

A STUDY OF PREVALENCE OF INSOMNIA AMONG UNIVERSITIES TUNKU
ABDUL RAHMAN'S STUDENTS

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TAN SHI SHENG

Approval Form

This research paper attached hereto, entitled “A study of the prevalence of insomnia among University Tunku Abdul Rahman’s Students” prepared and submitted by Tan Shi Sheng in partial fulfillment of the requirements for the Bachelor of Social Science (Hons) Psychology is hereby accepted.

Supervisor

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ABSTRACT

Insomnia is common complaints in general population nowadays. It caused by different factors such as physical (cardiovascular), behavior (daytime nap, early retirement to bed), environmental (quietness and brightness environment), and medication (alcohol, central nervous system stimulant). For adolescent, insomnia will affect their healthy and academic performance. In this study, it concentrated on three researches, which are the difference between gender difference towards insomnia, the relationship between insomnia towards stress and depression. There are 100 undergraduate students in University Tunku Abdul Rahman participated in this study. Besides that, three subscale questionnaires which are Insomnia Severity Index (ISI), Stress Perceived Scale (PSS-10) and Patient Health Questionnaire (PHQ-9) used in this study. The research method that used is cross sectional design and the sampling method is convenient sampling. Through the findings, it found that there is no significance difference among gender towards insomnia. But it found that stress and depression is positive correlation with insomnia. In conclusion, both genders have the equal opportunity to have insomnia. But in this study brought important information which is depression and stress is correlated with insomnia, so it can be a guideline for parent and educator to pay attention of the young generation.

DECLARATION

I declare that the material contained in this paper is the end result of my own work and that due acknowledgement has been given in the bibliography and references to ALL sources be they printed, electronic or personal.

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LIST OF ABBREVIATIONS

UTAR	: University Tunku Abdul Rahman
OSA	: Obstructive Sleep Apnea
CSA	: Central Sleep Apnea
ACTH	: Adrenocortic Otripic Hormone
HPA	: Hypothelamic-pituitary-adrenal axis
REM	: Rapid Eye Movement
CMA	: Comprehensive Meta Analysis
VAS	: Visual Analogue Scale
ISI	: Insomnia Severity Index
CES-D	: Center for Epidemiologic Studies-Depression scale
BDI	: Beck Depression Inventory
SIAS	: Social Interaction Anxiety Scale
PHQ-9	: Patient Health Questionnaire
PSS-10	: Perceived Stress Scale

CHAPTER I

INTRODUCTION

Background of study

According to Watson, Goldberg, Arguelles, and Buchwald (2006), insomnia and sleepiness are common complaints in general population. Insomnia can be defined as complaint of disturbed sleep, manifested as difficulties in sleep initiation or sleep maintenance, and also as early awakenings (Doghranji, 2006). According to Budur, Roddriguez, and Schaefer (2007), insomnia has been classified in few ways. For instance, it can be classified as cause (primary, secondary), symptoms (difficulty falling asleep, difficulty staying asleep, non-restorative sleep), or duration (acute = insomnia less than 1 month, chronic = insomnia for 1 month or longer). While all of the classifications are useful in the diagnosis of insomnia.

According to the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (as cited in Budur, Roddriguez, Schaefer, 2007), 20% to 49% of America adults have intermittent insomnia. According to MedicineNet (2011), Intermittent insomnia is an insomnia that occurs from time to time and each time lasts less than a week or two. An estimated of 10% to 20% of adults have chronic insomnia and approximately 25% of people with chronic insomnia have primary insomnia (Budur, Roddriguez, Schaefer, 2007). According to The Free Dictionary (2011), chronic insomnia lasts more than three weeks and primary insomnia is a dyssomnia characterized by persistent difficulty initiating or maintaining sleep or by persistently nonrestorative sleep. So, insomnia is prevalent among the adults in America (Budur, Roddriguez, Schaefer, 2007).

According to Kamel and Gammack (2006), there are several causes of insomnia which are primary specific sleep disorders, physical illness, behavioral, environmental and medication. The examples for primary specific sleep disorder are Circadian Rhythm Disorders, Sleep Apnea and others. According to The Free Dictionary (2011), Circadian rhythm disorder is a lack of synchrony between the schedule of sleeping and waking required by the external environment and that of a person's own circadian rhythm. While Sleep Apnea is define as a condition which an individual stop breathing for more than ten seconds during sleep. There are three types of sleep apnea which are Obstructive Sleep Apnea, Central Sleep Apnea and mixed sleep apnea. In Obstructive Sleep Apnea (OSA), the breath will stop because tissue in the throat closes off the airway and Central Sleep Apnea (CSA) is the brain centers responsible for breathing fail to send messages to the breathing muscles. While mixed sleep apnea is the combination of the OSA and CSA (The Free Dictionary, 2011). Next, physical illness in body systems such as cardiovascular can lead to Insomnia. Besides several pains, menopause and psychiatric illness also play an important role in leading a person to insomnia. Furthermore, some behaviors such as daytime nap, early retirement to bed and else are creator of insomnia. The quietness and brightness of environment are the factor of insomnia. Lastly, the examples for medication that will cause insomnia are alcohol, central nervous system stimulant and others (Kamel & Gammack, 2006). But according to the twin studies which conduct by Watson, Goldberg, Arguelles and Buchwald (2006), insomnia is strongly influence by genetic factor.

Furthermore, Doghramji (2006), stated that insomnia can bring negative consequence towards our activity in daily life. It will lead to ill health and predicted to have lower expectancy in life. Insomnia is associated with daytime impairment such as fatigue, irritability, decreased memory and concentration, also affecting many aspects of day time functioning. Between, it is

always co-related with affective disorders, substance abuse, and other physical and psychological comorbidities (Doghramji, 2006). As Léger, Guilleminault, Bader, Lévy, and Paillard (2002), stated that the social, insomnia is also associated with an increased risk of accidents According to Morin, Vallieres and Ivers (2007), Clinical and Research evidence that the sleep related cognition such as faulty beliefs, worry and attention bias play an important role in perpetuating and worsen insomnia.

Problem Statement

Insomnia is already bringing a lot of impact towards our life. Anbar and Slothower (2006), have studied that sleep disturbances during adolescence can lead to inadequate parental supervision and environmental factors such as consumption of alcohol or caffeine (Gaultney, 2010). Moreover, adolescents also experience delay in the timing of sleep onset and awakening, associated with their pubertal status, which can cause a conflict with the social demands for early morning schooling (Anbar & Slothower, 2006). Specifically, insomnia affected up to 50% of patients with cancer (O'Donnell, 2004). Furthermore, Yang, Wu, Hsieh, Liu, and Lu in year 2003 stated that it may impact academic performance and health of a college student too (as cited as Gaultney, 2010). So, the impact of insomnia is severity in this society nowadays.

Operational definition

Stress. U.S. Department of Health and Human Services Centers for Disease Control and Prevention (n.d) stated that stress is the influence that will disrupt one person well beings. It may bring effects on health as well as psychological change. However, sometime stress is beneficial just if it is not overwhelm. There are different types of stress which are positive stress, tolerable stress and toxic stress.

Depression. According to Eby & Eby (2006), is defined as a type of affective disorder or mood disorder that characterized by pessimism, sense of inadequacy, decrease in daily activity and else that affect a person normal life. Moreover, if depression goes to certain extent, suicide can be resulted. There is 10% of American who affect by depression. World Health Organization had mentioned that depression will be the most common diseases on the earth by year 2020 (As cited in Eby & Eby, 2006).

Significance of study

First of all, women are more likely than men to report insomnia symptoms (Bartlett, Paisley & Desai, 2006). Buysse (2004), stated that the rates of insomnia in women are typically 20 to 50% higher than in men. Besides that, women also reported more frequent with insomnia symptoms. Both women and men will have insomnia approximately once a month to several times a month on average (Hamilton et al, 2007).

Epidemiologic cross-sectional studies have shown the depression is connected to disturbed sleep (Åkerstedt, 2006). According to Bartlett, Paisley and Desai (2006), it has been estimated that 40 to 50% of individual with insomnia also experience depression. Meanwhile, Turek (2005), study shows depression and insomnia had been related by psychiatrics. It has been estimated that more than 90% of patients that suffering from major depression also have sleep disturbances which can strongly linked depression with insomnia. A study of Taylor and colleagues (as cited in Turek, 2005), were reaffirms the relationship of insomnia and depression. The study found that people with insomnia were 9.82 times more likely to have “clinically significant” depression than noninsomniacs, and increased insomnia frequency and increased number of awakenings were related to increased depression. Besides that, in a recent literature,

psychosocial factor such as depression has been associated with insomnia severity (Bluestein, Rutledge & Healey, 2010).

The association between insomnia and stress is well known. Stress has been found to predate the onset of insomnia in 3 quarters of poor sleepers (Yeo, Perera, Kok & Tsoi, 1996). The relationship between psychological stress and insomnia is similar to pain and insomnia. Sleep disturbances may increase cancer-related distress which lead to further sleep problems, contributing to vicious cycle in which insomnia lead to stress and stress lead to insomnia (Theobald, 2004).

In conclusion, although there are different researchers proved that girls have the higher rate of insomnia compare to male while insomnia is correlated with both stress and depression, most of the samples are focus on western countries only. As we know, different countries have different culture, value, race, life-style and personality and so on and so forth. It may lead to different result. For instance, research done by Zhang and Wing (2006) mentioned that there are no gender difference of insomnia in some Asian countries such as Japan and northern China. There are only few researchers done the research about the relationship between stress and depression towards insomnia in Asian especially the sample size is not just concentrate on undergraduates. So, it is important to conduct this study among undergraduates in Malaysia. Besides that, it also can find out that whether the result is same with western view. For the future, it is not only can be a reference for educator and also parents and children.

Research Questions

The research questions are

1. Does the male have higher insomnia rate as compare with female?
2. Does any correlated between stress and insomnia?

3. Does any correlated between depression and insomnia?

Objective of study

This study is conducted to examine whether gender difference in insomnia. Besides that, it also wants to find out whether stress and depression level have correlation with insomnia.

