Effects of Cognitive Behavioral Therapy for Insomnia (CBT-I) on Sleep Quality, Insomnia Symptoms and Dysfunctional Beliefs and Attitudes about Sleep among Malaysia Undergraduate Student: A Single Case Study

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UAPC3093 Project Paper 2

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April 19, 2021

Abstract

Cognitive Behavioral Therapy for Insomnia (CBT-I) is the most recommended first-line treatment for insomnia among non-pharmacological treatments. This study aims to investigate the effects of CBT-I on sleep quality, insomnia symptoms, and dysfunctional beliefs and attitudes about sleep on Malaysia undergraduate student. This study is a single case study conducted in Malaysia which only has 1 participant. The instruments used to measure the variables were Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), and 16-item Dysfunctional Beliefs and Attitudes about Sleep Scale (DBAS-16). The pre-test and post-test were taken by the researcher from the participant before the first session of intervention and after the last session of intervention. The participant was a 20-year-old Chinese female Malaysian undergraduate student. Based on the results, CBT-I showed positive effect on insomnia symptoms and dysfunctional beliefs and attitudes about sleep which had clinically meaningful reduction in both variables. However, CBT-I showed no effect on improving sleep quality in this case. In conclusion, this study shows how the components and techniques of CBT-I bring changes of thoughts and behaviors which perpetuating insomnia issues. This study able to contribute to the field of study of practicing CBT-I on a target sample of Malaysian undergraduate student which act as a reference for future studies.

Keywords: cognitive behavioral therapy for insomnia, sleep quality, insomnia, dysfunctional beliefs and attitudes about sleep, Malaysian undergraduate.

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Introduction

Background of Study

Sleep takes a huge role in human's activity. It is important to maintain a good sleep behavior as to prevent psychological illness and to maintain physical health. According to DSM-5, insomnia is used to diagnose several mental disorders such as substance use disorder, anxiety disorder, depressive disorder, and post-traumatic stress disorder and it will aggravate the disorders if insomnia is not addressed properly (Taylor & Pruiksma, 2014). In self-regulation, healthy sleep behaviors play a crucial role, functioning as an executive function in the brain that regulates our actions (Barber, & Munz, 2011). Repeated disturbance or an inability to initiate sleep in the normal sleep cycle can lead to a sleep deficit, which in turn causes physical, mental and emotional fatigue (Shittu et al., 2014).

When the sleep behaviors become abnormal, it will lead to several sleeping disorders which includes insomnia. Insomnia is characterized as troubles in falling asleep and keeping up rest, inability to wake up as early, as well as non-effective sleep despite having enough sleep time with the addition of poor daytime working ability or function (Williams et al., 2013). A Malaysian community-based survey in 4 Malaysian states shows that the prevalence of insomnia symptoms was present in 33.8% of the targeted population and 12.2% of the population are suffering from chronic insomnia (Zailinawati et al., 2008). Study had done a study on the prevalence of insomnia among university students. The evidence shows that the prevalence of insomnia in the population of university students 18.5%, which considerably higher than 7.4% among the general population (Jiang et al., 2015). Studies found that the common factors that causes acute insomnia to turn chronical is the use of wrong coping strategies which reinforce the insomnia symptoms to continue (Morin et al. 2007; Perlis et al., 2016).

Treatment of Insomnia

Insomnia has been first recognized in the date back to the ancient Greeks which commonly defined as the inability to initiate sleep or maintain sleep (Attarian & Perlis, 2017). Until the early 1980s, the sleep medication movement started to become more active and started working much more effectively on the issues of insomnia (Attarian & Perlis, 2017). Eszopiclone, Zolpiclone, Zalepon and Zolpidem also known as the "Z-drugs" was introduced in the 1980s as the main treatment for insomnia (Stranks & Crowe, 2014).

After a few decades, there is an increase of conventional or alternative treatments for insomnia that are widely practiced which claims that they are helpful for insomnia. However, studies have found that complementary and alternative treatment such as acupuncture, yoga and meditation have a limited number of studies which not able to clarify their validity and effectiveness (Gooneratne, 2008).

To address the issue of insomnia in the long-term, American College of Physicians (ACP), Academy of Sleep Medicine (AASM) and National Institution of Health (NIH) have claimed that Cognitive Behavioral Therapy for Insomnia (CBT-I) is one of the most recommended interventions which act as the first-line treatment for insomnia (Qaseem et al., 2016; Sateia et al., 2017; Taylor & Pruiksma, 2014). Within the whole course of intervention of CBT-I, there are a lot of activities and practices that need to be taught by the practitioners to the patients and it requires commitment from the patients. The treatment would not be effective if it were only a one-way street and the patients are not committed to the interventions.

Problem Statement

Insomnia is the most prevalent complaint linked to sleep and the second most common overall complaint recorded in the field of primary care (Attarian & Perlis, 2017). Several studies

show that depression, anxiety and low level of satisfaction with life can be easily observed from university students (Lemma et al., 2012; Moo-Estrella et al., 2005; Samaranayake, & Fernando, 2011; Seun-Fadipe, & Mosaku, 2017; Shittu et al., 2014). However, there is still no study which focuses on how to help the undergraduates to cope with the issue in the context of Malaysia. There was research that have been done on searching the reason behind poor sleep quality among the population of university students in Malaysia, but the study does not provide any treatment or help to the participants which engaged in the study (Siraj et al., 2014).

According to American Psychological Association (APA) Dictionary of Psychology (2007), a complication is defined as the "additional illness, disease, disorder or condition that happens or develops during the course of another disease or disorder or during a medical procedure" (VandenBos, 2007). Insomnia is one of the core symptoms of psychiatric disorders, such as depression, anxiety and substance abuse disorder (Gourineni, 2017). Insomnia will also influence our neurocognitive function which is linked to cognitive impairment or dementia (Gourineni, 2017). In terms of physical health, insomnia is associated with metabolic conditions and cardiovascular diseases such as diabetes, obesity, coronary heart disease, congestive heart failure, and stroke (Gourineni, 2017). Insomnia will also bring burdens to one's daily activities such as absenteeism, reduction in work performance and quality of life (Gourineni, 2017). As related to undergraduates, it will influence their attendance and academic performance.

Although there are medications for insomnia, it only helps in the short term and it will bring along a series of side effects. The short-term pharmacological treatment choice for insomnia such as Midazolam and Triazolam which also identifies as conventional benzodiazepines is associated with adverse side effects including the rebound of insomnia, withdrawal and dependency on such drugs (Hesse et al., 2003). The "Z-drugs" was then

introduced to replace benzodiazepines in pharmacological treatment. Although, the "Z-drugs" removes the side effects of rebound of insomnia, however they will bring other kinds of side effects to the patients as well. Some of the side effects includes deterioration of cognitive functions (verbal memory, working memory), depression, seizures, and reduction motor function (Finsterer, & Frank, 2016; Stranks & Crowe, 2014).

As the results of side effects caused by sleeping pills, some countries have started to ban the use of sleeping pills. Some of the Asian countries started to ban them as well. In Taiwan, as of April 29th, 2020, there are 4 types of sleeping pills that were banned which includes Eszopiclone, Zaleplon, Zolpidem, and Zopiclone by Taiwan's Food and Drug Administration which doctors are not allowed to prescribe these 4 types of medication to patients (Yang, 2020). If there is a day in the future which the same medicine is announced to be banned in Malaysia, what are the alternative ways for patients who are suffering from insomnia?

In terms of non-pharmacological treatments, CBT-I is highly recommended as the first-line treatment by ACP, AASM and NIH (Qaseem et al., 2016; Sateia et al., 2017; Taylor & Pruiksma, 2014). However, there is still a lack of studies and research to show the evidence to prove that CBT-I is an effective non-pharmacological treatment in Malaysia.

Research Objectives

According to the problem statement stated above, these are the few objectives this study aims to investigate:

1. To investigate the effects of CBT-I on sleep quality on an undergraduate with insomnia.
2. To investigate the effects of CBT-I on insomnia symptoms on an undergraduate with insomnia.

3. To investigate the effects of CBT-I on dysfunctional beliefs and attitudes about sleep on an undergraduate with insomnia.

Research Questions

The subsequent research questions are targeted to be find out by conducting the study:

1. What is the effect of CBT-I on sleep quality on an undergraduate with insomnia?
2. What is the effect of CBT-I on insomnia symptoms on an undergraduate with insomnia?
3. What is the effect of CBT-I on dysfunctional beliefs and attitudes about sleep on an undergraduate with insomnia?

Research Hypothesis

The following research hypotheses are predicted as the finding of this study:

H_1: CBT-I has an effect on sleep quality on undergraduate with insomnia.

H_2: CBT-I has an effect on insomnia symptoms on undergraduate with insomnia.

H_3: CBT-I has an effect on dysfunctional beliefs and attitudes about sleep on undergraduate with insomnia.

Significance of Study

This study may help our society to test out the effects of a non-pharmacological treatment, CBT-I, to address sleep quality issues, insomnia, and dysfunctional beliefs and attitudes about sleep. There are medical and clinical associations (ACP, AASM, NIH) from other countries that have done a lot of studies claim that CBT-I is an effective first-line treatment for insomnia (Qaseem et al., 2016; Sateia et al., 2017; Taylor & Pruiksma, 2014). This empirical study would like to take the first step to seek for empirical evidence on the effects of CBT-I in Malaysia society. If one day the “Z-drugs” has been banned in Malaysia, CBT-I can become the

non-pharmacological treatment for individuals with insomnia if this study is able to prove its beneficial effects.

There is a lack of studies and research that can be found in Malaysia discussing the effects of CBT-I among the Malaysian population. If CBT-I is found to be effective, the program is likely to alleviate insomnia symptoms in individuals in Malaysia. This research is able to help tighten up the knowledge gap in our society in clinical and psychological practice while dealing with insomnia patients. Therefore, this study will be able to deliver results and information for the field of study to refer in the future.

Conceptual Definition

Sleep Quality

Sleep quality is defined as an individual's satisfaction of the experience of sleep, incorporating aspects of initiation, maintenance, and quantity of sleep, and awakening refreshment (Kline, 2013).

Insomnia

According to the APA Dictionary of Psychology, insomnia is defined as "difficulty in initiating or maintaining a restorative sleep, which results in fatigue, the severity or persistence of which causes clinically significant distress or impairment in functioning" (VandenBos, 2007).

Dysfunctional Beliefs and Attitudes about Sleep

Dysfunctional beliefs and attitudes about sleep is defined as maladaptive sleep related cognition such as maladaptive beliefs and appraisals, unrealistic expectation and attention bias toward sleep (Morin et al., 2007).

Operational Definition

Sleep Quality

In this study, sleep quality will be measured by Pittsburgh Sleep Quality Index (PSQI). It is a self-report questionnaire that measures the quality of sleep over a span of 1 month. The global PSQI score is determined by a total score ranging from 0 to 21, where higher scores signify poor sleep quality and lower scores signify better sleep quality.

Insomnia

Insomnia in this study is presented by the scores based on Insomnia Severity Index (ISI). ISI is a self-reported questionnaire which assesses the severity of insomnia based on the past 2 weeks. Each item is weighted by a scale of 0-4, which sums up to a total score range from 0-28. Higher scores determine the higher severity of insomnia, while lower scores determine lower severity or absence of insomnia symptoms.

Dysfunctional Beliefs and Attitudes about Sleep

In this study, dysfunctional beliefs and attitudes about sleep will be identified by using a 16-item Dysfunctional Beliefs and Attitudes about Sleep Scale (DBAS-16). The scoring of this assessment is based on the mean score of all items which is the sums of 16 items divided by 16. The higher mean score, it indicates that the individual has more dysfunctional beliefs and attitudes about sleep.

Literature Review

CBT-I for Sleep Quality

CBT-I intervention can become a tool to help individuals resolve some of the factors that are found to influence their sleep quality. According to the meta-analysis conducted by van Straten and Colleagues (2018), there was a significant effect of CBT-I on sleep quality which tested by using PSQI with a moderate effect size of $g = 0.65$ (van Straten et al., 2018). A pilot randomized controlled trial study was done by Taylor and Colleagues (2014), 34 college students from the age of 12 to 27 were randomly assigned to either differently controlled groups which are 6 sessions of CBT-I or a 6-week wait list control. This study found that CBT-I has a significant effect on insomnia symptoms which measure by ISI ($p = .003$) with a large effect size ($d = 1.20$).

Based on the studies that have been stated above, the results show that CBT-I has a significant effect on sleep quality with a moderate to large effect size (Taylor et al., 2014; van Straten et al., 2018). The intervention such as sleep hygiene education and cognitive restructuring act as psychoeducational interventions which teaches the patients on how to address their behaviors and thoughts which influences their sleep quality (Perlis et al., 2006).

CBT-I for Insomnia

Medical and clinical associations included ACP, AASM, and NIH had claimed that CBT-I as the first-line treatment for insomnia (Qaseem et al., 2016; Sateia et al., 2017; Taylor & Pruiksma, 2014). A meta-analysis was done by van Straten and Colleagues (2018), there was a large and significant effect of CBT-I on insomnia when tested by ISI with an effect size of $g = 0.98$ (van Straten et al., 2018). According to a randomized controlled trial conducted by Taylor

and Colleagues (2014), CBT-I was found to be significantly effective on sleep quality which is measured by PSQI (p = .012) with a large effect size (d = 1.01).

A study was conducted by Davidson and Colleagues (2017), to find out the effectiveness of CBT-I in a primary care setting. There are 81 individuals that were involved in this study. The participants attended a 6-session group of CBT-I program and ISI was used to test their insomnia symptoms after the intervention. The result shows that there is a significant effect in insomnia symptoms as (p < .0001) with a large effect size (d = -1.77). Researches have been done and the result shows that CBT-I is one of the most effective non-pharmacological treatment for insomnia as it targets the perpetuating factors that might prolong the symptoms (Taylor & Pruiksma, 2014; Taylor et al., 2014; Trauer et al., 2015).

CBT-I for Dysfunctional Beliefs and Attitudes about Sleep

A systematic review and meta-analysis were conducted by Thakral and Colleagues (2020) to find out the effectiveness of CBT-I on dysfunctional beliefs and attitudes about sleep. A total of 16 randomized controlled trials were identified in this study. Hedge's g was used to assess CBT-I effect size at post-treatment compared to controls. The result shows that CBT-I had significantly reduced the dysfunctional beliefs and attitudes about sleep with the effect size (g = -0.90) at the post treatment. In the long-term, the dysfunctional beliefs and attitudes about sleep was found to be significantly reduced by CBT-I in the follow up time ranging from 3 to 18 months with the effect size (g = -1.04). The study had concluded that CBT-I has a moderate to large effect on dysfunctional beliefs and attitudes about sleep.

Taylor and Colleagues (2014) studied on the effect of CBT-I on dysfunctional beliefs and attitudes about sleep. The study found that CBT-I has a significant effect on dysfunctional beliefs and attitudes about sleep which tested by DBAS (p = .003) with a large effect size (d = 1.27).

The results show that CBT-I has a moderate to a large statistically significant effect on the dysfunctional beliefs and attitudes about sleep as the maladaptive beliefs has been reduced after the participants had received the intervention from CBT-I (Taylor et al., 2014; Thakral et al., 2020).

Theoretical Framework

The Behavioral Model of Insomnia was founded by Spielman and Colleagues in 1987 (Spielman et al., 1987). This theoretical model helps people to conceptualize and understand how acute insomnia develops into chronic insomnia and what causes or factors can be targeted for treatment make it become a widely cited theoretical model for the etiology of chronic insomnia (Perlis et al., 2006). Figure 2.1 presented the schematic representation of the Behavioral Model of Insomnia.

