by setting goals and constructing the OE of that particular behavior (Bandura, 2001). People tend to consider what they possibly can gain or lose as an outcome of behavior before they decide to perform it.

OE are a common factor in many health behavior change models as well, for instance, the perceived benefit in the Health Belief Model, the behavioral beliefs in the Theory of Planned Behavior, the OE in the Health Action Process Approach (HAPA), and the Social Cognitive Theory (SCT) (Becker, 1974; Ajzen, 1991; Schwarzer et al., 2003; Bandura, 1986). Research agreed that despite that OE was conceptualized differently in the models, they were considerably overlapping (Barone et al., 1997; Maddux, 1993; Maddux, 1999). In the past, less attention has been paid to OE as the psychosocial factor influencing the PA of university students, especially during the period of the pandemic. Hence, in this study, the psychosocial variable that is focused on is the OE of PA with the basis of the theoretical model, SCT.

There are different types of OE which can be sorted into three categories, a) valence, b) perceived outcome immediacy, and c) dimensionality (Ralf and Aleksandra, 2016; Fasbender, 2019). *The valence* of OE covers whether the expected consequences of the behavior are pleasant (beneficial) or aversive (suffering) in nature. *Perceived outcome immediacy* describes when the expected consequences of the behavior to happen. They can be long- or short-term consequences (Rhodes and Conner, 2010). *Dimensionality* refers to the three related, yet conceptually independent subdomains of OE, namely, physical, social, and self-evaluative OE (Bandura, 1997). Physical OE are the beliefs about positive or negative physical experiences resulting from performing PA. Social OE reflect beliefs about PA leading to increased socialization opportunities and gaining social approval. Self-evaluative OE reflect beliefs

about consequences brought about by PA relating to the feeling of satisfaction and self-worth (Ralf and Aleksandra, 2016). (Kamarulzaman, 2021)

OE takes the form of if-then assumptions (e.g., if I eat healthily, then I will…). These expectations come in different degrees of desire and probability. The expectations are the result of the contemplation process by balancing the pros and cons of the anticipated behavioral outcomes. The OE scores indicate the degree of belief in the positive outcomes (Steinhardt and Dishman, 1989; Schwarzer, 2008).

2.5 Outcome Expectancies of Physical Activity among University Students during COVID-19 Pandemic

A cross-sectional study done before the pandemic among 517 university students in Jordan was shown to perceive higher social benefits of exercises (i.e., increase acceptance by others and increase social interaction) whereas lower perception of psychological and physical benefits (Hamdan, 2020). Before lockdown, the main motives for sports were found to be competition, fun, and social function among German university students (Pietsch et al., 2022). This was explained that social interaction was a crucial motive for PA (Lovell et al., 2010). Moreover, another study done among 406 university students in the United States (US) has shown that those who perceived a higher body acceptance due to PA were associated with higher PAL (Tylka and Homan, 2015). However, more studies were showing that physical and psychological benefits were more important among university students in influencing the PAL.

A study done among 2576 students in Colombia has shown a higher score for physical followed by psychological benefits (Rico et al., 2020). Technical university students in Malaysia were also found to have a higher scores for physical and psychological benefits than social benefits. When compared among the individual items of benefits listed in the questionnaire, the perceived benefits of mental health improvement and stress-relieving had the highest score. Increments in physical fitness and stamina were similarly as important. In terms of the social benefits, acceptance by others had the least score (Abdullah et al., 2018). Comparable results were shown among female Muslim university students in Malaysia as well with physical performance as the most important benefit, followed by psychological outlook and the least social interaction. Interestingly, the perceived benefit items that were of the higher score were the same as the study of Abdullah et al (2018). Social acceptance also had the lowest score within the social interaction subscale (Dadok, 2019).

From literature done during the pandemic, OE of PA were shown to be influenced by the pandemic consistently. Many studies have highlighted the increment in the importance of mental health benefits as the motivators for PA (Marashi et al., 2021; Pietsch et al., 2022; Breiner et al., 2021; Symons et al., 2021). The relaxing, enjoyment, stress-, anxiety-, and boredom-relieving effects of PA were shown to be increased when compared to pre-pandemic. In terms of the physical outcomes, an increasing trend was also observed such as improvement in overall body function, appearance, fitness, and strength (Symons et al., 2021; Al-yaaribi, 2021; Pietsch et al., 2022). It was probably due to the increased attention to the protective effect of PA from severe COVID-

19 outcomes during this pandemic which was proven in a large retrospective observational study involving 48440 patients (Sallis et al., 2021). However, the benefits of weight loss, strength building, or appearance goals were reduced during the pandemic among Canadian adults (Marashi et al., 2021). A consistent trend of the decrement in perceived social benefits was observed in the literature (Marashi et al., 2021; Pietsch et al., 2022; Al-yaaribi, 2021; Breiner et al., 2021; Symons et al., 2021). This was probably due to the social distancing implementation that reduced the social interactions used to find in sports activity engagement. People tended to avoid meeting others during the critical time of their health concerns (Mertens et al., 2020). Hence physical and psychological benefits were perceived to be more important while social benefits were less important among university students both before and during the pandemic.

2.5 The Relationship between Outcome Expectancies and Physical Activity Level during COVID-19 Pandemic

OE have been shown to predict or mediate PAL in many studies. In a three-wave survey study done among China students, OE mediated the relationship between perceived stress and PA (Zhou et al., 2021). The higher their positive OE, the higher their tendency to engage in PA. Stress was associated to lower OE, causing a reduction in PAL. Since one of the OE of PA is stress reduction, hence by focusing on this OE might increase the PAL despite being under a stressful situation. Another longitudinal cohort study done on the German population indicated that the positive PA expectation fulfillment predicted a

better outcome of PA adoption and maintenance (Klusmann et al., 2016). This dynamic feedback loop motivated the behavioral change process.

In the context of adopting healthy PAL during the COVID-19 pandemic, the negative impact on emotional well-being experienced during this period may negatively impair the physiological function of the brain, narrowing the cognitive bandwidth which directs the individuals to focus mainly on the current needs rather than the long-term benefits (Mcewen, 2007; Crielaard et al., 2021). In contrast, perceiving positive future outcomes of the behavior may facilitate health-promoting intentions including exercise. In a study done among the physically disabled population, the higher the perceived negative OE, the less likely people may engage in PA (Perrier et al., 2012). Another study done among China middle school students suggested that the perceived physical health benefits of PA and the consequences of PA on academic achievement were the underlying psychosocial factors affecting engagement in PA (Zhang et al., 2007). Thus, promoting the positive OE of PA that is important during the COVID-19 pandemic among university students may increase the PAL despite the mood disturbance.

However, there were works of literature showing inconsistent findings on this relationship. Marcin (2018) found that OE could not explain the variance in PA alone. Together with other SCT factors (self-efficacy and exercise goal setting), they explained around 14.0% of the variance in PA (Uszynski et al., 2018). Kasser (2018) also did not show the predictive effect of OE on PAL among

disabled adults with multiple sclerosis though they were aware of the benefits (Kasser and Kosma, 2018).

Therefore, positive OE may motivate people to adopt PA due to the dynamic feedback loop when the expectations are fulfilled. To be more specific, in the current study, dimensionality and the perceived outcome immediacy of OE were taken into consideration to examine the correlation between OE and PA.

2.6 Factors affecting the correlation between Outcome Expectancies and Physical Activity

2.6.1 Dimensionality of Outcome Expectations

In a review of the relationship between OE and PA, there were inconsistent findings on the significant correlation (Williams et al., 2005). This may be due to the utilization of a unidimensional approach in the scales for OE that blurs the theoretical and conceptual differences among the OE. To overcome this, MOEES was developed by Wójcicki (2009) to measure three related but conceptually independent domains of OE for exercise, namely, physical, social, and self-evaluative OE as suggested originally by Bandura (2004). This measuring scale has been adopted in many pieces of research, especially among the older population but rarely in young adults.

A study done among university students with physical disabilities indicated that the scores for physical and self-evaluative MOEES scales were high but for

social MOEES scale were moderate showing the importance of physical and self-evaluative OE were more than social OE among the study population (Dysterheft et al., 2016). Another study done among adults with type 2 diabetes has shown that both social and self-evaluative expectations contributed to moderate-intensity exercise as the population stressed more social approval or feeling of self-worth as the OE of PA than physical outcomes (Heiss and Petosa, 2016). Li (2013) also found different scores of OE for different dimensions among older Chinese adults. The study populations reported a higher score of physical OEs than social and self-evaluative OE. It was because most of the PA promotion for the elderly focused more on the physical health benefits but not on social and self-evaluative benefits (Li, 2013). Hence, the different populations may stress on different dimensions of outcome expectations.

2.6.2 Perceived outcome immediacy

The exclusion of *perceived outcome immediacy* of outcomes also contributes to the inconsistent relationship between PAL and OE (Rovniak et al., 2002). The temporal dimension of exercise OE is an important predictor of PAL, not just only the valency of the outcomes. The more proximal the OE, the more likely it can increase the PA (Li, 2013). Intertemporal choice research outlined that proximity to future outcomes alters the way these outcomes are processed (Ainslie, 1975). The value of these outcomes may be decreased if they can only be fulfilled further in the future. For instance, although proximal OE of PA (e.g., enjoyment) are less objectively important than distal ones (e.g., health benefit), proximal outcomes may exert a greater effect than distal outcomes in motivating the current health behavior. The devaluation of future rewards relative to

immediate rewards may be explained by the recipients of the rewards. For future rewards, they would be received by the "future self", which was temporally distinct and less relevant than the current self (Peetz et al., 2009; Mcelroy and Mascari, 2007).

Another explanation of the temporal aspect of OE is that focusing on the proximal exercise outcomes could intrinsically motivate individuals to participate in PA according to self-determination theory (Deci and Ryan, 1985). These outcomes refer to the sense of enjoyment, accomplishment, and skill utilization during and shortly after exercise. Conversely, if one focuses on the distal outcomes, it may stress the sense of one "ought" to exercise. However, this aspect is always overlooked, especially among younger populations (Brawley and Latimer, 2007; Segar et al., 2011). Contrasting the influence of distal and proximal outcomes may provide a better insight into the correlation between PA and OE. Li (2013) has done related research among older Chinese adults to test the effect of OE and its temporality on the PAL. Those with high OE and high rates for their immediacy had higher PAL, followed by high OE but low immediacy, moderate OE and immediacy, and low OE and immediacy (Li, 2013). More women had both high OE and immediacy. A related study has suggested that by focusing on the proximal outcomes of PA (e.g., stress relief), one may be more intrinsically motivated for PA than on distal outcomes (e.g., improved health) (Evans et al., 2014). Research done by Klusmann (2016) also reported that the most effective predictor of the success rate of PA increment was the proximal OE (e.g., positive emotional outcomes) as they were unlikely to interfere and more likely to be obtained than distal ones (e.g., social

recognition which was dependent on others and health benefits). An intervention study among university students has shown that sending messages that focused on the proximal affective (emotional) beneficial outcomes of PA (e.g., reduce muscular tension, enhance concentration and immediate happiness) as well as distal cognitive (knowledge) beneficial outcomes (e.g., reduce the risk of chronic illness such as cardiovascular disease) could possibly increase the self-reported levels of PA (Morris et al., 2016). The study on the proximity of OE and its effect on the PAL among university students are limited. From the available studies found, it shows that proximal positive outcomes of PA are significant predictors of PAL.

CHAPTER 3

METHODOLOGY

3.1 Study Design and Setting

The correlation of emotional well-being and OE with PAL among undergraduate students during the COVID-19 pandemic was a cross-sectional study design. Data collection was performed with an online questionnaire on Google forms and disseminated to prospective subjects via WhatsApp, Facebook, Instagram, and Microsoft Teams from March to June 2022. Consent was requested from the participants before they filled in the questionnaire. The questionnaire consisted of 4 parts including social-demographic data (Appendix A), physical activity level (Appendix B), emotional well-being level (Appendix C), and outcome expectancies of PA (Appendix D).

3.1.2 Study Platform

The subjects were approached using WhatsApp, Facebook, Instagram, and Microsoft Teams**.**

3.2 Subjects

3.2.1 Sample Size

The current research targeted undergraduate students (18 to 25 years old) of UTAR (Sungai Long and Kampar campuses). To calculate the sampling size of this research, Cochran's (1977) formula was used. This formula was used to calculate the ideal sample size of a large population with a specific desired level of precision, confidence level, and the estimated proportion of the attribute present in the population (Cochran, 1977). Cochran's formula was shown below, (Israel, 1992)

$$n_0 = \frac{z^2 \times p\,(1-p)}{e^2}$$

Where n_0 referred to sample size; z^2 referred to the chosen critical value of the desired level of confidence; p refers to the maximum variability of the population, and e referred to the desired level of margin of error.

Adopting the strategies of Israel (1992) in determining sample size, in the current research the recommended level of confidence of 95% was employed. There was a large population of UTAR undergraduate students but do not know the variability of the population. Hence, the maximum variability of the population at 50% was used. Since there was a lack of resources and time in this study, a margin error of ±8 is used. Moreover, the t-value for an alpha level of 0.05 is 1.96 for the sample size above 120. Hence, the calculation was as follow:

$$n_0 = \frac{(1.96)^2 \times 0.5\ (1 - 0.5)}{(0.08)^2} = 150.06 \approx 150$$

Assuming a 10% non-response rate:

$$n_0 = 150 \times \frac{110}{100} = 165$$

Hence, the sample size required for this study was decided at 165.

3.2.2 Inclusion Criteria

Participants in this study included students from Universiti Tunku Abdul Rahman (UTAR), Malaysian citizens, regardless of gender, and race, aged 18 to 25, and pursuing their undergraduate degree programs.

3.2.3 Exclusion Criteria

Undergraduate students with a medical diagnosis of chronic disease, individuals with conditions that prevent them from performing physical exercise, and individuals who were currently receiving treatment for mental health issues were excluded.

3.3 Ethical Consideration and Approval

Ethical approval was obtained from UTAR Scientific and Ethical Review Committee (U/SERC/112/2022). All subjects were given information on the study at the beginning of the questionnaires. The information explained that the participation was voluntary. Subjects who agreed to participate would require to click the "Agree" button on the consent forms to participate in the study.

Subjects could withdraw from the study by simply exiting or closing the browser page. (see Appendix A)

3.3.1 Consent Form

All samples were taken following the Personal Data Protection Act 2010 (PDPA) before the commencement of the study. The subjects remained anonymous and were assured their responses would remain confidential.

3.4 Data Collection

3.4.1 Questionnaire:

3.4.1.1 Social-demographic data

Respondents were requested to complete a socio-demographic questionnaire during the physical meeting. A socio-demographic questionnaire was created to obtain participants' general details, medical history, and anthropometric measurements. (See Appendix B)

3.4.1.2 Physical Activity

International Physical Activity Questionnaire short form (IPAQ- SF) is a PA assessment to measure the previous seven days PAL of an individual who is in the age range of 15 - 69 years (IPAQ, 2005). This instrument is validated in many pieces of research in twelve countries (Craig et al., 2003). It is made up of four components which include vigorous physical activity (jogging/running, heavy lifting, and fast bicycling), moderate physical activity (house chores,

gardening, and yoga), walking duration, and sitting duration. The frequency and duration of the four types of PA were answered by the respondents. For continuous score, metabolic equivalent of task (MET)-minutes/week was calculated by multiplying the minutes, days spent on the specific activity acquired from the questionnaire replies intensity-specific MET value. 1 MET is defined as a resting energy expenditure assuming oxygen consumption of 3.5ml-min/kg weight. The MET value for each intensity of PA was standardized as 3.3 METs (low intensity), 4.0 METs (moderate intensity), and 8.0 METs (vigorous intensity). The total physical activity MET-minutes/week was obtained by adding the scores for walking, moderate and vigorous MET-minutes/week. For the categorical score, PAL of the respondents was categorized into three level namely, low, moderate and high, based on the total PA score as shown in Table 3.2 same as the category set by NHMS 2015 and NHMS 2019 (MOH, 2015; MOH, 2019). A higher MET-minutes/week score implied that the participant engaged in more PA and a score of minimum 600 MET-min/week was determined as physically active. (See Appendix C)

Physical Activity Scoring Equation:

Vigorous PA score (VPA) = 8 × (days with vigorous activities) × (daily minutes of vigorous activity)

Moderate PA score (MPA) = 4 × (days with moderate activities) × (daily minutes of moderate activity)

Walking PA score = 3.3 × (days with walking activities) × (daily minutes of walking)

Total PA score (TPA) = Vigorous PA score + Moderate PA score + Walking PA score

Table 3.1: Physical Activity Classification Criteria

PA scoring	Physical Activity Level (PAL)
Total PA score < 600 MET.min.wk	Low
Total PA score ≥ 600 MET.min.wk	Moderate
Total PA score ≥ 3000 MET.min.wk	High

3.4.1.3 Emotional well-being

Positive and Negative Affect Schedule (PANAS) questionnaire described feelings and emotions using 20 different word items with 10 items measuring positive affect (e.g., excited, inspired) and the other 10 measuring negative affect (e.g., upset, afraid) (Watson et al., 1988; Tran, 2013). Participants were required to rate the 20 words to what extent they felt that way throughout the COVID-19 pandemic using a 5-point Likert scale response set ranging from (1 = Very slightly or not at all to 5 = Extremely) (See Appendix D). To obtain the score for the Positive Affect, the scores on items 1,3,5,9,10,12,14,16,17, and 19 were summed up. Scores could range from 10-50, with higher scores representing higher levels of positive affect. Similarly, to score for the Negative Affect, the scores on items 2,4,6,7,8,11,13,15,18, and 20 were summed up. The scores could range from 10-50, with lower scores representing lower levels of negative affect

Positive Affect Score: Add the scores on items 1, 3, 5, 9, 10, 12, 14, 16, 17, and 19. Scores can range from 10 – 50, with higher scores representing higher levels of positive affect.

Negative Affect Score: Add the scores on items 2, 4, 6, 7, 8, 11, 13, 15, 18, and 20. Scores can range from 10 – 50, with lower scores representing lower levels of negative affect.

Participant's scores on the PANAS: Positive: ____ Negative: ____

3.4.1.4 Outcome Expectancies (OE)

OE was measured using the 15-item model of the Multidimensional Outcome Expectations for Exercise Scale (MOEES). It was used to assess three related but conceptually independent aspects of OE for PA, namely, physical, social, and self-evaluative OE. It consisted of 15 items reflecting three categories of OE (6 items reflecting physical, 4 items reflecting self-evaluative, and 5 items reflecting social OE) adopted from a prior research study (Wójcicki et al., 2009). All three OE scales were shown to have good internal consistency in the previous research with Cronbach's alpha (α) of 0.82 (physical), 0.84 (self-evaluative), and 0.82 (social). Although this model was only proven to be valid for the elderly population so far without a specific validity study for the younger population, there was another study using MOEES to evaluate the OE of PA among college students (Wójcicki et al., 2009; Farren et al., 2017). In that study, the MOEES had an excellent internal consistency (α= 0.96). The items measured the extent to which participants agreed that if they engage in physical activities will help them to attain key outcomes. The items were rated on a 5-point Likert scale (1 = extremely disagree; 5 = extremely agree). The total subscale score was derived by summing the numerical ratings for each response (i.e., scale range from 6 to 30 for physical outcome expectations, 4 to 20 for social outcome expectations, and 5 to 25 for self- evaluative outcome expectations). Those with a higher score were more inclined to think about the positive consequences of the exercise.

To achieve standardized number scales between the subscales, mean item average scores of three subscales were derived by averaging the number of items from the subscale respectively with the following formula:

[mean item average scores = Total subscale score of dimension/number of items in dimension answered by the participants].

For instance, the six items from the physical outcome expectations subscale (improve my ability to perform daily activities, improve my overall body functioning, strengthen my bones, increase my muscle strength, aid in weight control, and improve the functioning of my cardiovascular system) were averaged by dividing the sum of the respective scores by 6. (See Appendix E)

3.4.1.5 Perceived Outcome Immediacy (POI)

The method was adopted from a previous study done by Li (Li, 2013). For each item in MOEES, participants were asked to rate a follow-up 7-point Likert scale question: "How soon will you see this expected outcome if you engage in PA?" (1 = a distant future; 7 = immediately; Missing = very hard to say). With the "missing" option, participants were allowed to opt out if they were uncertain about the temporal nature of the OE. An immediacy score was calculated by averaging the scores within each of the subdimension. The higher the scores, the more immediate the outcomes being actualized. The Cronbach's α was shown to be ranging from 0.94 to 0.95 indicating satisfactory internal consistency in the previous study (Li, 2013).

To achieve standardized number scales between the subscales, the mean item average scores of three subscales were derived by averaging the number of items from the subscale that was answered by the participants respectively with the following formula:

[mean item average scores = Total subscale score of dimension/number of items in dimension answered by the participants].

For instance, if the participants answered three out of six items from the POI of physical outcome expectations subscale, it would be averaged by dividing the sum of the respective scores by three.

3.5 Statistical Analysis

For the statistical analysis, the Statistical Packages for Social Sciences (SPSS) Version 26.0 computer program was utilized to collect, tabulate and analyze the data collected. The mean, standard deviations (SD), median, interquartile range (IQR) frequency and percentage of the socio-demographic variables, PA, OE, POI, and positive and negative affect scores were calculated using descriptive tests. All data were checked for normality by using the Kolmogorov-Smirnov test and also visual identification of bell-shaped curves with histograms. For descriptive statistics, continuous variables were reported as mean (SD) for normally distributed data or median (IQR) for non-normally distributed data. Categorical variables were described using n (%). To test the differences between the groups, the continuous variable used the independent t-test (for normally distributed data), and Mann-Whitney test (for non-normally distributed data), whereas categorical variables, using the chi-squared test to categorize and interpret the necessary information for this research study at 95% confidence interval. To answer the null hypotheses 1 to 2, the correlation between emotional well-being, OE, and PAL was investigated using Spearman's

correlation test for non-normally distributed data. The statistically significant level was set at $p < 0.05$. The strength of the correlation was indicated by the linear correlation coefficient R and the classification of the degree of correlation is shown in table 3.2.

Table 3.2: Degree of Correlation Classification

Degree of Correlation	*Positive Correlation*	*Negative Correlation*
Perfect	+1	-1
Strong	$0.8 \leq r < 1.0$	$-1.0 < r \leq -0.8$
Moderate	$0.4 \leq r < 0.8$	$-0.8 < r \leq -0.4$
Weak	$0 < r < 0.4$	$-0.4 < r < 0$
Absent	0	0

3.6 Flow Chart of the Study

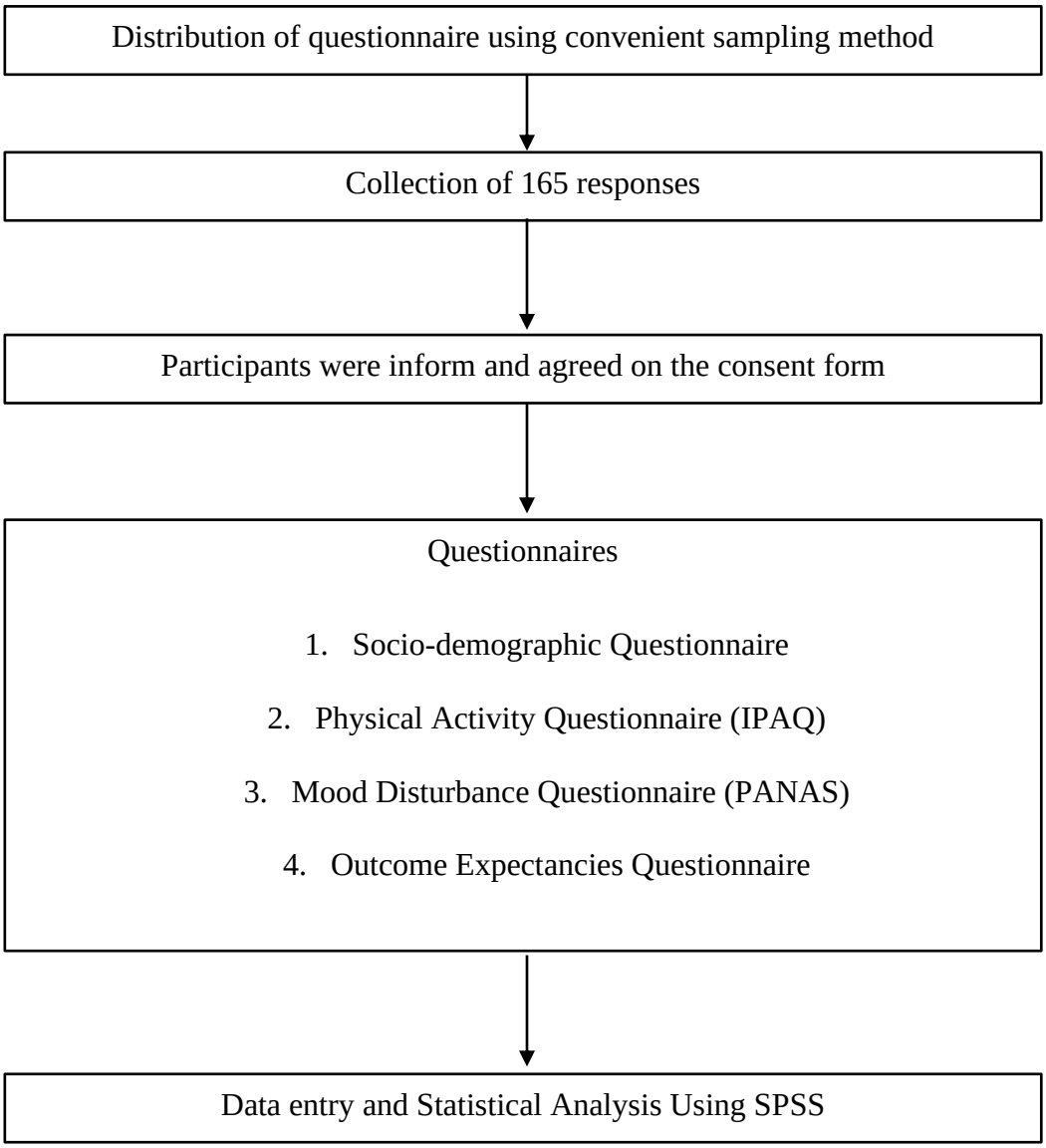


Figure 3.1: Flow Chart of the Study

CHAPTER 4

RESULTS

4.1 Participants recruitment

The online questionnaire link was distributed to potential participants in March 2022 and closed in July 2022. A total of 207 participants were recruited. However, 42 of them were excluded from the study due to not meeting the study criteria or providing incomplete data. Only 165 participants were selected and analyzed for the research.