The hypotheses of the study include:

1. Female is easier to have insomnia compare with male.
2. There is a relationship between stress and insomnia.
3. There is a relationship between depression and insomnia.

CHAPTER II

LITERATURE REVIEW

Cognitive and Physiological model of insomnia

Insomnia is a disorder of hyperarousal experienced throughout the entire day. This hyperarousal may exhibit itself as a state of hypervigilance during the day and hard to initiate and maintain the sleep at night. This arousal can be explained by both cognitive and physiological models of insomnia (Roth, 2007). According to The Free Dictionary (2011), hypervigilance is abnormally increase arousal, responsiveness to stimuli, and scanning of the environment for treats.

For the cognitive model of insomnia, it emphasizes that if individual worry and rumination about life stresses will lead to sleep problem and create the acute episodes of insomnia, especially in initiating sleep and returning back to sleep after an awakening. When the individual begins to experience sleep difficulties, worry and rumination translate from life events to worries about the sleep itself and about the consequences of not getting enough sleep. This negatively-toned cognitive activity is further fueled if a sleep-related threat is detected or a sleep deficit is perceived (Roth, 2007).

According to Roth (2007), in parallel with the cognitive models, there is another model of the evolution of insomnia suggest that hyperarousal is primarily due to neurophysiologic or physiologic factors. Physiological arousal has been evaluated through measurements of the whole body metabolic rate, heart rate variability, neuroendocrine measures, and functional neuroimaging. The role of neuroendocrine systems is mediating some of effect of serotonin of the sleep and wake cycle (Cardinali & Pandi-Perumal, 2006). Recent studies are make comparison between good sleepers with insomnia patients. For the metabolic rates, insomnia

patients exhibited higher metabolic rates (measured at intervals across the 24-hour day) than the healthy controls. For the heart rate variability, it found that average heart rates were increased and variability was decreased in all stages of sleep in insomnia patients compared to healthy normal sleepers through 36 hour study (Roth, 2007).

According to Roth (2007), chronic activation of the stress response system in neuroendocrine systems proved the existence of sleeping arousal. Urinary catecholamines, Urinary free cortisol levels and Cortisol & adrenocorticotropic hormone (ACTH) make influence in sleeping condition. According to The Free Dictionary (2011), catecholamine is a hormone to stimulate cellular activities and carry nerve impulses through the body while ACTH is a hormone that stimulate the secretion of cortisone and other hormone by the adrenal cortex. Cortisol is a hormone to regulate carbohydrate metabolism, immune system and maintain blood pressure. Urinary free cortisol levels bring influence to poor sleeper and also correlated with total wake time of a sleeper. Besides, sleep percentage in the first stage and wake time after sleep onset are related to urinary catecholamines. Primary insomniacs have higher level of ACTH in their Plasma when compare to normal person especially in the evening. For these findings can prove that Hypothalamic-pituitary-adrenal axis (HPA) is linked with pathology of chronic insomnia (Roth, 2007). HPA is a major part of neuroendocrine system and a mechanism to interact between glands, hormones and part of the mid-brain (The Free Dictionary, 2011).

Finally, cerebral glucose metabolism is assessed by using positron emission tomography (PET), an indirect measure of whole brain metabolism of insomnia patients. Insomnia patients exhibited greater cerebral glucose metabolism during waking and non-rapid eye movement (REM) sleep states compare to healthy subjects. Moreover, research found that the insomnia patients metabolism rate have smaller reductions from waking to non-REM sleep. These findings

suggest about the interacting neural networks involved in the inability to fall asleep, which include an emotion- regulating system, a general arousal system and a cognitive system (Roth, 2007).

Gender differences.

Some studies found that female preponderance in patients who sought treatment for insomnia but there is a study in year 2001 found that there was no significant different in gender. According to Mahendran (2001), there were 85 consecutive case were reported by Insomnia Clinic. 52.9% male, 47.15% female and the age range is 31-60 participate in this research. The result showed that there was no significant gender difference in gender toward insomnia.

But, other studies are proposed that female is more preponderance in insomnia. First of all, Zhang and Wing (2006), stated that there is a study to examine between the genders differences in insomnia. The study was used different meta-analyses to investigate the sex difference of insomnia among different conditions. 29 studies were included in this study. Meta-analyses were analyzed by using Comprehensive Meta Analysis (CMA). There are different analyses about gender in this study. First, it was divided the studies into 2 groups which are 4 high quality studies which have met the criteria and 25 nonquality studies which didn't met the criteria. The criteria include large studies (>4999 people), semistructured/ structured diagnostic interviews, based on stringent operational criteria. Both of them showed a female preponderance in the risk of insomnia. Second, 29 studies were divided into 2 groups: 23 current insomnia studies (recent 1 week to 6 months) and 6 long-term insomnia studies (recent 1 year and lifetime). Both of them showed similar female preponderance in the risk of insomnia. Third, it compared the sex difference in the prevalence of insomnia among elderly (≥ 65 years), middle-age (31-64 years), and young adult subjects (15-30 years). 3 groups showed female is in the risk of insomnia,

but overall risk ratio progressively increased from 1.28 in young adults to 1.73 in elderly subjects. Another analysis is the studies of different regions. 29 studies were divided into 4 continents which are 11 studies in America, 11 studies in Europe, 5 studies in East Asia and 2 studies in Australia. Result showed that female excess in the risk of insomnia in all regions (Zhang & Wing, 2006). Through this study of meta- analysis, it can be conclude that female is predisposition with insomnia.

There is a study conducted by Johnson, Roth, Schultz and Breslau (2006), also reported that the difference between gender and insomnia. The data come from random sample of 1014 adolescents who were 13 to 16 years old which are selected from households in a 400 000-member health maintenance organization encompassing metropolitan Detroit. Interviewers used computer-assisted structured interviews with each adolescent. Due to the analyses of insomnia and pubertal development, onset of menses was associated with a 2.75-fold increased risk for insomnia. There was no difference in risk for insomnia among girls before menses onset relative to boys, but it was difference emerged after menses onset. In contrast, maturational development was not associated with insomnia in boys. Furthermore, analyses of insomnia symptom types reported that the association of insomnia with menses onset and the emergent gender difference may be attributable to difficulty maintaining sleep and nonrestorative sleep symptoms of insomnia. In conclusion, gender difference in insomnia seems to emerge in association with onset of menses.

Besides that, according to Krystal (2004), insomnia is a disorder that can lead to substantial impairments in the quality of life and functional capacity. While this condition more frequently occurs in women than man. It is because insomnia is association with hormonal changes such as menopause or late-luteal phase of menstrual cycle that are unique to women.

The relationship between hormone levels and sleep is complex, there appears an association between decrease in circulating estrogen and progesterone and an increased propensity to insomnia. Another factor that is contributed to the high rate of insomnia among woman is that they are more likely to suffer from psychiatric disorders which are highly correlated with insomnia (Krystal, 2004).

Stress and insomnia.

A research regarding the relationship between stress and insomnia in Singapore have been conducted by Yeo et al. (1996), in Singapore, there are no study of insomnia has been conducted in the general population. So, this study is a larger study on the prevalence of neurotic disorders in Chinese and Malays. One in three Chinese households and all Malay households have been selected as participants. Indians and others religion were excluded as the expected number of affected individuals were too low to make analysis. Yeo et al. (1996), stated that the ages of participants are between 15 years old to 55 years old. Interviewers interviewed the same ethnic group by using an instrument comprising 3 parts which are demographic data, part of Diagnostic Interview Schedule covering 6 disorders which are generalized anxiety disorder, panic disorder, obsessive compulsive disorder, phobic disorder, dysthymia, major depression and a section question with insomnia, level of stress and suicidal behavior. It has been used Visual analogue scale (VAS) rating the level of stress participants perceived themselves to be suffering from and the sources of this stress. This was a measure of ongoing life stress as perceived participants and was not an independent measure of stress. 2380 individuals have been surveyed and 370 cases reported to have sleep problems. The result showed there are 75% of insomnia group has reported that their stress level was in the moderate to severe ranged, compare to 60% in the non-insomnia group. The insomnia group rate home stress is higher than work stress. For

the home stress, most of the insomnia patients are attribute their stress to their children, followed by their parents, spouses, siblings, in-law and others. In fact, home stress was the only source stress that was significantly higher in the insomnia group compare with non-insomnia group. The stress in the insomnia group was attributed to immediate family members. According to The Free Dictionary (2011), immediate family members defined as a person's spouse, child, child's spouse, stepchild, stepchild's spouse, grandchild, grandchild's spouse, parent, stepparent, parent-in-law or siblings. In this study, there was a positive association between insomnia and increased stress level (Yeo et al., 1996).

According to Åkerstedt (2006), stress involved increased psychological and physiological activation in response to demands and an activated HPA (hypothalamo-pituitary-adrenocortical) system incompatible with normal sleep. It has stated that the sleep impairment cause further increases in the HPA systems and promote a various cycle of stress and insomnia. Besides that, most insomniacs attribute their problem to cognitive arousal. Åkerstedt (2006), showed that increases in alpha and beta power and reduced delta power in somniacs with intrusive thoughts (stress-related). Disturbed sleep in itself may raise worried about being able to sleep the following night, which will contribute to the next night, a vicious circle thus being created. Disturbed sleep then become a stressor in itself. In conclusion, stress and insomnia is correlated with each other.

Depression and insomnia.