In this theoretical model, it generates 3 factors which describe on how insomnia happens. Predisposing factors were discussed entirely by the series of biopsychosocial model. In the biopsychosocial spectrum, biological factors included inherent weak sleep generating system and hyperarousal or hyperactivity (fast heart rates, fast brain wave activity, high metabolic rates); psychological factors included psychological disorders (anxiety, depression), perfectionism or a worrisome cognitive style; social factors included one's sociodemographic or the sleep partner's sleep schedule (Perlis et al., 2006).

Precipitating factors usually acts as the factor which triggers the predisposing factors which cause an acute insomnia which also can be explained by using the series of biopsychosocial aspects (Perlis et al., 2006). In precipitating factors, the biological factors included illness or injury; psychological factors included the onset of psychiatric disorder or

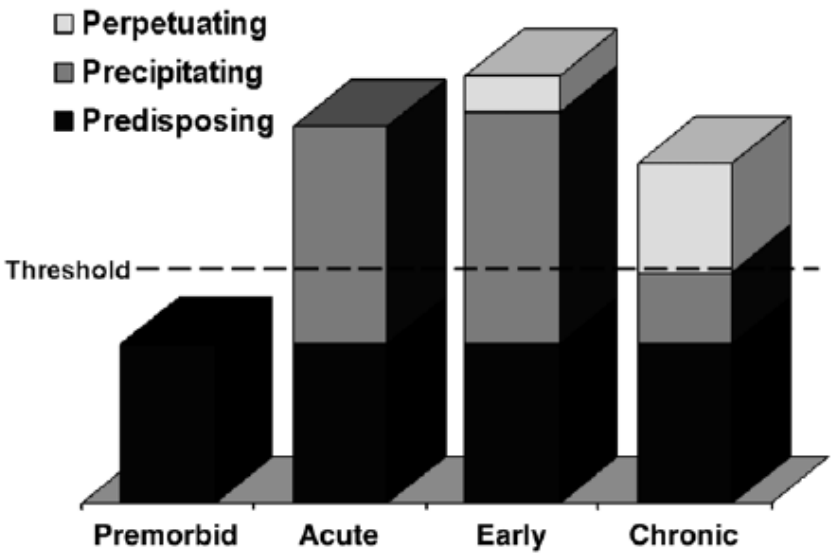
acute stress reactions; social factors included a typical stressful life event such as divorce and death of loved one (Perlis et al., 2006).

Perpetuating factors refers to the factors that which cause acute insomnia to become chronic insomnia. Perpetuating factors can be explained as the maladaptive coping strategies by the individuals with insomnia which maintains the symptoms and causes the insomnia to become a chronic illness (Perlis et al., 2006). The behaviors such as staying in bed longer without sleep, taking a nap, worrying about sleep and the fear of poor daytime functioning are maladaptive coping strategies which reinforces the insomnia symptoms.

Among the 3 factors that were discussed according to the Behavioral Model of Insomnia, it shows that the only factor that can be manipulated or targeted for treatment are the perpetuating factors (Perlis et al., 2006). Therefore, this theoretical model helped CBT-I to come up with a list of components and techniques for the therapy to address the perpetuating factors which cause chronic insomnia.

Figure 2.1

Theoretical Framework for CBT-I (The Behavioral Model of Insomnia)



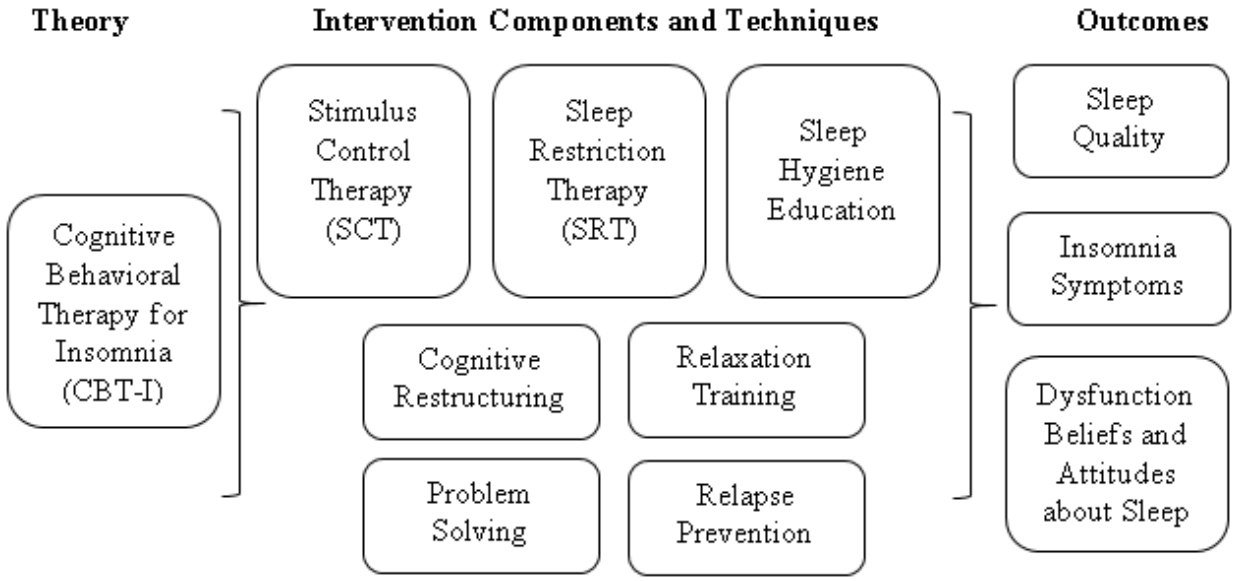
Conceptual Framework

The conceptual framework for this study is directed by the theoretical framework of the Behavioral Model of Insomnia (Figure 2.1). Based on the theory's perspective, this study focuses on reducing the perpetuating factors of an individual suffering from insomnia. The intervention components and techniques used in CBT-I acts as the treatment for the individual to tackle on the perpetuating factors that causes a prolonging of insomnia.

This study proposes a conceptual framework (Figure 2.2) which targets on the effects of the CBT-I interventions on sleep quality, insomnia symptoms and dysfunctional beliefs and attitudes about sleep. The main variables of this study are CBT-I intervention, sleep quality, insomnia symptoms, and dysfunctional beliefs and attitudes about sleep. The study hypothesizes that CBT-I intervention has an effect on sleep quality, insomnia symptoms, and dysfunctional beliefs and attitudes about sleep.

Figure 2.2

Conceptual Framework of the Effects of CBT-I on Sleep Quality, Insomnia Symptoms, and Dysfunctional Beliefs and Attitudes about Sleep



Methodology

Research Design

The research design that was employed by this study will be a single case pre- and post-test research design. This research design was chosen for this study because this method is used to find out the effects of intervention with a small number of participants. The data collection method used for this study is the quantitative method. The instruments that were used to measure the variables were PSQI, ISI, and DBAS-16 are based on the quantitative score.

Sampling Procedures

Sampling Method

A Malaysian university undergraduate student is the sample of this study. Students who are currently undergoing one's tertiary education in any university in Malaysia were able to be involved in this study. As this study is a single case study, there is no sample size calculation needed during the course of the study. Judgmental or purposive sampling methods were applied in this study. This sampling method is also known as a selective or subjective sampling method which the researcher chooses who is the participant. In this study, the participant had to reach the criteria as they were filtered by using ISI.

Inclusion and Exclusion Criteria

To fulfill the inclusion criteria, the participant had to: (1) an undergraduate student, (2) age above 18-year-old, (3) able to understand and communicate in English or Mandarin, and (4) score 8 or above in ISI which classifies as one having a subthreshold, moderately severe, or severe clinical insomnia.

The exclusion criteria include: (1) history of serious mental illness (schizophrenia, bipolar I or II disorder), (2) current psychiatric conditions (psychosis, dementia, cognitive

impairment, mania), (3) reported suicide attempts in the past 6 months (medical record, self-reported), (4) ongoing or pending medical procedures that might inhibit sleep, and sleep disorders other than insomnia (sleep apnea, narcolepsy), and (5) undergoing any form of counselling or psychotherapy services or practices. The reasons of these exclusion criteria being set was to prevent any external variables which might influence the participant's sleeping condition.

Location of Study

The location of this study was conducted in Malaysia as the target participant were Malaysian university students. However, due to the pandemic of COVID-19, to comply with the physical distancing policy, the intervention was conducted via online through Google Meet according to Malaysia's Personal Data Protection Act (PDPA) compliance. The online intervention was conducted with the guidelines from APA and *Lembaga Kaunselor* for telepsychology (American Psychological Association, 2013; Lembaga Kaunselor, 2020).

Ethical Clearance Approval

The ethical clearance protocol submitted to the authorities, but there was no feedback from them.

Procedure of Obtaining Consent

The consent of the participant was obtained during the history intake. While the researcher had briefed the participants about the idea of the treatment program, the researcher also went through the inform consent which discussed on the purpose of study, procedures, risks and benefits, cost and payment, confidentiality, contact information, and voluntary participation. Participant was informed that the information will be kept as private and confidential, and the data will only be used for research purposes. The participation is fully voluntary; however, she

had the right to decide to withdraw from the study when she feels uncomfortable. There will zero payment needed for attending the intervention as well. The participant was given the chance to ask the researcher questions on the consent as to clarify her doubt.

Instrumentation

Pittsburgh Sleep Quality Index (PSQI)

The PSQI was developed by Buysse and his colleagues in 1988 which is used to measure sleep quality (Buysse et al., 1989). PSQI is a self-report questionnaire that measures the quality of sleep over a span of 1 month. It consists of 19 individual items that generate 7 components that create one global score. On an interval scale of 0-3, each object is weighted. By totaling the seven component scores, the global PSQI score is then determined, providing a total score ranging from 0 to 21, where high scores signify poor sleep quality; lower scores signify better sleep quality. In a systematic review and meta-analysis PSQI was proved to have a significantly high reliability and validity with a Cronbach's alpha of .70 to .83 (Mollayeva et al., 2016).

Insomnia Severity Index (ISI)

Insomnia in this study is presented by the scores based on ISI. ISI is a self-reported questionnaire that consists of 7 items which assesses the severity of insomnia based on the past 2 weeks. Each item is weighted by a scale of 0-4, which starts from "None" to "Very Severe" and "Very Satisfied" to Very Dissatisfied" The total score of ISI will be in the range from 0-28. Higher scores determine the higher severity of insomnia, while lower scores determine lower severity or absence of insomnia symptoms. ISI is significantly reliable as it has a Cronbach's alpha of .90 to .91 for internal consistency (Morin et al., 2011). ISI is also significantly validated as the convergent validity was proven that the total ISI score and measures of fatigue,

depression, anxiety, and quality of life are significantly correlated between each other (Morin et al., 2011).

16-item Dysfunctional Beliefs and Attitudes about Sleep (DBAS-16)

In this study, beliefs and attitudes about sleep will be identified by using DBAS-16. DBAS-16 is a self-reported questionnaire consisting of 16 items with the scale of 1-10 which starts from "strongly disagree" to "strongly agree". The scoring of this assessment is based on the mean score of all items. By totaling up all the 16 items score and divided by 16, the higher the score indicates that the patient has more dysfunctional beliefs and attitudes about sleep. DBAS-16 is a high reliable assessment as it has the internal consistency with Cronbach's alpha of .77 to .79 (Morin et al., 2007).

Intervention

Cognitive Behavioral Therapy for Insomnia (CBT-I)

The intervention was guided by the manual of Cognitive Behavioral Treatment for Insomnia in the Military: Therapist Guide (CBTi-M) by Taylor and Colleagues (2019). It is a treatment guideline for CBT-I with a total of 6 sessions. There are several intervention components and techniques needed to be completed with the patients before the termination of the sessions which includes stimulus control, sleep restriction, sleep hygiene education, cognitive restructuring, relaxation training, problem solving and relapse prevention. The guidelines provide the information on what should the therapist do in each session step by step. Table 1 shows the description of each session in CBT-I according to the therapist guide.

Table 1

The Description of Each Session in CBT-I

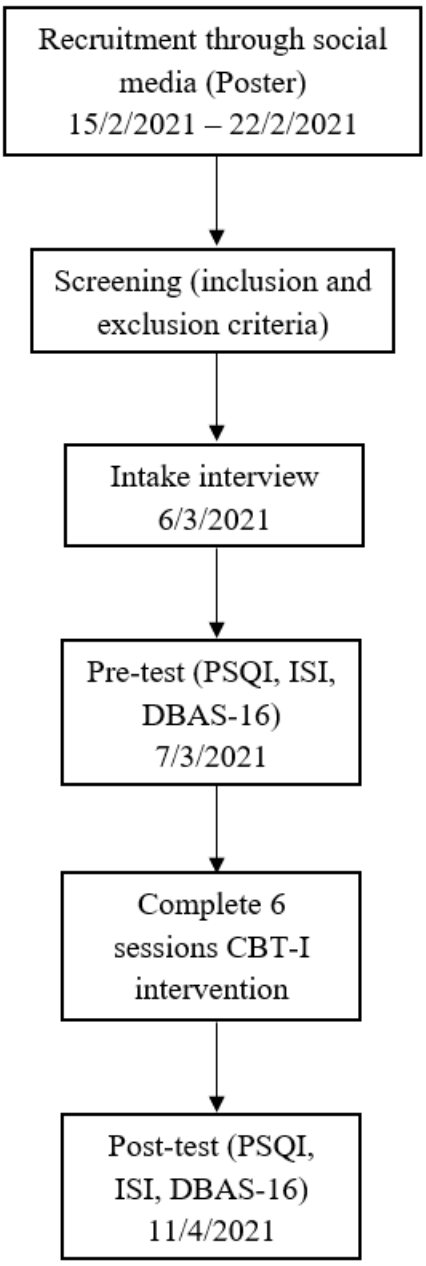
Session	Description

Session 1	Introduction Provide a better understanding of sleep and insomnia. Individuals will be informed on how the treatment is going to help to get sleep back on track and explain on how to fill the sleep log which will be a road map for the treatment.
Session 2	Stimulus Control, Sleep Restriction Identify the current sleep routine that maintaining the insomnia and introduce a regular sleep routine with good healthy habits.
Session 3	Sleep Hygiene Education Adjusting sleep schedules to improve sleep and modify sleep routine. Introduce more helpful sleep habits to apply to the sleep routine that improve the ability to sleep.
Session 4	Relaxation Training Introduce relaxation skills that might help to improve the ability of sleep.
Session 5	Cognitive Restructuring Discuss on the dysfunctional thought that might influence the ability of sleep.
Session 6	Problem Solving, Relapse Prevention Introduce the “To Do” list in bed and before bedtime. Discuss on what to do when insomnia symptoms relapse.

Research Procedure

Figure 3

Flow of the Research Procedure



A recruitment poster (Appendix C) was posted in the researcher own Facebook page and Malaysia Counselling & Psychology Peer Group for a week. The poster included the basic info of the program, information of researcher contact, researcher's supervisor contact, inclusion criteria, and the register link and QR-code. The registration period opened for 1 week and there was a total of 5 participants had registered to the program.