4.2 Socio-demographic Characteristic

The socio-demographic characteristics of the study sample are shown in Table 4.1. There were more females (65.5%) than males (34.5%) recruited for the study. Most of the participants came from the age group of 21-23 (78.2%) followed by 18-20 (16.4%) and 24-25 (5.5%). Almost all of the participants were Chinese (97.0%) and only 3 were Indians (3.0%). The majority of the participants were studying in Year 3 (41.2%) and Year 2 (36.4%), followed by Year 1 (12.7%), Year 4 (8.5%), and only 2 in their Year 5 (1.2%).

Table 4.1**:** Socio-demographic information of participants.

Variables	Subjects (N=165)	
	Frequency (n)	**Percentage (%)**
Gender		
Male	57	34.5
Female	108	65.5
Age		
18-20 years	27	16.4
21-23 years	129	78.2
24-25 years	9	5.5
Ethnicity		
Chinese	160	97.0
Indian	5	3.0
Year of Study		
Year 1	21	12.7
Year 2	60	36.4
Year 3	68	41.2
Year 4	14	8.5
Year 5	2	1.2

4.3 Physical activity level (PAL)

The PA was assessed using IPAQ that yielded an IPAQ score with the unit of MET minutes/week. All the IPAQ scores and sitting time had a p-value of 0.000 except for the sitting time of males (p=0.164) for the Kolmogorov-Smirnov test, suggesting that all data were not normally distributed (see Appendix F1). Hence, all data were expressed in the median and interquartile range (IQR).

Table 4.2 has shown the IPAQ scores of the participants. The TPA score of all participants had a median of 1173.00 (1899.95) MET minutes/week. In terms of the intensity of activity, VPA had a higher median of 240.00 (960) MET minutes/week when compared to moderate PA [120.00 (480) MET minutes/week]. The total walking scores had a median of 396.00 (519.75) MET minutes/week. The median sitting time was 5.00 (4.58) hours/day.

In terms of the category of the PAL, most of the participants were having a moderate PAL (52.7%), followed by low PAL (29.7%) and high PAL (17.6%) as shown in Table 4.3 and Figure 4.1.

Table 4.2**:** IPAQ scores of participants

Item	Average score Median (IQR)
TPA (MET minutes/week)	1173.00 (1899.95)
VPA (MET minutes/week)	240.00 (960)
MPA (MET minutes/week)	120.00 (480)
Walking (MET minutes/week)	396.00 (519.75)

Table 4.3: Physical activity level (PAL) of participants

Item	Frequency (n)	Percentage (%)
Low (< 600 MET minutes/week)	49	9.7
Moderate (≥ 600 MET minutes/week)	87	52.7
High (≥ 3000 MET minutes/week)	29	17.6

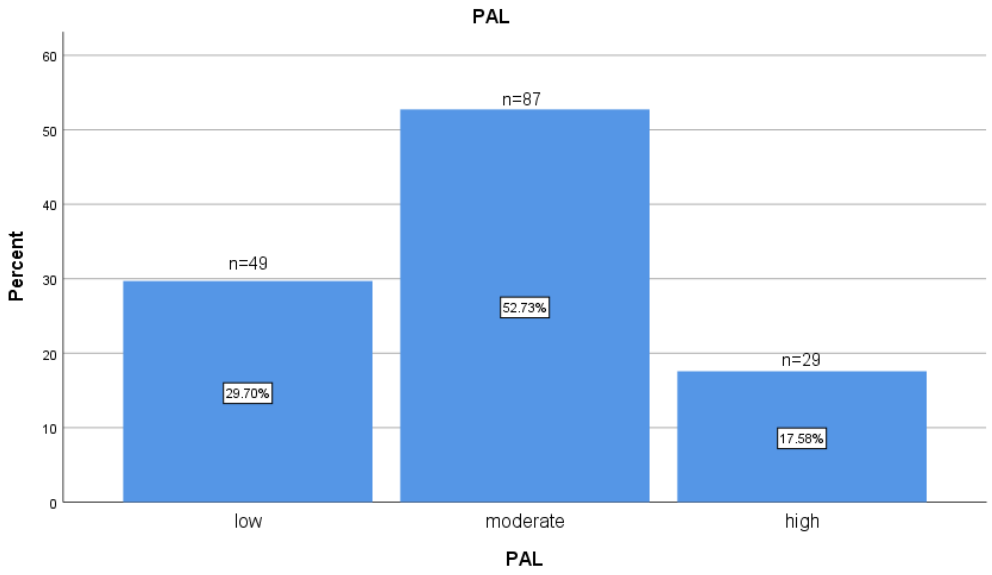


Figure 4.1 Physical activity level (PAL) of participants

4.4 Emotional well-being - Positive and Negative Affect Scale (PANAS)

Emotional well-being was measured with the PANAS. It has two subscales. For the positive affect score, the p-value for the Kolmogorov-Smirnov test was 0.046 suggesting that the data was not normally distributed. However, the histogram showed a bell shape suggesting that the data was approximately normal (see Appendix F2). For the negative affect score, the p-value for the Kolmogorov-Smirnov test was 0.016 suggesting that the data was not normally distributed. However, the histogram showed a bell shape suggesting that the data was approximately normal (see Appendix F2). Hence, both subscales were treated as normally distributed data and expressed in mean $\pm$ standard deviation.

The range of the scale was from 10 to 50. As shown in Table 4.4a, the mean positive affect score (32.66 ± 6.08) was higher than the mean negative affect score (24.01 ± 7.55). In terms of the positive affect items, "interesting" (3.54 ± 0.79) and "attentive" (3.45 ± 0.95) had the highest mean score while for negative affect items, "nervous" (2.88 ± 1.16) and "upset" (2.63 ± 1.08) had the highest mean score as shown in Table 4.4b

Table 4.4a: Positive and Negative Affect scores of Participants

Item	Range	Mean	Standard Deviation
Positive Affect	10-50	32.66	6.08
Negative Affect	10-50	24.01	7.55

Table 4.4b: Means and Standard Deviations of Each Item in Positive and Negative Affect Schedule

Statement	Mean	Standard Deviation
Positive Affect		
Interesting	3.54	0.79
Attentive	3.45	0.95
Determined	3.32	0.99
Enthusiastic	3.31	0.94
Inspired	3.27	1.00
Excited	3.27	0.96
Active	3.26	1.01
Strong	3.22	0.84
Alert	3.07	0.97
Proud	2.95	1.06
Negative Affect		
Nervous	2.88	1.16
Upset	2.63	1.08
Distressed	2.53	1.13
Jittery	2.51	1.15
Irritable	2.48	1.06
Scared	2.36	1.06
Afraid	2.32	1.14
Ashamed	2.11	0.99
Guilty	2.10	1.04
Hostile	2.10	1.00

4.5 Outcome Expectancies of Physical Activity

OE was measured using the 15-item model of the Multidimensional Outcome Expectations for Exercise Scale (MOEES). Other than the total OE score, it was subdivided into another three subscales, namely, physical OE, social OE and self-evaluative OE. For total OE, the p-value for the Kolmogorov-Smirnov test was 0.095 (>0.05) suggesting that the data was normally distributed whereas the three subscales had p-value smaller than 0.05 (physical OE=0.009, social OE= 0.000, self-evaluative OE= 0.000). In terms of the histograms, only social OE showed a bell shape suggesting that the data was approximately normal (see Appendix F3). The remaining 2 had a shape skewed to the right. Hence, total OE and social OE were expressed in mean $\pm$ standard deviation, while physical and self-evaluative OE were expressed in median $\pm$ IQR. The range for total OE was from 15 to 75. The mean for total OE was 60.55 ± 8.07, falling within the upper range. For the three-dimensional subscales, all of their mean or medians also fall within the upper range respectively as shown in Table 4.5a.

To compare the OE among the three dimensions, the mean OE average scores of the three subscales were calculated as shown in Table 4.5b. Self-evaluative OE had the highest mean item average score (4.23 ± 0.05), followed by physical (4.18 ± 0.04) and social dimension (3.57 ± 0.06). Table 4.5c have shown the MOEES 15-item questionnaire with the participants' response frequencies and the mean of each item. "Help manage stress" had the highest mean (4.33) followed by "increase my muscle strength" (4.31) and "improve my mood". The 4 items in social OE had the lowest mean. The lowest mean was "increase my acceptance by others" (3.38).

Table 4.5a: Outcome Expectancies of Participants

Item	Range	Mean±SD/ Median (IQR)
Total OE	15-75	60.55 ± 8.07
Physical OE	6-30	25.00 (5)
Social OE	4-20	14.27 ± 3.24
Self-evaluative OE	5-25	21.00 (5)

Table 4.5b**:** Mean Average Scores or Outcome Expectancies Subscales

Outcome Expectancies Subscales	Mean	Standard Deviation
Physical OE	4.18	0.04
Social OE	3.57	0.06
Self-evaluative OE	4.23	0.05

Table 4.5c: Means and Standard Deviations of Each Item in Multidimensional Outcome Expectations for Exercise Scale

Statement	Mean	Standard Deviation
Physical outcome expectations:		
increase my muscle strength	4.31	0.74
improve my overall body functioning	4.28	0.67
improve the functioning of my cardiovascular system	4.23	0.75
improve my ability to perform daily activities	4.12	0.78
aid in weight control	4.09	0.96
strengthen my bones	4.04	0.80
Social outcome expectations:		
provide companionship	3.67	0.98
make me more at ease with people	3.64	1.02
improve my social standing	3.58	0.97
increase my acceptance by others	3.38	1.13
Self-evaluative outcome expectations		
help manage stress	4.33	0.79
improve my mood	4.30	0.76
give me a sense of personal accomplishment	4.27	0.77
improve my psychological state	4.20	0.77
increase my mental alertness	4.11	0.74

4.6 Perceived Outcome Immediacy

POI was measured using the derivative scales of MOEES by asking the participants to rate “how soon will you see this expected outcome if you engage in physical activity” on a 7-point Likert scale. Other than the total OE immediacy score, the immediacy score for physical OE, social OE, and self-evaluative OE were derived. The p-value for the Kolmogorov-Smirnov test of all variables were less than 0.05 (total POI= 0.007, physical POI= 0.009, social POI= 0.007, self-evaluative POI= 0.020) as shown in table 4.8. However, their histograms were showing bell-shaped curves, suggesting that they were normally distributed (see Appendix F4). Hence, all of them were expressed in mean $\pm$ standard deviation.

Since participants had the choice of not filling in the scale if they were unsure, the ranges of the scales all started from 0. All of the means of POI scores including total, physical, social, and self-evaluative, fell within the upper range with the total mean score of 67.64 ± 12.73 as shown in Table 4.6a.

To compare the POI among the three dimensions, the mean POI average scores of the three subscales were calculated as shown in Table 4.6b. Self-evaluative POI had the highest mean item average score (5.27 ± 0.96), followed by physical POI (4.32 ± 0.99) and social POI (4.22 ± 1.27).

Table 4.6c have shown the 15-item POI questionnaire with the participants' response frequencies and the mean of each item. Self-evaluative dimension had higher mean scores compared to the other two dimensions with "improve my mood" as the highest (M=5.55), followed by "help manage stress" (M=5.39).

There was a total of 63 missing values with the social dimension having the highest percentage of missing values (5.30%), followed by the self-evaluative dimension (2.06%) and physical dimension (1.11%).

Table 4.6a: Perceived Outcome Immediacy Score of Participant

Item	Range	Mean±SD
Total POI	0-105	67.64 ± 12.73
Physical POI	0-42	25.70 ± 6.15
Social POI	0-28	16.07 ± 5.78
Self-evaluative POI	0-35	25.87 ± 5.21

Table 4.6b: Mean Average Scores or Perceived Outcome Immediacy Subscales

Outcome Expectancies Subscales	Mean	Standard Deviation
Physical OE	4.32	0.99
Social OE	4.22	1.27
Self-evaluative OE	5.27	0.96

Table 4.6c: Means and Standard Deviations of Each Item in Perceived Outcome Immediacy Scale

Statement	Missing N	Mean	Standard Deviation
Physical outcome expectations:			
increase my muscle strength	1	4.55	1.30
improve my overall body functioning exercise	2	4.53	1.13
improve my ability to perform daily activities	3	4.40	1.19
aid in weight control	0	4.29	1.44
improve the functioning of my cardiovascular system	1	4.25	1.34
strengthen my bones	4	3.97	1.42
Social outcome expectations:			
provide companionship	9	4.45	1.47
make me more at ease with people	7	4.20	1.48
increase my acceptance by others	8	4.18	1.54
improve my social standing	11	4.14	1.50
Self-evaluative outcome expectations			
improve my mood	3	5.55	1.19
help manage stress	2	5.39	1.21
improve my psychological state	1	5.24	1.25
give me a sense of personal accomplishment	7	5.19	1.44
increase my mental alertness	4	5.03	1.24

4.7 Correlation between Physical Activity and Emotional well-being

Hypothesis 2 (H_B): There is a significant relationship between PAL and emotional well-being

A Spearman's correlation test was utilized to assess the relationship between PAL and emotional well-being (positive and negative affects) as not all data were normally distributed as shown in Table 4.7a. There was only a weak positive correlation between the TPA score and the positive affect score of all participants (r=0.290, p=0.000). When stratified by the intensity of PA, this correlation effect was also found between VPA and positive affect (r=0.320, p=0.000) but not with MPA and walking. No significant correlation was found between variables and negative affect score as shown in Table 4.7b

Table 4.7a: Correlation between Physical Activity and Positive Affect Score

	Positive Affect Score	
	r	p-value
TPA (MET minutes/week)	0.290**	0.000
VPA (MET minutes/week)	0.320**	0.000
MPA (MET minutes/week)	0.110	0.161
Walking (MET minutes/week)	0.121	0.121

** Spearman's correlation is significant at the 0.01 level (2-tailed).

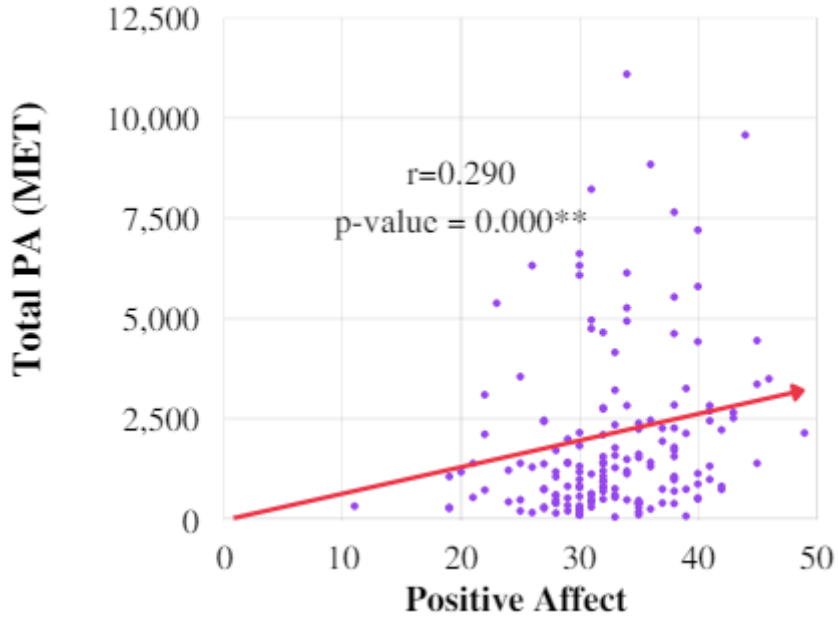


Figure 4.2 Scatter Plot for Positive Affect Score and TPA

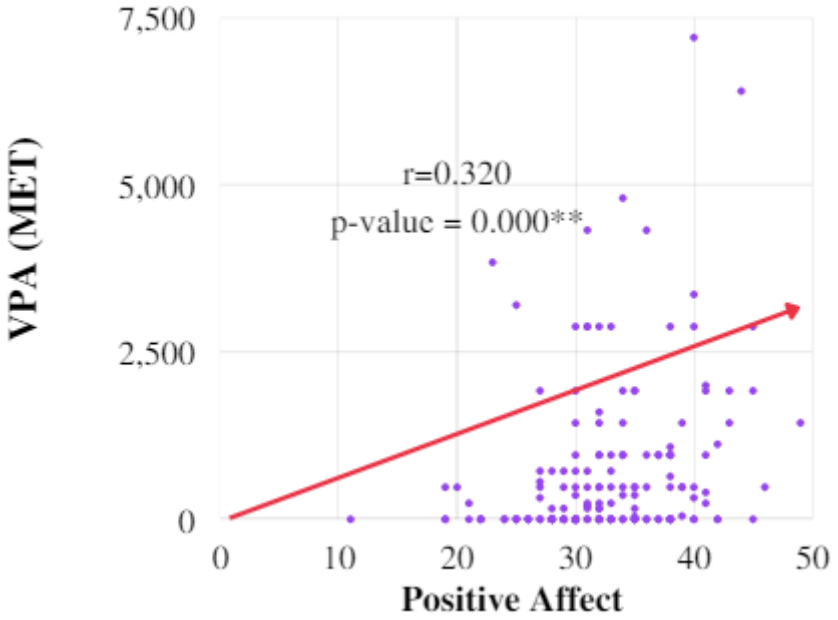


Figure 4.3 Scatter Plot for Positive Affect Score and VPA

Table 4.7b: Correlation between Physical Activity and Negative Affect Score

	Negative Affect Score	
	r	p-value
TPA (MET minutes/week)	-0.083	0.292
VPA (MET minutes/week)	-0.001	0.992
MPA (MET minutes/week)	0.002	0.977
Walking (MET minutes/week)	-0.052	0.509

4.8 Correlation between Physical Activity and Outcome Expectancies

Hypothesis 3 (H_C): There is a significant relationship between PAL and outcome expectancies.

4.8.1 Dimensionality

A Spearman's correlation test was utilized to assess the relationship between PAL and the dimensionality of OE as the IPAQ score was not normally distributed. There was no correlation found between PAL and dimensionality of OE as shown in Table 4.8a. to Table 4.8d. Only a weak positive correlation is found between social OE and VPA score (r=0.177, p=0.023) in Table 4.8c.

Table 4.8a: Correlation between Physical Activity and Total Outcome Expectancies

	Total Outcome Expectancies	
	r	p-value
TPA (MET minutes/week)	0.018	0.821
VPA (MET minutes/week)	0.118	0.131
MPA (MET minutes/week)	0.075	0.341
Walking (MET minutes/week)	-0.041	0.598

Table 4.8b: Correlation between Physical Activity and Physical Outcome Expectancies

	Physical Outcome Expectancies	
	r	p-value
TPA (MET minutes/week)	0.012	0.873
VPA (MET minutes/week)	0.003	0.971
MPA (MET minutes/week)	0.044	0.575
Walking (MET minutes/week)	0.033	0.673

Table 4.8c: Correlation between Physical Activity and Social Outcome Expectancies

	Social Outcome Expectancies	
	r	p-value
TPA (MET minutes/week)	-0.041	0.605
VPA (MET minutes/week)	0.177*	0.023
MPA (MET minutes/week)	0.041	0.601
Walking (MET minutes/week)	-0.138	0.076

* Spearman Correlation is significant at the 0.05 level (2-tailed).

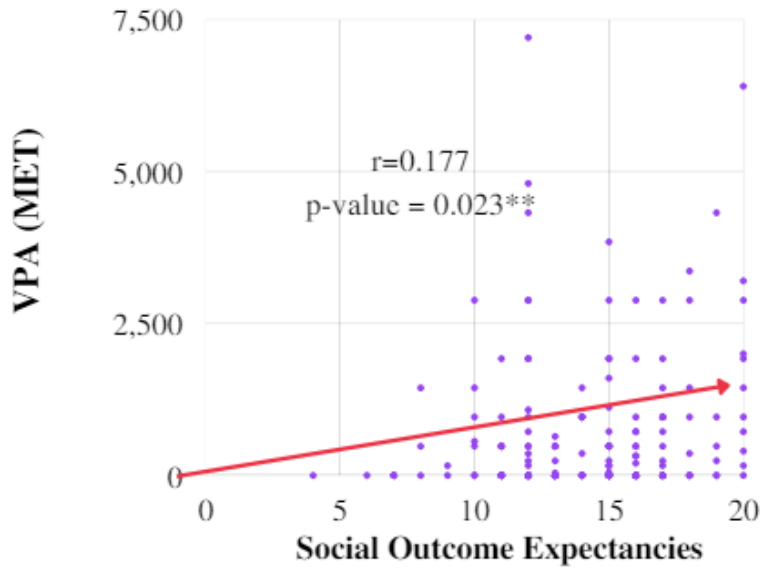


Figure 4.4 Scatter Plot for Social Outcome Expectancies and VPA

Table 4.8d: Correlation between Physical Activity and Self-evaluative Outcome Expectancies

	Self-evaluative Outcome Expectancies	
	r	p-value
TPA (MET minutes/week)	0.061	0.436
VPA (MET minutes/week)	0.105	0.179
MPA (MET minutes/week)	0.080	0.304
Walking (MET minutes/week)	0.015	0.845

4.8.2 Perceived Outcome Immediacy

A Spearman's correlation test was utilized to assess the relationship between PAL and its POI as not all data were normally distributed.

In terms of total POI, it had a weak correlation with TPA (r=0.278, p=0.000) as shown in Table 4.9a. For physical dimension wise, it had a similar result to the total score. There was a weak positive correlation between physical POI (r=0.296, p=0.000), self-evaluative POI (r= 0.254, p=0.001), and TPA as shown in Tables 4.9b and 4.9d. For social POI, it only had a weak positive correlation with VPA (r=0.277, p=0.000) as shown in Table 4.9c. In conclusion, POI has a weak positive correlation with TPA.