A study which has concluded that insomnia severity was significantly correlated with depression. According to Bluestein, Rutledge and Healey (2010), this correlation cross-sectional study was conducted in a hospital-sponsored primary care clinic, 2 urban and academic family practice centers. There are 236 participants and the age ware 18 years old or older with clinically

significant insomnia. Survey instruments are insomnia severity index (ISI) and center for epidemiologic studies-depression scale (CES-D). The ISI has Cronbach alpha more than .70 and calculated Cronbach alpha in this study is .84. CES-D has high coefficients alpha more than 0.85 and calculated Cronbach alpha in this study is .88. The result showed that ISI scores is significantly correlated ($P < 0.1$) with depression. Depressive symptomatology has a positive relationship with insomnia severity. It means that high depression score had significant individual associations with insomnia severity. This study found a strong relationship between insomnia severity and depression. In their seminal study of insomnia in primary care, Simon and VonKorff (as cited in Bluestein, Rutledge & Healey, 2010), reported that compared with controls, insomnia patients were significantly more likely to suffer comorbid depression.

Furthermore, Buckner, Bernert, Cromer, Joiner and Schmidt (2008), stated that there is research to examine the relationship between depressive symptoms, insomnia and social anxiety. The sample in this research is undergraduates. 57.4% of female and age ranged from 18 to 32 ($M = 19.21$, $SD = 1.46$). The majority of the sample (88%) was in their first year and second year in college. The Instrument that was used is Insomnia Severity Index (ISI), Beck Depression Inventory (BDI) and Social Interaction Anxiety Scale (SIAS). Three questionnaires consist of good internal consistency which is equal or higher than .85. The result showed that insomnia was correlated with both depressive symptoms ($r = .49$, $P < .01$) and social anxiety ($r = .49$, $P < .01$). Social anxiety was correlated with depressive symptoms ($r = .46$, $P < .01$) Moreover, these findings suggest that depressive symptomatology may play a role in the relationship between insomnia and social anxiety. It also suggested that current depressive symptoms may be critical in explaining the existing sleep problems among individuals with clinically significant social

anxiety. Alternatively, social anxiety may lead to the simultaneous development of depressive and insomnia symptoms (Buckner et al., 2008).

Moreover, there is an article also review the relationship between depression and sleep, with emphasis on the foundation and clinical salience. According to Berk (2009), insomniacs have 40-60% have the symptoms of depression, with rates of around 80%. In physiological view, melatonin hormone is secreted nocturnally by pineal gland and its release has been used as a marker of circadian phase. About 2 hours before sleep, melatonin will be response to dim light conditions but depression will delay melatonin release, suggesting a phrase delay in circadian rhythms. Furthermore, depression patient may also be supersensitive to light induced suppression to melatonin. While lower level of melatonin in depression is a consistent finding in both depression and bipolar disorder and there is a tendency for the circadian cycle to phase advance, with delayed sleep and waking times. Moreover, there is 3 typical sleep symptoms in depression which are difficulty initiating sleep (initial insomnia), difficulty maintaining sleep (mild insomnia), and early morning waking (terminal insomnia). So, the association between insomnia and depression has a well characterized physiological foundation with each other.

CHAPTER III

METHODOLOGY

Participant

The students in University Tunku Abdul Rahman (UTAR), Kampar has been chosen as the population and area of the research. A sample of 100 students from the population participates in this research. There were 50 male participants and 50 female participants. The age range of the sample is 18 to 24 ($M=20.82$, $SD=1.533$). The mean age of male participants was 20.76 ($SD=1.546$) and the mean age of female participants was 20.88 ($SD=1.573$) (see appendix B4 for calculation, p. 50-51).

Apparatus

The survey included three measurement scales which are Insomnia Severity Index (ISI), Patient Health Questionnaire (PHQ-9) and Perceived Stress Scale (PSS-10). Besides that, demographic information such as gender and age are collected too.

Insomnia Severity Index (ISI). Insomnia as indicated by a score of equal or more than 7 marks on the Insomnia Severity Index (ISI). The ISI is a 7-item questionnaire that asks respondents to rate the severity of recent problems with sleep onset, sleep maintenance, early waking, and the impact of insomnia using a 5-point Likert scale (where 0 = not at all and 4 =extremely). ISI scores may range from 0 to 28. Higher scores indicate more severe insomnia, within 4 categories: absence of insomnia (0 to 7), mild (8 to 14), moderate (15 to 21), and severe insomnia (22 to 28). Cronbach alpha for the ISI was .84 (Bluestein, Rutledge & Healey, 2010).

Patient Health Questionnaire (PHQ-9). According to Cameron, Crawford, Lawton and Reid (2008), PHQ-9 which consists of 9 questions designed to assess participants' mood over the last two weeks and correspond to the nine diagnostic criteria for major depressive disorder covered in Diagnostic and Statistical Manual of Mental Disorder (DSM-IV). Items are rated from the score of 0 (not at all) to 3 (nearly every day) which according to the increased frequency of difficulties in each criteria. Scores are summed up and range from 0 to 27. The scores can be interpret as showing either of minimal depression (0-4), mild depression (5-9), moderate depression (10-14), moderately severe depression (15-19) and severe depression (20-27). The Cronbach's alpha shows that reliability coefficients of this scales range from 0.83 to 0.92 and this can concluded that the PHQ-9 contains high internal consistency (Cameron et al., 2008).

Perceived Stress Scale (PSS-10). PSS-10 consists of 10 questions are rated on a 5-point Likert scale format, with optional responses ranging from 0 (*Never*) to 4 (*Very Often*). The overall score ranges from 0 (low degree of perceived stress) to 40 (high degree of perceived stress) (Goldstein, 2007). PSS scores are obtained by reversing responses (For example, 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0) to the four positively stated items (items 4, 5, 7, & 8) and then summing across all scale items. In the study of the PSS-10 had a Cronbach's α of .81 (Willert, Thulstrup, Hertz & Bonde, 2009).

Demographic Information. A brief demographic information will be collected too. The demographic insomnia is self reported such as age and gender.

Procedure

The research design used in the study is survey research where it is designed to deal more directly with the nature of people's thoughts, opinions, and feelings. A survey research design is the overall plan or structure used to conduct the entire study. In the study, the survey research

design used is cross-sectional design. This research design is one of the most commonly used survey research design where one or more samples are drawn from the population at one time (Shaughnessy, Zechmeister, & Zechmeister, 2009). Convenient Sampling is used in this study where participants are available and willing to participate in this study is selected.

The student will complete their questionnaires in UTAR Block G library. Library is being chosen as the space to conduct the research because it was quiet and no disturbance while the students complete their questionnaire. Question will be asked before they start to ensure they were no doubts while participating in the research.

After that, one questionnaire with three subscales (Insomnia Severity Index, Perceived Stress Scale-10 and Patient Health Questionnaire-9) is distributed to the 100 samples, which consist of 50 males and 50 females from different course of undergraduate UTAR student.

All participants will conduct one questionnaire. Before start to do the questionnaire, there are few reminders will explain verbally to let the students understand. First, the researcher will explain to them that the purpose of research. Second, the result of each student is private and confidentiality. Third, each subscale of questionnaire will complete about five minutes. Forth, the participants need to have five minutes break before they continue the next subscale of questionnaire. The reason is to decrease the chances of being fatigue, bored and hesitated in answering. Fifth, the questionnaires took about 20-30 minutes to complete.

For answer the Insomnia Severity Index (ISI), the participant can only choose one answer and circle it. Different questions have the different answer to choose. For answer the Perceived Stress Scale (PSS-10), the participant can only choose one answer and circle it which may never, almost never, sometimes, fairly often, and very often. For answer the Patient Health

Questionnaire (PHQ-9), can only choose one answer and circle it too which were never, almost never, sometimes and fairly.

After questionnaires are collected, the data is summarized and analyzed the level of insomnia, stress and depression among the participants. *Independent sample T-test* is used to analyze the difference of gender toward insomnia of UTAR students. The relationship between depression and insomnia will be used *Spearman correlation* test to identify whether there are any relationship, if yes, it will also find out whether there are positive or negative significance relationship between each other. Furthermore, the relationship between stress and insomnia will be used *Spearman correlation* test to identify whether there is any relationship too. If yes, it will also find out whether there is positive or negative significance relationship between each other.

CHAPTER IV

FINDING & ANALYSIS

Gender VS Level of Insomnia

The first research question of this study was to assess does the male have higher insomnia rate as compare with female. To address this question, students are separate into two groups which are equal for both male (n=50) and female (n=50) to conduct the *independent sample t-test* between gender and insomnia. The result of this analysis is shown in the table 2.1 which shows the mean, standard deviation and *t* value of both gender undergraduates in UTAR.

Table 2.1

Mean, Standard Deviation and t value of the Insomnia Severity Index among gender of undergraduates in UTAR

	M	SD	<i>t</i>	<i>Df</i>	P
Male	10.12	5.944	.018	98*	>0.05
Female	10.1	5.433			

The result of *independent sample t-test* showed that there was no significant difference between gender and insomnia among undergraduates in UTAR. $t(98) = 0.018, p > 0.05$. (see Appendix C1 for calculation, p.53-55)

Stress VS Level of Insomnia

The second research question of this study was to assess does any correlated between stress and insomnia of undergraduates in UTAR. To address this question, *Pearson Correlation* was conducted between the relationship between stress and insomnia of undergraduates in UTAR. The correlation is shown in the table 2.2.

Table 2.2

Pearson's Correlations between stress and insomnia among UTAR undergraduates.

Variable	Insomnia Severity Index (ISI)
Perceived Stress Scale (PSS-10)	0.541

The result of *Pearson Correlation* showed that there was a significant positive correlation between level of insomnia and stress among undergraduates in UTAR, $r(98) = 0.541, p < 0.05$. The higher score in insomnia severity index, the higher the score in Perceived Stress Scale. (see appendix C2 for calculation, pg 56-61)

Depression VS Level of insomnia

The third research question of this study was to assess does any correlated between depression and insomnia of undergraduates in UTAR. To address this question, *Pearson Correlation* was conducted between the relationship between depression and insomnia of undergraduates in UTAR. This correlation shown in table 2.3

Table 2.3

Pearson's Correlations between depression and insomnia among UTAR undergraduates

Variable	Insomnia Severity Index (ISI)
Patient Health Questionnaire (PHQ-9)	0.673

The result of *Pearson Correlation* showed that there was a significant positive correlation between level of insomnia and depression among undergraduates in UTAR, $r(98) = 0.673$, $p < 0.05$. The higher score in insomnia severity index, the higher the score in Patient Health Questionnaire. (see appendix C3 for calculation, pg 62-67)

CHAPTER IV

DISCUSSION

Based on the result that I have found and statistic method that I have used which are *Independent sample t-test* and *Pearson Correlation* test. Through the *Pearson Correlation*, It is found that there is significance correlated between stress and insomnia, depression and insomnia among UTAR undergraduates. But *Independent sample t-test* found that there is no significance difference between gender towards insomnia among UTAR undergraduates.