As to be fair of the participants who had registered, researcher had approached each participant according to the time that they registered, first come first serve basis. For the first participant, she had met the inclusion criteria, however, she had met one of the exclusion criteria which she had was currently undergoing counselling practice in her studies. The second participant had not met the inclusion criteria as during the screening for insomnia symptoms, she scored 4-point which indicates no insomnia symptoms. The third participants had met the inclusion criteria which also had the screening score of 10-point in ISI, and she had not met the exclusion criteria. The fourth and fifth participants was rejected with provided the information for help.

History intake was done a day before the first session of the program. During the intake interview, the researcher had briefed the participants about the idea of the treatment program and go through the inform consent which discussed on the purpose of study, procedures, risks and benefits, cost and payment, confidentiality, contact information, and voluntary participation. The client had known the rights as a participant, and she agreed to participate in this study. Yet, the participant was given the right to leave or withdraw from the study if they felt uncomfortable or because of any personal reasons.

After obtaining consent from the participant, the 3 main assessments in this study (PSQI, ISI, and DBAS-16) were given to the participant as to collect data for the pre-test before the beginning of the first session of the intervention. After completed the pre-test, the 6-session intervention begun with the session-by-session guide manual for CBT-I. During the procedure of intervention, the participant was asked to complete the tasks given by the researcher. Upon the completion of the 6^{th} session, the participant was then asked to fill the 3 assessments again as to collect data for the post-test.

Data Analysis Plan

The sleep quality, insomnia symptoms, and dysfunctional beliefs and attitudes about sleep in the pre-test and post-test was analyzed and reported with descriptive statistics and the interpretation of scoring. For PSQI, to identify for clinically meaningful results, it should be decrease of 3 point on the global PSQI score by comparing the pre-test and post-test results (Hughes et al., 2009). To define clinically meaningful for individual with primary insomnia, a 6-point reduction in ISI score was recommended (Yang et al., 2009). By comparing the score between pre-test and post-test in DBAS-16, if there is a decrease of 15% among the mean score, it will be considered significant reduction of dysfunction beliefs and attitudes about sleep (Jansson & Linton, 2005).

Results

Demographic and Topic-specific Characteristics

Case Introduction

"Rui" was a 20-year-old single Malaysian Chinese female. She stayed with her both parents and 4 siblings in Cheras, Selangor. She is the eldest in the family among the siblings with 3 sisters and 1 brother. She was a student pursuing accounting. She was now physically and mentally healthy. She does not have suicidal thought.

Presenting Complaints

Participants claimed that she had poor sleep quality even she had 7 to 8 hours of sleep. She will still feel tired and not energetic during the day even she thinks that she had enough time of sleep. She was currently having a same bedroom with one of her younger sisters which is now currently 15-year-old which having morning classes. Most of the time she will be awake by her sister's alarm. She also needed to prepare her 6-year-old youngest sister for kindergarten at morning. Through screening the participant by using ISI, she scored 10 out of 28 which indicated she had a subthreshold insomnia.

History

Participant mentioned that she noticed the insomnia issues started during secondary school. Due to the overwhelm workload on the preparation for her school activity, she did not able to manage well between her daily functioning schedule and sleep schedule. Due to this situation, he did not able to get into deep sleep and there were days that she sleeps less than 4 hours that she said that it was not enough for her to recharge. This also caused her involved with an argument with her school friend as she had a different idea, and her friend did not agree. This incident caused more stress to her and impact her sleep. After the school activity, she did not

able to get her sleep schedule recovered and there are times that she had poor sleep quality as well.

Trail of Sessions

Session 1

Session 1 was mainly focused on providing psychoeducation on the basic of sleep. The topic of psychoeducation on the basic of sleep included the important of sleep, sleep drive, sleep cycle, how sleep drive and sleep cycle work together, and sleep stages. The idea of insomnia was also explained in detail to the participant. The information of insomnia included the definition of insomnia, insomnia experiences, and the 3P model of insomnia which caused insomnia to happen (predisposing factors, precipitating factors, perpetuating factors). The idea of CBT-I was also discussed with the participant by acknowledging her on the contributions and benefits of CBT-I in the field of sleep problem and insomnia. Before the end of this session, sleep log was introduced to the participant. Sleep log (Appendix D) is the one of the main homework for CBT-I treatment which follow the participants from the beginning of the session until the end. Sleep log was used to monitor participants sleep and daytime habits. The slides of this session can be view in (Appendix I).

Session 2

In the beginning of session 2, researcher briefly reviewed on the sleep log which discuss any questions and troubleshoot on the difficulties which participant faced while completing it. The main goal of session 2 is to identify the areas in participant's current sleep routine that perpetuating insomnia or sleep problem and introduce a regular sleep routine with helpful habits for sleep. Researcher discussed several helpful habits that should follow and the harmful habits that should avoid by the participant as to enhance the regular sleep routine. After introducing the

helpful and harmful habits about sleep to the participant, there was a section for information reviewing as to check the participant's understanding for session 2 topics. Another important homework was introduced to the client which in "My New Sleep Plan" (Appendix E). This was used to help participant to develop a new sleep routine or plan which she preferred by following the helpful habits and avoid the harmful habits that had discussed. The participant did not dropout from this session. The slides of this session can be view in (Appendix J).

Session 3

In the beginning of session 3, researcher reviewed on the sleep log and troubleshoot on the difficulties which participant faced while following the sleep plan. This session focused on adjusting the new sleep plan to improve sleep and modify sleep routine if needed. Sleep hygiene was discussed as to apply to the sleep routine that may improve participants quality of sleep. There was also a section for information reviewing as to check the participant's understanding for session 3 topics on sleep hygiene. The sleep plan was reviewed before the end of the session as to include the helpful sleep hygiene that discussed in this session. The participant did not dropout from this session. The slides of this session can be view in (Appendix K).

Session 4

Researcher reviewed on the sleep log at the beginning of session 4. There was no troubleshooting of difficulties needed in this session as the participant mentioned that she was doing well for previous week. Session 4 covered the relaxation techniques that might be helpful to improve ability to sleep. The cycle of stress and sleep was introduced to the client. It discussed on how stress caused emotion and physical arousal leads to sleep problems and the sleep problems leads to stress again which create an endless loop. Progressive muscle relaxation technique was introduced to the participant and practiced during the session. By the end of

session 4, relaxation technique was come to an agreement to include to the sleep plan. Relaxation log (Appendix F) was introduced to the client to record the feeling before and after the doing the relaxation exercise. The participant did not dropout from this session. The slides of this session can be view in (Appendix L).

Session 5

Researcher reviewed on the sleep log at the beginning of session 5 and there was absent of need on troubleshooting difficulties. The goal of this session was teaching the participant on how to practice cognitive restructuring by replacing unrealistic or dysfunctional thoughts to realistic alternative thoughts. By practicing cognitive restructuring participant able to reduce and learn how to cope with the worrying that might interfere her sleep. The participant did not dropout from this session. The slides of this session can be view in (Appendix M).

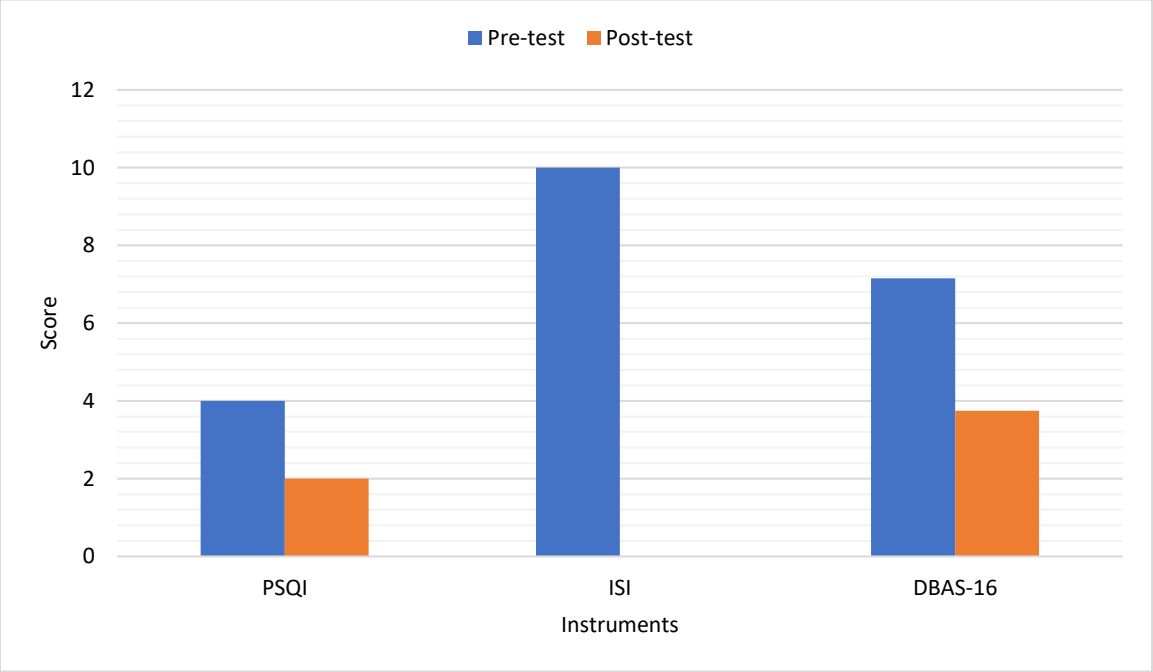
Session 6

Session 6 was the last session of this treatment program. Sleep log was reviewed and compared from the first week until the latest. The changes and improvement were showed to the participant and encourage her to continue with the sleep routine that she had right now that she claimed that is helpful for her. In the last session, “To Do Log” (Appendix G) was introduced to the participant and had guided her step by step on how to work on it as a skill for problem solving. Participant was been tell on how to develop flexibility on the sleep routine. The last part of this session was discussed on relapse prevention as what to do when insomnia or sleep problems relapse. The participant did not dropout from this session. The slides of this session can be view in (Appendix N).

Data Analysis and Interpretation

Figure 4.1

Result of PSQI, ISI and DBAS-16 in Pre- and Post-test



Note. Global PSQI Score: 0 – 27; Total ISI score: 0 – 28; Mean DBAS-16 score: 1 – 10.

H_1: CBT-I has an effect on sleep quality on individual with insomnia.

The results in Figure 4.1 showed the Global PSQI score from the participant before and after CBT-I intervention. Participant scored 4 in the pre-test and 2 in the post-test. There was only a 2-point reduction based on the results. According to the data analysis plan, as meet the criteria of 3-point reduction in global PSQI score, it does not consider clinically meaningful. Thus, the hypothesis was rejected.

H_2: CBT-I has an effect on insomnia symptoms on individual with insomnia.

As shown in Figure 4.1, the results indicated the total score of ISI in pre-test and post-test. The participant scored 10 in the pre-test and 0 in the post-test. There was a decrease of 10-point on ISI score by comparing the results of pre-test and post-test. As there was a reduction of 6-point and above on ISI score, the results indicated that it was clinically meaningful which

CBT-I intervention has a positive effect on reducing insomnia symptoms. Therefore, the hypothesis was supported.

H_3: CBT-I has an effect on dysfunctional beliefs and attitudes about sleep on individual with insomnia.

As Figure 4.1 showed the mean score of DBAS-16 in pre-test and post-test, the participant scored the mean score of 7.15 in pre-test and the mean score of 3.75 during the post-test. There was a reduction of 34.0% on the mean score of DBAS-16 by comparing the result on pre-test and post-test results. There was a reduction of 15% and above on DBAS-16, it indicated the dysfunctional beliefs and attitudes about sleep of the participant had decreased after CBT-I intervention. Thus, the hypothesis was supported.

Discussion and Conclusion

Discussion

Sleep Quality

According to the results on this study, the hypothesis was rejected as the results does not show clinically meaningful effect of CBT-I on sleep quality on the participant. Results indicated that CBT-I did not bring positive effect on sleep quality as in improving the sleep quality, which was inconsistent with studies that had conducted in the past (Perlis et al., 2006; Taylor et al., 2014; van Straten et al., 2018). One of the possible reasons might be because of she scored 4-point during the pre-test and to have a reduction of 3-point to indicates clinically meaningful had become a difficult challenge for the case.

Yet, if looking it into specific component on PSQI, client get 1-point each for a total of 4 component which included (1) subjective sleep quality, (2) sleep latency, (3) sleep disturbances, and (4) daytime dysfunction. However, after the CBT-I treatment there were absents of 2 component which are sleep latency and daytime functioning. This indicate that the CBT-I program helps her to reduce the amount of time she takes to fall asleep and remove the daytime dysfunction.

Insomnia Symptoms

Based on the results, the hypothesis was accepted as the there was an effect as the ISI score decreased from 10-point to 0-point. The results indicated that there was a clinically meaningful on the effect of CBT-I on insomnia symptoms as the score decrease more than 6-point. The results shown sign of consistency comparing with the past studies that had conducted in different countries (Qaseem et al., 2016; Sateia et al., 2017; Taylor & Pruiksma, 2014; Taylor et al., 2014; Trauer et al., 2015; van der Zweerde et al., 2019; van Straten et al., 2018).

By looking the results with the case independently, the client was having subthreshold insomnia before receiving CBT-I intervention as she scored 10 in ISI. After the total of 6 session CBT-I intervention, post-test was collected, and it showed absent of insomnia symptoms which the participant scored 0-point on ISI. These results had strengthened the idea of why CBT-I was the first-line non-pharmacological treatment for insomnia which several medical and clinical associations (ACP, AASM, NIH) had recommended (Qaseem et al., 2016; Sateia et al., 2017; Taylor & Pruiksma, 2014).

Dysfunctional Beliefs and Attitudes about Sleep

In terms of dysfunctional beliefs and attitudes about sleep, the hypothesis was accepted as CBT-I has an effect on dysfunctional beliefs and attitudes about sleep on the participant. The results showed that the mean scored of DBAS-16 in pre-test was 7.15 and post-test was 3.75. By comparing the pre- and post-test mean score in percentage, there was a changed of 34.0% on the mean score of DBAS-16 which more than 15% indicates clinically meaningful that CBT-I helps to reduce the dysfunctional beliefs and attitudes about sleep for the participant. The results were consistent to the past studies that had been done which testing the effectiveness of CBT-I on dysfunctional beliefs and attitudes about sleep (Taylor et al., 2014; Thakral et al., 2020).

Although there was a huge difference between the score of pre-test and post-test, however, there were some items which had minor reduction and some item had increases. For item number one which mentioned “I need 8 hours of sleep to feel refreshed and function well during the day.”, participant scored 10 in pre-test and 9 in post-test. There was only a minor reduction on this item might because of the client had an average sleep time of 7 to 8 hours, which brings her to believe that she needs 8 hours to feel refreshed and able to function well during the next day. There was also an increased on one of the items “I believe insomnia is

essentially the result of a chemical imbalance.", participant scored 6 in pre-test and 8 in post-test. This might be due to there is no coverage on the biological factor throughout the CBT-I intervention, there was an increase in this item.

Implications

Theoretical Implications

In theoretical framework, this study had discussed on the 3 factors of developing insomnia based on the Behavioral Model of Insomnia, and the only factor that this study target to manipulate from the treatment were the perpetuating factors (Perlis et al., 2006). To focus on the perpetuating factors which maintaining the issues of insomnia, based on CBT-I intervention, this study had come with several intervention components and techniques which guided by the manual of CBTi-M from Taylor and Colleagues (2019).

Some of the perpetuating factors which had contributed to chronic insomnia such as: (1) irregular sleep schedule, (2) excessive time in bed which trying to go to bed early, (3) doing other things in bed other than sleep and sex, (4) take longer sleep after a poor night's sleep or during weekends, (5) worrying about sleep or the next day functioning during the bedtime, and (6) excessive consuming of energy drinks or caffeine. These poor sleep habits which become the perpetuating factors which influence individual's sleep were because of they do not have the idea that these are the harmful habits to prolong the insomnia issues.