Table 4.9a**:** Correlation between Physical Activity and Total Outcome Immediacy

	Total Outcome Immediacy	
	r	p-value
TPA (MET minutes/week)	0.278**	0.000
VPA (MET minutes/week)	0.358**	0.000
MPA (MET minutes/week)	0.223**	0.004
Walking (MET minutes/week)	0.111	0.157

** Spearman Correlation is significant at the 0.01 level (2-tailed).

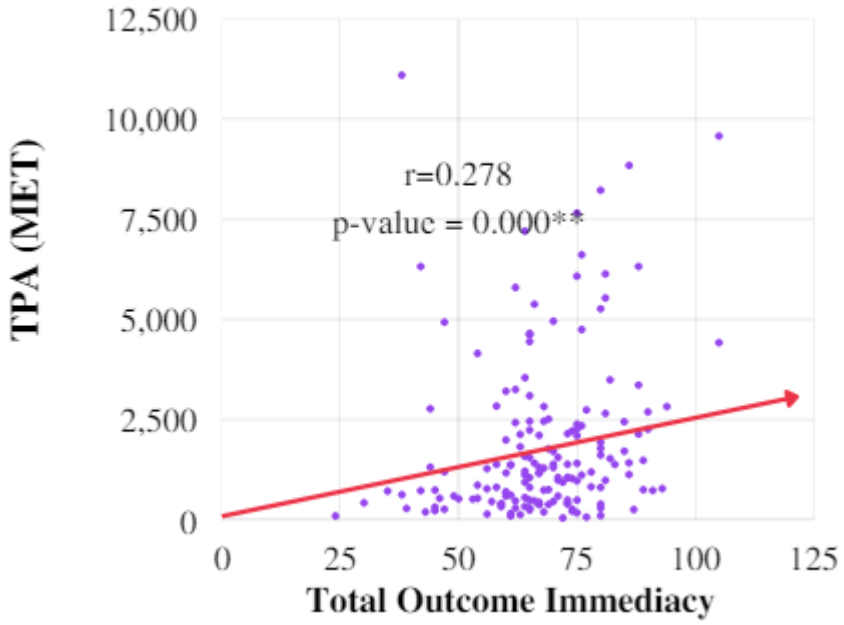


Figure 4.5 Scatter Plot for Total Outcome Immediacy and TPA

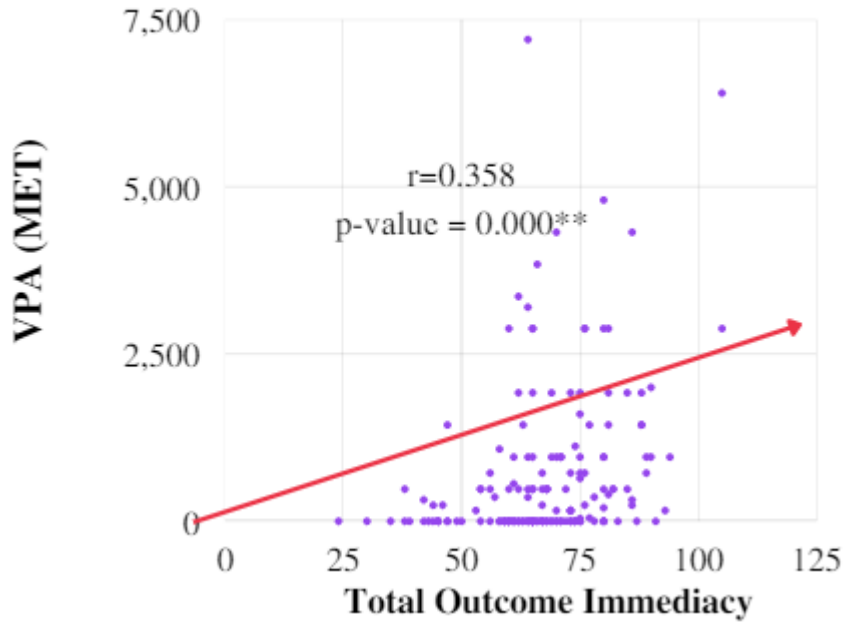


Figure 4.6 Scatter Plot for Total Outcome Immediacy and VPA

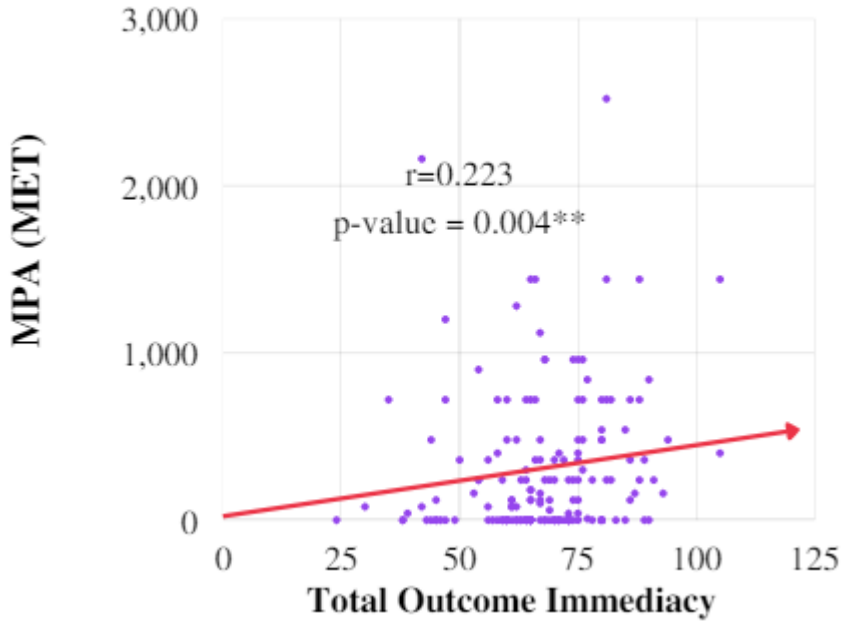


Figure 4.7 Scatter Plot for Total Outcome Immediacy and MPA

Table 4.9b**:** Correlation between Physical Activity and Physical Outcome Immediacy

	Physical Outcome Immediacy	
	r	p-value
TPA (MET minutes/week)	0.296**	0.000
VPA (MET minutes/week)	0.338**	0.000
MPA (MET minutes/week)	0.199**	0.010
Walking (MET minutes/week)	0.159*	0.041

* Spearman Correlation is significant at the 0.05 level (2-tailed).

** Spearman Correlation is significant at the 0.01 level (2-tailed)

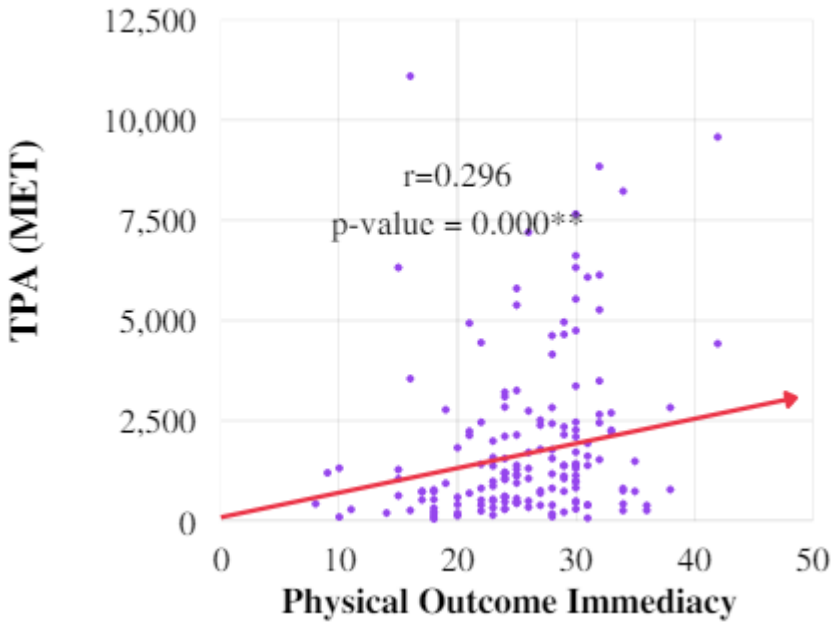


Figure 4.8 Scatter Plot for Physical Outcome Immediacy and TPA

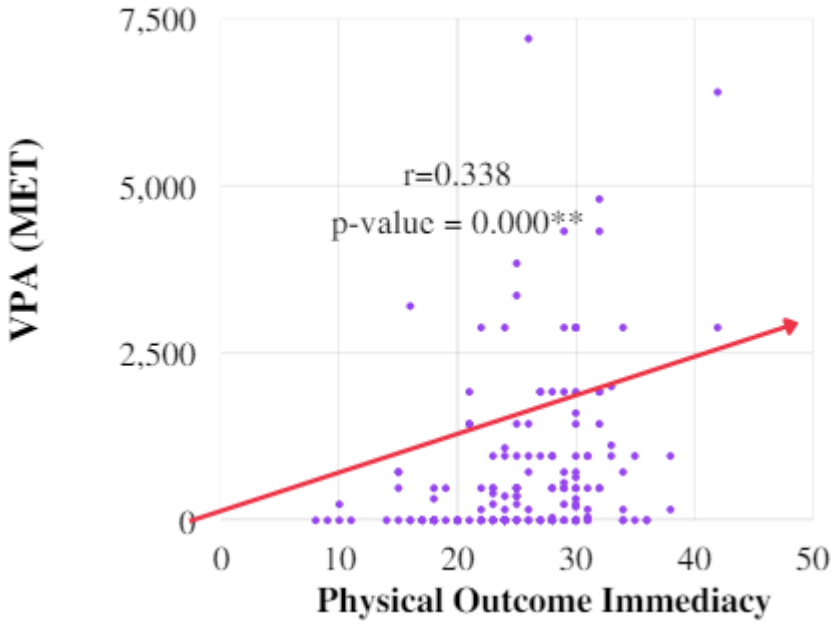


Figure 4.9 Scatter Plot for Physical Outcome Immediacy and VPA

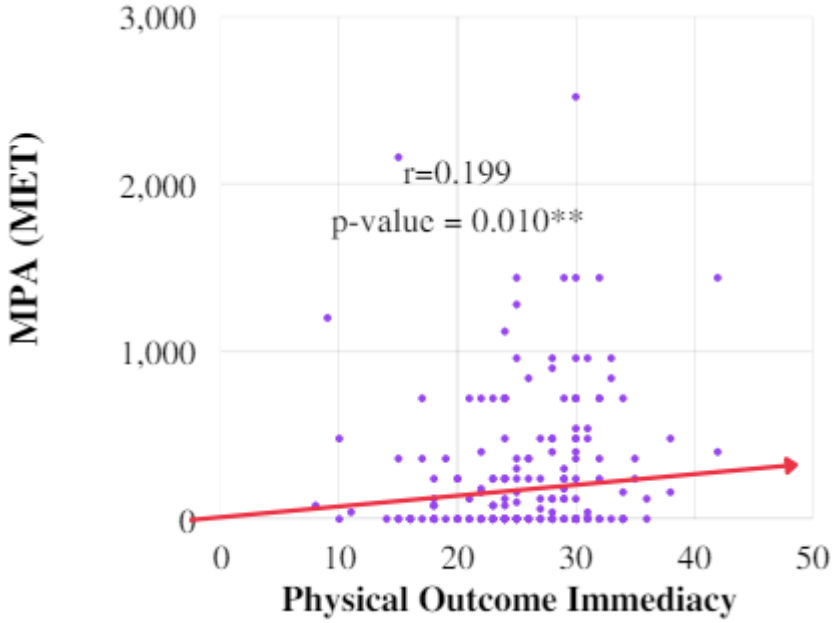


Figure 4.10 Scatter Plot for Physical Outcome Immediacy and MPA

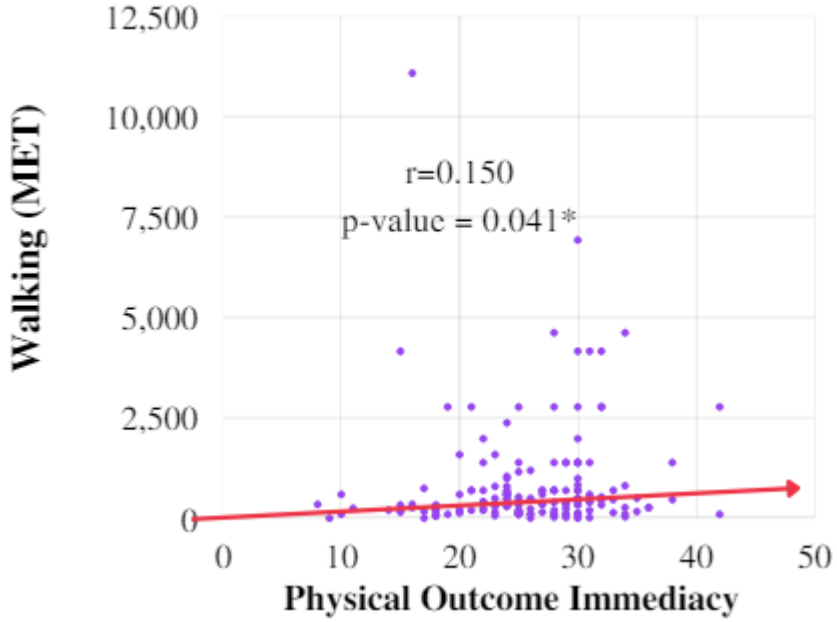


Figure 4.11 Scatter Plot for Physical Outcome Immediacy and Walking Score

Table 4.9c**:** Correlation between Physical Activity and Social Outcome Immediacy

	Social Outcome Immediacy	
	r	p-value
TPA (MET minutes/week)	0.142	0.069
VPA (MET minutes/week)	0.277**	0.000
MPA (MET minutes/week)	0.074	0.342
Walking (MET minutes/week)	-0.01	0.990

** Spearman Correlation is significant at the 0.01 level (2-tailed).

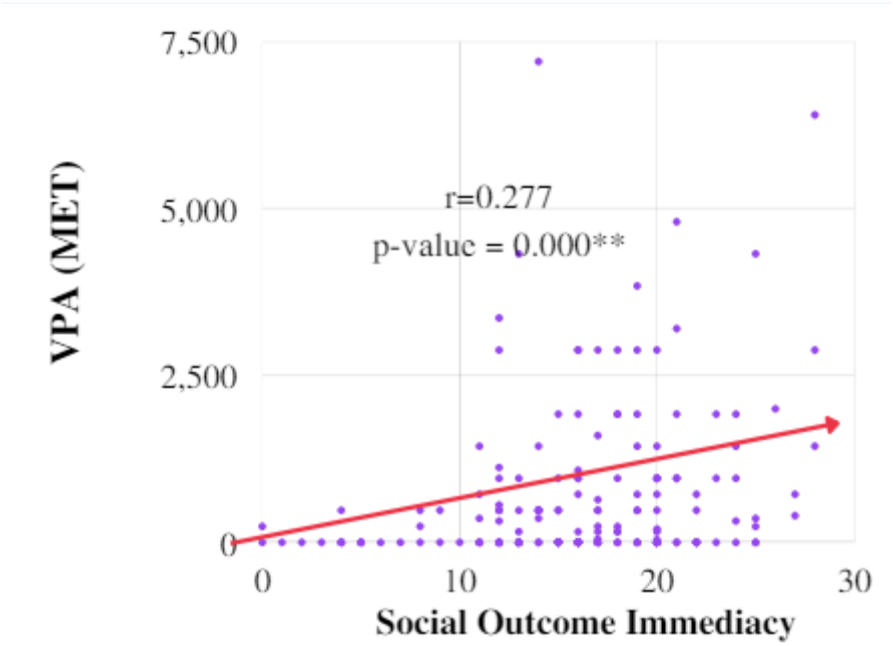


Figure 4.12 Scatter Plot for Social Outcome Immediacy and VPA

Table 4.9d**:** Correlation between Physical Activity and Self-Evaluative Outcome Immediacy

	Self-Evaluative Outcome Immediacy	
	r	p-value
TPA (MET minutes/week)	0.254**	0.001
VPA (MET minutes/week)	0.269**	0.000
MPA (MET minutes/week)	0.270**	0.000
Walking (MET minutes/week)	0.087	0.269

** Spearman Correlation is significant at the 0.01 level (2-tailed).

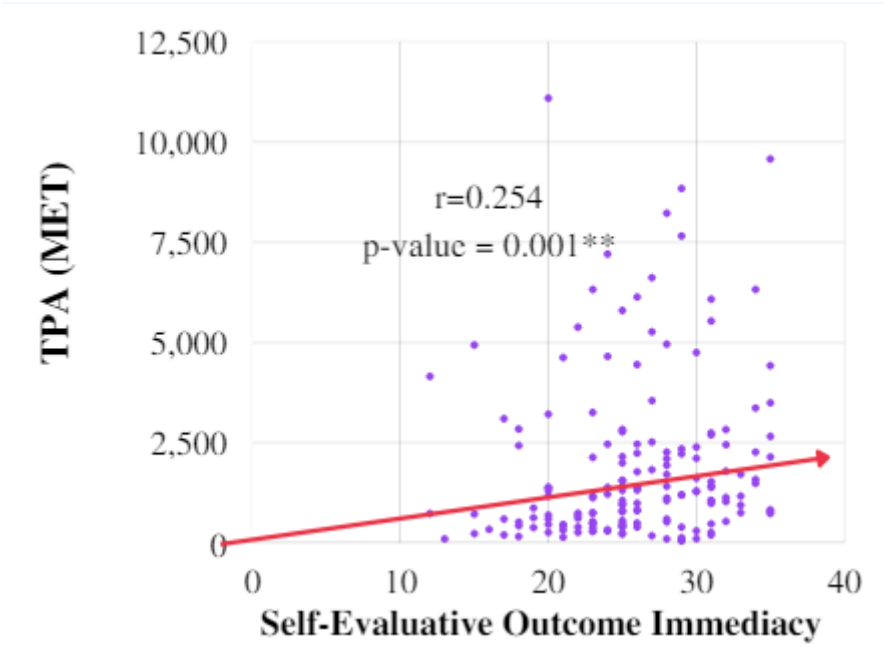


Figure 4.13 Scatter Plot for Self-Evaluative Outcome Immediacy and TPA

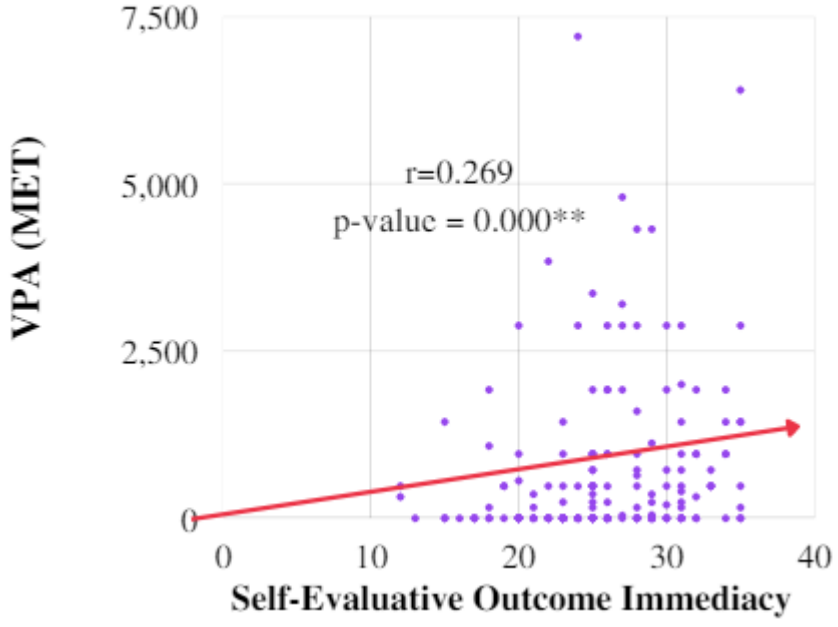


Figure 4.14 Scatter Plot for Self-Evaluative Outcome Immediacy and VPA

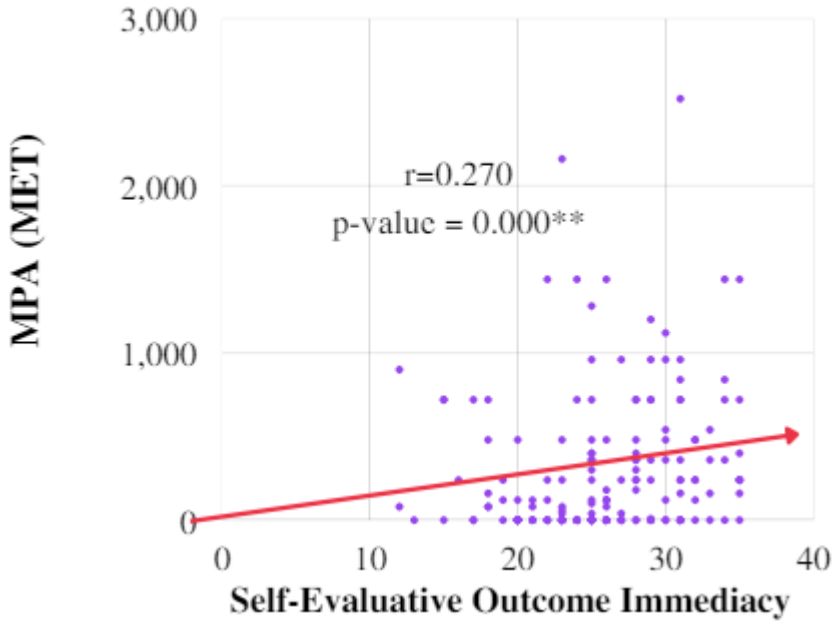


Figure 4.15 Scatter Plot for Self-Evaluative Outcome Immediacy and MPA

CHAPTER 5

DISCUSSION

5.1 Physical activity level (PAL)

It was hypothesized that PAL would be low due to the COVID-19 pandemic. The current study population has obtained a median of 1173.00 (1899.95) MET-minutes/week for the TPA score. Since the median was between 600-3000 MET minutes/week, this indicated that the study population was moderately active. This result was comparable to the national data by the Malaysian Sports Culture Index (MSCI2020) which has shown that Malaysians were able to adopt a moderately active lifestyle despite the hitting of the COVID-19 pandemic (IYRES, 2020). When compared to previous studies done among a similar population during the COVID-19 pandemic, lower PAL was observed in the current study. In the study of Tan et al (2020), the median for TPA was 2826.00 (990.00-5508.00) while in the study of Avinna et al (2020), the mean was 1734.80 $\pm$ 1484.96 MET-minute/week which was higher than the value for the current study.

According to the definition set by NHMS 2015, a score of at least 600 MET-minutes per week is described as physically active (MOH, 2015). As a result,

29.7% of the participants in this study were physically inactive. When compared to the NHMS 2019 whereby 25.1% of Malaysian students were physically inactive, the current study population was comparatively less physically active during the COVID-19 pandemic. This result contradicted the previous studies done among similar populations whereby increased PAL was observed during the COVID-19 pandemic (S. T. Tan et al., 2021; Avinna et al., 2021; Fathynah et al., 2021; Huat et al., 2021).

However, studies were showing comparable results of lower PAL observed during- or/and post-lockdown compared to pre-lockdown but the effect was more prominent among the population who were physically active pre-pandemic (Hargreaves et al., 2021; Martínez-de-Quel et al., 2020). The possible explanations may be due to the strict movement control order at the beginning of the pandemic restricting students from physical activities engagement due to lack of resources and facilities, laziness or lack of energy, and lack of willpower and motivation (Piotrowski and Piotrowska, 2021; Yao, 2021; Farah et al., 2021). This has resulted in a carryover effect as inactive habit formation during lockdown has been sustained to post-lockdown even without movement and activity restriction (Hargreaves et al., 2021; Gardner and Rebar, 2019). While parks, gyms, and other exercise facilities were closed down, people were forced to do everything at home but not everyone perceive home as a pleasant place for exercise as some may not be large enough or well-equipped. The anxiety and lack of social support also contributed to physical inactivity (Marashi et al., 2021).

From the perspective of the influence of the reopening of lockdown, the decrease of PA compared to during lockdown may be due to the increase in commuting time as one of the reasons why people were more active during lockdown was due to the leisure time allocated from commuting time (Hargreaves et al., 2021; Meyer et al., 2020). The specific post-lockdown daily hassle experience such as the feelings of worry/stress when returning to campus and financial concerns were also found to be associated with the decrease in PAL (Hargreaves et al., 2021). This has highlighted the problem of physical inactivity among the current study population even when movement was no longer so restricted and the campus has reopened.