I proposed whether male have higher insomnia rate as compare with female in the first research question. In most of the studies, it showed that there is significant difference among gender and female has the higher insomnia rate compare with male. For example, the research of meta- analysis done by Zhang and Wing (2006) stated that female is more preponderance in insomnia. However, the result of *Independent sample T-test* that I have done showed that there was no significant difference between gender and insomnia among undergraduates in UTAR. $t(98) = 0.018, p > 0.05$. There is because of several reasons that lead to the discrepancy between the findings in studies and the result that I done.

The first reason is female is more willing report and seeks for treatment compare with male. According to the research done by Mahendran (2001) showed that there was no significant gender difference towards insomnia. It is because female is more willingness to acknowledge the problem and seek treatment compare with male. Besides that, women are more likely than men to report insomnia symptoms too (Bartlett, Paisley & Desai, 2006). In my opinion, it will influence the outcome of a research to be inaccurately whether there is gender difference towards insomnia. For instance, some researchers will conduct the insomnia study in private centre, clinic,

or hospital setting, so it will lead to discrepancy and inaccurately if the female insomnia patient is more than male insomnia patient.

Secondly, it is the region difference. Both gender from different countries have the different life style and different personality, it will lead to different result of a research too. A research stated that compare with other studies, female in Asian countries excess in the risk of insomnia was the lowest and the research also mentioned that there are no gender difference of insomnia in Asian countries such as Japan and northern China (Zhang & Wing, 2006). The research done by Gaultney (2010) also stated that Asian students consists of less risk for insomnia relative to white and Latino students. Therefore, it is not surprisingly that the result is not significant.

Moreover, there is one more possibility that lead to the different in the result. The sample size to represent the population for this research is too small compare with others researchers, it may influence the result to be inaccurately among gender differences toward insomnia. In this research just targeted fifty male and fifty female which total is one hundred while in the past studies, most of the research had targeted one thousand and above respondent. For example, Johnson et.al (2006) used 1676 respondents.

The second research question is to test the relationship between insomnia and stress. Through the Pearson Correlation analysis that I have done, it shown that there is a significant positive correlation between stress and insomnia [$r(98) = 0.541, p < 0.05$]. The higher level of insomnia is correlated with the higher level of stress. According to the research which is done by Åkerstedt (2006), stress and insomnia is also correlated with each other. It supported the result

that I have done. Furthermore, Yeo et.al (1996) is also done the research in Singapore and proved that there was a positive association between insomnia and increased stress level.

The third research question is to test the relationship between insomnia and depression. Through the Pearson Correlation analysis that I have done, it shown that there is a significant positive correlation between insomnia and depression [$r(98) = 0.673, p < 0.05$]. This result can be supported by Bluestein, Rutledge and Healey (2010) where they strongly stated that there is a strong relationship between insomnia severity and depression. Moreover, the research that done by Buckner, Bernert, Cromer, Joiner and Schmidt (2008) also showed that insomnia was correlated with depressive symptoms. According to Taylor, Lichstein, Durrence, Reidel, Bush (2005), increased insomnia frequency was related to increased depression. So, hypothesis of insomnia is correlated with depression is significant.

Finding related to broader issues and future research

Although it has found out that there are no significance difference of insomnia between male and female, it focus on UTAR undergraduates which is from age 18 to 24 only which is youth. The United Nations, for statistical purposes, defines 'youth', as person between the ages of 15 and 24 years (Youth and the United Nations, n.d.). According to World Health Organization (2011), age 60+ is taken as older generation. For the future research, it can collect data from older generation to analysis whether there are significance differences in gender towards insomnia.

Besides that, the result also showed that insomnia is positive correlated with depression and stress. But we cannot prove that whether depression and stress will lead to insomnia. So, it may find out that whether insomnia will lead to stress and depression or stress and depression

will lead to insomnia. It is important to know the answer as parents and educators have the opportunity to have prevention in the young generation rather than cure.

There are another variable which is important to find out for the future research which is anxiety. Even through current opinion of some researchers suggests that insomnia and anxiety are separate entitle, their symptoms overlap considerably (Spence et al, 2004). According to Taylor, Lichstein, Durrence, Reidel and Bush (2005), increased insomnia frequency was related to increased anxiety. So, it is interesting to find out that whether insomnia is correlated with anxiety.

Shortcoming and Recommendation for future study

Although all of the two of three research hypothesis are significance but there are few assumptions which are also the limitation of the research that I conducted. First of all, it is the number of sample that I taken from population. The sample size that I took is small as I only took 100 samples to represent the UTAR undergraduates. So, it may mislead the accuracy of the result. It is because if the sample size is too small, it cannot get more different information from different population. Therefore, it is important to have a bigger sample size to represent to population to make survey to get the more accurate result for discussion.

Moreover, the second shortcoming of the research is language that used in questionnaire. The questionnaire that participants answered is English version. Some of the participants are misunderstanding the meaning of the question. It might because they were born in Chinese family background, so they can't fully understand some questions which are trickier in language. It will directly influence the accuracy of the result. So, it is suggested to translate the English version questionnaire to Chinese version questionnaire.

Furthermore, most of the participants are Chinese. It is very difficult to find Malay and Indian to conduct the survey because the number of Malay and Indian students is low percentage in UTAR. So, I can't do stratified random sampling for the race. It may lead to the prejudice. It is because different race have different perspective. It will directly influence the result of each research hypothesis. The way to avoid this problem is to prolong the duration of survey. So, it just has more time to search for enough target participants to take part in the research.

Besides that, the places that I conduct survey also are not convenient which UTAR Block G Library. Although it is a quiet and comfortable environment to answer the questionnaire but I faced a problem. Many students are rejected to do the survey. This is because they think that it wastes their time as they went to library to search for information, lend book, do their homework or rest only. So, it is recommended that it can do the survey at Cafeteria at Block G. It will be chosen instead of Block C Cafeteria and Block I cafeteria because two of them are not as clean as the Block G Cafeteria. Besides that, it has a convenient environment such as air-con provided and quiet. Moreover, there are many students who gather there to have chit-chat and take a rest. During the rest time or waiting for their friends to finish their breakfast or lunch, they may be willing to help me to do the research voluntarily.

In addition, most of the journals that I used to compare with the results are from western countries. Therefore, there might be some cultural differences among the western and eastern country students. Moreover, different countries of residents have different views and it may lead to bias. To decrease the problem, there is a recommendation. It is not only to search the journal from UTAR Library, it also needs to go to Public Library to search more information from overseas.

Conclusion

Through the research, there are not only benefits for undergraduates to understand more about insomnia and also parents and educators. Although the result found out that there is no significant between insomnia and gender, educators and parents also need to pay more attention of the problems of insomnia. If the children or students have the symptoms of insomnia such as fatigue, irritability, decreased memory and concentration, also affecting many aspects of day time functioning (Doghranji, 2006), educators and parents stand an important role to encourage them to seek for help and treatment.

Besides that, research also showed that there are positive correlation between stress and insomnia, and positive correlation between depression and insomnia. So, stress and depression are two factors that are strongly correlated with insomnia. It is important to let the parents and educators know that if their students or children are in the condition of stress or depression, they need to be more attention as it is more possibility to have insomnia too.

Furthermore, the research of insomnia has been done by many researchers from western countries but less in Asian countries especially our country, Malaysia. Therefore, this research study that I done is useful for many students, educator, psychologist, counselor and some people who is interest with the issue of insomnia as a guideline and reference.

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APPENDIX A: Questionnaires

Appendix A1

Insomnia Severity Index

Gender : M / F

Age:

Use **circle** to indicate the severity of your insomnia problem(s)

Insomnia Problem	<i>None</i>	<i>Mild</i>	<i>Moderate</i>	<i>Severe</i>	<i>Very severe</i>
1. Difficulty falling asleep	0	1	2	3	4
2. Difficulty staying asleep	0	1	2	3	4
3. Problem waking up too early	0	1	2	3	4
	<i>Very Satisfied</i>	<i>Satisfied</i>	<i>Moderately Satisfied</i>	<i>Dissatisfied</i>	<i>Very Dissatisfied</i>
4. How satisfied/ dissatisfied are you with your current sleep pattern?	0	1	2	3	4
	<i>Not at all Noticeable</i>	<i>A Little</i>	<i>Somewhat</i>	<i>Much</i>	<i>Very Much Noticeable</i>
5. How noticeable to others do you think your sleep problem is in terms of impairing the quality of your life?	0	1	2	3	4
	<i>Not at all Worried</i>	<i>A Little</i>	<i>Somewhat</i>	<i>Much</i>	<i>Very Much Worried</i>
6. How worried/ distressed are you about your current sleep problem?	0	1	2	3	4
	<i>Not at all Interfering</i>	<i>A Little</i>	<i>Somewhat</i>	<i>Much</i>	<i>Very Much Interfering</i>
7. To what extent do you consider your sleep problem to interfere with your daily functioning (e.g. daytime fatigue, mood, ability to function at work/daily chores, concentration, memory, mood, etc.) currently?	0	1	2	3	4