CBT-I intervention had covered several aspects which include cognitive and behavioral changes that might be helpful to reduce those perpetuating factors. Stimulus control, sleep restriction, sleep hygiene education, cognitive restructuring had target to let the individual aware of the harmful habits and thoughts that they having which creates harm for their sleep and changing it into a more helpful way of doing and thinking as to promote a better sleep hygiene.

Relaxation training involved to teach the individual how to deal with the stressor which might trigger the insomnia as a prevention. Problem solving included to decrease the worry of the individual near bedtime on thinking of tomorrow tasks. Lastly, relapse prevention had discussed with the individual by acknowledge on how to deal with the insomnia issues again if it relapses.

Based on the results of this study, those components and techniques which covered in CBT-I intervention shows clinically meaningful on reducing the insomnia symptoms and dysfunctional beliefs and attitudes about sleep.

Practical Implications

The results of present study had contributed to the area of study of insomnia in Malaysia among undergraduate students as to show the effective of CBT-I intervention. There is no study which had done in the setting of Malaysia population on the first-line treatment of non-pharmacological treatment for insomnia which had widely suggested ACP, AASM, and NIH (Qaseem et al., 2016; Sateia et al., 2017; Taylor & Pruiksma, 2014). Based on the findings of present study, it able to act as a reference for the future study which would like to conduct study on the effectiveness of CBT-I for insomnia in Malaysia population.

The results of present study can be the references as to show the patient the effectiveness of CBT-I intervention for Malaysia undergraduate students. Present study results showed that CBT-I intervention help to reduce the insomnia symptoms and dysfunctional beliefs and attitudes about sleep on undergraduate student more than 30%. For future practice, counsellors and psychologists who is dealing with clients with insomnia, based on the results of this study, they can consider on using CBT-I for first-line treatment to those clients.

Limitations

The intervention of CBT-I in this study was fully guided by the manual of CBTi-M by Taylor and Colleagues (2019). As the population of study by develop this manual is not conducted in Malaysia, therefore the cultural aspect of this manual is one of the limitations of this study. For example, this manual provides a pizza dough and the topping as an example of explaining sleep efficiency, it might be not common among the household in Malaysia which had made own pizza at home.

There was no follow-up session or data collection had done for present study. Without follow-up session or data collection, the long-term effect of the intervention will not be able to be detected. This is one of the limitations that the study not able to know that does CBT-I intervention helps the participant on preventing the relapse of the insomnia issues. The research design is also one of the limitations of this study. The single case study is the second lowest evidence-based research design among the level of evidence (Ackley et al., 2008). Compare to other research design such as cross-sectional or longitudinal research design; this study is not persuasive enough.

This study cannot represent the whole Malaysia population. Malaysia is widely known as a multicultural society which classify in 4 major ethnicity groups which include Bumiputera (Malay and Indigenous), Chinese, Indians and Others (non-Malaysian citizen) (Malaysia, 2011). However, this study only had 1 participant which was Malaysian Chinese female undergraduate students. The results would not be able to represent the whole Malaysia population among the undergraduate students.

Recommendations

For future research purposes, this study recommends to involves people from different culture to test the effects of CBT-I in the ethnicity group of Bumiputera and Indians. Based on the statistical data, Malaysia citizens were distributed into Bumiputera 67.4%, Chinese 24.6%, Indians 7.3%, and others 0.7%. As to get a representative data to Malaysia population, the involvement of different ethnicity is needed. On the other hand, while involving several ethnic groups, the cultural aspects need to take into consideration as well. The awareness of different cultural and the cultural sensitivity must be high as to adapt the CBT-I intervention to different ethnicity group in Malaysia.

As a reference for future study, follow-up data collection was recommended by this study. CBT-I was found to be clinically significant effective on insomnia issues which can last up for 1 year (van der Zweerde et al., 2019). In future research, follow-up session and data collection were highly recommended to conduct as to get a long-term effect of CBT-I in the context of Malaysia. Lastly, the recommendation of this study suggest that future research can work in different research design while conducting this study in Malaysia. To get a higher level of evidence on this topic, the future research can consider conduct the study in randomize control trail research design with a 1 year follow up as to get a more persuasive data compare to this study (Ackley et al., 2008).

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Appendix

Appendix A

Action Plan

Action Plan of UAPC3093 Project Paper II

Supervisee Oon Chin Aik

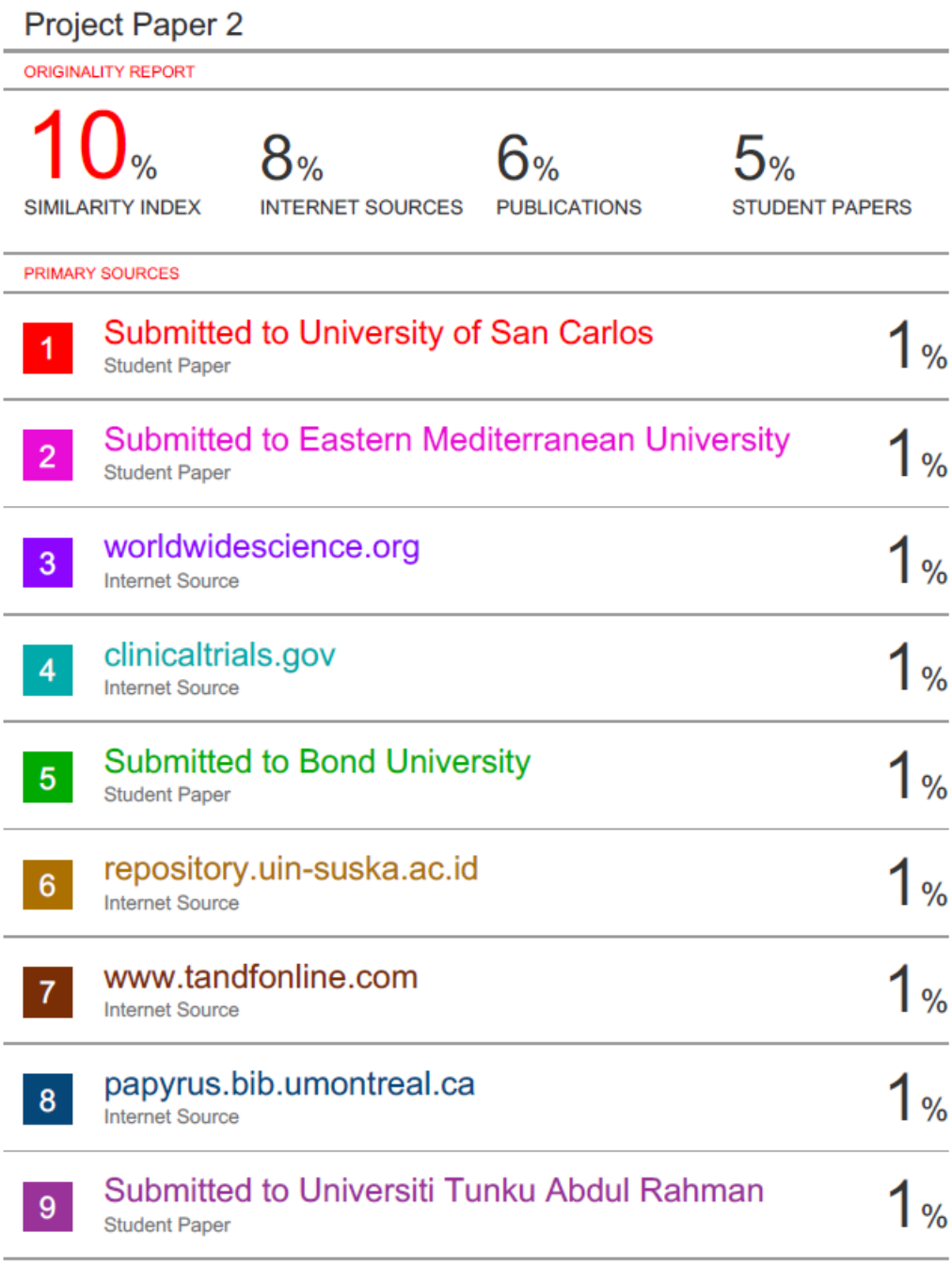
Supervisor Mr. Pheh Kai Shuen

Task Description	Date	Supervisee's Signature	Supervisor's Signature	Supervisor's Remarks	Next Appointment Date/Time
Methodology Submit Chapter 3: Methodology Amend Chapter 3: Methodology	5/3/2021	Oon Chin Aik		good progress Amended according	19/3/2021
Results & Findings Submit Chapter 4: Results Amend Chapter 4: Results	19/3/2021	Oon Chin Aik		Proofreading needed Amendment accepted	9/4/2021
Discussion & Conclusion Submit Chapter 5: Discussion Amend Chapter 5: Discussion	9/4/2021	Oon Chin Aik		good progress Amendment accepted	12/4/2021
Abstract	9/4/2021				
Turnitin Submission	12/4/2021			Generate similarity rate from Turnitin.com	
Amendment					
Submission of final draft	19/4/2021			Submission of hardcopy and documents	
Oral Presentation					

Notes:
1. **Deadline for submission cannot be changed, mark deduction is as per faculty standard.**
2. **Supervisees are to take the active role to make appointments with their supervisors.**
3. **Both supervisors and supervisees should keep a copy of this action plan.**
4. **This Action Plan should be attached as an appendix in Project Paper 2.**

Appendix B

Originality Report



Project Paper 2

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Supervisor's Comment Turnitin Report

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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.: 0	Effective Date: 01/10/2013	Page No.: 1of 1

FACULTY OF ART AND SOCIAL SCIENCE

Full Name(s) of Candidate(s)	Oon Chin Aik
ID Number(s)	16AAB03438
Programme / Course	UAPC3093 PROJECT 2
Title of Final Year Project	Effects of Cognitive Behavioral Therapy for Insomnia (CBT-I) on Sleep Quality, Insomnia Symptoms and Dysfunctional Beliefs and Attitudes about Sleep among Malaysia Undergraduate Student: A Single Case Study

Similarity	**Supervisor's Comments (Compulsory if parameters of originality exceeds the limits approved by UTAR)**
Overall similarity index: 10 % **Similarity by source** Internet Sources: 8 % Publications: 6 % Student Papers: 5 %	
Number of individual sources listed of more than 3% similarity: 0	

Parameters of originality required and limits approved by UTAR are as follows:
(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 results, I hereby declare that I am satisfied with the originality of the Final Year Project Report submitted by my student(s) as named above.

Signature of Supervisor

Name: _____

Date: _____

Signature of Co-Supervisor

Name: _____

Date: _____

IAD Form

Universiti Tunku Abdul Rahman			
Form Title : Sample of Submission Sheet for FYP/Dissertation/Thesis			
Form Number : FM-IAD-004	Rev No: 0	Effective Date: 21 June 2011	Page No: 1 of 1

FACULTY/INSTITUTE* OF ART AND SOCIAL SCIENCE
UNIVERSITI TUNKU ABDUL RAHMAN

Date: 19 April 2021

SUBMISSION OF FINAL YEAR PROJECT /DISSERTATION/THESIS

It is hereby certified that Oon Chin Aik (ID No: 16AAB03428) has completed this final year project/ dissertation/ thesis* entitled "Effects of Cognitive Behavioral Therapy for Insomnia (CBT-I) on Sleep Quality, Insomnia Symptoms and Dysfunctional Beliefs and Attitudes about Sleep among Malaysia Undergraduate Student: A Single Case Study" under the supervision of Mr. Pheh Kai Shuen (Supervisor) from the Department of Psychology and Counselling, Faculty/Institute* of Art and Social Science, and _____ (Co-Supervisor)* from the Department of _____, Faculty/Institute* of _____.

I understand that University will upload softcopy of my final year project / dissertation/ thesis* in pdf format into UTAR Institutional Repository, which may be made accessible to UTAR community and public.

Yours truly,

Oon Chin Aik

Name: Oon Chin Aik

**Delete whichever not applicable*

Appendix C

Recruitment Poster

Appendix D

Sleep Log

Item	Instruction
Date.	What was yesterday's date (i.e., night you went to sleep)?
1. What time did you get into bed?	State the time that you got into bed. This may not be the time you began "trying" to fall asleep. Sometimes people get into bed and read, watch TV, or other things. That is the time you should put down for this answer. What we want to know here is when you first got into bed for the night.
2. What time did you "try" to go to sleep?	Record the time that you began "trying" to fall asleep. This may or may not be different from your answer for question 1. Some people begin trying to go to sleep as soon as they get in bed, while others get into bed and read, watch TV, or other things. What we want to know for this question is when you first started trying (e.g., closed your eyes, turned out the lights and TV, closed your book) to go to sleep.
3. How long did it take you to fall asleep?	Beginning at the time you wrote in question 2, how long did it take you to fall asleep?
4. How many times did you wake up, not counting your final awakening?	How many times did you wake up between the time you first fell asleep and your final awakening?
5. In total, how long did these awakenings last?	What was the total time you were awake between the time you first fell asleep and your final awakening? For example, if you woke 3 times for 20 minutes, 35 minutes, and 15 minutes, add them all up (20+35+15= 70 min or 1 hr and 10 min).
6. What time was your final awakening?	Record the last time you woke up in the morning.
7. What time did you get out of bed for the day?	What time did you get out of bed with no further attempt at sleeping? This may be different from your final awakening time (e.g., you may have woken up at 0625 but did not get out of bed to start your day until 0720).
8. How would you rate the quality of your sleep?	"Sleep Quality" is your sense of whether your sleep was good or poor.
9. In total, how long did you nap or doze yesterday?	Estimate the total amount of time you spent napping or dozing, in hours and minutes. For instance, if you napped twice, once for 30 minutes and once for 60 minutes, and dozed for 10 minutes, you would answer "1 hour 40 minutes." If you did not nap or doze, enter 0 hours 0 minutes.
10. Comments:	Please comment on anything that you would like to tell us that is relevant to your sleep such as you were woken up by a dog barking, kids crying, or some other disturbance.

Appendix E

Sleep Plan

My New Sleep Plan

(To be completed with information from healthy habits sections)

1. I will use the bed/bedroom for sleep and sex only.
2. I will not watch TV, listen to the radio, eat, or read in bed.
3. I will take at least an hour before bedtime to unwind. I will do the following to unwind: _____ or _____ or _____.
4. I will set a reasonable bedtime and arising time and stick to them.
   - My **new** bedtime will be no earlier than about _____ (or later if I am not yet sleepy).
   - My **new** rise time will be _____ every day, no matter how bad I slept that night.
5. I will _____ or _____ to help me get up in the morning at the same time every day.
6. I will go to bed only when I am sleepy. I know I am sleepy when _____ _____.
7. I will get out of bed if I can't fall asleep or go back to sleep in about 15 minutes (I will not clock-watch); I will return to bed only when I feel sleepy. I agree to repeat this step each time I wake up during the night.
8. When I get out of bed in the night I will do the following: _____ or _____ or _____.
9. I will not nap during the day. But, try to take the nap before 3pm and at most 30 mins only.

Planned Improvements of My Sleep Hygiene

(Check those that apply)

____ **Avoid Caffeine after Lunch.** I will not have caffeine after lunch.

____ **Avoid Alcohol after Dinner.** I will not have any alcohol after dinner and will not drink more than one drink during dinner.