5.2 Emotional Well-Being

It was hypothesized that the emotional well-being of university students would be negatively affected during the COVID-19 pandemic. The mean positive affect score was 32.66 ± 6.08 while the mean negative affect score was 24.01 ± 7.55. Both were in the upper range (1-50) of the scales. The current study also showed that the positive affect score was higher than the negative affect score. This finding was similar to a longitudinal study done among college students in China by Li during the first 2 weeks of confinement where the mean positive and negative affect score of their population was 32.6 ± 7.9 and 22.4 ± 8.0 respectively with the positive score higher than the negative score (Li et al., 2020). Several other studies have also shown that the positive affect score was higher than the negative affect score during the COVID-19 pandemic (Zach et al., 2021; Zammitti et al., 2021; Romeo et al., 2021).

As compared to studies done before the COVID-19 outbreak in Malaysia to indicate the PANAS score in general, the emotional well-being of the current study was not much affected. There is one study done in 2020 among Malaysian youth and young adults ranging from 20-40-year-old, the positive affect score was 29.7 ± 6.40 while the negative affect score was 28.70± 6.20 which had a lower positive affect score and higher negative affect score than the current study (Omar et al., 2020). There is a study done in 2019 among university students of Malaysia, the mean positive affect score of the population (29.84 ± 7.47) which was considered a moderate level was lower than the current study (Hui et al., 2019).

As compared to the studies on affectivity during the COVID-19 pandemic, contradicting result was obtained as most of the studies showed a negative impact on emotional well-being. One study done by Qin in 2020 focusing on the emotional well-being of Chinese residents during the COVID-19 pandemic elucidated that the positive affect scores of the subjects were 24.78 ± 6.88 while the negative affect score was 19.34 ± 7.05. When compared to the current study, both scorings are lower than the current population (Qin et al., 2020). In Qin's study, a positive correlation was found between negative affect scores and the proportion of confirmed COVID-19 cases, fear of falling sick or dying, feelings of helplessness, and leisure constraints. However, these factors were under control as the rate of vaccination increased in Malaysia and many studies have shown a decrease in mental distress with the increase in vaccination rate (Nguyen, 2021; Id et al., 2021). Another study done among university students in China had results showing that the positive affect of the students was at a moderate level (25.5 ± 7.3), while the negative affect was moderately low (19.1 ± 7.1) which indicated that the students were emotionally affected by the pandemic when their findings were shown to be lower than the general findings (Wang et al., 2020). This was due to the shallowness of experience among students when facing difficulties and therefore more prone to express intense emotions. Higher positive affect scores were found among students with higher health literacy, medical majors, and academic qualifications as they had a more comprehensive knowledge when facing the pandemic situation. Another study was done in Malaysia during MCO phase 3-4 (April to May 2020) also showed a similar result where healthcare and medical students faced a lower level of anxiety (Sundarasen et al., 2020). This could be used to explain in the current

study as the pandemic continued to exist for such a long period, the current study population was exposed to and equipped with adequate knowledge to overcome the pandemic situation (Bailey et al., 2019; Levkovich, 2020). Hence, their emotion was not significantly affected. Moreover, another reason to explain students experienced the highest anxiety level was that they were isolated from their friends and family (Sundarasen et al., 2020). Prolonged loneliness may affect emotional well-being as social interactions are said to be one of the basic human needs similar to food or sleep (Baumeister and Leary, 1995). Nonetheless, social isolation was no longer prevalent during the current situation due to the loosened SOP by the government. The normal adaptive response of humans when facing a difficult situation such as a pandemic may also be one of the reasons. When humans faced a stressful situation, there would be an increase in distress level. However, as time passes by, the distress level may return to the general situation (Harder et al., 2020). Hence, the study population had adapted to the pandemic situation plus the stress factors had been removed, resulting in lesser negative impact on the emotional well-being of the study population.

5.3 Outcome expectancies and Perceived Outcome Immediacy

In the current study, the total OE was considered high as the mean for total OE is within the upper range (mean = 60.55 ± 8.07, range= 15-75) whereas the total POI was 67.64 ± 12.73, falling in the upper range of the scale (0-105) which was considered moderate.

Self-evaluative outcomes had the highest mean item average score for both expectancies (4.23 ± 0.05) and immediacy (5.27 ± 0.96), followed by physical outcomes (OE= 4.18 ± 0.04; POI= 4.32 ± 0.99) and social outcomes (OE= 3.57 ± 0.06; POI= 4.22 ± 1.27). As compared to studies done before the pandemic, a similar trend has been observed (Rico et al., 2020; Abdullah et al., 2018; Dadok, 2019). The trend was not much affected by the pandemic as studies done during the pandemic have also highlighted the perceived higher importance of self-evaluative and physical outcomes in PA than social outcomes (Marashi et al., 2021; Pietsch et al., 2022; Breiner et al., 2021; Symons et al., 2021). In the study of Klusmann et al (2016), emotional outcomes (i.e., I feel more balanced, I feel better physically, I feel more attractive and powerful) were considered proximal whereas health and social recognition outcomes (i.e., PA is good for health, my family and friends like it, others appreciate my willpower and I am a good example for others) were considered distal.

Self-evaluative outcomes refer to the benefits of PA about the feeling of satisfaction and self-worth (Ralf and Aleksandra, 2016). This factor was

somewhat interrelated to emotional well-being as satisfaction with life is part of the determinants of it (Magyar and Keyes, 2019). Having the highest mean score for self-evaluative OE further highlighted the importance of the relationship between PA and emotional well-being among undergraduate students as they had high expectations for the self-evaluative benefits brought about by PA. This finding was consistent with a few studies done during the pandemic showing an increment of the importance of psychological outlook benefits in PA. Among the 5 items listed in the questionnaire under the self-evaluative dimension, students had the highest expectancies and immediacy for the PA outcomes of "improve my mood" and "help manage stress". This was consistent with the previous studies done during the pandemic whereby the stress- and anxiety-relieving effects and enjoyment of PA had a high score (Marashi et al., 2021; Pietsch et al., 2022; Breiner et al., 2021; Symons et al., 2021). The perceived mental health among university students seemed to be worse than perceived physical health during this pandemic in a Hungarian online survey (Ács et al., 2020). Together with the pre-existing academic stress and the possible positive relation between PA and academic performance, students may be more prone in expecting the self-evaluative benefits of PA (American College Health Association, 2019; Li et al., 2020; Zhai and Du, 2020; Wunsch et al., 2021). Hence, the perceived self-evaluative benefits from PA may be magnified by the mental impact of the pandemic (Breiner et al., 2021). This was corresponding to the finding of the positive correlation between positive affect and PAL in the current study. Hence, the self-evaluative benefits of PA can be a very important influencing factor in PA participation during this COVID-19 pandemic.

Physical outcomes were the second most important benefit of PA in the current study. This was also corresponding to the study by Pietsch (2022) whereby the improvement in fitness, and health has increased as the motives for PA during the lockdown. The PA promotion by stressing the physical health outcomes and its immunity strengthening effect against coronavirus during this pandemic may also explain the high physical outcome expectations (Pelinski et al., 2020; Sallis et al., 2021). Physical OE was also shown to be the highest among the three dimensions in Li (2013)'s research among older Chinese adults due to the prevalence of physical health benefits promotion as the outcome of exercises targeted at the elderly. Hence, the reason why physical OE had a higher score was partly due to the way PA promotion was conducted among the students.

Social outcomes were perceived to be the least important outcome in the current study. In this case, Ali's study has suggested a similar result that the least rated motivation for home workouts for university students was social recognition while the highest was positive health (Al-yaaribi, 2021). The social function motives for PA dropped during the lockdown among the students (Pietsch et al., 2022). This may be due to the influence of the pandemic restricting group exercises while promoting home-based exercises. People were also avoiding meeting others due to health concerns (Mertens et al., 2020). Since the data was collected partly before students returned to campus, the social outcomes during that period might not be expected much as students did not get to meet their friends. The item "increase my acceptance by others" had the lowest rating. This finding was comparable to the studies among university students by Abdullah et al. (2018) and Dadok (2019) suggesting that social acceptance were the least

important benefits of PA among the students. Besides, social POI had the highest missing value (5.3%), followed by self-evaluative (2.06%) and physical POI (1.11%). Since participants were allowed to leave blank on the scale if they were uncertain of the perceived immediacy of the items, this result suggested that students were uncertain of how soon they can see the social benefits brought by PA to be fulfilled. This was probably due to that social outcomes were not as frequent to be promoted as the benefits of PA when compared to self-evaluative and physical outcomes. Hence, students may not be aware of the possible social benefits of PA. Therefore, the score for social outcomes may not be significantly important during the pandemic. However, it was believed that it may increase by time as the pandemic was easing and more social interaction could be found again in playing sports with friends when returning to the campus.

5.4 Correlation between physical activity and emotional well-being

It was hypothesized that there was a correlation between PA and emotional well-being whereby a higher PAL was associated with better emotional well-being (higher positive affect score and/or lower negative affect score). The result of the current study showed that there was a weak positive correlation between TPA score and positive affect score (r=0.290, p=0.000) but not with negative affect score. This was supported by other studies showing that active individuals had a significantly higher level of positive emotions than those that were inactive and even during the COVID-19 pandemic (Legey et al., 2017; Qin et al., 2020; Zach et al., 2021; Liu et al., 2022). To explain from a physiological aspect, it was probably due to the enhancement in acyclic monoamines and endorphins levels stimulated after physical exercises that have a positive protective effect on mental health with the immediate example of "runner's high" effect, an experience of euphoria after an endurance run (Tikka et al., 2021). To explain from the weight aspect, it was probably due to the benefit of PA in weight changes (maintain or reduce) which was proven to have protective effects from reducing the positive affect (Gismero-gonzález et al., 2020; Zachary et al., 2020). Moreover, there was a systematic research highlighted the bi-directional relationship between psychological factors and PAL suggesting the possible reciprocal interaction between emotional well-being and PAL (Stults-Kolehmainen and Sinha, 2014). However, the association may be moderated by other factors such as the stage of change of exercise. Those who had the habit of exercising tended to exercise more when they were stressed to eliminate the unpleasant feelings as a form of emotion-focused coping(Lutz et al., 2010; Edenfield and Blumenthal, 2011). Since it was a cross-sectional study,

further investigation in future research may be needed to confirm this effect among undergraduate students.

There was also a weak positive correlation between VPA score and positive affect score (r=0.320, p=0.000) but not in MPA nor walking. A similar result was also found in Gismero's study among the Spanish population whereby intense PA was correlated with a higher positive affect score (Gismero-gonzález et al., 2020). In a large study done in 2015 with more than 12,000 participants, researchers have also found a similar significant association between vigorous exercise and lesser depressive symptoms (Noh et al., 2015). In Qin's study, a higher positive affect score was obtained by participants with vigorous PAL (Qin et al., 2020). In Kim's study among Korean college students, depression level among students with low PA group was significantly higher than moderate and vigorous PAL (Kim et al., 2021). This has suggested that people who have a vigorous PAL have a better emotional state. This was probably due to that physical exercise, especially aerobic exercise can effectively help to treat anxiety and vigorous exercise was more effective than lower-intensity exercise (Olutende et al., 2017; Aylett et al., 2018). Moreover, this can be explained by the common usage of the "hurts so good" expression while doing vigorous exercise. The term "hurt" referred to the unpleasant body sensations followed by physical exertion while "good" referred to the sense of pride resulting from the accomplishment of something goof for health, fitness or appearance (Ekkekakis, 2003). The runner's high effect mentioned above were also able to explain this finding as the role of opiated secreted post-exercise is to return the peripheral physiological condition back to normal including normalizing blood

pressure, heart and respiration rate. This indirectly reduced the uncomfortable physical exertion feelings of tiredness and pain due to high intensity PA (Vaccarino and Kastin, 2001; Hoffmann, 1997).

Social interaction including communication with others, being in a group and building rapport with others found in recreational sports, competitive sports, or group exercises such as basketball, badminton, futsal, etc. may also explain the beneficial effect of PA on emotional well-being. The perceived social interaction was associated with higher positive emotion in recreational sports and exercise compared to those who exercise alone (Wienke and Jekauc, 2016). In the study done among US university students, those who were more socializing were associated with meeting high PAL as compared to low socializing students. Moreover, low socializing was also found to be correlated with a higher tendency for poor mental health (Nicole A Vankim and Nelson, 2013). Group exercise has also been shown to reduce anxiety levels among college students (Patterson et al., 2021). Moreover, the benefits of PA for physical health together with social health may have a protective effect on mental health when PA is done in a positive and supportive environment (Nicole A Vankim and Nelson, 2013; Wayment and McDonald, 2017). Hence, the social context in which the exercises were involved along with the exercise itself is the factor in alleviating the anxiety. In the context of the current study, since the campus has reopened and group activities were allowed, the engagement in group exercises may increase the socializing level of students, mediating the beneficial effect of PA on mental health.

5.5 Correlation between physical activity and outcome expectancies

It was expected that there was a positive correlation between PA and its OE in terms of its dimensionality and POI.

5.5.1 Dimensionality

The current result only showed a weak positive correlation between social OE and VPA score ($r=0.177$, $p=0.023$) but not in other variables. This was inconsistent with the previous studies as many have proven that the perceived positive outcomes of exercise were associated with higher PAL in general or specific target populations (Zhang et al., 2007; Lin et al., 2020; Zhou et al., 2021; ÖZKUL, 2021; Ruhayati et al., 2021). However, some studies did also show that OE alone was not enough to explain the variance in PA as it should be considered together with other SCT factors such as self-efficacy and exercise goal setting (Uszynski et al., 2018). Kasser (2018) also failed to show the significant relationship between OE and PA among multiple sclerosis adults though they were aware of the benefits (Kasser and Kosma, 2018).

Despite that social OE had the lowest score than physical and self-evaluative OE, only social OE were correlated to vigorous intensity PA. This may suggest that social OE was more powerful in predicting the high-intensity PA engagement of students. This finding somewhat corresponded to the discussion in 5.4 stating that one of the benefits of PA is to improve social interaction (Ralf and Aleksandra, 2016; Nicole A. Vankim and Nelson, 2013; Wienke and Jekauc, 2016; Wayment and McDonald, 2017). The involvement in team sports (e.g.

basketball, football, futsal, and volleyball) that were typically high intensity was found to be motivated by affiliation according to the Physical Activity and Leisure Motivation Scale (PALMS) (Molanorouzi et al., 2015; Roy Chowdhury, 2012). Social interaction was the motivator for PA was also found in several studies (Grace et al., 2008; Jepson et al., 2012). This has shown that people preferred to exercise with friends than alone and this kind of group exercise has brought enjoyment to them. Therefore, the engagement in VPA of students is associated with their expectation of improving social outcomes through exercises.

5.5.2 Perceived outcome immediacy

It was found that there was a weak positive correlation between TPA and total POI ($r=0.278$, $p=0.000$), physical POI ($r=0.296$, $p=0.000$), and self-evaluative POI ($r= 0.254$, $p=0.001$) while social POI did not have correlation with TPA but was only weakly correlated with VPA ($r=0.277$, $p=0.000$). This was suggesting that POI had a stronger association with PAL than OE which was compatible with previous works of literature (Li, 2013; Ainslie, 1975; Peetz et al., 2009; Mcelroy and Mascari, 2007; Evans et al., 2014). In Li's study, perceived outcome immediacy was more effective in predicting exercise behavior than the dimensionality of exercise. Most of the physically active individuals perceived high and immediate OE from the exercise whereas those that have high OE but perceived these benefits to be distal were not associated to be physically active (Li, 2013). The devaluation of distal outcomes may be due to the perceived relevance of the benefits to the present due to the doubt and ambiguity of whether the benefits would be achieved in the future, especially among those

who were not able to maintain the PAL before they achieved the distal benefits (Evans et al., 2014). The proximal OE was also more unlikely to be interfered with and had a higher guaranteed achievement (Peetz et al., 2009; Mcelroy and Mascari, 2007; Klusmann et al., 2016). Moreover, proximal exercise outcomes (sense of enjoyment, accomplishment, and skill utilization during and shortly after exercise) were able to intrinsically motivate the PA engagement, especially among those with relatively lower PAL because they occurred immediately or shortly after exercise (Deci and Ryan, 1985; Evans et al., 2014). Intrinsic motives predicted better PA outcomes in many studies (Molanorouzi et al., 2015; Al-yaaribi, 2021). However, the manipulative effect of perceived immediacy of outcomes was less strong among physically active populations as they already had a high intrinsic motivation (Evans et al., 2014). Hence, it was suggested that in the current study, the less active population may be less naturally perceived the proximal benefits of exercise as compared to the active groups and may benefit the most by raising the awareness of proximal outcomes of exercises.

The reason why perceived immediacy of social OE has no significant correlation with TPA was probably due to the low score for both OE and POI. This has provided insight into the possibility of the moderating effect of POI on the association between OE and PA which was found in previous studies (Li, 2013; Williams, 2010). In the research done by Li (2013), physical OE was the most highly rated, they were also the most distal compared to social and self-evaluative OE. Hence, the motivating power of physical OE for exercise was compromised by low immediacy.

Moreover, social outcomes were suggested to have a special correlation with VPA as only social outcomes had correlation with VPA for both OE and POI. This has further highlighted the importance of social outcomes in the engagement of VPA as concluded in Discussion 5.4 and 5.5.1.

5.6 Strengths and Limitations of Study

The study used a validated questionnaire which produced reliable and accurate data. Moreover, the significant correlation found among the parameters may be beneficial in the development of preventative intervention dealing with the prevalence of physical inactivity among undergraduate students. Lastly, this study was conducted during the later phase of the COVID-19 pandemic which has limited studies done during a similar period.

There were a few unavoidable limitations found in this study. Firstly, it was a cross-sectional study that could not determine the causal inference. Secondly, convenient sampling used may produce selection bias as indicated by the over-representation of Chinese and females in the current study. Thirdly, the unpreventable usage of an online questionnaire for data collection may produce positive bias due to self-reporting. Lastly, the study was conducted during the transition from the pandemic to the endemic phase in Malaysia which may cause changes in factors influencing the PA among the students such as the reopening of campus and outdoor activities were allowed.

5.7 Future Studies and Suggestions

A longitudinal study should be implemented to study the causal inference between all the parameters. Moreover, a larger population size with a smaller margin of error (±1 to ±5) should be used to produce more representative samples and data. In the future, the consideration of other related factors such as self-efficacy, gender difference, and study courses can be included to provide a better insight into this topic.

CHAPTER 6

CONCLUSION

In summary, the undergraduate students in UTAR have demonstrated a low PA and good emotional well-being during the COVID-19 pandemic. Self-evaluative and physical outcomes of PA were perceived to be more important than social outcomes during the pandemic. The study has also revealed a weak positive correlation between positive affect, POI, and PA. In terms of the intensity of PA, the engagement of VPA was shown to have a weak positive association with positive affect as well as social OE which suggested that VPA may have a stronger impact on emotional well-being and one of the reasons may be due to the social interaction experienced when engaging in intense team sports and exercises such as basketball, futsal, etc. The problem of physical inactivity among students should be highlighted. Interventions to increase the PA among the students that focus on increasing the POI of the PA are suggested especially the self-evaluative outcomes such as exercise can "help manage stress", "improve my mood" and the beneficial influence of PA on emotional well-being. Moreover, highlighting the social outcomes may be beneficial in promoting the vigorous team sports activities among the students as the social

interaction found in the sessions are found to have a stronger effect on VPA engagement to increase the PA among the students.

Reference

Abdullah, M.F. et al., 2018. Benefits and Barriers of Physical Activities among Technical University Students. *Journal of Advanced Research in Social and Behavioural Sciences*, 13(1), pp.1–8. Available at: www.akademiabaru.com/arsbs.html.

Abrams, D.B. et al., 2013. Affect. *Encyclopedia of Behavioral Medicine*, pp.49–50. Available at: https://link.springer.com/referenceworkentry/10.1007/978-1-4419-1005-9_1088 [Accessed: 29 August 2022].

Ács, P. et al., 2020. Effects of COVID-19 on physical activity behavior among university students: results of a Hungarian online survey. *Health Prob Civil*, 14(3), pp.174–182.

Ahmad, Y.B.A.Y., 2021. *Effects of COVID-19 Pandemic on Physical Activity and Sedentary Behavior among Malaysia Undergraduate University Students*. Universiti Sains Malaysia.

Ainslie, G., 1975. Specious Reward: A Behavioral Theory of Impulsiveness and Impulse Control. *Psychological bulletin*, 82(4), pp.463–496. Available at: https://doi.org/10.1037/h0076860.

Ajzen, I., 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), pp.179–211. Available at: https://doi.org/10.1016/0749-5978(91)90020-T [Accessed: 26 December 2021].

Al-Kumaim, N.H. et al., 2021. Exploring the impact of the covid-19 pandemic on university students' learning life: An integrated conceptual motivational model for sustainable and healthy online learning. *Sustainability (Switzerland)*, 13(2546).

Al-yaaribi, A.L.I., 2021. University Students ' Motivation for Home-based Exercise During the COVID- 19 Pandemic : Sex and Age Differences. *Journal of Physical Education Research,*, 8(II), pp.1–09.

American College Health Association, 2019. American College Health Association. American College Health Association-National College Health Assessment II: Reference Group Executive Summary Spring 2019. Silver Spring, MD: American College Health Association.

Amir, S., Brown, Z.W. and Amit, Z., 1980. The role of endorphins in stress: Evidence and speculations. *Neuroscience & Biobehavioral Reviews*, 4(1), pp.77–86. Available at: https://www.sciencedirect.com/science/article/abs/pii/0149763480900275?via%3Dihub [Accessed: 21 December 2021].

Annesi, J.J., 2020. Effects of a naturally occurring stressor on health behaviors and their psychosocial correlates. *Psychology, Health & Medicine*, 25(5), pp.601–612. Available at: https://doi.org/10.1080/13548506.2019.1658882.

Anon, 2021a, *Britain's mood, measured weekly* [Online]. Available at:

https://yougov.co.uk/topics/science/trackers/britains-mood-measured-weekly [Accessed: 23 December 2021].

Anon, 2021b, *CORONAVIRUS – The situation in Malaysia | Flanders Trade* [Online]. Available at: https://www.flandersinvestmentandtrade.com/export/nieuws/coronavirus-—-situation-malaysia [Accessed: 17 December 2021].

Arumugam, N., Ramasamy, V.R. and Suppiah, P.C., 2021. Mental Health Among Malaysian University Students Amidst Lockdown Mental Health Among Malaysian University Students Amidst Lockdown. *International Journal of Academic Research in Progressive Education and Development*, 10(2), pp.1081–1095. Available at: http://dx.doi.org/10.6007/IJARPED/v10-i2/10596.

Avinna, S. et al., 2021. Physical Activity among Undergraduate University Students During the Pandemic Covid-19 Physical Activity among Undergraduate University Students During the Pandemic Covid-19. *International Journal of Academic Research in Business and Social Sciences*, 11(10), pp.594–604. Available at: http://dx.doi.org/10.6007/IJARBSS/v11-i10/11164 DOI:10.6007/IJARBSS/v11-i10/11164.

Aylett, E., Small, N. and Bower, P., 2018. Exercise in the treatment of clinical anxiety in general practice – a systematic review and meta-analysis. *BMC Health Services Research*, 18(559), pp.1–18. Available at: https://doi.org/10.1186/s12913-018-3313-5.

Bailey, S.C. et al., 2019. Changes in COVID-19 Knowledge , Beliefs , Behaviors , and Preparedness Among High-Risk Adults from the Onset to the Acceleration Phase of the US Outbreak. *J Gen Intern Med*, 35(11), pp.3285–3292.

Bandura, A., 1997. Self-efficacy: The exercise of control. *New York: Freeman*. Available at: https://psycnet.apa.org/record/1997-08589-000 [Accessed: 9 January 2022].

Bandura, A., 2001. Social Cognitive Theory: An Agentic Perspective. *Annual Review of Psychology* , 52, pp.1–26. Available at: http://dx.doi.org/10.1146/annurev.psych.52.1.1 [Accessed: 9 January 2022].

Bandura, A., 1986. Social foundations of thought and action: A social cognitive theory. *Englewood Cliffs, NJ: Prentice-Hall*. Available at: https://psycnet.apa.org/record/1985-98423-000 [Accessed: 7 January 2022].

Barone, D.F., Maddux, J.E. and Snyder, C.R., 1997. *Social cognitive psychology : history and current domains*, Plenum Press, New York.

Baumeister, R.F. and Leary, M.R., 1995. The Need to Belong: Desire for Interpersonal Attachments as a Fundamental Human Motivation. *Psychological Bulletin*, 117(3), pp.497–529. Available at: /record/1995-29052-001 [Accessed: 15 August 2022].