APPENDIX A2

Perceived Stress Scale

Circle how often you felt or thought a certain way

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

1.	In the last month, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2.	In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3.	In the last month, how often have you felt nervous and “stressed”?	0	1	2	3	4
4.	In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5.	In the last month, how often have you felt that things were going your way?	0	1	2	3	4
6.	In the last month, how often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7.	In the last month, how often have you been able to control irritations in your life?	0	1	2	3	4
8.	In the last month, how often have you felt that you were on top of things?	0	1	2	3	4
9.	In the last month, how often have you been angered because of things that were outside of your control?	0	1	2	3	4
10.	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

APPENDIX A3

PATIENT HEALTH QUESTIONNAIRE

*Over the last 2 weeks, how often have you been bothered by any of the following problems? (Use **circle** to indicate your answer)*

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly

1.	Little interest or pleasure in doing things?	0	1	2	3
2.	Feeling down, depressed, or hopeless?	0	1	2	3
3.	Trouble falling or staying asleep, or sleeping too much?	0	1	2	3
4.	Feeling tired or having little energy?	0	1	2	3
5.	Poor appetite or overeating?	0	1	2	3
6.	Feeling bad about yourself - or that you are a failure or have let yourself or your family down?	0	1	2	3
7.	Trouble concentrating on things, such as reading the newspaper or watching television?	0	1	2	3
8.	Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual?	0	1	2	3
9.	Thoughts that you would be better off dead, or of hurting yourself in some way?	0	1	2	3

APPENDIX B: Original Data

Appendix B1

Gender 1=Male
 2=Female

ISI Level 1= Absence of insomnia (0-7)
 2= Mild Insomnia (8-14)
 3= Moderate Insomnia (15-21)
 4= Severe Insomnia (22-28)

Table 1.1

Raw data for each participant gender, age and the score of Insomnia Severity Index (ISI)

Participant	Gender	Age	Insomnia Severity Index (ISI)							Total score	Level
			Q1	Q2	Q3	Q4	Q5	Q6	Q7		
1	1	20	0	0	0	1	0	0	1	2	1
2	1	18	1	1	3	4	2	1	1	13	2
3	1	20	1	1	0	1	1	1	1	6	1
4	1	19	2	3	1	3	3	3	3	18	3
5	1	21	0	1	0	0	1	0	0	2	1
6	1	22	2	1	2	2	2	2	2	13	2
7	1	22	1	0	1	2	1	1	2	8	2
8	1	21	0	0	0	1	0	0	1	2	1
9	1	19	1	1	1	1	1	0	1	6	1
10	1	23	2	1	3	2	2	1	2	13	2
11	1	20	0	0	0	1	2	0	2	5	1
12	1	22	0	0	0	0	0	1	2	3	1
13	1	21	2	1	2	2	1	2	2	12	2
14	1	22	0	0	1	1	0	1	1	4	1
15	1	24	2	3	3	2	2	3	4	19	3
16	1	22	1	0	3	2	1	2	1	10	2
17	1	19	3	2	4	1	3	0	4	17	3
18	1	20	0	0	2	0	1	0	2	5	1
19	1	23	1	1	0	1	0	0	1	4	1
20	1	22	3	3	4	3	3	3	3	22	4
21	1	19	0	0	2	1	1	1	2	7	1
22	1	23	0	0	4	1	2	1	4	12	2

23	1	20	0	0	0	1	0	0	0	1	1
24	1	18	1	0	0	1	0	0	0	2	1
25	1	20	4	4	3	3	2	4	3	23	4
26	1	19	1	1	2	0	0	0	0	4	1
27	1	22	0	2	3	1	1	1	1	9	2
28	1	22	0	0	0	0	1	1	1	3	1
29	1	22	1	0	0	1	0	0	2	4	1
30	1	19	2	1	2	2	2	1	3	13	2
31	1	22	2	1	3	2	3	1	3	15	3
32	1	21	1	1	0	2	1	0	2	7	1
33	1	20	2	3	2	3	2	1	3	16	3
34	1	21	1	2	3	0	1	0	1	8	2
35	1	22	2	2	3	3	3	2	4	19	3
36	1	20	1	1	2	2	2	2	2	12	2
37	1	19	1	1	0	1	0	0	3	6	1
38	1	22	3	2	3	2	3	1	2	16	3
39	1	23	2	2	1	2	2	2	3	14	2
40	1	18	2	2	3	3	2	3	3	18	3
41	1	20	3	1	1	3	2	2	2	14	2
42	1	19	0	3	3	4	1	2	1	14	2
43	1	20	1	1	1	1	0	2	1	7	1
44	1	19	1	0	0	2	2	1	0	6	1
45	1	21	1	0	0	0	1	1	0	3	1
46	1	23	2	1	0	2	1	2	2	10	2
47	1	20	1	2	2	2	1	2	2	12	2
48	1	21	2	2	1	2	2	2	3	14	2
49	1	23	2	1	2	2	2	2	4	15	3
50	1	20	1	3	3	3	4	2	2	18	3
51	2	22	2	2	2	3	2	2	3	16	3
52	2	21	2	1	2	3	1	1	2	12	2
53	2	18	1	1	2	2	0	0	1	7	1
54	2	22	2	2	0	2	0	2	1	9	2
55	2	20	1	1	2	1	2	1	1	9	2
56	2	19	2	1	3	1	1	1	1	10	2
57	2	22	1	1	1	2	1	1	1	8	2
58	2	21	0	1	1	2	1	1	0	6	1
59	2	19	1	1	1	1	0	0	2	6	1

60	2	18	1	1	3	2	3	1	1	12	2
61	2	20	1	0	3	3	3	4	3	17	3
62	2	19	0	0	1	1	2	0	0	4	1
63	2	20	0	0	2	1	0	0	0	3	1
64	2	21	3	2	1	3	1	1	1	12	2
65	2	20	1	1	1	2	0	0	1	6	1
66	2	19	0	0	3	3	2	1	3	12	2
67	2	20	1	0	0	1	0	0	1	3	1
68	2	19	2	3	1	1	1	1	2	11	2
69	2	20	0	0	1	0	0	0	0	1	1
70	2	19	3	1	1	2	1	2	2	12	2
71	2	22	4	3	0	2	2	3	3	17	3
72	2	23	2	0	4	2	0	0	3	11	2
73	2	24	1	2	0	1	0	0	0	4	1
74	2	23	1	1	3	1	0	1	3	10	2
75	2	22	2	2	3	1	0	1	1	10	2
76	2	21	0	0	0	1	0	0	1	2	1
77	2	20	0	0	0	1	0	0	1	2	1
78	2	20	3	2	1	3	1	2	2	14	2
79	2	24	0	0	1	0	1	0	0	2	1
80	2	23	1	0	0	1	1	0	0	3	1
81	2	21	0	2	1	0	0	0	0	3	1
82	2	20	1	1	3	2	1	1	1	10	2
83	2	19	1	1	1	2	1	0	1	7	1
84	2	19	1	1	1	2	0	0	0	5	1
85	2	22	1	3	2	2	3	1	2	14	2
86	2	23	2	2	1	1	3	2	3	14	2
87	2	21	3	2	4	3	2	1	1	16	3
88	2	21	3	3	1	2	2	1	2	14	2
89	2	20	1	2	3	1	3	1	3	14	2
90	2	21	4	4	4	4	4	4	4	28	4
91	2	19	2	2	1	2	2	2	2	13	2
92	2	22	3	3	2	2	3	1	3	17	3
93	2	22	2	2	2	2	2	1	1	12	2
94	2	23	2	3	2	3	3	1	3	17	3
95	2	21	1	3	3	2	1	1	1	12	2
96	2	22	1	2	3	1	2	2	3	14	2

97	2	21	2	3	4	2	2	3	2	18	3
98	2	22	3	2	0	2	3	1	0	11	2
99	2	24	1	2	0	1	1	0	1	6	1
100	2	20	1	1	3	0	2	0	2	9	2

Appendix B2

Gender 1=Male
 2=Female

Table 1.2

Raw data for each participant gender, age and the score Perceived Stress Scale (PSS-10)

Participant	Gender	Age	Perceived Stress Scale (PSS-10)										Total score
			Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	
1	1	20	2	1	2	1	2	2	2	1	2	1	16
2	1	18	2	2	2	1	2	3	1	2	1	2	18
3	1	20	2	1	2	1	1	2	2	2	2	2	17
4	1	19	3	3	4	2	3	3	3	1	3	3	28
5	1	21	3	2	2	1	1	2	2	1	2	2	18
6	1	22	2	2	2	2	2	2	3	2	1	2	20
7	1	22	2	2	2	3	2	3	1	2	1	2	20
8	1	21	2	2	1	1	1	2	1	1	1	1	13
9	1	19	2	2	1	1	1	1	1	2	1	1	13
10	1	23	3	2	3	2	2	2	2	2	3	2	23
11	1	20	2	3	2	1	2	1	2	2	1	3	19
12	1	22	1	1	1	3	3	1	3	3	1	1	18
13	1	21	1	2	1	2	3	2	3	3	1	1	19
14	1	22	1	2	1	3	1	1	0	1	3	4	17
15	1	24	2	3	2	2	2	2	3	2	3	2	23
16	1	22	2	1	1	2	2	3	1	2	1	0	15
17	1	19	3	4	4	2	1	3	2	2	4	3	28
18	1	20	1	1	3	3	2	2	3	3	1	2	21
19	1	23	4	4	3	1	1	2	2	2	3	2	24
20	1	22	3	2	3	2	2	2	2	2	3	2	23
21	1	19	0	1	0	2	4	1	1	2	2	2	15
22	1	23	0	1	1	2	2	1	3	2	2	2	16
23	1	20	2	1	2	2	1	1	1	1	1	1	13
24	1	18	0	1	0	1	1	1	0	1	0	1	6
25	1	20	4	4	4	1	3	1	2	3	4	4	30