____ **Avoid Nicotine 1-2 Hours Before Bedtime.** I will not have a cigarette or other nicotine products after_____ hrs.

____ **Don't Exercise Within 3 Hours of Bedtime.** I will not exercise after _____ hrs.

____ **Ensure your Bedroom is a Comfortable Temperature, Quiet, and Dark.** I will make the following changes to my bedroom: _____

_____

_____.

____ **Eat a Light Snack at Bedtime but Avoid High-Fat or Gas-Producing Foods**

____ **Avoid Excessive Fluids Near Bedtime**. I will not have more than 8 ounces of fluid after ____ hrs.

Relaxation

I will practice relaxation at _____ am/pm and again at bedtime.

Negative Thoughts

I will try to replace unbalanced, negative thoughts about sleep with balanced ones in the future.

To Do List

I will make a to do list every afternoon, well before bedtime, during which I can deal with the problems and concerns so I don’t have to at bedtime.

Appendix F

Relaxation Log

Practice relaxation (e.g., tactical breathing, progressive muscle relaxation) at least twice per day. Once should be during the day when you are not experiencing a high degree of stress. The second should be close to bedtime. Record how tense you felt before and after your relaxation practice, on a scale of 0-100 with 0 = deeply and completely relaxed throughout your body, and 100 = extremely tense throughout your body.

		Time		Self-Rating		
	Date	**Start**	**End**	**Before**	**After**	**Difficulties or Comments**
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

Appendix G

To do log

To Do Log

INSTRUCTIONS:
1. List Problems.
2. Rank order problems.
3. List possible solutions (more is better).
4. Evaluate solutions; X = Impossible, ? = Difficult, and Y = Possible/Easy.
5. Pick one thing to do the next day about the problem and circle it.
6. Scratch out solution once it has been tried and move on to the next one if necessary.

Problem	Problem Solutions

Appendix H

Sleep Log Calculator

Week1: Session 1										
		########	7/3/2021	8/3/2021	9/3/2021	10/3/2021	11/3/2021	12/3/2021	13/3/21	AVERAGE
What time did you try to go to sleep?	Q2_LO	21:20	0:00	0:00	23:30	0:00	0:00	0:10	0:30	**0:01**
Sleep Onset Latency (min)	Q3_SOL	55	20	10	10	20	20	20	20	**17.14**
Number of Awakenings	Q4_#Wake	3	1	1	0	1	1	0	0	**0.57**
Wake Time After Sleep Onset (min)	Q5_WASO	70	5	5	0	5	5	0	0	**2.86**
Wake time (time of final awakening)	Q6_WT	6:35	9:00	9:00	9:00	9:00	9:00	9:00	8:30	**8:55**
Out of bed (out of bed for the day)	Q7_OB	7:20	9:10	9:15	9:15	9:10	9:10	9:15	8:40	**9:07**
Sleep Quality (0=very poor, 1=poor, 2=fair, 3=good, 4=very good)	Q8_SQ	3	2	3	3	2	3	2	3	**2.57**
Nap Time (min)	Q9_Nap	60	10	0	0	0	0	0	0	**1**
Duties end after 2100 or begin before 0600? (1=yes, 0=no)	Q11_duty	1								
How many nightmares?	Q12_NM	1.00								**0.00**
Nightmare Severity? (0-4)	Q13_NMSev	3.00								**#DIV/0!**
Time in Bed	**TIB**	10.00	9.17	9.25	9.75	9.17	9.17	9.08	8.17	**9.11**
Total Sleep Time	**TST**	7.17	8.58	8.75	9.33	8.58	8.58	8.50	7.67	**8.57**
Sleep Efficiency	**SE (%)**	0.72	94%	95%	96%	94%	94%	94%	94%	**94%**
Comments			Sister's alarm rang.	Sister's alarm rang.	Apply face mask.	Sister's alarm rang.	Sister's alarm rang.			

Week 2: Session 2										
		sample								AVERAGE
Lights out (Try to go to sleep)	Q2_LO	21:20	23:40	23:40	23:20	23:40	23:30	23:30	23:30	**23:32**
Sleep Onset Latency (min)	Q3_SOL	55	10	10	10	10	5	10	10	**9.29**
Number of Awakenings	Q4_#Wake	3	0	0	0	0	0	0	1	**0.14**
Wake Time After Sleep Onset (min)	Q5_WASO	70	0	0	0	0	0	0	5	**0.71**
Wake time (time of final awakening)	Q6_WT	6:35	8:40	8:30	7:10	8:30	8:30	8:30	7:30	**8:11**
Out of bed (out of bed for the day)	Q7_OB	7:20	8:50	8:45	7:20	8:40	8:45	8:40	7:40	**8:22**
Sleep Quality (0=very poor, 1=poor, 2=fair, 3=good, 4=very good)	Q8_SQ	3	3	3	4	3	4	3	3	**3.29**
Nap Time (min)	Q9_Nap	60	0	0	0	0	0	0	0	**0**
Duties end after 2100 or begin before 0600? (1=yes, 0=no)	Q11_duty	1								
How many nightmares?	Q12_NM	1.00								**0.00**
Nightmare Severity? (0-4)	Q13_NMSev	3.00								**#DIV/0!**
Time in Bed	**TIB**	10.00	9.17	9.08	8.00	9.00	9.25	9.17	8.17	**8.83**
Total Sleep Time	**TST**	7.17	8.83	8.67	7.67	8.67	8.92	8.83	7.75	**8.48**
Sleep Efficiency	**SE (%)**	0.72	96%	95%	96%	96%	96%	96%	95%	**96%**
Comments					8 am class				Sister's alarm	

Week 3: Session 3

		sample	21/3/21	22/3/21	23/3/21	24/3/21	25/3/21	26/3/21	27/3/21	AVERAGE
Lights out (Try to go to sleep)	Q2_LO	21:20	23:40	23:00	23:00	23:30	23:30	23:30	23:30	**23:22**
Sleep Onset Latency (min)	Q3_SOL	55	10	10	10	10	10	10	10	**10.00**
Number of Awakenings	Q4_#Wake	3	1	0	0	0	1	0	0	**0.29**
Wake Time After Sleep Onset (min)	Q5_WASO	70	5	0	0	0	5	0	0	**1.43**
Wake time (time of final awakening)	Q6_WT	6:35	8:30	7:00	7:00	7:20	8:30	8:30	8:00	**7:50**
Out of bed (out of bed for the day)	Q7_OB	7:20	8:40	7:10	7:10	7:30	8:40	8:40	8:10	**8:00**
Sleep Quality (0=very poor, 1=poor, 2=fair, 3=good, 4=very good)	Q8_SQ	3	3	3	3	3	3	4	4	**3.29**
Nap Time (min)	Q9_Nap	60	15							**15**
Duties end after 2100 or begin before 0600? (1=yes, 0=no)	Q11_duty	1								**0**
How many nightmares?	Q12_NM	1								**0.00**
Nightmare Severity? (0-4)	Q13_NMSev	3								**#DIV/0!**
Times practiced imagery?	Q14_Pract	2								
Minutes imagery practiced?	Q15_PractMin	15								
Time in Bed	TIB	10.00	9.00	8.17	8.17	8.00	9.17	9.17	8.67	**8.62**
Total Sleep Time	TST	7.17	8.58	7.83	7.83	7.67	8.75	8.83	8.33	**8.26**
Sleep Efficiency	SE (%)	0.72	95%	96%	96%	96%	95%	96%	96%	**96%**
Comments			Sister's alarm rang.	Have 8am class.	Have 8am class.	Writing report.	Sister's alarm rang.		Have 9am class.	

Week 4: Session 4

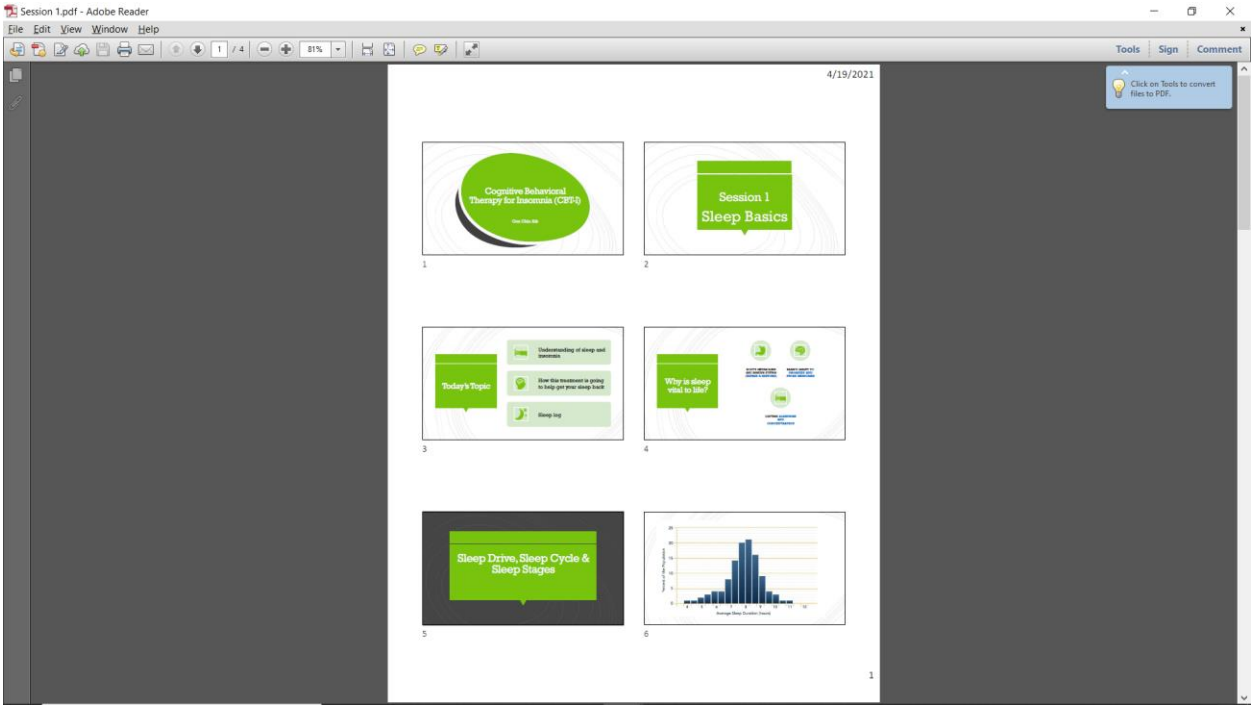
		sample	28/3/21	29/3/21	30/3/21	31/3/21	1/4/2021	2/4/2021	3/4/2021	AVERAGE
Lights out (Try to go to sleep)	Q2_LO	21:20	0:00	23:00	23:00	23:30	23:30	0:00	23:30	**23:30**
Sleep Onset Latency (min)	Q3_SOL	55	5	5	5	10	10	10	5	**7.14**
Number of Awakenings	Q4_#Wake	3	0	0	0	0	0	0	0	**0.00**
Wake Time After Sleep Onset (min)	Q5_WASO	70	0	0	0	0	0	0	0	**0.00**
Wake time (time of final awakening)	Q6_WT	6:35	7:00	7:00	7:00	8:30	8:30	8:00	8:00	**7:42**
Out of bed (out of bed for the day)	Q7_OB	7:20	7:10	7:10	7:10	8:40	8:40	8:10	8:10	**7:52**
Sleep Quality (0=very poor, 1=poor, 2=fair, 3=good, 4=very good)	Q8_SQ	3	4	3	4	3	3	3	4	**3.43**
Nap Time (min)	Q9_Nap	60	0	0	0	0	0	0	0	**0**
Duties end after 2100 or begin before 0600? (1=yes, 0=no)	Q11_duty	1								
How many nightmares?	Q12_NM	1								**0.00**
Nightmare Severity? (0-4)	Q13_NMSev	3								**#DIV/0!**
Times practiced imagery?	Q14_Pract	2								
Minutes imagery practiced?	Q15_PractMin	15								
Time in Bed	TIB	10.00	7.17	8.17	8.17	9.17	9.17	8.17	8.67	**8.38**
Total Sleep Time	TST	7.17	6.92	7.92	7.92	8.83	8.83	7.83	8.42	**8.10**
Sleep Efficiency	SE (%)	0.72	97%	97%	97%	96%	96%	96%	97%	**97%**
Comments			Writing report.	Have 8am class.	Have 8am class.				Have 9am class.	