Becker, M.H., 1974. The Health Belief Model and Sick Role Behavior*: *http://dx.doi.org/10.1177/109019817400200407*, 2(4), pp.409–419. Available at: https://journals.sagepub.com/doi/10.1177/109019817400200407 [Accessed:

26 December 2021].

Bernama, 2022, *Public higher learning institution students to return to campus in stages beginning March 1* [Online]. Available at: https://www.nst.com.my/news/nation/2022/02/770115/public-higher-learning-institution-students-return-campus-stages [Accessed: 15 August 2022].

Bortel, T. Van et al., 2016. Psychosocial effects of an Ebola outbreak at individual , community and international levels. *Bull World Health Organ*, 94(3), pp.210–214. Available at: http://dx.doi.org/10.2471/BLT.15.158543.

Brawley, L.R. and Latimer, A.E., 2007. Physical activity guidelines for Canadians: Strategies for dissemination of the message, expectations for change and evaluation. *Applied Physiology, Nutrition and Metabolism*, 32(SUPPL.2F).

Breiner, C.E., Miller, M.L. and Hormes, J.M., 2021. Eating Behaviors Changes in eating and exercise behaviors during the COVID-19 pandemic in a community sample : A retrospective report. *Eating Behaviors*, 42(June), p.101539. Available at: https://doi.org/10.1016/j.eatbeh.2021.101539.

Brooks, S.K. et al., 2020. Rapid Review The psychological impact of quarantine and how to reduce it : rapid review of the evidence. *The Lancet*, 395(10227), pp.912–920. Available at: http://dx.doi.org/10.1016/S0140-6736(20)30460-8.

Bryant, F.B. and Veroff, J., 1982. The structure of psychological well-being: A sociohistorical analysis. *Journal of Personality and Social Psychology*, 43(4), pp.653–673.

Buchan, M.C. et al., 2021. Bi-directional relationships between physical activity and mental health among a large sample of Canadian youth : a sex-stratified analysis of students in the COMPASS study. *International Journal of Behavioral Nutrition and Physical Activity*, 18(132). Available at: https://doi.org/10.1186/s12966-021-01201-z.

Cao, W. et al., 2020. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, 287(March), p.112934. Available at: https://doi.org/10.1016/j.psychres.2020.112934.

Coakley, K.E. et al., 2021. Physical Activity Behavior and Mental Health Among University Students During COVID-19 Lockdown. *Frontiers in Sports and Active Living*, 3, p.185.

Cochran, W.G., 1977. *Sampling techniques* 3rd ed., John Wiley & Sons.

Copenhagen: WHO Regional Office for Europe, 2020. *Pandemic fatigue – reinvigorating the public to prevent COVID-19. Policy framework for supporting pandemic prevention and management.*,

Craig, C.L. et al., 2003. International physical activity questionnaire: 12-Country reliability and validity. *Medicine and Science in Sports and Exercise*, 35(8), pp.1381–1395.

Crielaard, L. et al., 2021. Understanding the impact of exposure to adverse socioeconomic conditions on chronic stress from a complexity science perspective. *BMC Medicine*, 19(242). Available at: https://doi.org/10.1186/s12916-021-02106-1.

Dadok, N.A.B.L., 2019. Exercise Benefits, Barriers & Stages of Change of Muslim University Students.

Deci, E.L. and Ryan, R.M., 1985. *Intrinsic Motivation and Self-Determination in Human Behavior*, Springer, Boston, MA.

Diener, E., 1984. Subjective well-being. *Psychological Bulletin*, 95(3), pp.542–575.

Dysterheft, J.L. et al., 2016. A mixed methods exploration of how university students with physical disabilities perceive physical activity and the influence of perceptions on physical activity levels. *Cogent Medicine*, 3. Available at: http://dx.doi.org/10.1080/2331205X.2016.1196809.

Edenfield, T.M. and Blumenthal, J.A., 2011. Exercise and stress reduction. In R. J. Contrada & A. Baum (Eds.). In: *The handbook of stress science: Biology, psychology, and health*. Springer Publishing Company, pp. 301–319.

Ekkekakis, P., 2003. Pleasure and displeasure from the body : Perspectives from exercise. *COGNITION AND EMOTION*, 17(2), pp.213–239.

Evans, M.B., Cooke, L.M., Murray, R.A. and Wilson, A.E., 2014. The Sooner, the Better: Exercise Outcome Proximity and Intrinsic Motivation. *Applied Psychology: Health and Well-Being*, 6(3), pp.347–361.

Farah, B.Q. et al., 2021. Barriers to physical activity during the COVID-19 pandemic in adults: a cross-sectional study. *Sport Sciences for Health*, 17(2), pp.441–447. Available at: https://doi.org/10.1007/s11332-020-00724-5.

Farren, G.L., Zhang, T., Martin, S.B. and Thomas, K.T., 2017. Factors related to meeting physical activity guidelines in active college students: A social cognitive perspective. *Journal of American College Health*, 65(1), pp.10–21.

Fasbender, U., 2019. Outcome Expectancies. In: *Encyclopedia ofPersonality and Individual Differences*. Springer Nature Switzerland AG 2019.

Fathynah, S., Shiekh, S. and Marathamuthu, S., 2021. Behaviour and The Perception of Physical Activity during the Period of Movement Control Order (MCO) in Malaysia. *Malaysian Journal of Movement, Health & Exercises*, 10(1), pp.9–16. Available at: https://doi.org/10.15282/mohe.v10i1.491.

Febrilia, I., Warokka, A. and Abdullah, H.H., 2011. University Students ' Emotional State and Academic Performance : New Insights of Managing Complex Cognitive. *Journal of e-Learning and Higher Education*, 2011. Available at: http://www.ibimapublishing.com/journals/JELHE/jelhe.html.

Folkman, S. and Moskowitz, J.T., 2000. Stress, positive emotion, and coping. *Current Directions in Psychological Science*, pp.115–119.

Gao, J., 2009. A Study on Physiological Responding and Subjective Experiences of Emotion Regulation on Positive and Negative Emotion - Dissertation. *Liaoning Normal University*. Available at: https://m.dissertationtopic.net/doc/276578 [Accessed: 23 December 2021].

Gardner, B. and Rebar, A.L., 2019. Habit Formation and Behavior Change. *Oxford Research Encyclopedia of Psychology*. Available at:

https://oxfordre.com/psychology/view/10.1093/acrefore/9780190236557.001.0001/acrefore-9780190236557-e-129 [Accessed: 30 August 2022].

Gerber, M. and Pu, U.W.E., 2009. Do exercise and fitness protect against stress-induced health complaints ? A review of the literature. *Scandinavian Journal of Public Health*, 37, pp.801–819. Available at: https://journals-sagepub-com.libezp2.utar.edu.my/doi/pdf/10.1177/1403494809350522.

Gismero-González, E. et al., 2020. Emotional Impact of COVID-19 Lockdown Among the Spanish Population. *Frontiers in Psychology*, 11(616978).

Goodwin, R.D., 2003. Association between physical activity and mental disorders among adults in the United States. *Preventive Medicine*, 36(6), pp.698–703. Available at: https://doi.org/10.1016/S0091-7435(03)00042-2 [Accessed: 20 December 2021].

Grace, C. et al., 2008. Prevention of type 2 diabetes in British Bangladeshis: Qualitative study of community, religious, and professional perspectives. *Bmj*, 337(7678), pp.1094–1097.

Hagen, K.B. et al., 2012. Exercise therapy for bone and muscle health : an overview of systematic reviews. *BMC Medicine*, 10(167). Available at: http://www.biomedcentral.com/1741-7015/10/167%0ARESEARCH.

Hamdan, K., 2020. Perceived Benefits and Barriers to Participation in Exercise among Jordanian University Students Perceived Benefits and Barriers to Participation in Exercise among Jordanian University Students. *Al-Balqa Journal for Research and Studies*, 23(1).

Harder, N., Lemoine, J. and Harwood, R., 2020. Psychological outcomes of debriefing healthcare providers who experience expected and unexpected patient death in clinical or simulation experiences: A scoping review. *Journal of Clinical Nursing*, 29(3–4), pp.330–346. Available at: https://onlinelibrary.wiley.com/doi/full/10.1111/jocn.15085 [Accessed: 18 August 2022].

Hargreaves, E.A. et al., 2021. Changes in Physical Activity Pre- , During and Post-lockdown COVID-19 Restrictions in New Zealand and the Explanatory Role of Daily Hassles. *Frontiers in Psychology*, 12(February), pp.1–13.

Heiss, V.J. and Petosa, R.L., 2016. Social cognitive theory correlates of moderate-intensity exercise among adults with type 2 diabetes. *Psychology, Health and Medicine*, 21(1), pp.92–101.

Hoffmann, P., 1997. The endorphin hypothesis. *Physical activity and mental health*, pp.163–177. Available at: https://psycnet.apa.org/record/1997-97207-010 [Accessed: 29 August 2022].

Huat, G.K., Sukumaran, S., Dillon, D. and Amarasinghe, A., 2021. Impact of Physical Activity on Quality of Life Among Undergraduate Medical Students During COVID-19 Pandemic. *International Journal of Bioinformatics and Biomedical Engineering*, 6(2), pp.19–28. Available at: http://www.aiscience.org/journal/ijbbevvvvvvvvvvvvv.

Hui, H.M., Marina, A., Hui, H.M. and Marina, A., 2019. Improving Undergraduate Students ' Positive affect through Mindful Art Therapy Improving Undergraduate Students ' Positive Affect through Mindful Art Therapy. , 8(4), pp.757–777.

Id, F.P. et al., 2021. COVID-19 vaccines and mental distress. *PLoS ONE*, 16(9), pp.1–11. Available at: http://dx.doi.org/10.1371/journal.pone.0256406.

IPAQ, 2005. Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire (IPAQ) – Short and Long Forms.

IPAQ, 2002. International Physical Activity Questionnaire: Long Last 7 Days Self-Administered Format. Available at: https://cdn-links.lww.com/permalink/jcrp/a/jcrp_2016_04_12_kaminsky_jcrp-d-16-00031r1_sdc1.pdf.

Israel, G.D., 1992. Determining sample size. *Gainesville: Agricultural education and communication department, University of Florida.* Available at: https://www.tarleton.edu/academicassessment/documents/Samplesize.pdf.

IYRES, I. for Y.R.M. (IYRES), 2020. *Facts & Figures Malaysian Sports Culture Index (MSCI'20)*,

Jepson, R. et al., 2012. Physical Activity in South Asians: An In-Depth Qualitative Study to Explore Motivations and Facilitators. *PLoS ONE*, 7(10).

Kamarulzaman, N.S.B., 2021. The Effect of Gratitude Intervention on Anxiety and Depressive Symptoms among University Students in Malaysia Nur Syahrain Binti Kamarulzaman Thesis Submitted in Fulfillment of Master of Psychology (Clinical) Integrated Program.

Karthikeyan, R. and Selvaganapathy, K., 2015. Physical Activity Level Among University Students: a Cross Sectional Survey. *International Journal of Physiotherapy and Research*, 3(6), pp.1336–43. Available at: http://dx.doi.org/10.16965/ijpr.2015.202.

Kasser, S.L. and Kosma, M., 2018. Social Cognitive Factors, Physical Activity, and Mobility Impairment in Adults with Multiple Sclerosis. *Behavioral Medicine*, 44(4), pp.306–313.

Keertan, A., 2021, *PM: Contact sports, recreational activities now allowed under Phase Two and Three but only at facilities that can supervise games | Malaysia | Malay Mail* [Online]. Available at: https://www.malaymail.com/news/malaysia/2021/09/15/pm-contact-sports-recreational-activities-now-allowed-under-phase-two-and-t/2005868 [Accessed: 20 December 2021].

Khoo, S. et al., 2020. Physical Activity Promotion in Malaysia: Challenges and Opportunities. *Frontiers in Public Health*, 8(October), pp.8–12.

Khuram, W., Wang, Y. and Khalid, A., 2021. Moderating Impact of Positive Emotion between Academic Stress , and Academic Performance of Students : A Conceptual Framework. *8th International Conference on Education and Education of Social Sciences*, pp.528–533.

Kim, C., Song, Y. and Jeon, Y.J., 2021. The effect of college students' physical

activity level on depression and personal relationships. *Healthcare (Switzerland)*, 9(5), pp.1–11.

Kim, E.S. et al., 2017. Maintaining Healthy Behavior : a Prospective Study of Psychological Well-Being and Physical Activity. *Annals of Behavioral Medicine*, 51, pp.337–347. Available at: https://journals.sagepub.com/doi/pdf/10.1177/1557988318803744.

Kissler, S.M. et al., 2020. Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period. *Science (New York, N.y.)*, 368(6493), pp.860–868. Available at: /pmc/articles/PMC7164482/ [Accessed: 13 December 2021].

Klusmann, V., Musculus, L., Sproesser, G. and Renner, B., 2016. Fulfilled Emotional Outcome Expectancies Enable Successful Adoption and Maintenance of Physical Activity. *Frontiers in Psychology*, 6(1990). Available at: https://www.frontiersin.org/articles/10.3389/fpsyg.2015.01990/full.

Kraemer, W.J. and Ratamess, N.A., 2012. Hormonal Responses and Adaptations to Resistance Exercise and Training. *Sports Medicine 2005 35:4*, 35(4), pp.339–361. Available at: https://link.springer.com/article/10.2165/00007256-200535040-00004 [Accessed: 22 December 2021].

Lee, I.-M. et al., 2012. Impact of Physical Inactivity on the World's Major Non-Communicable Diseases. *Lancet*, 380(9838), pp.219–229.

Legey, S. et al., 2017. Relationship Among Physical Activity Level, Mood and Anxiety States and Quality of Life in Physical Education Students. *Clinical Practice & Epidemiology in Mental Health*, 13(1), pp.82–91.

Levkovich, I., 2020. The Impact of Age on Negative Emotional Reactions , Compliance With Health Guidelines , and Knowledge About the Virus During the COVID-19 Epidemic : A Longitudinal Study From Israel. *Journal of Primary Care & Community Health*, 11, pp.1–10.

Li, H.Y., Cao, H., Leung, D.Y.P. and Mak, Y.W., 2020. The Psychological Impacts of a COVID-19 Outbreak on College Students in China: A Longitudinal Study. *International Journal of Environmental Research and Public Health*, 17(3933).

Li, K., 2013. Domain dimensionality and temporality of outcome expectancy for physical activity among middle-aged and older Chinese adults : A latent pro fi le analysis. *Psychology of Sport & Exercise*, 14(5), pp.682–691. Available at: http://dx.doi.org/10.1016/j.psychsport.2013.05.007.

Lian, T.C. et al., 2016. Physical activity and its correlates among adults in Malaysia: A cross-sectional descriptive study. *PLoS ONE*, 11(6), pp.1–15.

Lin, M.L. et al., 2020. Examining the relationship between cellphone use behavior, perceived exercise benefit and physical exercise level among university students in taiwan. *Healthcare (Switzerland)*, 8(4).

Liu, Z. et al., 2022. Relationship Between Physical Activity, Parental Psychological Control, Basic Psychological Needs, Anxiety, and Mental Health

in Chinese Engineering College Students During the COVID-19 Pandemic. *Frontiers in Psychology*, 13(March), pp.1–9.

Lovell, G.P., Ansari, W. El and Parker, J.K., 2010. Perceived Exercise Benefits and Barriers of Non-Exercising Female University Students in the United Kingdom. *International Journal of Environmental Research and Public Health*, 7(3), p.784. Available at: /pmc/articles/PMC2872307/ [Accessed: 31 August 2022].

Lutz, R.S., Stults-Kolehmainen, M.A. and Bartholomew, J.B., 2010. Exercise caution when stressed: Stages of change and the stress–exercise participation relationship. *Psychology of Sport & Exercise*, 6(11), pp.560–567. Available at: https://www.infona.pl//resource/bwmeta1.element.elsevier-49ad8f99-0f35-3266-9964-b07c724cb918 [Accessed: 20 August 2022].

Maddux, J.E., 1999. Expectancies and the social–cognitive perspective: Basic principles, processes, and variables. In I. Kirsch (Ed.). In: *How expectancies shape experience.* American Psychological Association, pp. 17–39.

Maddux, J.E., 1993. Social cognitive models of health and exercise behavior: An introduction and review of conceptual issues. *Journal of Applied Sport Psychology*, 5(2), pp.116–140. Available at: https://www.tandfonline.com/doi/abs/10.1080/10413209308411310 [Accessed: 9 January 2022].

Magyar, J.L. and Keyes, C.L.M., 2019. Defining, measuring, and applying subjective well-being. *Positive psychological assessment: A handbook of models and measures (2nd ed.).*, pp.389–415. Available at: /record/2019-20160-025 [Accessed: 17 August 2022].

Mama, S.K. et al., 2015. Psychosocial Factors and Theory in Physical Activity Studies in Minorities. *American journal of health behavior*, 39(1), pp.68–76. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4429882/.

Marashi, M.Y. et al., 2021. A mental health paradox: Mental health was both a motivator and barrier to physical activity during the COVID-19 pandemic. *PLoS ONE*, 16(4 April), pp.1–20. Available at: http://dx.doi.org/10.1371/journal.pone.0239244.

Martínez-de-Quel, O., Su´arez-Iglesias, D., L´opez-Flores, M. and P´erez, C.A., 2020. Physical activity, dietary habits and sleep quality before and during COVID-19 lockdown: A longitudinal study. *Appetite 158 (2021)*, 158(105019). Available at: https://doi.org/10.1016/j.appet.2020.105019.

Masha'al, D., Shahrour, G. and Aldalaykeh, M., 2022. Anxiety and coping strategies among nursing students returning to university during the COVID-19 pandemic. *Heliyon*, 8(1), p.e08734. Available at: https://doi.org/10.1016/j.heliyon.2022.e08734.

Massar, S.A.A. et al., 2022. Reopening after lockdown : the influence of working-from- home and digital device use on sleep , physical activity , and wellbeing following COVID-19 lockdown and reopening. *SleepJ*, (October 2021), pp.1–10. Available at: https://doi.org/10.1093/sleep/zsab250.

Mcelroy, T. and Mascari, D., 2007. When Is It Going To Happen ? How

Temporal Distance Influences Processing for Risky ? Choice Framing Tasks WHEN IS IT GOING TO HAPPEN ? HOW TEMPORAL DISTANCE INFLUENCES PROCESSING FOR RISKY – CHOICE. *Social Cognition*, 25(4), pp.495–517.

Mcewen, B.S., 2007. Physiology and Neurobiology of Stress and Adaptation : Central Role of the Brain. *Physiological Review*, 87, pp.873–904. Available at: https://journals.physiology.org/doi/full/10.1152/physrev.00041.2006

Mertens, G. et al., 2020. Fear of the coronavirus (COVID-19): Predictors in an online study conducted in March 2020. *Journal of Anxiety Disorders*, 74, p.102258.

Meyer, J. et al., 2020. Joint prevalence of physical activity and sitting time during COVID-19 among US adults in April 2020. *Preventive Medicine Reports*, 20. Available at: /pmc/articles/PMC7695441/ [Accessed: 24 December 2021].

Ministry of Health (MOH), 2016. *National Strategic Plan for Non-Communicable Diseases (NSP-NCD) 2016-2025*,

MOH, 2015. *National Health and Morbidity Survey 2015: Non-Communicable Diseases, Risk Factors & Other Health Problems*,

MOH, 2019. *The National Health and Morbidity Survey 2019- Physical Activity*,

Molanorouzi, K., Khoo, S. and Morris, T., 2015. Motives for adult participation in physical activity: Type of activity, age, and gender Health behavior, health promotion and society. *BMC Public Health*, 15(1).

Morris, B. et al., 2016. Changing self-reported physical activity using different types of affectively and cognitively framed health messages, in a student population. *Psychology, Health and Medicine*, 21(2), pp.198–207. Available at: http://dx.doi.org/10.1080/13548506.2014.997762.

Nahas, M. V., Goldfine, B. and Collins, M.A., 2003. Determinants of Physical Activity in Adolescents and Young Adults: The Basis for High School and College Physical Education to Promote Active Lifestyles G. Balint et al., (eds.). *Physical Educator*, 60(1). Available at: https://www.research.ed.ac.uk/en/publications/disentangling-inclusion-in-physical-education-lessons-developing- [Accessed: 21 December 2021].

Nguyen, M., 2021. The Psychological Benefits of COVID-19 Vaccination. *Advances in Public Health*, 2021.

Noh, J.W. et al., 2015. Relationship between the intensity of physical activity and depressive symptoms among Korean adults: Analysis of Korea Health Panel data. *Journal of Physical Therapy Science*, 27(4), pp.1233–1237.

Nussbaumer-Streit, B. et al., 2020. Quarantine alone or in combination with other public health measures to control COVID-19: a rapid review. *Cochrane Database of Systematic Reviews*, 2020(4). Available at: https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD013574/full [Accessed: 13 December 2021].

Nystoriak, M.A. and Bhatnagar, A., 2018. Cardiovascular Effects and Benefits

of Exercise. *Frontiers in Cardiovascular Medicine*, 5(135). Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6172294/pdf/fcvm-05-00135.pdf.

Olutende, O.M., Wekesa, J.S., Mogaka, E.S. and WabuyaboKwey, I., 2017. Effects of Aerobic Exercise on Mood State of University Students: A Quasi-Experimental Approach. *International Journal of Current Research*, 9(11), pp.61107–61112.

Omar, S.Z. et al., 2020. Influence of different facets of internet addiction on subjective well-being in Malaysia: A comparison across ethnic groups. *Jurnal Komunikasi: Malaysian Journal of Communication*, 36(2), pp.196–211.

ÖZKUL, Ç., 2021. Perceived Exercise Benefits and Barriers in Active and Inactive University Students. *Turkish Journal of Physiotherapy and Rehabilitation*, 32(3), pp.33–42.

Pan, X. et al., 2020. Asymptomatic cases in a family cluster with SARS-CoV-2 infection Viral load of SARS-CoV-2 in clinical samples. *The Lancet Infectious Diseases*, 20(4), pp.410–411. Available at: http://dx.doi.org/10.1016/S1473-3099(20)30114-6.

Patterson, M.S. et al., 2021. Social networks, group exercise, and anxiety among college students. *Journal of American College Health*, 69(4), pp.361–369.

Pauline, J.S., 2013. Physical Activity Behaviors, Motivation, and Self-Efficacy among College Students. *College Student Journal*, 47(1), pp.64–74.

Peetz, J., Wilson, A.E. and Strahan, E.J., 2009. So Far Away: The Role of Subjective Temporal Distance to Future Goals in Motivation and Behavior. *Social Cognition*, 27(4), pp.475–495. Available at: http://dx.doi.org/10.1521/soco.2009.27.4.475 [Accessed: 12 January 2022].

Pelinski, M. et al., 2020. Physical exercise as a tool to help the immune system against COVID - 19 : an integrative review of the current literature. *Clinical and Experimental Medicine*, 2019(0123456789). Available at: https://doi.org/10.1007/s10238-020-00650-3.

Perrier, M., Sweet, S.N., Strachan, S.M. and Latimer-cheung, A.E., 2012. I act , therefore I am : Athletic identity and the health action process approach predict sport participation among individuals with acquired physical disabilities. *Psychology of Sport & Exercise*, 13(6), pp.713–720. Available at: http://dx.doi.org/10.1016/j.psychsport.2012.04.011.

Pietsch, S., Linder, S. and Jansen, P., 2022. Well-being and its relationship with sports and physical activity of students during the coronavirus pandemic. *German Journal of Exercise and Sport Research*, (52), pp.50–57.

Piotrowski, D. and Piotrowska, A.I., 2021. Operation of gyms and fitness clubs during the COVID-19 pandemic – financial , legal , and organisational conditions. *Journal of Physical Education and Sport*, 21(2), pp.1021–1028.

Priya, S., 2022, *Malaysia's relaxed SOPs effective 1 May 2022* [Online]. Available at: https://www.humanresourcesonline.net/malaysia-s-relaxed-sops-effective-1-may-2022 [Accessed: 15 August 2022].

Puccinelli, P.J. et al., 2021. Reduced level of physical activity during COVID-19 pandemic is associated with depression and anxiety levels : an internet- based survey. *BMC Public Health*, 21(425), pp.1–11. Available at: https://doi.org/10.1186/s12889-021-10470-z.