26	1	19	2	1	3	4	2	0	4	1	3	1	21
27	1	22	1	1	2	2	2	2	2	2	2	2	18
28	1	22	2	2	3	1	2	3	2	2	1	1	19
29	1	22	2	2	2	3	3	3	2	2	2	0	21
30	1	19	3	2	4	1	3	3	2	1	1	3	23
31	1	22	1	2	2	2	2	3	2	2	2	1	19
32	1	21	2	2	0	4	3	1	2	4	1	0	19
33	1	20	2	2	3	1	2	2	2	2	3	3	22
34	1	21	1	2	0	1	1	1	1	0	1	2	10
35	1	22	3	3	3	2	2	3	2	2	3	2	25
36	1	20	2	3	2	2	2	3	2	1	1	2	20
37	1	19	2	2	2	1	1	1	1	1	1	1	13
38	1	22	3	1	3	2	2	3	2	3	3	3	25
39	1	23	2	1	3	2	2	2	2	2	2	2	20
40	1	18	2	2	2	2	1	3	2	2	3	2	21
41	1	20	1	1	1	2	2	2	2	2	3	2	18
42	1	19	4	4	4	2	4	4	2	1	1	3	29
43	1	20	2	2	2	2	2	1	0	1	0	0	12
44	1	19	1	1	2	2	1	2	1	2	0	2	14
45	1	21	0	0	1	2	1	4	3	2	1	1	15
46	1	23	0	2	1	2	1	2	3	3	3	3	20
47	1	20	1	2	3	4	2	0	0	0	1	1	14
48	1	21	2	2	3	1	1	3	4	3	2	3	24
49	1	23	1	2	3	2	4	2	0	1	1	0	16
50	1	20	1	1	2	3	0	3	1	3	0	3	17
51	2	22	2	1	1	2	3	2	3	2	2	0	18
52	2	21	3	3	3	2	2	3	2	2	2	2	24
53	2	18	1	2	2	2	1	2	2	3	2	1	18
54	2	22	2	2	3	2	2	1	1	3	1	2	19
55	2	20	2	2	3	2	2	2	2	3	3	2	23
56	2	19	1	1	1	1	2	1	2	1	1	0	11
57	2	22	1	1	2	1	1	1	2	2	1	1	13
58	2	21	2	2	3	2	2	1	4	3	1	0	20
59	2	19	1	2	1	1	2	2	1	1	2	2	15
60	2	18	4	4	4	1	2	2	3	3	2	4	29
61	2	20	2	3	2	1	2	2	1	1	3	3	20
62	2	19	2	1	1	3	2	1	2	3	2	2	19

63	2	20	2	2	1	1	2	1	1	2	1	2	15
64	2	21	2	2	1	2	3	2	2	2	2	2	20
65	2	20	2	1	1	1	0	0	1	1	2	1	10
66	2	19	3	2	3	3	3	2	3	3	2	2	26
67	2	20	2	2	3	2	2	2	3	3	2	1	22
68	2	19	1	3	4	4	2	2	3	2	2	3	26
69	2	20	2	2	1	0	1	1	0	0	1	4	12
70	2	19	3	3	3	1	2	2	2	2	2	2	22
71	2	22	3	4	1	1	2	2	3	3	2	2	23
72	2	23	1	3	2	3	3	2	1	2	3	3	23
73	2	24	3	2	3	2	2	2	2	3	1	2	22
74	2	23	2	2	1	4	3	3	2	4	2	2	25
75	2	22	2	2	1	2	2	2	2	2	3	3	21
76	2	21	2	2	2	1	1	2	2	2	2	2	18
77	2	20	1	1	2	2	2	1	2	2	0	1	14
78	2	20	2	2	3	3	2	3	2	3	2	2	24
79	2	24	2	2	2	1	1	2	1	1	1	1	14
80	2	23	1	1	1	1	1	1	3	2	0	0	11
81	2	21	2	1	3	3	3	2	2	2	2	2	22
82	2	20	3	2	2	1	1	2	1	2	2	3	19
83	2	19	2	1	1	1	1	1	2	3	2	1	15
84	2	19	1	2	2	1	2	1	1	2	2	1	15
85	2	22	2	2	1	1	1	3	2	1	2	1	16
86	2	23	2	2	2	2	2	1	2	2	2	2	19
87	2	21	0	0	0	1	0	0	1	2	2	1	7
88	2	21	3	0	3	1	1	2	2	2	2	3	19
89	2	20	2	3	3	2	2	3	3	3	3	3	27
90	2	21	4	3	3	3	2	3	2	3	4	3	30
91	2	19	2	2	3	2	2	2	2	2	2	2	21
92	2	22	2	3	2	3	2	3	2	3	3	2	25
93	2	22	2	2	2	2	2	2	2	2	2	2	20
94	2	23	2	1	4	2	1	2	3	2	3	3	23
95	2	21	1	2	2	2	2	2	2	2	2	2	19
96	2	22	2	2	1	1	2	2	2	2	2	2	18
97	2	21	2	2	3	2	2	1	1	2	2	2	19
98	2	22	2	2	3	2	2	2	2	2	3	2	22
99	2	24	0	1	3	1	1	2	2	1	1	1	13
100	2	20	1	1	0	3	3	1	3	2	2	1	17

Appendix B3

Gender 1=Male
2=Female

PHQ-9 Level 1= Minimal depression(<5)
2= Mild (5-9)
3= Moderate(10-14)
4= Moderate Severe(15-19)
5= Severe(20-27)

Table 1.3

Raw data for each participant gender, age and the score Patient Health Questionnaire (PHQ-9)

Participant	Gender	Age	Patient Health Questionnaire (PHQ-9)									Total score	LEVEL
			Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9		
1	1	20	2	2	0	1	0	2	0	0	0	7	2
2	1	18	2	1	3	2	3	2	2	0	0	15	4
3	1	20	1	1	1	1	2	2	2	1	0	11	3
4	1	19	2	2	2	2	2	2	2	2	0	16	4
5	1	21	1	2	1	2	2	2	1	2	2	15	4
6	1	22	2	2	2	1	3	2	2	2	1	17	4
7	1	22	1	1	2	2	1	2	1	1	0	11	3
8	1	21	1	1	2	2	2	0	1	1	0	10	3
9	1	19	2	1	1	1	1	0	1	0	0	7	2
10	1	23	2	1	2	1	1	2	2	1	0	12	3
11	1	20	1	1	0	2	3	1	0	1	0	9	2
12	1	22	1	0	2	1	2	0	3	0	0	9	2
13	1	21	1	1	1	1	2	1	2	2	2	13	3
14	1	22	2	1	0	2	0	2	1	0	0	8	2
15	1	24	1	2	3	3	3	2	3	0	2	19	4
16	1	22	1	2	3	2	1	0	2	0	0	11	3
17	1	19	3	3	3	3	3	3	3	3	3	27	5
18	1	20	1	2	1	2	1	2	1	2	1	13	3
19	1	23	1	0	3	2	2	2	2	1	0	13	3
20	1	22	3	2	3	3	3	3	3	3	2	25	5
21	1	19	2	1	2	2	2	2	2	1	0	14	3

22	1	23	1	1	0	2	0	1	0	2	0	7	2
23	1	20	2	0	0	0	0	0	1	0	0	3	1
24	1	18	0	0	0	0	0	0	0	0	0	0	1
25	1	20	2	2	3	3	3	2	0	0	0	15	4
26	1	19	0	1	0	3	2	0	0	1	0	7	2
27	1	22	2	2	2	2	2	2	2	0	0	14	3
28	1	22	1	0	1	2	0	0	1	1	0	6	2
29	1	22	2	1	1	2	1	2	1	0	0	10	3
30	1	19	0	2	2	2	2	1	2	1	2	14	3
31	1	22	2	1	2	2	2	1	2	2	1	15	4
32	1	21	2	2	2	2	1	3	2	2	0	16	4
33	1	20	1	2	2	2	3	1	1	0	2	14	3
34	1	21	1	2	2	3	2	0	2	3	0	15	4
35	1	22	2	2	3	3	3	2	0	2	0	17	4
36	1	20	2	2	2	1	1	2	2	1	2	15	4
37	1	19	3	1	2	2	1	2	0	0	0	11	3
38	1	22	3	1	2	3	1	1	2	1	0	14	3
39	1	23	3	2	2	3	2	3	2	2	1	20	5
40	1	18	2	3	3	3	3	3	2	2	0	21	5
41	1	20	2	1	1	1	2	1	2	1	1	12	3
42	1	19	3	3	0	0	0	3	0	0	0	9	2
43	1	20	3	0	0	0	0	1	1	0	0	5	2
44	1	19	0	0	0	0	2	0	1	0	0	3	1
45	1	21	0	0	2	3	1	3	1	2	3	15	4
46	1	23	2	3	3	3	1	3	3	3	3	24	5
47	1	20	1	2	2	2	1	0	2	2	3	15	4
48	1	21	3	3	3	2	3	3	3	3	2	25	5
49	1	23	3	3	1	1	3	2	3	2	3	21	5
50	1	20	3	3	3	3	3	3	3	3	3	27	5
51	2	22	1	2	1	1	1	2	1	1	0	10	3
52	2	21	2	1	2	2	1	2	2	1	0	13	3
53	2	18	1	0	1	1	2	1	2	0	1	9	2
54	2	22	2	2	3	3	1	2	3	2	2	20	5
55	2	20	2	2	2	2	1	2	1	1	1	14	3
56	2	19	2	1	3	2	1	1	1	1	0	12	3
57	2	22	2	1	2	2	2	2	1	0	0	12	3
58	2	21	1	1	0	1	1	1	1	1	0	7	2