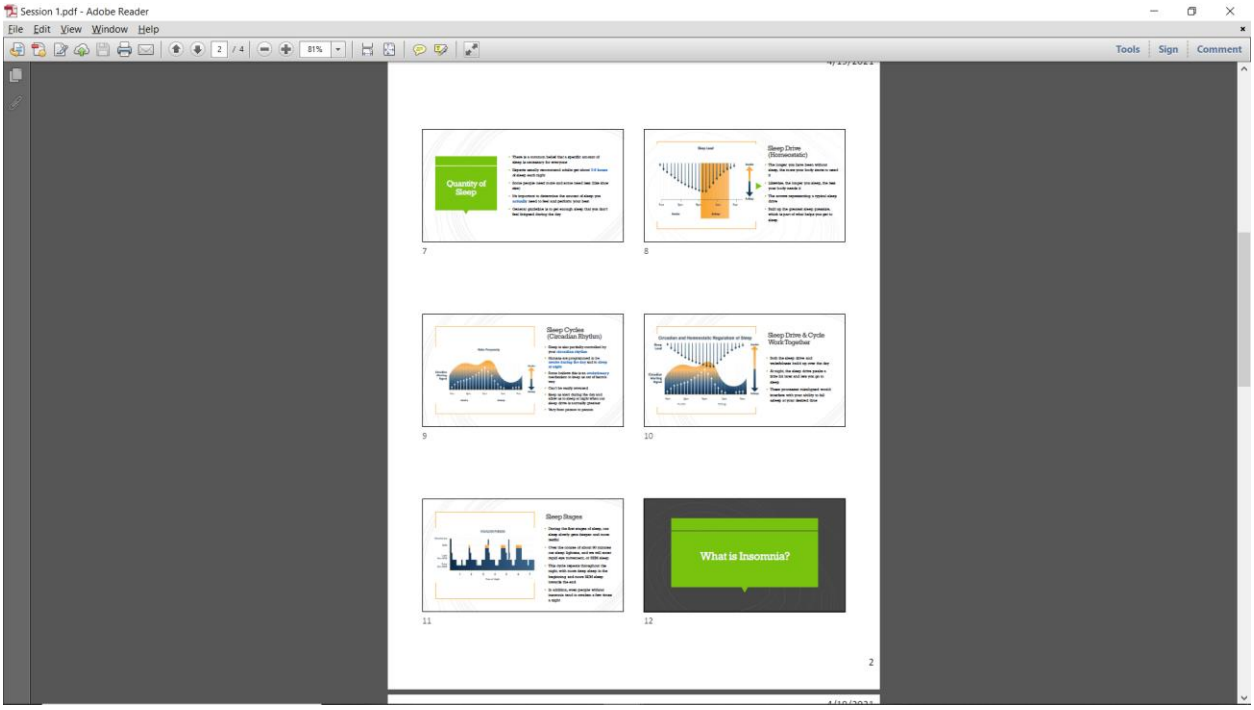
Week 5: Session 5

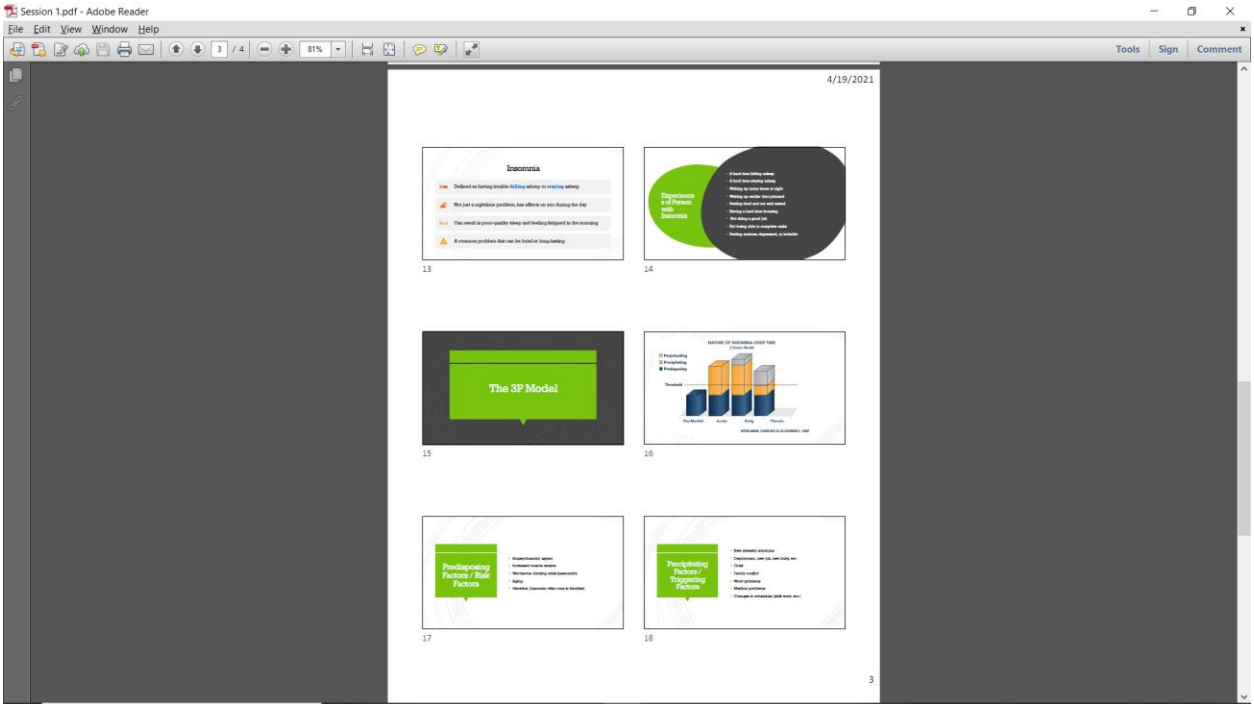
		sample	4/4/2021	5/4/2021	6/4/2021	7/4/2021	8/4/2021	9/4/2021	10/4/2021	AVERAGE
Lights out (Try to go to sleep)	Q2_LO	21:20	23:00	23:00	23:00	23:00	23:30	23:00	23:00	**23:04**
Sleep Onset Latency (min)	Q3_SOL	55	10	10	10	5	5	5	5	**7.14**
Number of Awakenings	Q4_#Wake	3	1	1	0	1	0	0	0	**0.43**
Wake Time After Sleep Onset (min)	Q5_WASO	70	5	5	0	5	0	0	0	**2.14**
Wake time (time of final awakening)	Q6_WT	6:35	6:00	7:00	7:00	7:10	7:00	8:00	8:00	**7:10**
Out of bed (out of bed for the day)	Q7_OB	7:20	6:05	7:05	7:05	7:15	7:05	8:10	8:10	**7:16**
Sleep Quality (0=very poor, 1=poor, 2=fair, 3=good, 4=very good)	Q8_SQ	3	3	3	3	4	4	4	4	**3.57**
Nap Time (min)	Q9_Nap	60	0	0	0	0	0	0	0	**0**
Duties end after 2100 or begin before 0600? (1=yes, 0=no)	Q11_duty	1								
How many nightmares?	Q12_NM	1								**0.00**
Nightmare Severity? (0-4)	Q13_NMSev	3								**#DIV/0!**
Times practiced imagery?	Q14_Pract	2								
Minutes imagery practiced?	Q15_PractMin	15								
Time in Bed	TIB	10.00	7.08	8.08	8.08	8.25	7.58	9.17	9.17	**8.20**
Total Sleep Time	TST	7.17	6.75	7.75	7.83	8.00	7.42	8.92	8.92	**7.94**
Sleep Efficiency	SE (%)	0.72	95%	96%	97%	97%	98%	97%	97%	**97%**
Comments			Sister's alarm rang.	Have 8am class.	Have 8am class.	Sister's alarm rang.	Have 9am exam.		Have 9am class.	

Appendix I

Session 1 Slides



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Tools Sign Comment
4/19/2021
Insomnia
13
14
The 3P Model
15
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17
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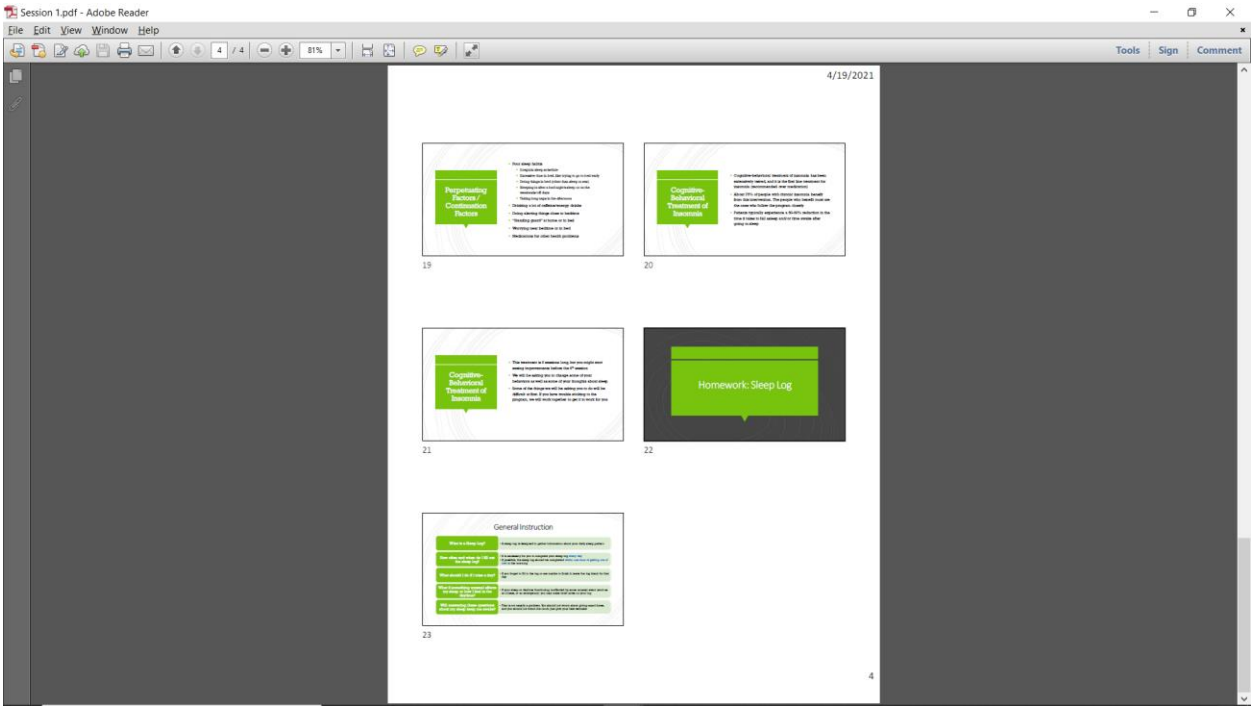
3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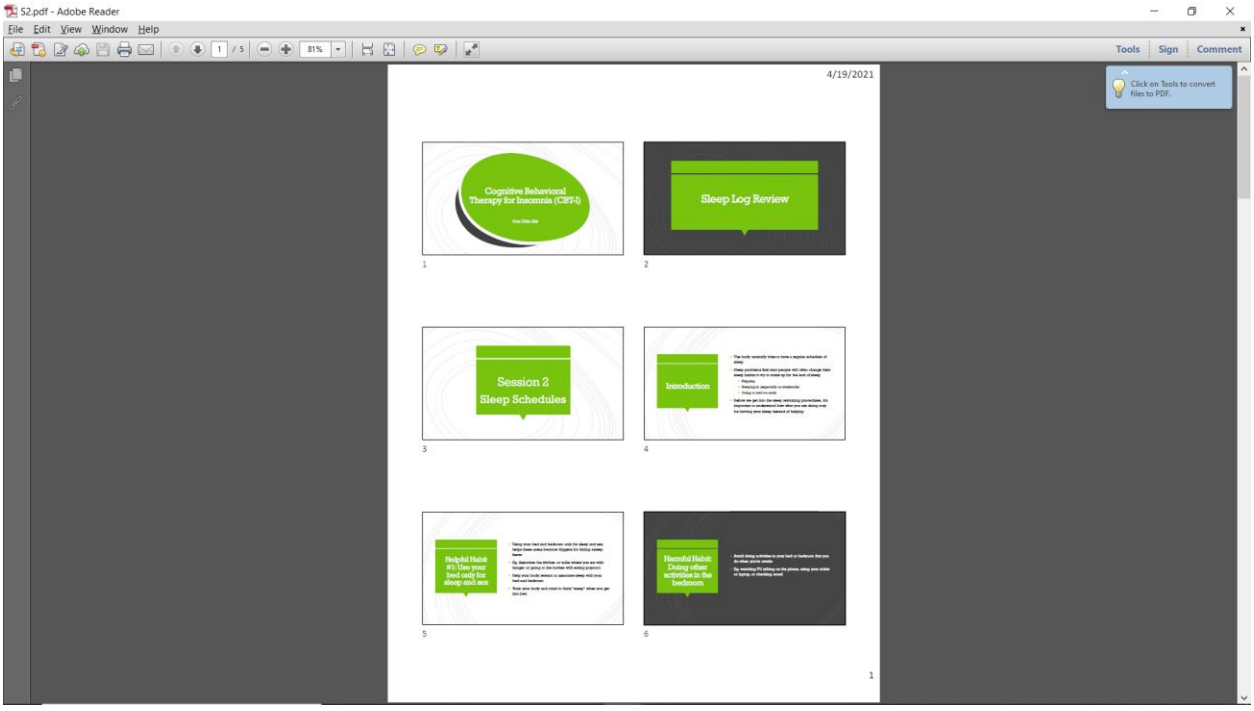
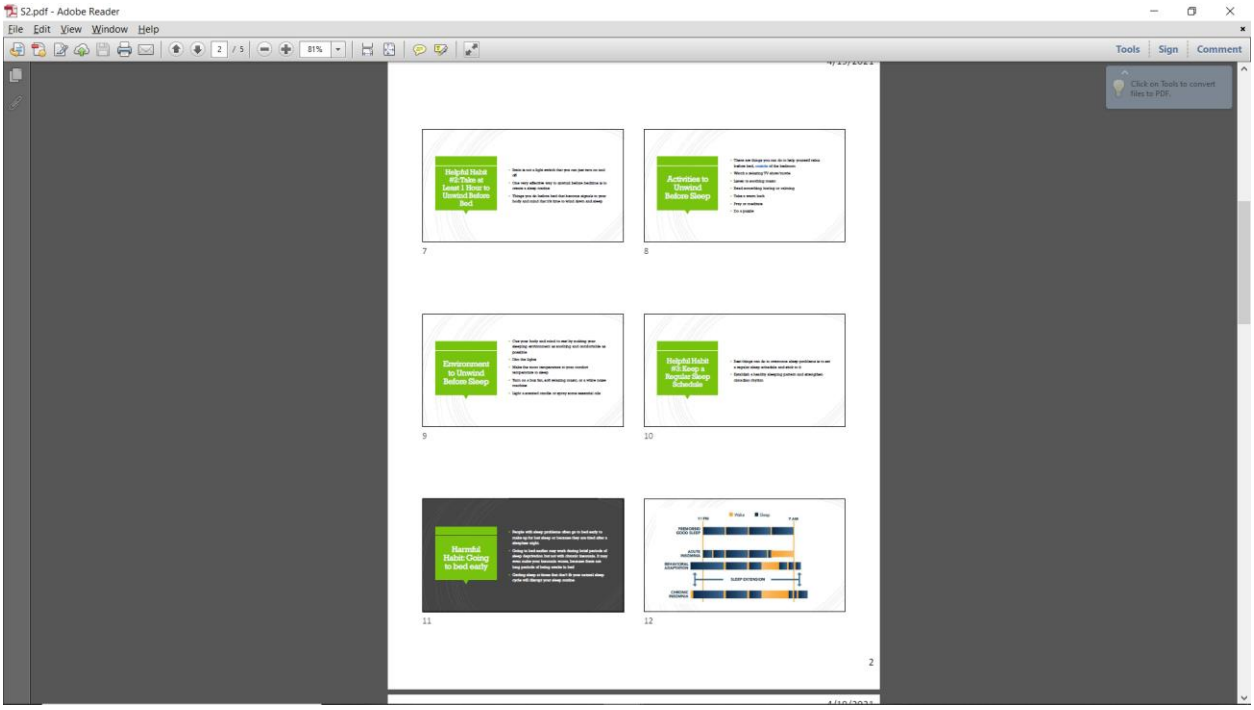
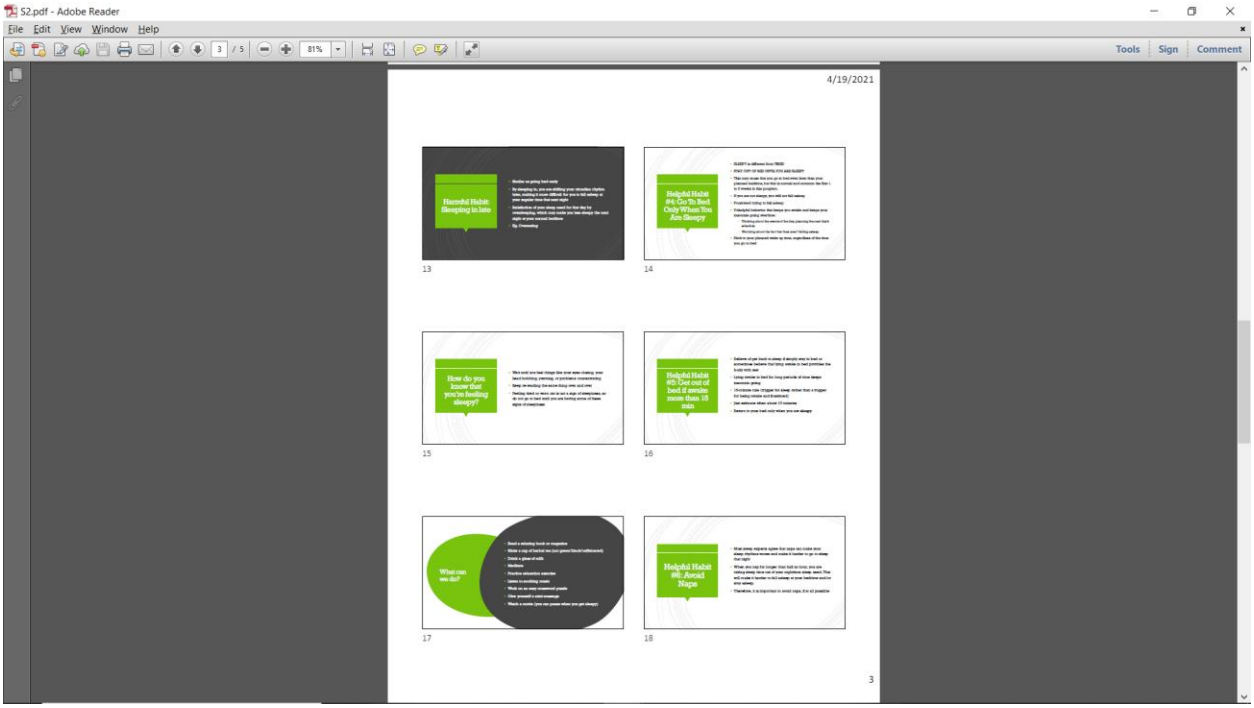
19
20
21
Homework: Sleep Log
22
General Instruction
23
4