Qin, F. et al., 2020. Physical Activity , Screen Time , and Emotional Well-Being during the 2019 Physical Activity , Screen Time , and Emotional Well-Being during the 2019 Novel Coronavirus Outbreak in China. , (July).

Ralf, S. and Aleksandra, L., 2016. Self-Efficacy and Outcome Expectancies. In: Benyamini, Y., Johnston, M. and Karademas, E.C., (eds.) *Assessment in Health Psychology*. Hogrefe Publishing, pp. 31–44.

Ren, Z. et al., 2021. Psychological Impact of COVID-19 on College Students After School Reopening : A Cross-Sectional Study Based on Machine Learning. *Frontiers in Psychology*, 12(April).

Rhodes, R.E. and Conner, M., 2010. Comparison of Behavioral Belief Structures in the Physical Activity Domain. *Journal of Applied Social Psychology*, 40(8), pp.2105–2120. Available at: https://onlinelibrary.wiley.com/doi/full/10.1111/j.1559-1816.2010.00652.x [Accessed: 10 January 2022].

Richman, L.S., Kubzansky, L., Choo, P. and Bauer, M., 2005. Positive Emotion and Health : Going Beyond the Negative. *Health Psychology*, 24(4), pp.422–429. Available at: https://doi.apa.org/doiLanding?doi=10.1037%2F0278-6133.24.4.422.

Rickard, N.S., Chin, T.C. and Vella-Brodrick, D.A., 2015. Cortisol Awakening Response as an Index of Mental Health and Well-Being in Adolescents. *Journal of Happiness Studies 2015 17:6*, 17(6), pp.2555–2568. Available at: https://link.springer.com/article/10.1007/s10902-015-9706-9 [Accessed: 23 December 2021].

Rico, V. et al., 2020. Physical Activity : Benefits and Barriers Perceived by University Students. *Journal of Community & Public Health Nursing*, 6(2).

Rodriquez, E.J., Gregorich, S.E., Livaudais-toman, J. and Pérez-stable, E.J., 2017. Coping With Chronic Stress by Unhealthy Behaviors : A Re- Evaluation Among Older Adults by Race / Ethnicity. *Journal of Aging and Health*, 29(5), pp.805–825. Available at: https://journals-sagepub-com.libezp2.utar.edu.my/doi/pdf/10.1177/0898264316645548.

Romeo, M., Yepes-Baldó, M., Soria, M.Á. and Jayme, M., 2021. Impact of the COVID-19 Pandemic on Higher Education: Characterizing the Psychosocial Context of the Positive and Negative Affective States Using Classification and Regression Trees. *Frontiers in Psychology*, 12(714397). Available at: https://doi.org/10.3389/fpsyg.2021.714397.

Rovniak, L.S. et al., 2002. Social Cognitive Determinants of Physical Activity in Young Adults : A Prospective Structural Equation Analysis. *Annals of Behavioral Medicine*, 24(2), pp.149–156. Available at: https://watermark.silverchair.com/12160_2008_article_242149.pdf?token=AQECAHi208BE49Ooan9kkhW_Ercy7Dm3ZL_9Cf3qfKAc485ysgAAAtswggL

XBgkqhkiG9w0BBwagggLIMIICxAIBADCCAr0GCSqGSIb3DQEHATAeB
glghkgBZQMEAS4wEQQMbhy3g9NvTdg5HNK5AgEQgIICjkSmFyTGQ1te
exsrus9FXQIGdqKWl.

Roy chowdhury, D., 2012. Examining reasons for participation in sport and exercise using the Physical Activity and Leisure Motivation Scale (PALMS). Available at: http://vuir.vu.edu.au/ [Accessed: 19 August 2022].

Ruhayati, Y., Damayanti, I., Rahayu, N.I. and Hadi, A., 2021. Relationship Between Students ' Perceived Exercise Benefit and Physical Activity Level During Covid-19 Pandemic in Indonesia. *Malaysian Journal of Medicine and Health Sciences*, 17(5), pp.105–109.

Sallis, R. et al., 2021. Physical inactivity is associated with a higher risk for severe COVID-19 outcomes : a study in 48 440 adult patients. *Br J Sports Med*, 55(March 2020), pp.1099–1105.

Schultchen, D. et al., 2019. Bidirectional relationship of stress and affect with physical activity and healthy eating. *British Journal of Health Psychology*, 24, pp.315–333. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6767465/pdf/BJHP-24-315.pdf.

Schwarzer, R., 2008. Modeling Health Behavior Change: How to Predict and Modify the Adoption and Maintenance of Health Behaviors. *Applied Psychology*, 57(1), pp.1–29. Available at: https://onlinelibrary.wiley.com/doi/full/10.1111/j.1464-0597.2007.00325.x [Accessed: 26 December 2021].

Schwarzer, R. et al., 2003. On the Assessment and Analysis of Variables in the Health Action Process Approach: Conducting an Investigation. Available at: http://userpage.fu-berlin.de/gesund/hapa_web.pdf [Accessed: 7 December 2021].

Seaton, C.L., Bottorff, J.L., Jones-bricker, M. and Lamont, S., 2018. The Role of Positive Emotion and Ego-Resilience in Determining Men ' s Physical Activity Following a Workplace Health Intervention. *American Journal of Men's Health*, 12(6), pp.1916–1928. Available at: https://journals.sagepub.com/doi/pdf/10.1177/1557988318803744.

Segar, M.L., Eccles, J.S. and Richardson, C.R., 2011. Rebranding exercise : closing the gap between values and behavior. *International Journal of Behavioral Nutrition and Physical Activity*, 8(94). Available at: http://www.ijbnpa.org/content/8/1/94.

Sellami, M. et al., 2018. Effects of Acute and Chronic Exercise on Immunological Parameters in the Elderly Aged : Can Physical Activity Counteract the Effects of Aging ? *Frontiers in Immunology*, 9(2187), p.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC61914.

Smith, L. et al., 2020. Prevalence and correlates of physical activity in a sample of UK adults observing social distancing during the COVID-19 pandemic. *BMJ Open Sport & Exercise Medicine*, 6(1). Available at: https://bmjopensem.bmj.com/content/6/1/e000850 [Accessed: 24 December

2021].

Son, C. et al., 2020. Effects of COVID-19 on College Students' Mental Health in the United States: Interview Survey Study. *J Med Internet Res 2020;22(9):e21279 https://www.jmir.org/2020/9/e21279*, 22(9), p.e21279. Available at: https://www.jmir.org/2020/9/e21279 [Accessed: 13 December 2021].

Sparling, P.B. and Snow, T.K., 2013. Physical Activity Patterns in Recent College Alumni. *Research Quarterly for Exercise and Sport*, 73(2), pp.200–205. Available at: https://doi.org/10.1080/02701367.2002.10609009 [Accessed: 21 December 2021].

Steinhardt, M.A. and Dishman, R.K., 1989. Reliability and validity of expected outcomes and barriers for habitual physical activity. *Journal of occupational medicine. : official publication of the Industrial Medical Association*, 31(6), pp.536–546. Available at: https://pubmed.ncbi.nlm.nih.gov/2786559/ [Accessed: 26 December 2021].

Stults-Kolehmainen, M.A. and Sinha, R., 2014. The Effects of Stress on Physical Activity and Exercise. *Sports medicine (Auckland, N.Z.)*, 44(1), p.81. Available at: /pmc/articles/PMC3894304/ [Accessed: 5 December 2021].

Sundarasen, S. et al., 2020. Psychological impact of covid-19 and lockdown among university students in malaysia: Implications and policy recommendations. *International Journal of Environmental Research and Public Health*, 17(17), pp.1–13.

Symons, M. et al., 2021. Physical activity during the first lockdown of the covid-19 pandemic: Investigating the reliance on digital technologies, perceived benefits, barriers and the impact of affect. *International Journal of Environmental Research and Public Health*, 18(11).

Tan, H. et al., 2021. Long-term Effects of the COVID-19 Pandemic on Public Sentiments in Mainland China: Sentiment Analysis of Social Media Posts. *Journal of Medical Internet Research*, 23(8). Available at: /pmc/articles/PMC8360336/ [Accessed: 19 August 2022].

Tan, S.T., Tan, S.S. and Tan, C.X., 2021. Physical Activity, Sedentary Behavior, and Weight Status of University Students during the COVID-19 Lockdown: A Cross-National Comparative Study. *Nutrition and Food Science*, (March 2020).

Teisala, T. et al., 2014. Associations of physical activity , fitness , and body composition with heart rate variability – based indicators of stress and recovery on workdays : a cross-sectional study. *Journal of Occupational Medicine and Toxicology*, 9(16). Available at: http://www.occup-med.com/content/9/1/16.

Tikka, S.K., Garg, S. and Siddiqui, M.A., 2021. Prescribing Physical Activity in Mental Health : A Focused Review on the Latest Evidence , Recommendations , Challenges , and Relevance to India. *Indian Journal of Psychological Medicine*, 43(6). Available at: https://journals.sagepub.com/doi/pdf/10.1177/0253717620972330.

Tran, V., 2013. Positive Affect Negative Affect Scale (PANAS). *Encyclopedia of Behavioral Medicine*, pp.1508–1509. Available at:

https://link.springer.com/referenceworkentry/10.1007/978-1-4419-1005-9_978 [Accessed: 23 December 2021].

Tylka, T.L. and Homan, K.J., 2015. Exercise motives and positive body image in physically active college women and men: Exploring an expanded acceptance model of intuitive eating. *Body Image*, 15, pp.90–97.

UNESCO, *Education: From disruption to recovery* [Online]. Available at: https://en.unesco.org/covid19/educationresponse [Accessed: 19 December 2021].

Uszynski, M.K. et al., 2018. Sources of Variability in Physical Activity Among Inactive People with Multiple Sclerosis. *International Journal of Behavioral Medicine*, 25(2), pp.259–264.

Vaccarino, A.L. and Kastin, A.J., 2001. Endogenous opiates: 2000. *Peptides*, 22(12), pp.2257–2328.

Vankim, Nicole A. and Nelson, T.F., 2013. Vigorous physical activity, mental health, perceived stress, and socializing among college students. *American Journal of Health Promotion*, 28(1), pp.7–15. Available at: https://journals.sagepub.com/doi/10.4278/ajhp.111101-QUAN-395 [Accessed: 20 August 2022].

Vankim, Nicole A and Nelson, T.F., 2013. Vigorous Physical Activity , Mental Health , Perceived Stress , and Socializing Among College Students. *American Journal of Health Promotion*, 28(1), pp.7–16.

Varela, A.R., Sallis, R., Rowlands, A. V. and Sallis, J.F., 2021. Physical inactivity and COVID-19: When pandemics collide. *Journal of Physical Activity and Health*, 18(10), pp.1159–1160.

Varol, T. et al., 2022. A Safe Return to Campus in Times of COVID-19: A Survey Study among University Personnel to Inform Decision Makers. *Vaccines*, 10(3), pp.1–13.

Villani, L. et al., 2021. Impact of the COVID-19 pandemic on psychological well-being of students in an Italian university: a web-based cross-sectional survey. *Globalization and Health*, 17(1), pp.1–14. Available at: https://globalizationandhealth.biomedcentral.com/articles/10.1186/s12992-021-00680-w [Accessed: 15 August 2022].

Vivien Fan and Ryan Cheong, 2020, *MCO, CMCO, RMCO, CMCO Again: Regulations and SOPs* [Online]. Available at: https://mahwengkwai.com/mco-cmco-rmco-regulations-sops/ [Accessed: 13 December 2021].

Wang, Y. et al., 2020. Positive and negative affect of university and college students during COVID-19 outbreak: a network-based survey. *International Journal of Public Health*, 65(8), pp.1437–1443. Available at: https://doi.org/10.1007/s00038-020-01483-3.

Watson, D., Clark, L.A. and Tellegen, A., 1988. Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of personality and social psychology*, 54(6), pp.1063–1070. Available at: https://doi.org/10.1037/0022-3514.54.6.1063.

Wayment, H.A. and McDonald, R.L., 2017. Sharing a personal trainer: Personal and social benefits of individualized, small-group training. *Journal of Strength and Conditioning Research*, 31(11), pp.3137–3145. Available at: https://journals.lww.com/nsca-jscr/Fulltext/2017/11000/Sharing_a_Personal_Trainer__Personal_and_Social.24.aspx [Accessed: 20 August 2022].

WHO, *#HealthyAtHome - Physical activity* [Online]. Available at: https://www.who.int/news-room/campaigns/connecting-the-world-to-combat-coronavirus/healthyathome/healthyathome---physical-activity [Accessed: 20 December 2021].

WHO, 2020, *Substantial investment needed to avert mental health crisis* [Online]. Available at: https://www.who.int/news/item/14-05-2020-substantial-investment-needed-to-avert-mental-health-crisis [Accessed: 19 December 2021].

Wickens, C.M., 2011. The academic and psychosocial impact of labor unions and strikes on university campuses. *Higher education: Teaching, internationalization and student issues*, (May), pp.107–133.

Wienke, B. and Jekauc, D., 2016. A Qualitative Analysis of Emotional Facilitators in Exercise. *Frontiers in Psychology*, 7(August), pp.1–13.

Wilke, J. et al., 2021. A Pandemic within the Pandemic ? Physical Activity Levels Substantially Decreased in Countries Affected by COVID-19. *International Journal of Environmental Research and Public Health Article*, 18(2235). Available at: https://doi.org/10.3390/ijerph18052235.

Williams, D.M. et al., 2005. A Review of the Outcome Expectancy Construct in Physical Activity Research. *Annals of Behavioral Medicine*, 29(1), pp.70–79. Available at: https://watermark.silverchair.com/12160_2008_article_291070.pdf?token=AQECAHi208BE49Ooan9kkhW_Ercy7Dm3ZL_9Cf3qfKAc485ysgAAAwUwggMBBgkqhkiG9w0BBwagggLyMIIC7gIBADCCAucGCSqGSIb3DQEHATAeBglghkgBZQMEAS4wEQQMt1gkiG6piV5C4I_kAgEQgIICuN5msmQggKVqYYpmxbqVa9XaSzy3r.

Williams, D.M., 2010. Outcome expectancy and self-efficacy: Theoretical implications of an unresolved contradiction. *Personality and Social Psychology Review*, 14(4), pp.417–425. Available at: https://journals.sagepub.com/doi/pdf/10.1177/1088868310368802 [Accessed: 10 January 2022].

Wójcicki, T.R., White, S.M. and Mcauley, E., 2009. Assessing Outcome Expectations in Older Adults : The Multidimensional Outcome Expectations for Exercise Scale. *Journal of Gerontology: Psychological Sciences*, 64B(1), pp.33–40. Available at: https://watermark.silverchair.com/gbn032.pdf?token=AQECAHi208BE49Ooan9kkhW_Ercy7Dm3ZL_9Cf3qfKAc485ysgAAAuIwggLeBgkqhkiG9w0BBwagggLPMIICywIBADCCAsQGCSqGSIb3DQEHATAeBglghkgBZQMEAS4wEQQMGPbRBYzyHJHftwJvAgEQgIIClZrTf0IWYSKfNfkY3KH_OodMWUEbBvHDNQ4Bp1zT9_05jWIq.

Wunsch, K., Fiedler, J., Bachert, P. and Woll, A., 2021. The tridirectional relationship among physical activity, stress, and academic performance in university students: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 18(2), pp.1–18.

Wunsch, K., Kasten, N. and Fuchs, R., 2017. The effect of physical activity on sleep quality , well-being , and affect in academic stress periods. *Nature and Science of Sleep*, 9, pp.117–126. Available at: https://www.dovepress.com/getfile.php?fileID=36184.

Xiao, P. et al., 2022. Anxiety, Depression, and Satisfaction With Life Among College Students in China: Nine Months After Initiation of the Outbreak of COVID-19. *Frontiers in Psychiatry*, 12(January), pp.1–10.

Yao, L.E., 2021. Original Article Perceived barriers to physical activity among Malaysian adults during COVID-19 pandemic : a cross-sectional study Barreiras à atividade física percebidas entre adultos da Malásia durante a pandemia de COVID-19 : um estudo transversal. , 11(4).

Yao, L.E. et al., 2021. Perceived barriers to physical activity among Malaysian adults during COVID-19 pandemic : a cross-sectional study. *Journal Bahiana*, 11(4), pp.702–710. Available at: http://dx.doi.org/10.17267/2238-2704rpf.v11i4.4087.

Yiswaree, P., 2020, *Higher Education Ministry: All university lectures to be online-only until end 2020, with a few exceptions* [Online]. Available at: https://www.malaymail.com/news/malaysia/2020/05/27/higher-education-ministry-all-university-lectures-to-be-online-only-until-e/1869975 [Accessed: 17 December 2021].

Zach, S. et al., 2021. Physical activity , resilience , emotions , moods , and weight control , during the COVID-19 global crisis. *Israel Journal of Health Policy Research*, 10(52). Available at: https://doi.org/10.1186/s13584-021-00473-x.

Zachary, Z. et al., 2020. Self-quarantine and Weight Gain Related Risk Factors During the Covid-19 Pandemic. *Obesity Research and Clinical Practice*, 14(January), pp.210–216.

Zammitti, A. et al., 2021. The Psychological Impact of Coronavirus Pandemic Restrictions in Italy . The Mediating Role of the Fear of COVID-19 in the Relationship between Positive and Negative Affect with Positive and Negative Outcomes. , pp.697–710.

Zhai, Y. and Du, X., 2020. Addressing collegiate mental health amid COVID-19 pandemic. *Psychiatry Research*, 288, p.113003. Available at: https://doi.org/10.1016/j.psychres.2020.113003.

Zhang, J., Middlestadt, S.E. and Ji, C., 2007. Psychosocial factors underlying physical activity. *International Journal of Behavioral Nutrition and Physical Activity*, 4(38). Available at: https://ijbnpa.biomedcentral.com/track/pdf/10.1186/1479-5868-4-38.pdf.

Zhou, S. et al., 2021. Physical Activity under Stress: A Perspective of HAPA and Individual Differences. *International Journal of Environmental Research*

and Public Health, 18(22), p.12144. Available at: /pmc/articles/PMC8619980/ [Accessed: 5 December 2021].

Appendix A

Re: U/SERC/112/2022

1 June 2022

Dr Tan Gim Cheong
Head, Department of Allied Health Sciences
Faculty of Science
Universiti Tunku Abdul Rahman
Jalan Universiti, Bandar Baru Barat
31900 Kampar, Perak.

Dear Dr Tan,

Ethical Approval For Research Project/Protocol

We refer to the application for ethical approval for your students' research projects from Bachelor of Science (Hons) Dietetics programme enrolled in course UDDD3108. 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
1.	Knowledge, Attitude, and Practices About Dietary Supplement Among UTAR Students During Covid-19 Pandemic	Ang Lie Yuan	En Muhammad Zulhusni Bin Suhaimi	1 June 2022 – 31 May 2023
2.	Dietary Pattern and Physical Activity Level in Relation to Immune Status Among Male and Female Students from Universiti Tunku Abdul Rahman (UTAR) During Covid-19 Pandemic	Chan Mee Gin		
3.	Dietary Pattern and Physical Activity Level in Relation to Immune Status Among Dietetics and Non-dietetics from Universiti Tunku Abdul Rahman (UTAR) During Covid-19 Pandemic	Kyle Lim Xin Hui		
4.	Exploring the Prevalence of Fast Food Consumption and Its Relationship with Consumer Behaviour, Personal Lifestyles and Product Attributes Among UTAR Students During the COVID-19 Pandemic	Soh Xiao Yeng		
5.	Association Between Intuitive Eating, Disordered Eating Behaviors & Physical Activity Motivation Among UTAR Students	Tea Yi Tian		
6.	The Relationship Between Spicy Food Intake and Gastroesophagael Reflux Disease (GERD) Risk Among Universiti Tunku Abdul Rahman (UTAR) Students	Tham Zhi Hui		
7.	Gender Differences in Fast Food Consumption Behaviour and Its Association with Mindful Eating Among UTAR Students During Covid-19 Pandemic	Chan Yee Yunn		
8.	Relationship Between Physical Activity Level, Screen Time and Mood Disturbance Among UTAR Students During COVID-19 Pandemic	Cheong Cheah Huan		
9.	The Relationship Between Fast Food Consumption and Level of Stress Among Undergraduate Students of UTAR Kampar Differed by Gender During COVID-19 Pandemic	Lee Chee Xiang		

No	Research Title	Student's Name	Supervisor's Name	Approval Validity
10.	The Relationship Between Fast Food Consumption and Level of Mindful Eating Among Dietetics and Non-dietetics UTAR Students During Covid-19 Pandemic	Mitrainy a/p Maniam	En Muhammad Zulhusni Bin Suhaimi	1 June 2022 – 31 May 2023
11.	The Relationship Between Level of Mood Disturbance & Fast Food Consumption Among University Students During Covid-19 Pandemic	Nur Sabrina Binti Mohammad Sarthar Khan		
12.	The Relationship of Mood Disturbance and Outcome Expectancies with Physical Activity Level and BMI Among Undergraduate Students During Covid-19 Pandemic	Tan Ye Lyn		

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.

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

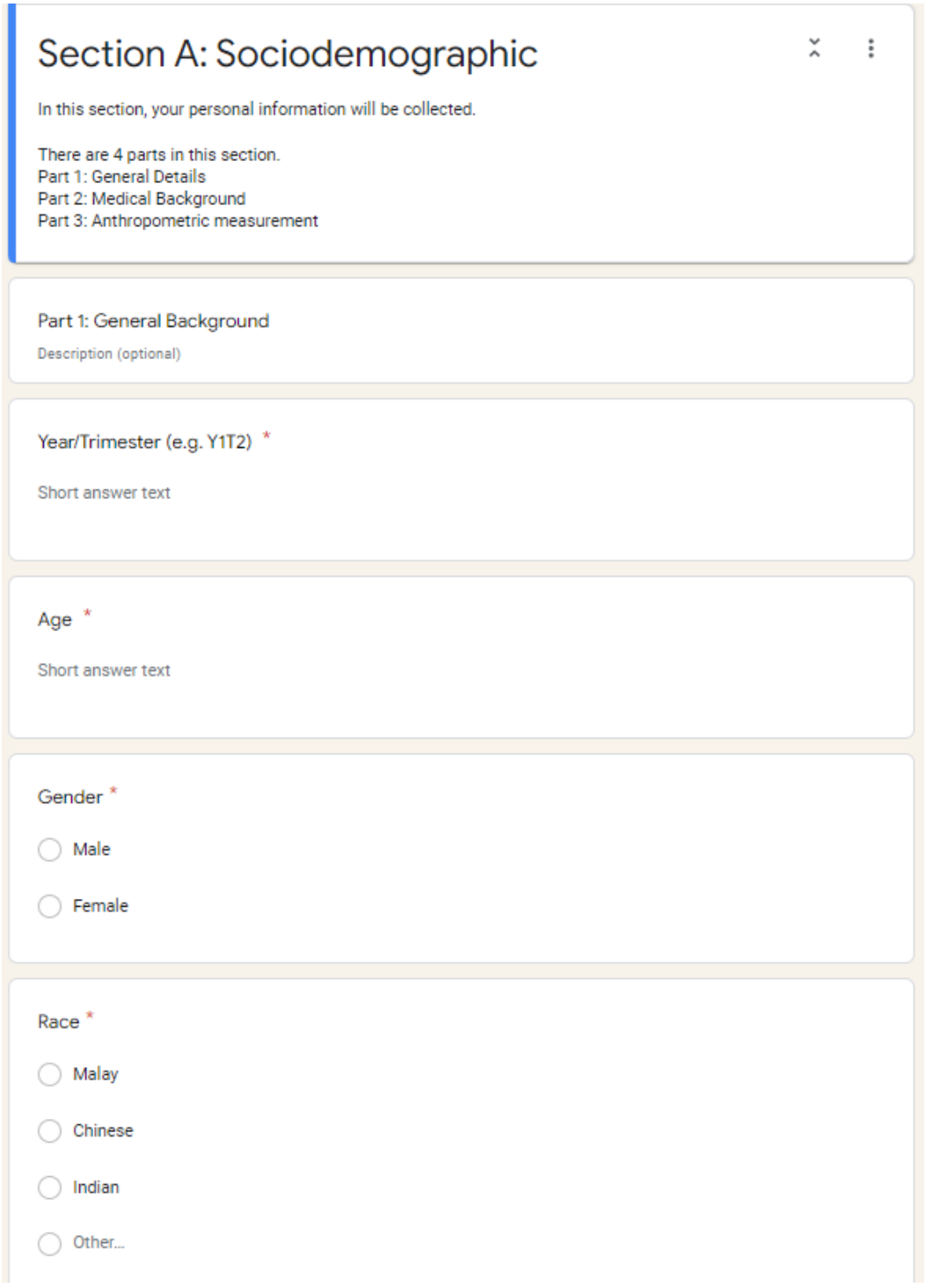
Thank you.