59	2	19	1	0	1	1	2	2	1	1	1	10	3
60	2	18	2	3	3	2	2	2	1	2	2	19	4
61	2	20	3	2	3	3	3	3	1	1	2	21	5
62	2	19	1	2	1	1	2	1	1	1	2	12	3
63	2	20	1	1	1	1	1	2	1	1	1	10	3
64	2	21	2	3	3	2	3	2	1	0	0	16	4
65	2	20	3	0	2	2	0	0	0	0	0	7	2
66	2	19	2	2	3	3	3	3	2	2	3	23	5
67	2	20	2	0	1	2	2	1	0	0	0	8	2
68	2	19	1	1	2	2	2	1	1	2	2	14	3
69	2	20	2	0	0	0	0	0	0	0	0	2	1
70	2	19	2	2	2	1	1	0	0	1	2	11	3
71	2	22	3	1	3	3	2	2	3	0	0	17	4
72	2	23	0	0	0	3	3	2	2	0	0	10	3
73	2	24	2	2	2	2	1	2	0	1	2	14	3
74	2	23	2	1	2	1	2	1	1	1	0	11	3
75	2	22	2	2	1	2	2	3	2	2	2	18	4
76	2	21	1	2	1	2	2	2	1	2	2	15	4
77	2	20	1	1	1	2	1	0	2	1	0	9	2
78	2	20	2	2	2	3	2	2	2	2	3	20	5
79	2	24	1	1	1	2	1	0	0	1	0	7	2
80	2	23	1	0	1	1	1	0	0	0	0	4	1
81	2	21	2	1	0	1	1	2	1	0	0	8	2
82	2	20	2	2	2	2	1	1	1	1	0	12	3
83	2	19	1	1	1	1	3	1	0	0	2	10	3
84	2	19	0	2	2	2	0	0	0	0	0	6	2
85	2	22	3	2	2	2	2	0	2	1	0	14	3
86	2	23	2	2	2	1	1	1	0	1	0	10	3
87	2	21	2	1	3	2	3	1	0	2	0	14	3
88	2	21	1	2	2	1	1	2	1	2	1	13	3
89	2	20	2	1	2	2	1	1	2	2	2	15	4
90	2	21	2	3	3	2	3	3	3	2	3	24	5
91	2	19	2	2	2	1	2	2	3	3	1	18	4
92	2	22	3	3	2	2	2	2	2	2	2	20	5
93	2	22	2	2	2	2	2	2	2	2	0	16	4
94	2	23	2	2	3	3	2	0	0	0	0	12	3
95	2	21	1	1	2	2	2	2	2	2	1	15	4

96	2	22	2	1	2	2	1	2	2	2	0	14	3
97	2	21	2	1	3	2	2	1	2	1	2	16	4
98	2	22	2	2	1	1	3	1	1	1	0	12	3
99	2	24	1	0	1	0	1	0	0	0	0	3	1
100	2	20	2	0	2	2	1	0	1	1	0	9	2

Appendix B4

Table 1.4

Computation of the mean and Standard Deviation for undergraduates Male and Female Age

Age			
Male student, X_1	X_1^2	Female student, X_2	X_2^2
20	400	22	484
18	324	21	441
20	400	18	324
19	361	22	484
21	441	20	400
22	484	19	361
22	484	22	484
21	441	21	441
19	361	19	361
23	529	18	324
20	400	20	400
22	484	19	361
21	441	20	400
22	484	21	441
24	576	20	400
22	484	19	361
19	361	20	400
20	400	19	361
23	529	20	400
22	484	19	361
19	361	22	484
23	529	23	529
20	400	24	576
18	324	23	529
20	400	22	484
19	361	21	441
22	484	20	400
22	484	20	400
22	484	24	576
19	361	23	529
22	484	21	441
21	441	20	400
20	400	19	361
21	441	19	361
22	484	22	484
20	400	23	529
19	361	21	441
22	484	21	441
23	529	20	400
18	324	21	441

20	400	19	361
19	361	22	484
20	400	22	484
19	361	23	529
21	441	21	441
23	529	22	484
20	400	21	441
21	441	22	484
23	529	24	576
20	400	20	400
<hr/>			
$\sum x_1 = 1038$ $n_1 = 50,$ $\bar{x}_1 = 20.76$	$\sum x_1^2 = 21666$ $S_1 = 1.546$	$\sum x_2 = 1044$ $n_2 = 50$ $\bar{x}_2 = 20.88$	$\sum x_2^2 = 21920$ $S_2 = 1.573$

Total sample of Utar undergraduates, $N=100$

$$\sum x_1 = 1038, \sum x_1^2 = 21666, \sum x_2 = 1044, \sum x_2^2 = 21920, N=100, n_1 = 50, n_2 = 50$$

$$\begin{aligned} \sum X &= \sum x_1 + \sum x_2 \\ &= 1038 + 1044 \\ &= 2082 \end{aligned}$$

$$\begin{aligned} \sum X^2 &= \sum x_1^2 + \sum x_2^2 \\ &= 21666 + 21920 \\ &= 43586 \end{aligned}$$

$$\begin{aligned} \text{Mean age all students } \bar{X} &= \sum x / N \\ &= 2082/100 \\ &= 20.82 \end{aligned}$$

$$\begin{aligned} S_{\text{all students}} &= \sqrt{\frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N-1}} \\ &= \sqrt{\frac{43586 - 43347.24}{99}} \\ &= \sqrt{2.412} \\ &= 1.553 \end{aligned}$$

$$\begin{aligned} \text{Mean } \bar{x}_1 &= \sum x_1 / n_1 \\ &= 1038/50 \\ &= 20.76 \end{aligned}$$

$$\begin{aligned} S_1 &= \sqrt{\frac{\sum x_1^2 - \frac{(\sum x_1)^2}{n_1}}{n_1-1}} \\ &= \sqrt{\frac{21666 - 21548.88}{49}} \\ &= \sqrt{2.39} \\ &= 1.546 \end{aligned}$$

$$\begin{aligned} \text{Mean } \bar{x}_2 &= \sum x_2 / n_2 \\ &= 1044/50 \\ &= 20.88 \end{aligned}$$

$$\begin{aligned} S_2 &= \sqrt{\frac{\sum x_2^2 - \frac{(\sum x_2)^2}{n_2}}{n_2-1}} \\ &= \sqrt{\frac{21920 - 21798.72}{49}} \\ &= \sqrt{2.475} \\ &= 1.573 \end{aligned}$$

Appendix C: Result

Appendix C1

Research Question

1. Does the male have higher insomnia rate as compare with female?

Table 2.4

Scores for insomnia severity index between male student and female student among undergraduate UTAR student.

Score in Insomnia Severity Index (ISI)			
Male student, X_1	X_1^2	Female student, X_2	X_2^2
2	4	16	256
13	169	12	144
6	36	7	49
18	324	9	81
2	4	9	81
13	169	10	100
8	64	8	64
2	4	6	36
6	36	6	36
13	169	12	144
5	25	17	289
3	9	4	16
12	144	3	9
4	16	12	144
19	361	6	36
10	100	12	144
17	289	3	9
5	25	11	121
4	16	1	1
22	484	12	144
7	49	17	289
12	144	11	121
1	1	4	16
2	4	10	100
23	529	10	100
4	16	2	4
9	81	2	4
3	9	14	196

4	16	2	4
13	169	3	9
15	225	3	9
7	49	10	100
16	256	7	49
8	64	5	25
19	361	14	196
12	144	14	196
6	36	16	256
16	256	14	196
14	196	14	196
18	324	28	784
14	196	13	169
14	196	17	289
7	49	12	144
6	36	17	289
3	9	12	144
10	100	14	196
12	144	18	324
14	196	11	121
15	225	6	36
18	324	9	81
<hr/>			
$\sum x_1 = 506$	$\sum x_1^2 = 6852$	$\sum x_2 = 505$	$\sum x_2^2 = 6547$
$n_1 = 50$		$n_2 = 50$	
$\bar{x}_1 = 10.12$	$S_1 = 5.9441$	$\bar{x}_2 = 10.1$	$S_2 = 5.4333$

Null Hypothesis H_0 : There is no significant difference between male and female student among undergraduates in UTAR

Research Hypothesis H_1 : There is a significant difference between male and female student among undergraduates in UTAR.

$$\begin{aligned}\bar{x}_1 &= \sum x_1 / n_1 \\ &= 506 / 50 \\ &= 10.12\end{aligned}$$

$$\begin{aligned}\bar{x}_2 &= \sum x_2 / n_2 \\ &= 505 / 50 \\ &= 10.1\end{aligned}$$

$$S_1 = \sqrt{\frac{\sum x_1^2 - \frac{(\sum x_1)^2}{n_1}}{n_1 - 1}}$$

$$S_2 = \sqrt{\frac{\sum x_2^2 - \frac{(\sum x_2)^2}{n_2}}{n_2 - 1}}$$

$$\begin{aligned}
&= \sqrt{\frac{6852 - \frac{506^2}{50}}{49}} &= \sqrt{\frac{6547 - \frac{505^2}{50}}{49}} \\
&= \sqrt{\frac{6852 - 5120.72}{49}} &= \sqrt{\frac{6547 - 5100.5}{49}} \\
&= \sqrt{35.332} &= \sqrt{29.52} \\
&= 5.944 &= 5.433
\end{aligned}$$

$$n_1 = 50, n_2 = 50, \sum x_1 = 506, \sum x_2 = 505, \sum x_1^2 = 6852, \sum x_2^2 = 6547$$

$$\begin{aligned}
\text{estimated } \sigma_{diff} &= \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} \\
&= \sqrt{\frac{5.944^2}{50} + \frac{5.433^2}{50}} \\
&= \sqrt{0.707 + 0.590} \\
&= 1.139
\end{aligned}$$

$$\begin{aligned}
t &= \frac{\bar{x}_1 - \bar{x}_2}{\text{estimated } \sigma_{diff}} & df &= (n_1 - 1) + (n_2 - 1) \\
&= \frac{10.12 - 10.1}{1.139} & &= (50 - 1) + (50 - 1) \\
&= 0.018 & &= 98 \\
& & &\approx 120
\end{aligned}$$

Since the degree freedom 98 is not found in the distribution table, I will use the nearest degree of freedom which is 120.