Appendix J

Session 2 Slides



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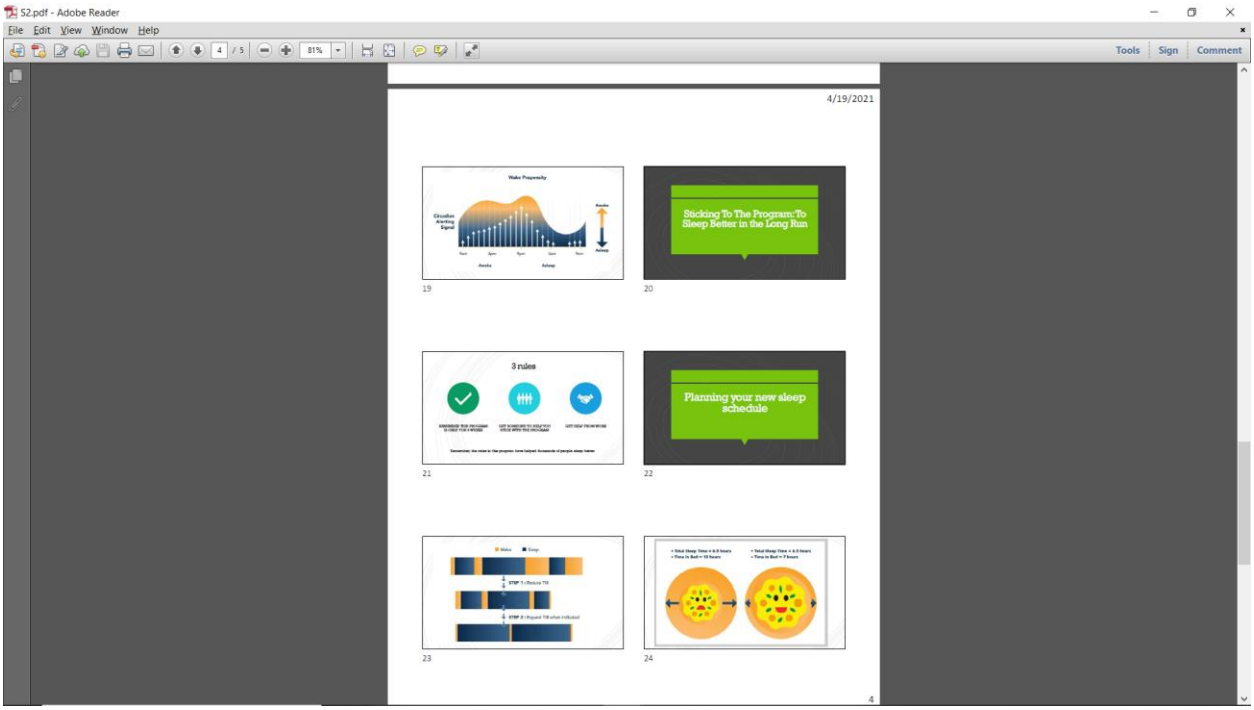
4/19/2021
Harmful Habit: Sleeping in late
Helpful Habit #4: Go To Bed Only When You Are Sleepy
How do you know that you're feeling sleepy?
Helpful Habit #5: Out out of bed if awake more than 15 min
What can we do?
Helpful Habit #6: Avoid Naps
3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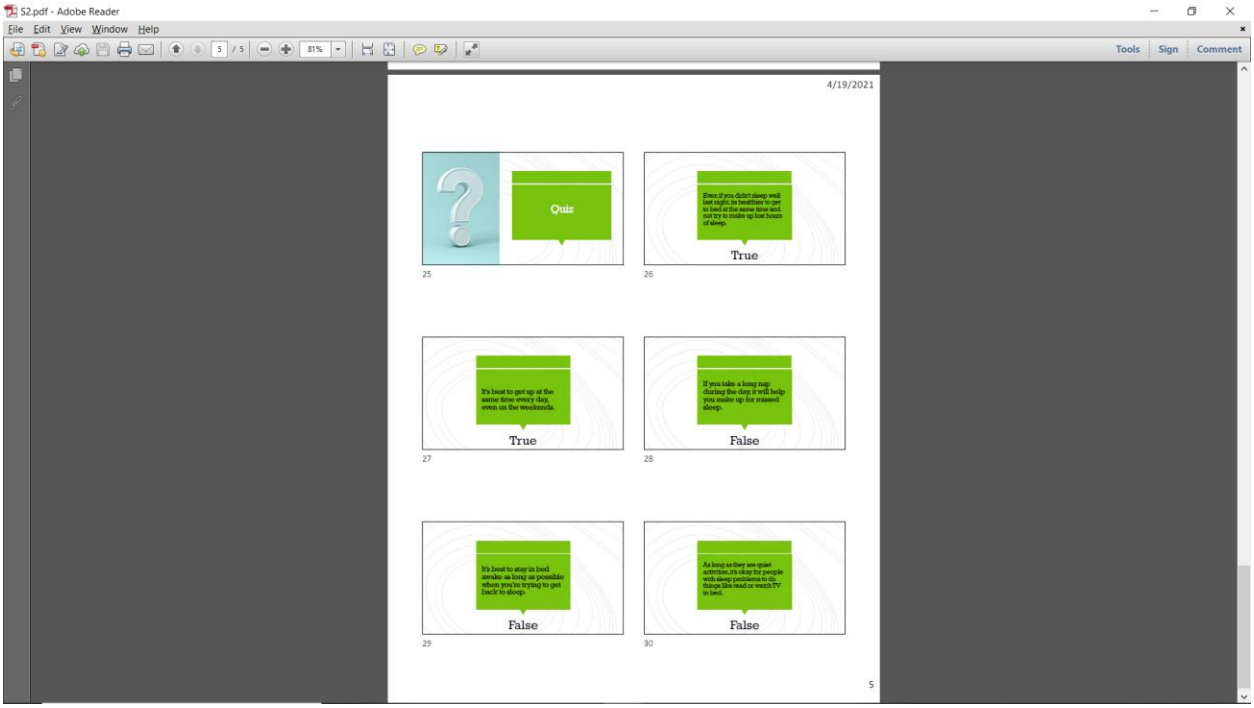
Tools Sign Comment
4/19/2021
Wake Propensity
Sticking To The Program: To Sleep Better in the Long Run
3 rules
Planning your new sleep schedule
4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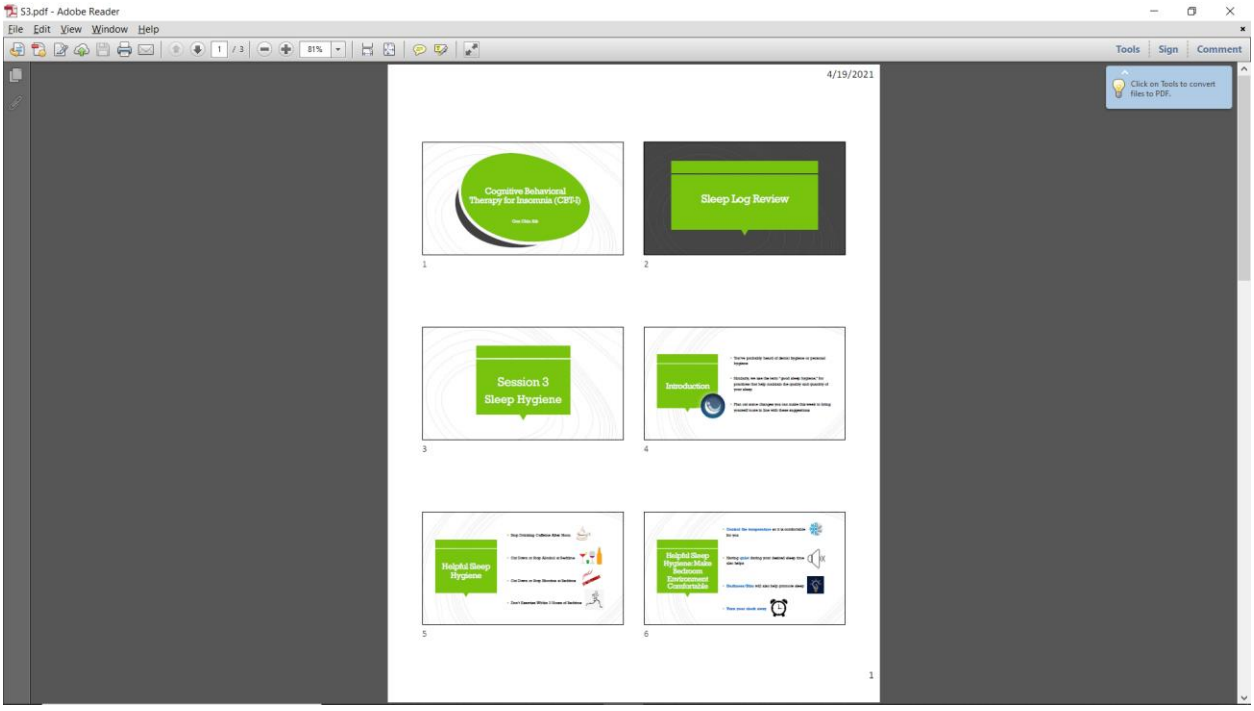
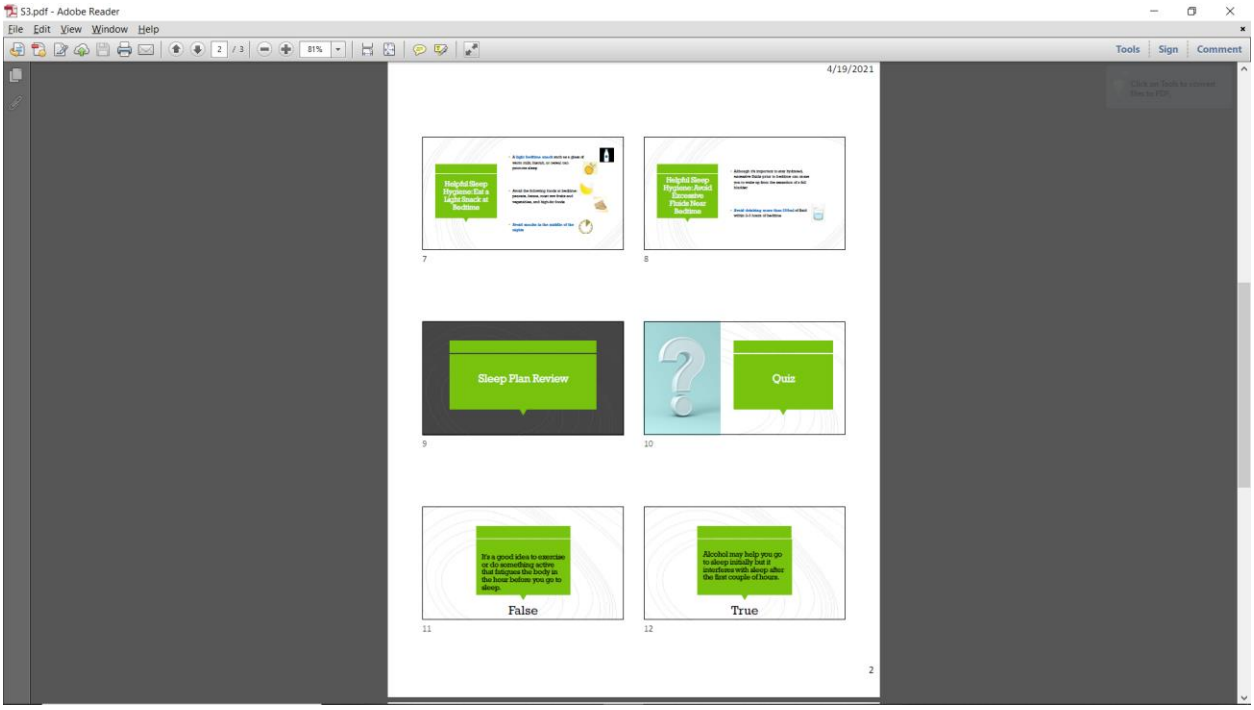
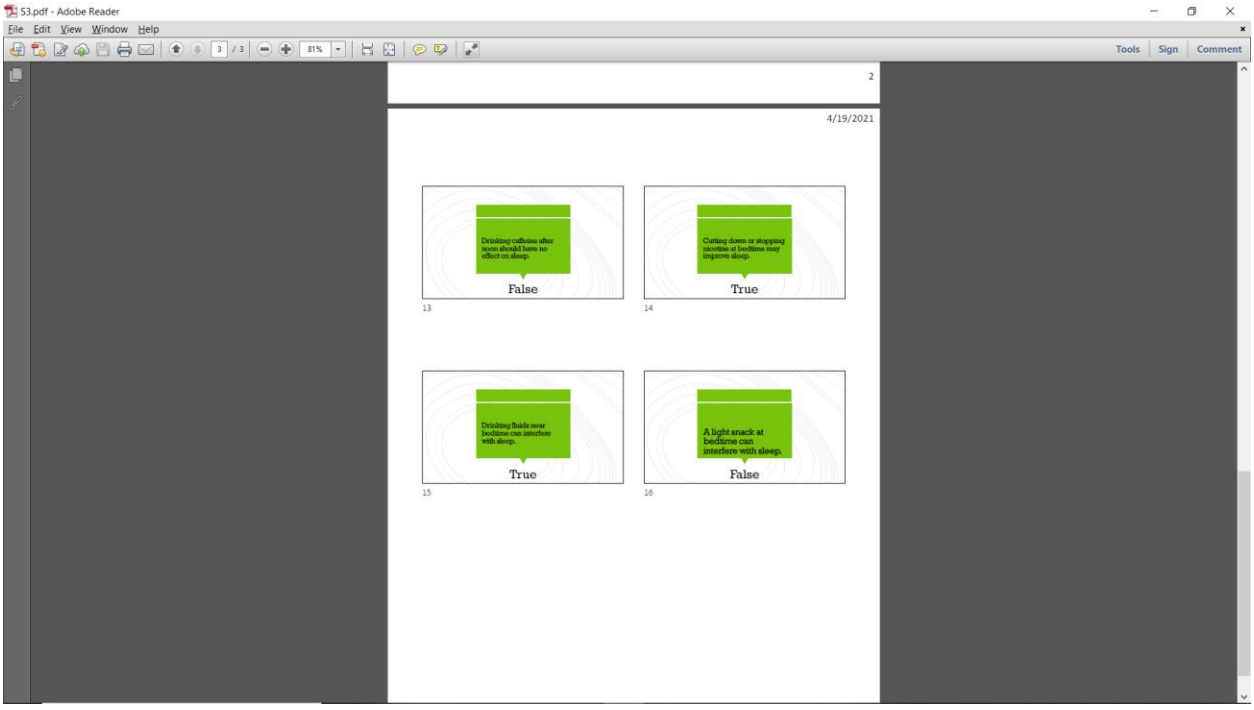
4/19/2021
Quiz
25
Even if you didn't sleep well last night, its healthier to get to bed at the same time and not try to make up lost hours of sleep.
True
26
It's best to get up at the same time every day, even on the weekends.
True
27
If you take a long nap during the day it will help you make up for missed sleep.
False
28
It's best to stay in bed awake as long as possible when you're trying to get back to sleep.
False
29
As long as they are quiet activities, it's okay for people with sleep problems to do things like read or watch TV in bed.
False
30
5