Yours sincerely,

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

c.c Dean, Faculty of Science
Director, Institute of Postgraduate Studies and Research

APPENDIX B



Section A: Sociodemographic

In this section, your personal information will be collected.

There are 4 parts in this section.
Part 1: General Details
Part 2: Medical Background
Part 3: Anthropometric measurement

Part 1: General Background

Description (optional)

Year/Trimester (e.g. Y1T2) *

Short answer text

Age *

Short answer text

Gender *

- Male
- Female

Race *

- Malay
- Chinese
- Indian
- Other...

Part 2: Medical Background

Description (optional)

Have you ever been diagnosed with any form of chronic disease (existing/previous)? *

- ○ No
- ○ Yes

Have you ever been diagnosed with any form of mental health problem or condition? *

- ○ No
- ○ Yes

Have you ever been diagnosed with any form of disease or condition that will limit your physical movements? *

- ○ No
- ○ Yes

Are you currently on any form of medication? *

- ○ No
- ○ Yes

Part 3: Anthropometric measurement

Description (optional)

Height (e.g. 160cm) *

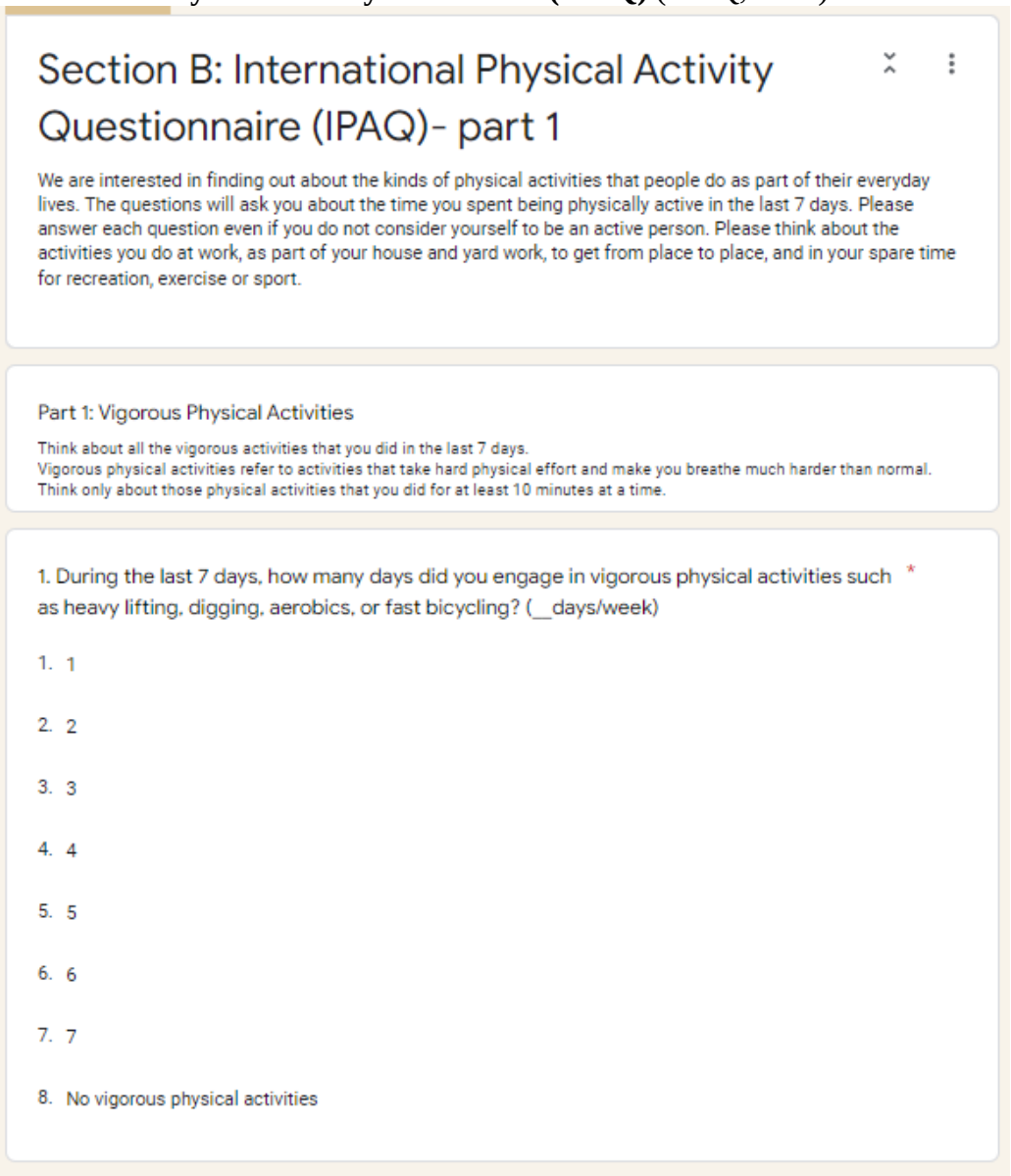
Short answer text

Current Weight (e.g. 60kg) *

Short answer text

Appendix C

Physical Activity Assessment (IPAQ) (IPAQ, 2002)**:**



Section B: International Physical Activity Questionnaire (IPAQ)- part 1

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Part 1: Vigorous Physical Activities

Think about all the vigorous activities that you did in the last 7 days.
Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal.
Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the last 7 days, how many days did you engage in vigorous physical activities such as heavy lifting, digging, aerobics, or fast bicycling? (__days/week) *

1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. No vigorous physical activities

Section B: International Physical Activity Questionnaire (IPAQ)- part 1 cont.

Description (optional)

Part 1: Vigorous Physical Activities- cont.

Description (optional)

2. How much time did you usually spend doing vigorous physical activities on one of those days? (___minutes/day) *

Please write your answer in the form of (___ minutes/day).

Short answer text

Section B: International Physical Activity Questionnaire (IPAQ)- part 2

Description (optional)

Part 2: Moderate Physical Activities

Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the last 7 days, how many days did you engage in moderate physical activities such as carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking. (__days/week) *

1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. No moderate physical activities

Section B: International Physical Activity Questionnaire (IPAQ)- part 2 cont.

Description (optional)

Part 2: Moderate Physical Activities- cont.

Description (optional)

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

Please write your answer in the form of (___ minutes/day). [Note: 1 hour = 60 minutes]

Short answer text

Section B: International Physical Activity Questionnaire (IPAQ)- part 3

Description (optional)

Part 3: Walking

Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the last 7 days, how many days did you walk for at least 10 minutes at a time? (__days/week) *

1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. No walking

Section B: International Physical Activity Questionnaire (IPAQ)- part 3 cont.

Description (optional)

Part 3: Walking- cont.

Description (optional)

6. How much time did you usually spend walking on one of those days? (___minutes/day) *

Please write your answer in the form of (___ minutes/day).

Short answer text

Section B: International Physical Activity Questionnaire (IPAQ)- part 4

Description (optional)

Part 4: Sitting

The last question is about the time you spent sitting on weekdays during the last 7 days. 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.

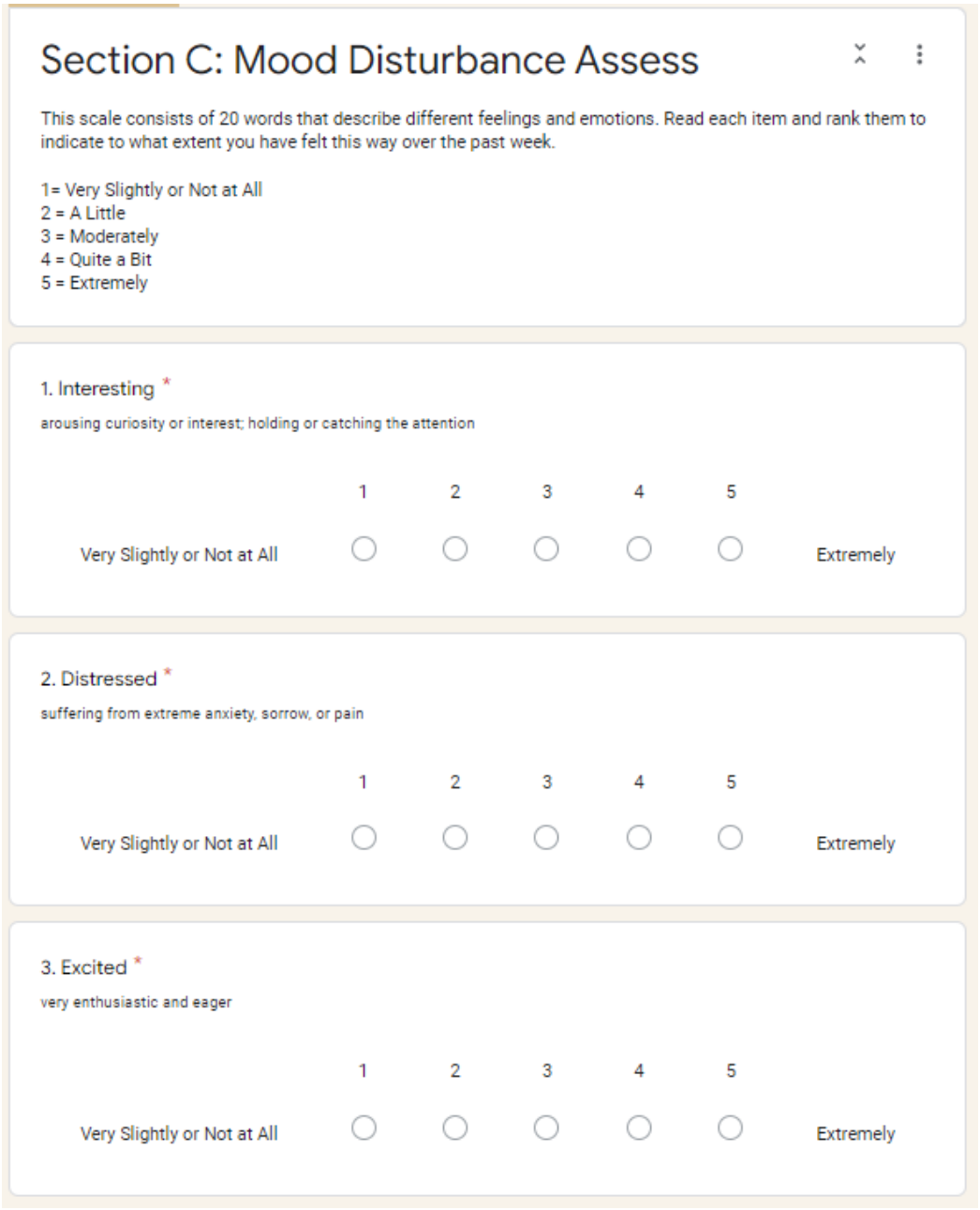
7. During the last 7 days, how much time did you spend sitting on a week day? (___minutes/day) *

Please write your answer in the form of (___ minutes/day).

Short answer text

Appendix D

Emotional well-being Assessment (PANAS) (Watson et al., 1988)**:**



Section C: Mood Disturbance Assess

This scale consists of 20 words that describe different feelings and emotions. Read each item and rank them to indicate to what extent you have felt this way over the past week.

1= Very Slightly or Not at All
2 = A Little
3 = Moderately
4 = Quite a Bit
5 = Extremely

1. Interesting *

arousing curiosity or interest; holding or catching the attention

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

2. Distressed *

suffering from extreme anxiety, sorrow, or pain

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

3. Excited *

very enthusiastic and eager

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

4. Upset *

the state of being unhappy, disappointed, or worried

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

5. Strong *

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

6. Guilty *

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

7. Scared *

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

8. Hostile *

showing or feeling opposition or dislike; unfriendly

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

9. Enthusiastic *

having or showing intense and eager enjoyment, interest, or approval

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

10. Proud *

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

11. Irritable *

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

12. Alert *

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

13. Ashamed *

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

14. Inspired *

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

15. Nervous *

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

16. Determined *

having made a firm decision and being resolved not to change it

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

17. Attentive *

paying close attention to something

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

18. Jittery *

nervous or unable to relax

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

19. Active *

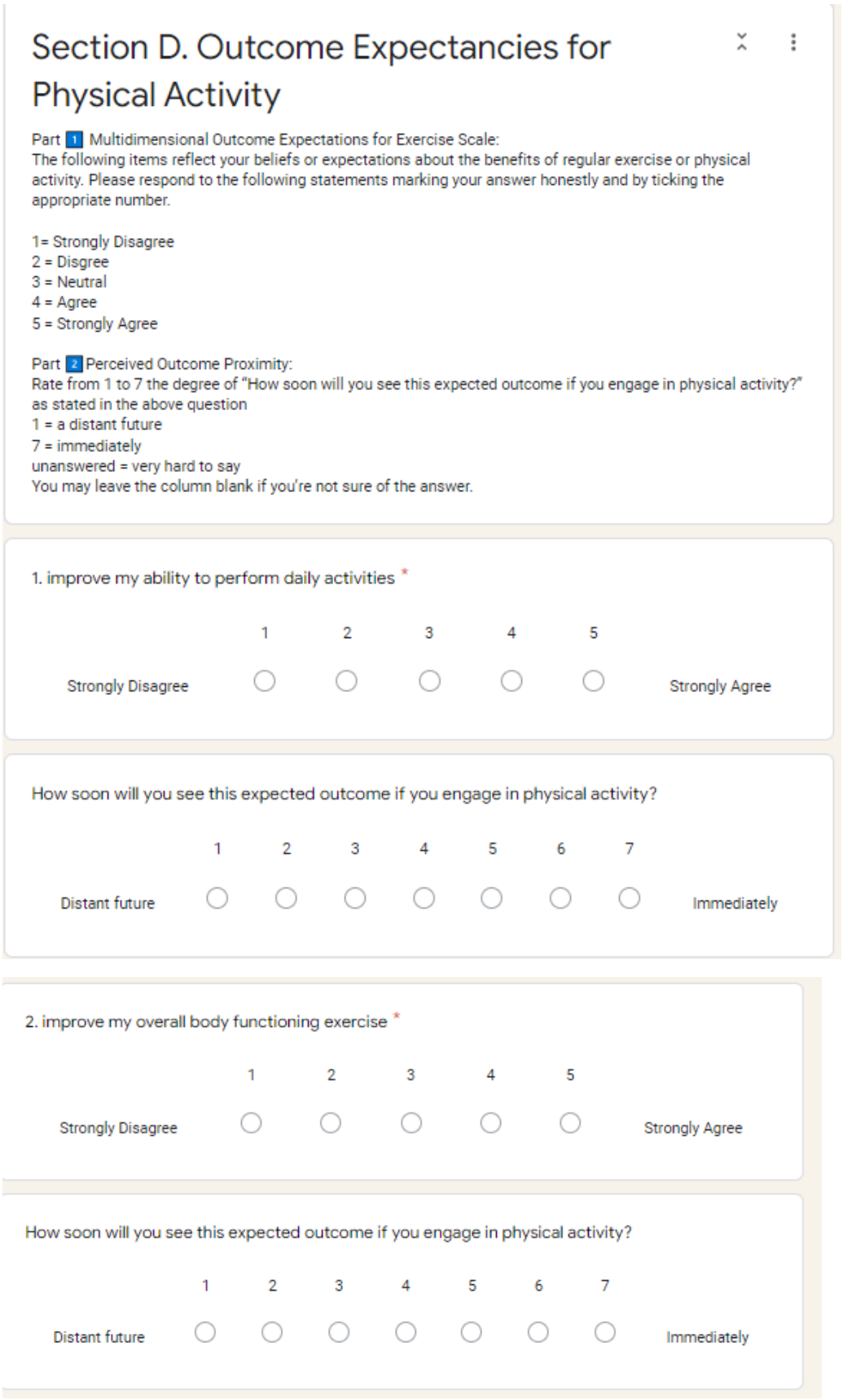
	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

20. Afraid *

	1	2	3	4	5	
Very Slightly or Not at All	○	○	○	○	○	Extremely

Appendix E

Outcome Expectancies (Wójcicki et al., 2009; Li, 2013)**:**



Section D. Outcome Expectancies for Physical Activity

Part 1 Multidimensional Outcome Expectations for Exercise Scale:
The following items reflect your beliefs or expectations about the benefits of regular exercise or physical activity. Please respond to the following statements marking your answer honestly and by ticking the appropriate number.

1= Strongly Disagree
2 = Disgree
3 = Neutral
4 = Agree
5 = Strongly Agree

Part 2 Perceived Outcome Proximity:
Rate from 1 to 7 the degree of "How soon will you see this expected outcome if you engage in physical activity?" as stated in the above question
1 = a distant future
7 = immediately
unanswered = very hard to say
You may leave the column blank if you're not sure of the answer.

1. improve my ability to perform daily activities *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

2. improve my overall body functioning exercise *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

3. strengthen my bones *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

4. increase my muscle strength *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

5. aid in weight control *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

6. improve the functioning of my cardiovascular system *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

7. improve my social standing *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

8. make me more at ease with people *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

9. provide companionship *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

10. increase my acceptance by others *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

11. help manage stress *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

12. improve my mood *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

13. improve my psychological state *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

14. increase my mental alertness *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

How soon will you see this expected outcome if you engage in physical activity?

	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

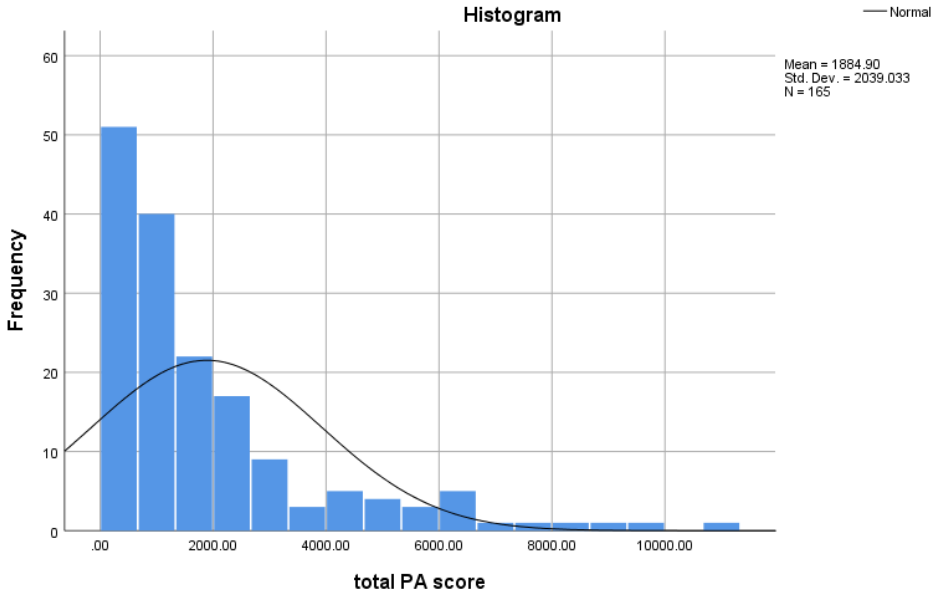
15. give me a sense of personal accomplishment *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

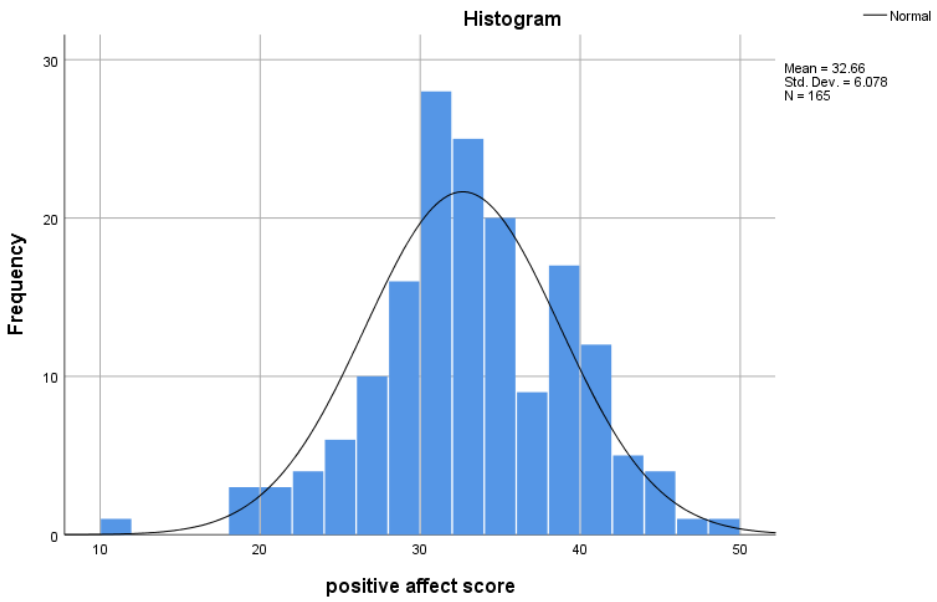
How soon will you see this expected outcome if you engage in physical activity?