Critical t ($df=120, p=0.05, \text{two-tailed}$) = 1.980

Since $cv > t$, therefore fail to reject the null hypothesis. The result of *Independent sample t-test* showed that there was no significant difference between gender and insomnia among undergraduates in UTAR. $t(98) = 0.018$

Appendix C2

Research Question

2. Does any correlated between stress and insomnia?

Table 2.5

Computation of the Correlation Coefficient Using the Computational Formulas for UTAR undergraduates' stress and insomnia level

Participant	Insomnia Severity Index (x)	Perceived Stress Scale (y)	xy	x^2	y^2
1	2	16	32	4	256
2	13	18	234	169	324
3	6	17	102	36	289
4	18	28	504	324	784
5	2	18	36	4	324
6	13	20	260	169	400
7	8	20	160	64	400
8	2	13	26	4	169
9	6	13	78	36	169
10	13	23	299	169	529
11	5	19	95	25	361
12	3	18	54	9	324
13	12	19	228	144	361
14	4	17	68	16	289
15	19	23	437	361	529
16	10	15	150	100	225

17	17	28	476	289	784
18	5	21	105	25	441
19	4	24	96	16	576
20	22	23	506	484	529
21	7	15	105	49	225
22	12	16	192	144	256
23	1	13	13	1	169
24	2	6	12	4	36
25	23	30	690	529	900
26	4	21	84	16	441
27	9	18	162	81	324
28	3	19	57	9	361
29	4	21	84	16	441
30	13	23	299	169	529
31	15	19	285	225	361
32	7	19	133	49	361
33	16	22	352	256	484
34	8	10	80	64	100
35	19	25	475	361	625
36	12	20	240	144	400
37	6	13	78	36	169
38	16	25	400	256	625
39	14	20	280	196	400
40	18	21	378	324	441
41	14	18	252	196	324

42	14	29	406	196	841
43	7	12	84	49	144
44	6	14	84	36	196
45	3	15	45	9	225
46	10	20	200	100	400
47	12	14	168	144	196
48	14	24	336	196	576
49	15	16	240	225	256
50	18	17	306	324	289
51	16	18	288	256	324
52	12	24	288	144	576
53	7	18	126	49	324
54	9	19	171	81	361
55	9	23	207	81	529
56	10	11	110	100	121
57	8	13	104	64	169
58	6	20	120	36	400
59	6	15	90	36	225
60	12	29	348	144	841
61	17	20	340	289	400
62	4	19	76	16	361
63	3	15	45	9	225
64	12	20	240	144	400
65	6	10	60	36	100
66	12	26	312	144	676

67	3	22	66	9	484
68	11	26	286	121	676
69	1	12	12	1	144
70	12	22	264	144	484
71	17	23	391	289	529
72	11	23	253	121	529
73	4	22	88	16	484
74	10	25	250	100	625
75	10	21	210	100	441
76	2	18	36	4	324
77	2	14	28	4	196
78	14	24	336	196	576
79	2	14	28	4	196
80	3	11	33	9	121
81	3	22	66	9	484
82	10	19	190	100	361
83	7	15	105	49	225
84	5	15	75	25	225
85	14	16	224	196	256
86	14	19	266	196	361
87	16	7	112	256	49
88	14	19	266	196	361
89	14	27	378	196	729
90	28	30	840	784	900
91	13	21	273	169	441

92	17	25	425	289	625
93	12	20	240	144	400
94	17	23	391	289	529
95	12	19	228	144	361
96	14	18	252	196	324
97	18	19	342	324	361
98	11	22	242	121	484
99	6	13	78	36	169
100	9	17	153	81	289

n=100	$\sum x = 1011$	$\sum y = 1911$	$\sum xy = 20818$	$\sum x^2 = 13399$	$\sum y^2 = 38933$
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H_0 = There is no significant correlated between level of insomnia and stress among undergraduates in UTAR.

H_1 = There is significant correlated between level of insomnia and stress among undergraduates in UTAR.

$$n=100, \sum x = 1011, \sum y = 1911, \sum x^2 = 13399, \sum y^2 = 38933, \sum xy = 20818$$

$$\begin{aligned}
 r_{xy} &= \frac{(n \cdot \sum xy) - (\sum x \sum y)}{\sqrt{[(n \cdot \sum x^2) - (\sum x)^2][(n \cdot \sum y^2) - (\sum y)^2]}} \\
 &= \frac{(100 \times 20818) - (1011 \times 1911)}{\sqrt{[(100 \times 13399) - (1011)^2][(100 \times 38933) - (1911)^2]}} \\
 &= \frac{149779}{\sqrt{317779 \times 241379}} \\
 &= \frac{149779}{276956.995} \\
 &= 0.541
 \end{aligned}$$

$$df = (\text{Number of pair} - 2)$$

$$= 100-2$$

$$=98$$

$$\approx 100$$

Since the degree freedom 98 is not found in the distribution table, I will use the nearest degree of freedom which is 100.

$$Cv = 0.195, p = 0.05$$

Since $r > cv$, therefore reject the null hypothesis. The result of *Pearson Correlation* showed that there was a significant positive correlation between level of insomnia and stress among undergraduates in UTAR, $r(98) = 0.541, p < 0.05$. The higher score in insomnia severity index, the higher the score in Perceived Stress Scale.

Appendix C3

Research Question

3. Does any correlated between depression and insomnia?

Table 2.6

Computation of the Correlation Coefficient Using the Computational Formulas for UTAR undergraduates' depression and insomnia level

Participant	Insomnia Severity Index (x)	Patient Health Questionnaire (y)	xy	x^2	y^2
1	2	7	14	4	49
2	13	15	195	169	225
3	6	11	66	36	121
4	18	16	288	324	256
5	2	15	30	4	225
6	13	17	221	169	289
7	8	11	88	64	121
8	2	10	20	4	100
9	6	7	42	36	49
10	13	12	156	169	144
11	5	9	45	25	81
12	3	9	27	9	81
13	12	13	156	144	169
14	4	8	32	16	64
15	19	19	361	361	361
16	10	11	110	100	121

17	17	27	459	289	729
18	5	13	65	25	169
19	4	13	52	16	169
20	22	25	550	484	625
21	7	14	98	49	196
22	12	7	84	144	49
23	1	3	3	1	9
24	2	0	0	4	0
25	23	15	345	529	225
26	4	7	28	16	49
27	9	14	126	81	196
28	3	6	18	9	36
29	4	10	40	16	100
30	13	14	182	169	196
31	15	15	225	225	225
32	7	16	112	49	256
33	16	14	224	256	196
34	8	15	120	64	225
35	19	17	323	361	289
36	12	15	180	144	225
37	6	11	66	36	121
38	16	14	224	256	196
39	14	20	280	196	400
40	18	21	378	324	441
41	14	12	168	196	144

42	14	9	126	196	81
43	7	5	35	49	25
44	6	3	18	36	9
45	3	15	45	9	225
46	10	24	240	100	576
47	12	15	180	144	225
48	14	25	350	196	625
49	15	21	315	225	441
50	18	27	486	324	729
51	16	10	160	256	100
52	12	13	156	144	169
53	7	9	63	49	81
54	9	20	180	81	400
55	9	14	126	81	196
56	10	12	120	100	144
57	8	12	96	64	144
58	6	7	42	36	49
59	6	10	60	36	100
60	12	19	228	144	361
61	17	21	357	289	441
62	4	12	48	16	144
63	3	10	30	9	100
64	12	16	192	144	256
65	6	7	42	36	49
66	12	23	276	144	529

67	3	8	24	9	64
68	11	14	154	121	196
69	1	2	2	1	4
70	12	11	132	144	121
71	17	17	289	289	289
72	11	10	110	121	100
73	4	14	56	16	196
74	10	11	110	100	121
75	10	18	180	100	324
76	2	15	30	4	225
77	2	9	18	4	81
78	14	20	280	196	400
79	2	7	14	4	49
80	3	4	12	9	16
81	3	8	24	9	64
82	10	12	120	100	144
83	7	10	70	49	100
84	5	6	30	25	36
85	14	14	196	196	196
86	14	10	140	196	100
87	16	14	224	256	196
88	14	13	182	196	169
89	14	15	210	196	225
90	28	24	672	784	576
91	13	18	234	169	324

92	17	20	340	289	400
93	12	16	192	144	256
94	17	12	204	289	144
95	12	15	180	144	225
96	14	14	196	196	196
97	18	16	288	324	256
98	11	12	132	121	144
99	6	3	18	36	9
100	9	9	81	81	81
n=100	$\sum x = 1011$	$\sum y = 1308$	$\sum xy = 15316$	$\sum x^2 = 13399$	$\sum y^2 = 20148$

Ho = There is no significant correlated between level of insomnia and depression among undergraduates in UTAR.

Hi = There is significant correlated between level of insomnia and depression among undergraduates in UTAR.

$$n=100, \sum x = 1011, \sum y = 1308, \sum x^2 = 13399, \sum y^2 = 20148, \sum xy = 15316$$

$$\begin{aligned}
 r_{xy} &= \frac{(n \cdot \sum xy) - (\sum x \sum y)}{\sqrt{[(n \cdot \sum x^2) - (\sum x)^2][(n \cdot \sum y^2) - (\sum y)^2]}} \\
 &= \frac{(100 \times 15316) - (1011 \times 1308)}{\sqrt{[(100 \times 13399) - (1011)^2][(100 \times 20148) - (1308)^2]}} \\
 &= \frac{209212}{\sqrt{317779 \times 303936}} \\
 &= \frac{209212}{310780.434} \\
 &= 0.673
 \end{aligned}$$

$$df = (\text{number of pairs} - 2)$$

$$= 100 - 2$$

=98

≈ 100

Since the degree freedom 98 is not found in the distribution table, I will use the nearest degree of freedom which is 100.

$Cv = 0.195$, $p = 0.05$

Since $r > cv$, therefore reject the null hypothesis. The result of *Pearson Correlation* showed that there was a significant positive correlation between level of insomnia and depression among undergraduates in UTAR, $r(98) = 0.673$, $p < 0.05$. The higher score in insomnia severity index, the higher the score in Depression Health Questionnaire.