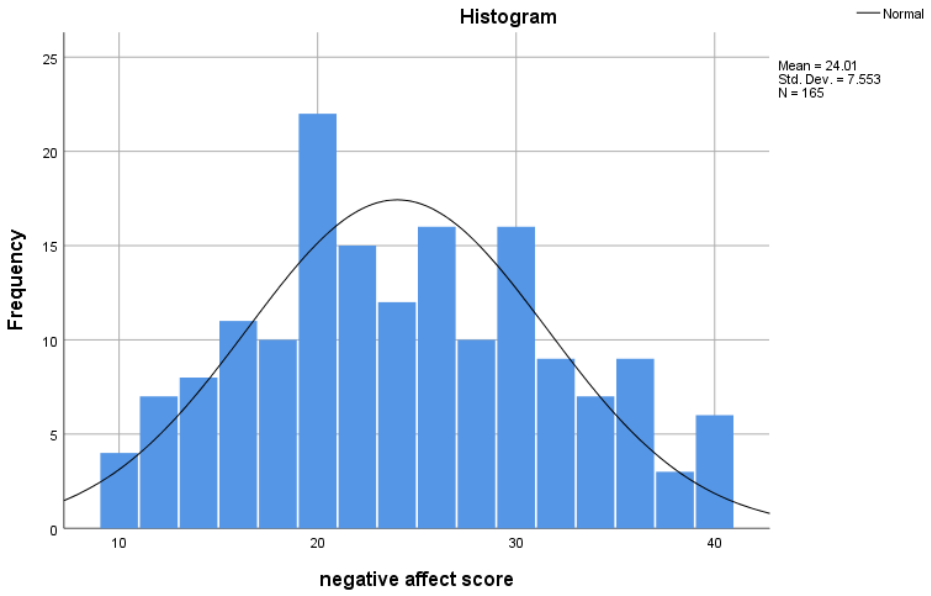
	1	2	3	4	5	6	7	
Distant future	○	○	○	○	○	○	○	Immediately

Appendix F1

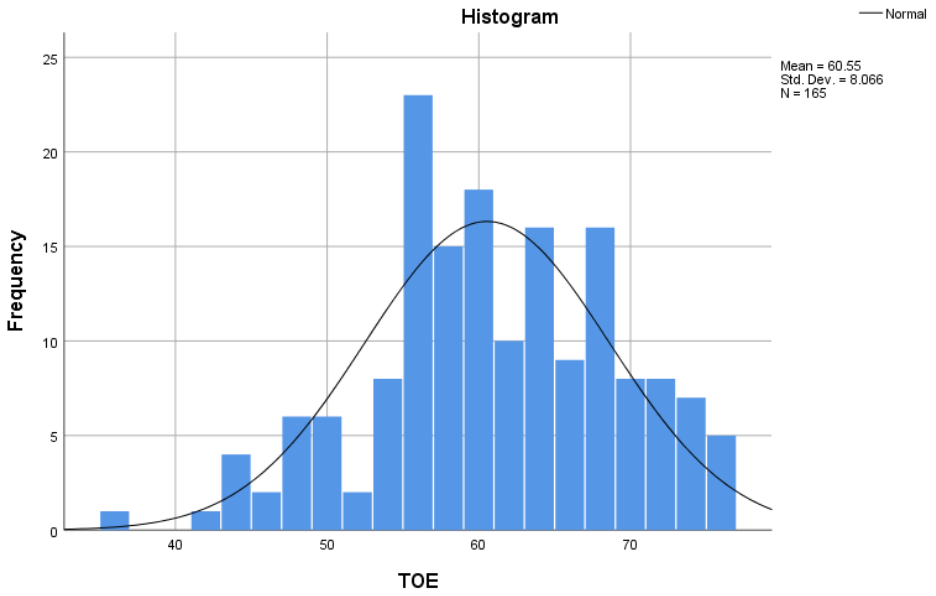

Histogram
Normal
Mean = 1884.90
Std. Dev. = 2039.033
N = 165
Frequency
60
50
40
30
20
10
0
.00
2000.00
4000.00
6000.00
8000.00
10000.00
total PA score

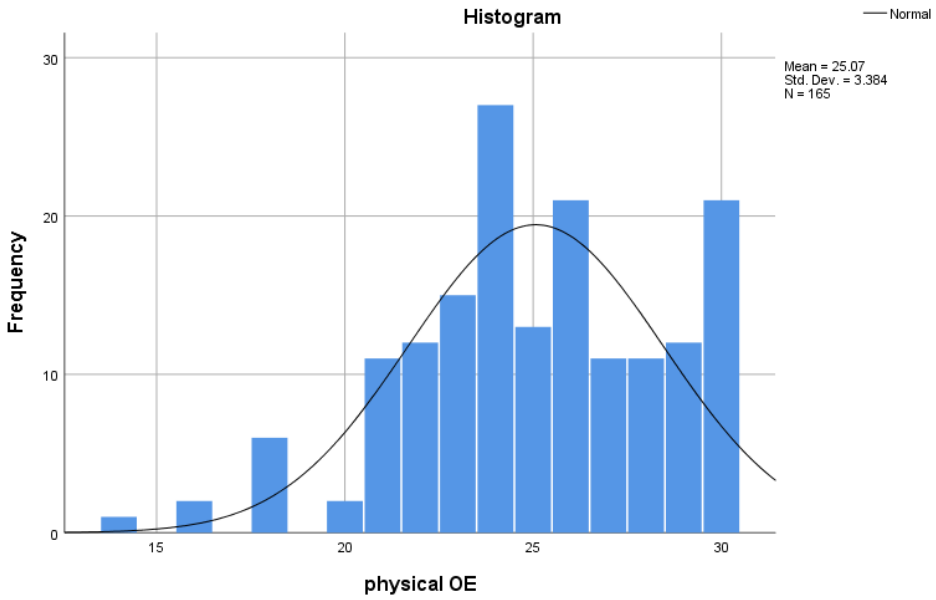
Appendix F2

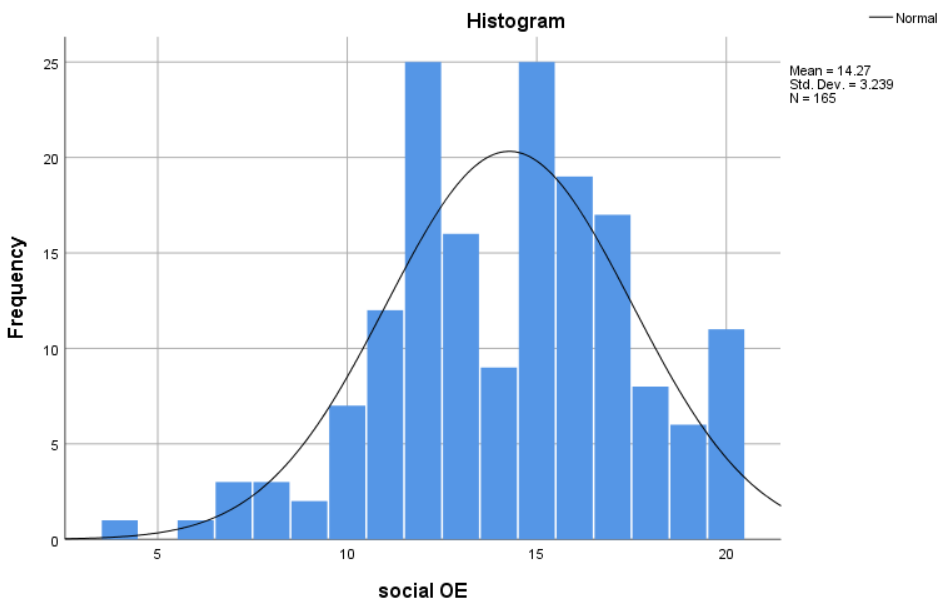

Histogram
Normal
Mean = 32.66
Std. Dev. = 6.078
N = 165
Frequency
positive affect score

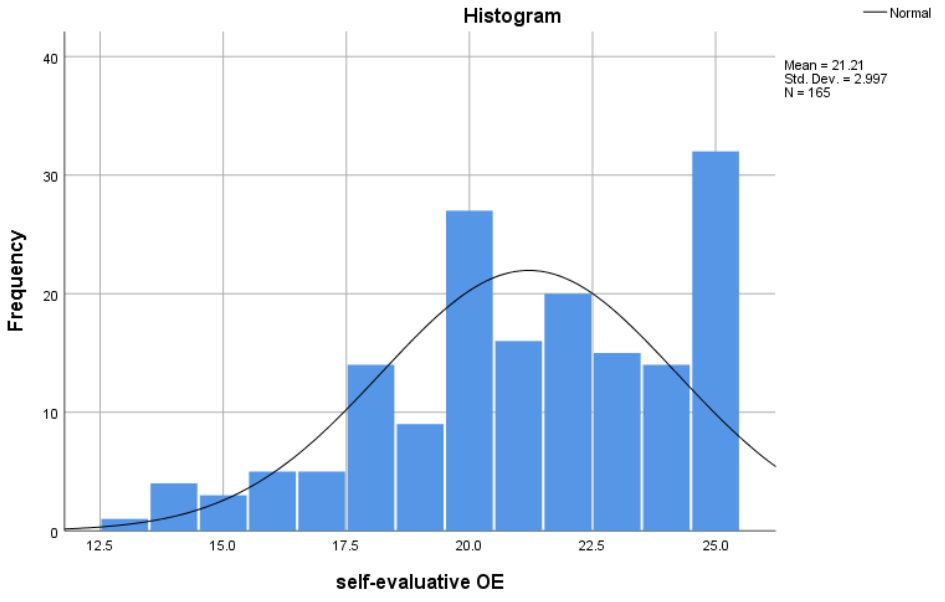

Histogram
Normal
Mean = 24.01
Std. Dev. = 7.553
N = 165
Frequency
negative affect score

Appendix F3

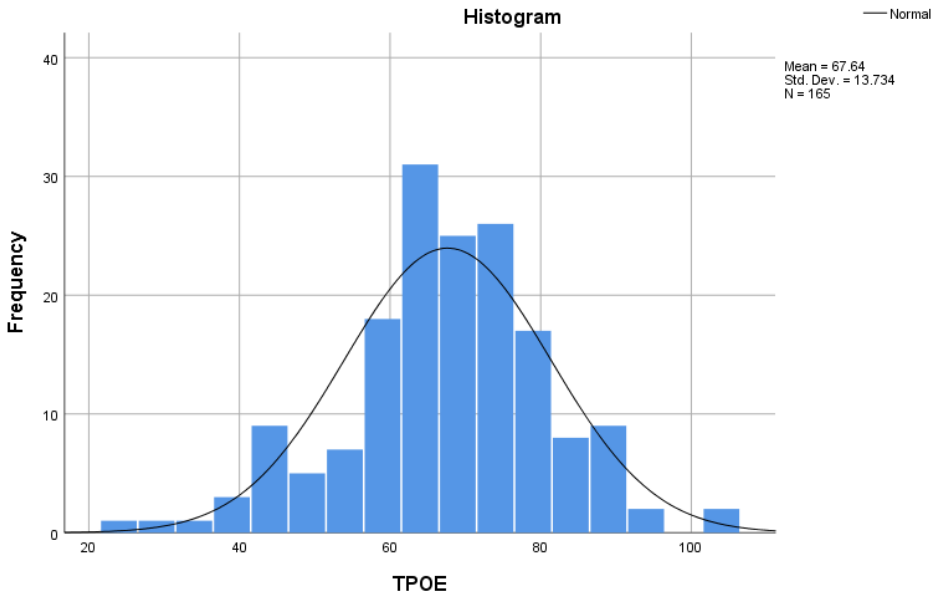

Histogram
Normal
Mean = 60.55
Std. Dev. = 8.066
N = 165
Frequency
TOE

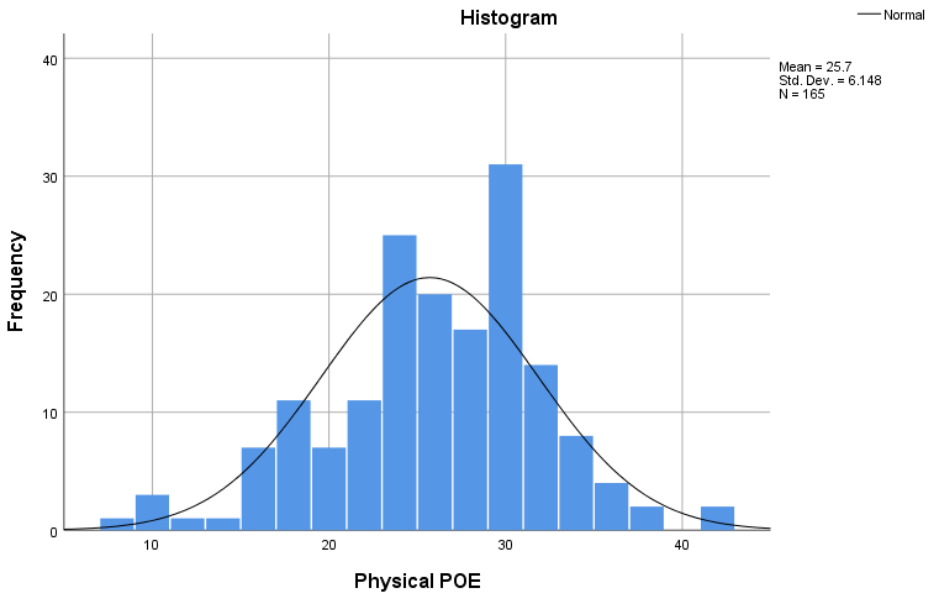

Histogram
Normal
Mean = 25.07
Std. Dev. = 3.384
N = 165
Frequency
physical OE

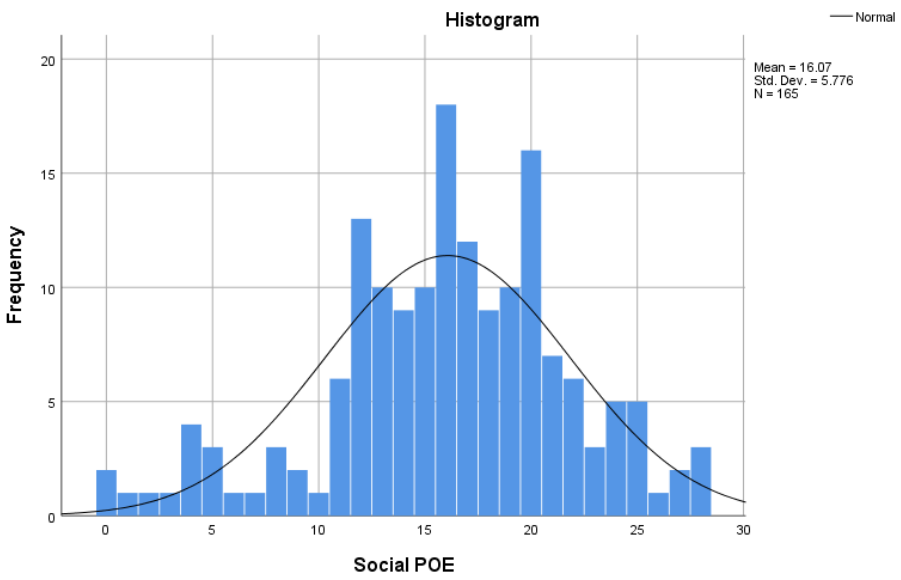

Histogram
Normal
Mean = 14.27
Std. Dev. = 3.239
N = 165
Frequency
25
20
15
10
5
0
5
10
15
20
social OE

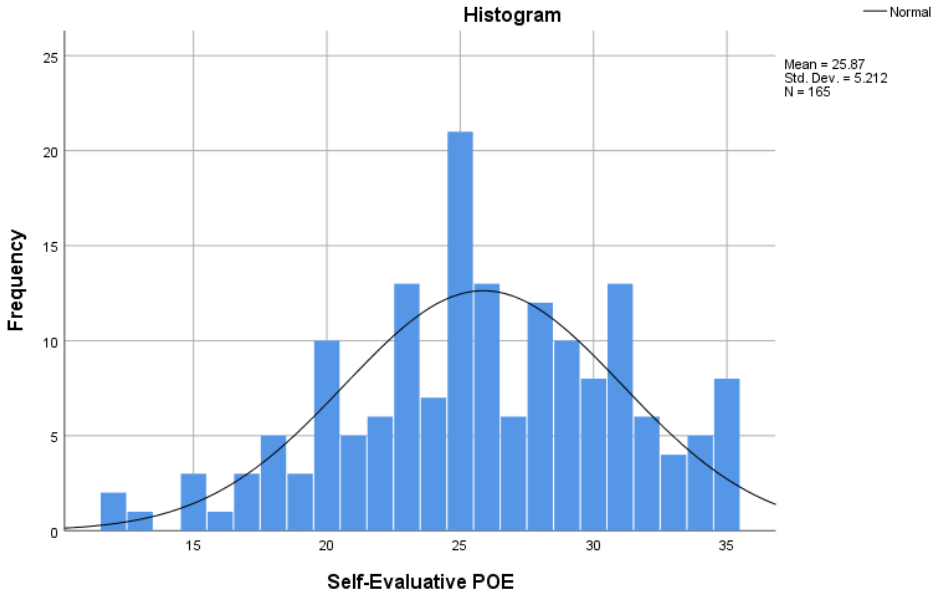

Histogram
Normal
Mean = 21.21
Std. Dev. = 2.997
N = 165
Frequency
40
30
20
10
0
12.5
15.0
17.5
20.0
22.5
25.0
self-evaluative OE

Appendix F4


Histogram
Normal
Mean = 67.64
Std. Dev. = 13.734
N = 165
Frequency
TPOE
0
10
20
30
40
20
40
60
80
100


Histogram
Normal
Mean = 25.7
Std. Dev. = 6.148
N = 165
Frequency
Physical POE
0
10
20
30
40
10
20
30
40


Histogram
Normal
Mean = 16.07
Std. Dev. = 5.776
N = 165
Frequency
Social POE
0
5
10
15
20
25
30


Histogram
Normal
Mean = 25.87
Std. Dev. = 5.212
N = 165
Frequency
Self-Evaluative POE
0
5
10
15
20
25
30
35

Appendix G

Universiti Tunku Abdul Rahman			
Form Title : Supervisor's Comments on Originality Report Generated by Turnitin for Submission of Final Year Project Report (for Undergraduate Programmes)			
Form Number: FM-IAD-005	Rev No.: 1	Effective Date: 3/10/2019	Page No.: 1of 1

FACULTY OF SCIENCE

Full Name(s) of Candidate(s)	Tan Ye Lyn
ID Number(s)	19ADB07045
Programme / Course	Bachelor of Science (HONS) Dietetics
Title of Final Year Project	The Relationship Between Emotional Well-Being and Outcome Expectancies with Physical Activity Level among Undergraduate Students during Covid-19 Pandemic

Similarity	**Supervisor's Comments (Compulsory if parameters of originality exceeds the limits approved by UTAR)**
Overall similarity index: 15 **%** **Similarity by source** Internet Sources: 10 % Publications: 9 % Student Papers: 8 %	
Number of individual sources listed of more than 3% similarity: NA	

Parameters of originality required and limits approved by UTAR are asfollows:

(i) Overall similarity index is 20% and below, and

(ii) Matching of individual sources listed must be less than 3% each,and

(iii) Matching texts in continuous block must not exceed 8 words

Note: Parameters (i) – (ii) shall exclude quotes, bibliography and text matches which are less than 8 words.

Note Supervisor/Candidate(s) is/are required to provide softcopy of full set of the originality report to Faculty/Institute

Based on the above result, I hereby declare that I am satisfied with the originality of the Final Year Report submitted by my student(s) as named above.

Signature of Supervisor

Name: Encik Muhammad Zulhusni Bin Suhaimi

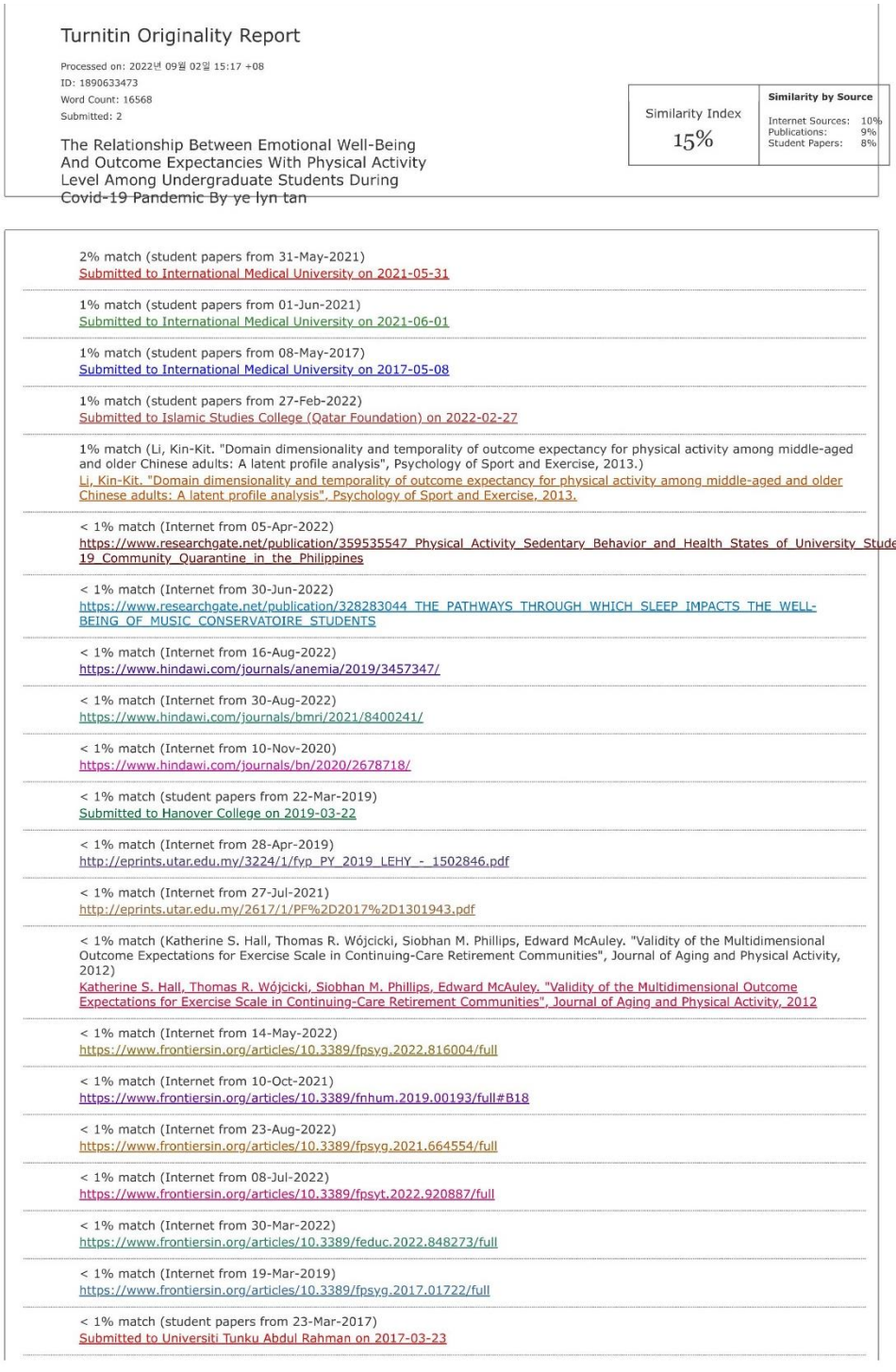
Date: 5/9/2022

Signature of Co-Supervisor

Name: _____

Date: _____

Appendix H



Turnitin Originality Report

Processed on: 2022년 09월 02일 15:17 +08
ID: 1890633473
Word Count: 16568
Submitted: 2

The Relationship Between Emotional Well-Being And Outcome Expectancies With Physical Activity Level Among Undergraduate Students During Covid-19 Pandemic By ye lyn tan

Similarity Index	Similarity by Source
15%	Internet Sources: 10% Publications: 9% Student Papers: 8%

2% match (student papers from 31-May-2021)
Submitted to International Medical University on 2021-05-31

1% match (student papers from 01-Jun-2021)
Submitted to International Medical University on 2021-06-01

1% match (student papers from 08-May-2017)
Submitted to International Medical University on 2017-05-08

1% match (student papers from 27-Feb-2022)
Submitted to Islamic Studies College (Qatar Foundation) on 2022-02-27

1% match (Li, Kin-Kit. "Domain dimensionality and temporality of outcome expectancy for physical activity among middle-aged and older Chinese adults: A latent profile analysis", Psychology of Sport and Exercise, 2013.)
Li, Kin-Kit. "Domain dimensionality and temporality of outcome expectancy for physical activity among middle-aged and older Chinese adults: A latent profile analysis", Psychology of Sport and Exercise, 2013.

< 1% match (Internet from 05-Apr-2022)
https://www.researchgate.net/publication/359535547_Physical_Activity_Sedentary_Behavior_and_Health_States_of_University_Students_Durir 19_Community_Quarantine_in_the_Philippines

< 1% match (Internet from 30-Jun-2022)
https://www.researchgate.net/publication/328283044_THE_PATHWAYS_THROUGH_WHICH_SLEEP_IMPACTS_THE_WELL-BEING_OF_MUSIC_CONSERVATOIRE_STUDENTS

< 1% match (Internet from 16-Aug-2022)
https://www.hindawi.com/journals/anemia/2019/3457347/

< 1% match (Internet from 30-Aug-2022)
https://www.hindawi.com/journals/bmri/2021/8400241/

< 1% match (Internet from 10-Nov-2020)
https://www.hindawi.com/journals/bn/2020/2678718/

< 1% match (student papers from 22-Mar-2019)
Submitted to Hanover College on 2019-03-22

< 1% match (Internet from 28-Apr-2019)
http://eprints.utar.edu.my/3224/1/fyp_PY_2019_LEHY_-_1502846.pdf

< 1% match (Internet from 27-Jul-2021)
http://eprints.utar.edu.my/2617/1/PF%2D2017%2D1301943.pdf

< 1% match (Katherine S. Hall, Thomas R. Wójcicki, Siobhan M. Phillips, Edward McAuley. "Validity of the Multidimensional Outcome Expectations for Exercise Scale in Continuing-Care Retirement Communities", Journal of Aging and Physical Activity, 2012)
Katherine S. Hall, Thomas R. Wójcicki, Siobhan M. Phillips, Edward McAuley. "Validity of the Multidimensional Outcome Expectations for Exercise Scale in Continuing-Care Retirement Communities", Journal of Aging and Physical Activity, 2012

< 1% match (Internet from 14-May-2022)
https://www.frontiersin.org/articles/10.3389/fpsyg.2022.816004/full

< 1% match (Internet from 10-Oct-2021)
https://www.frontiersin.org/articles/10.3389/fnhum.2019.00193/full#B18

< 1% match (Internet from 23-Aug-2022)
https://www.frontiersin.org/articles/10.3389/fpsyg.2021.664554/full

< 1% match (Internet from 08-Jul-2022)
https://www.frontiersin.org/articles/10.3389/fpsyt.2022.920887/full

< 1% match (Internet from 30-Mar-2022)
https://www.frontiersin.org/articles/10.3389/feduc.2022.848273/full

< 1% match (Internet from 19-Mar-2019)
https://www.frontiersin.org/articles/10.3389/fpsyg.2017.01722/full

< 1% match (student papers from 23-Mar-2017)
Submitted to Universiti Tunku Abdul Rahman on 2017-03-23