Appendix K

Session 3 Slides

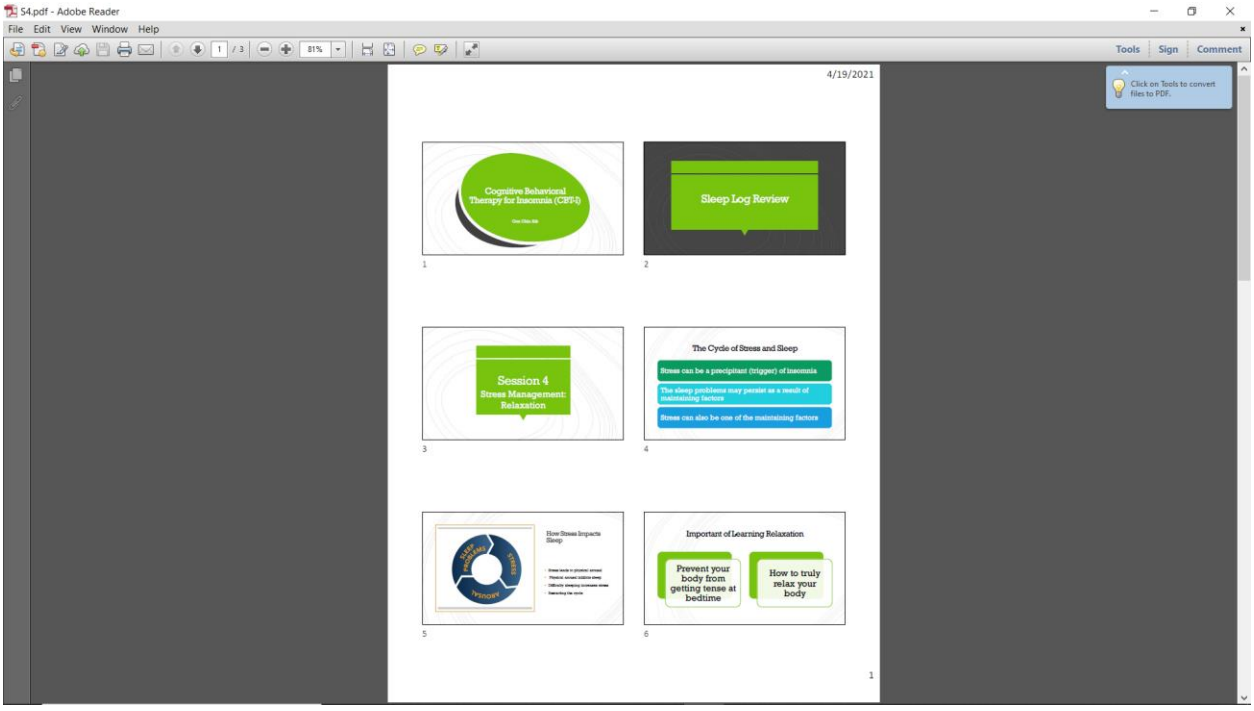


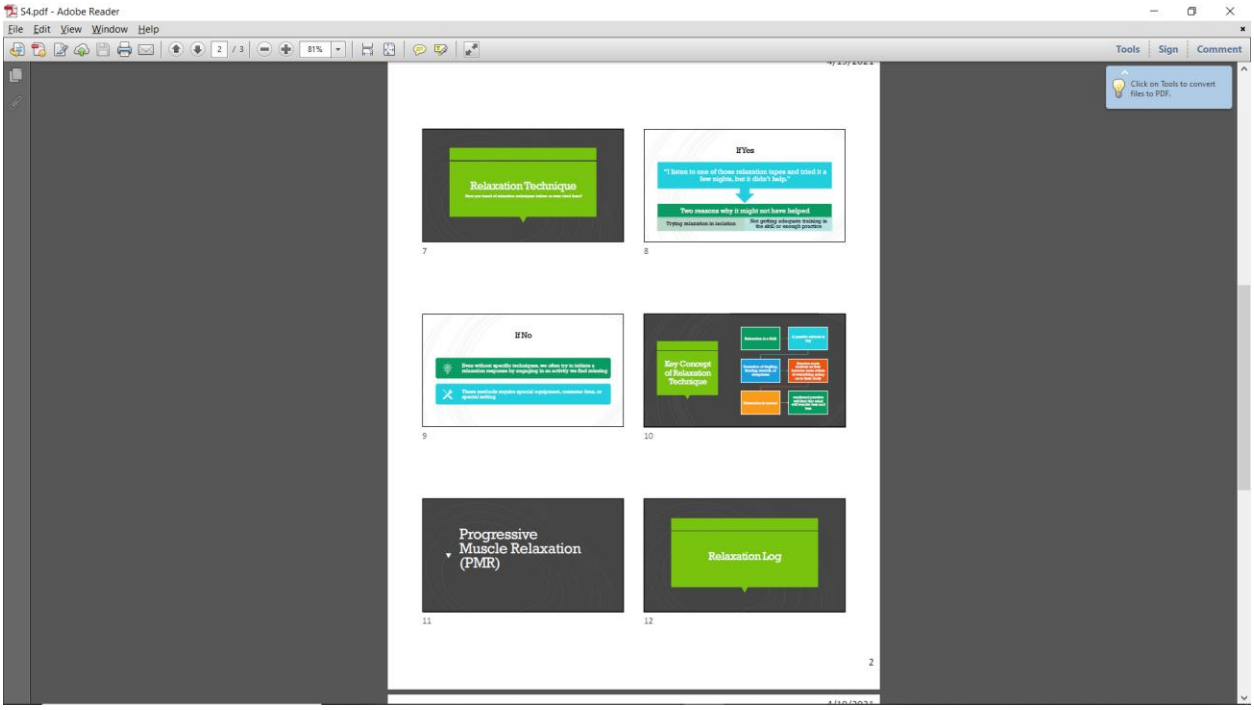



S3.pdf - Adobe Reader
File Edit View Window Help
Tools Sign Comment
2
4/19/2021
Drinking caffeine after noon should have no effect on sleep.
False
13
Cutting down or stopping nicotine at bedtime may improve sleep.
True
14
Drinking fluids near bedtime can interfere with sleep.
True
15
A light snack at bedtime can interfere with sleep.
False
16

Appendix L

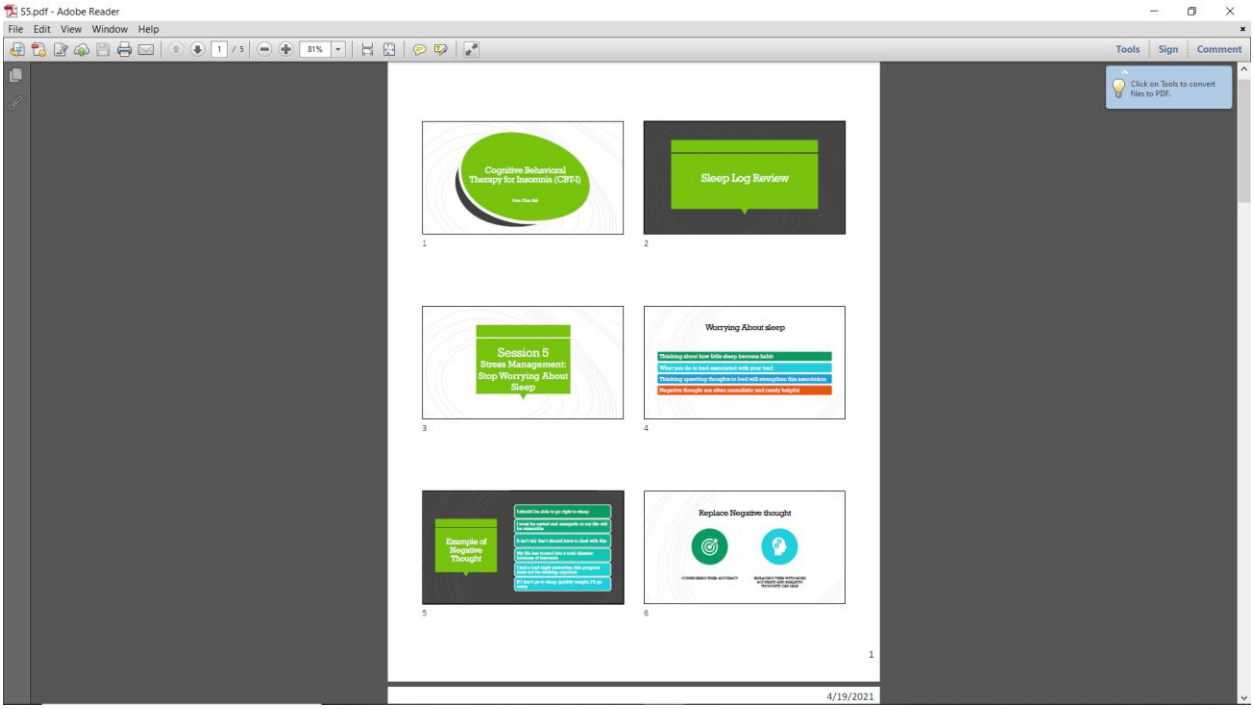
Session 4 Slides

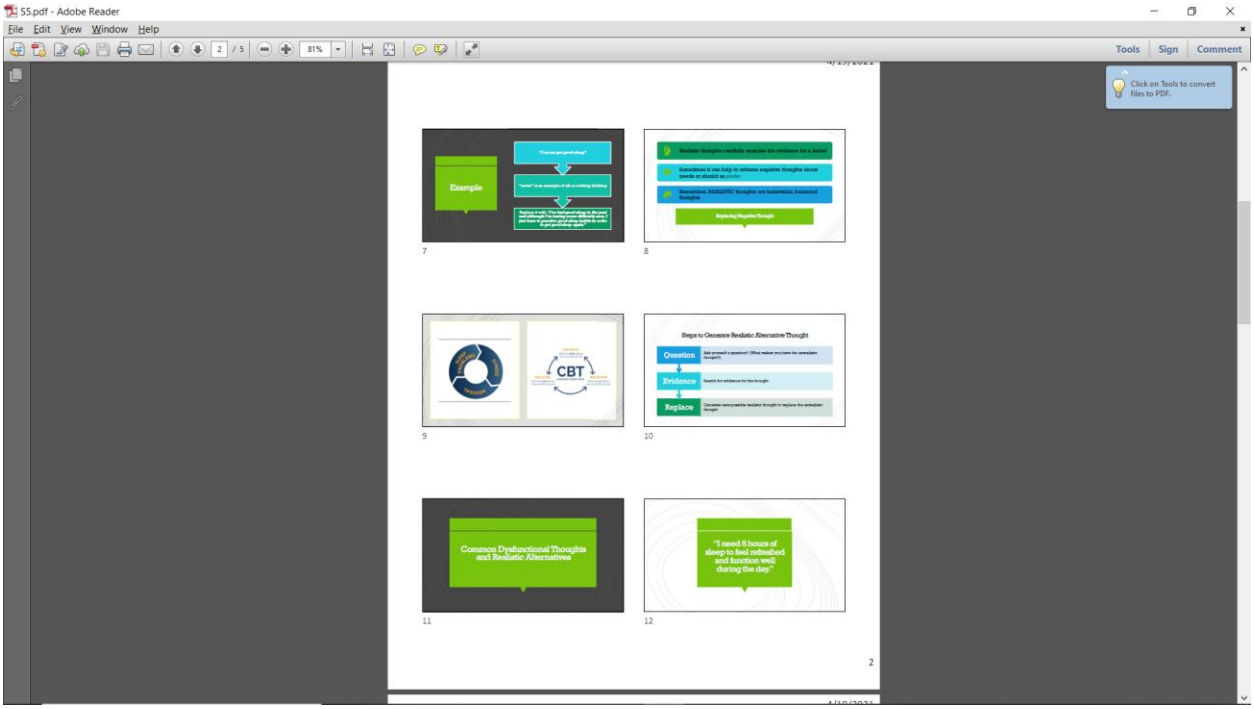




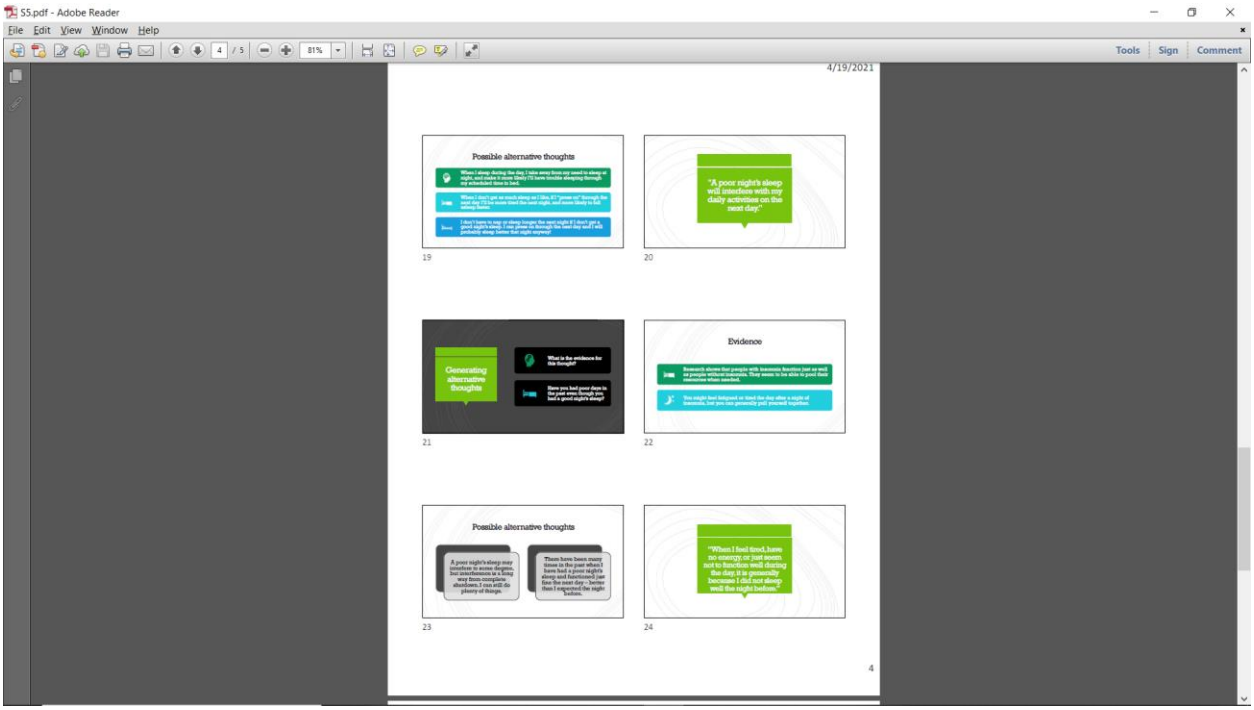
Appendix M

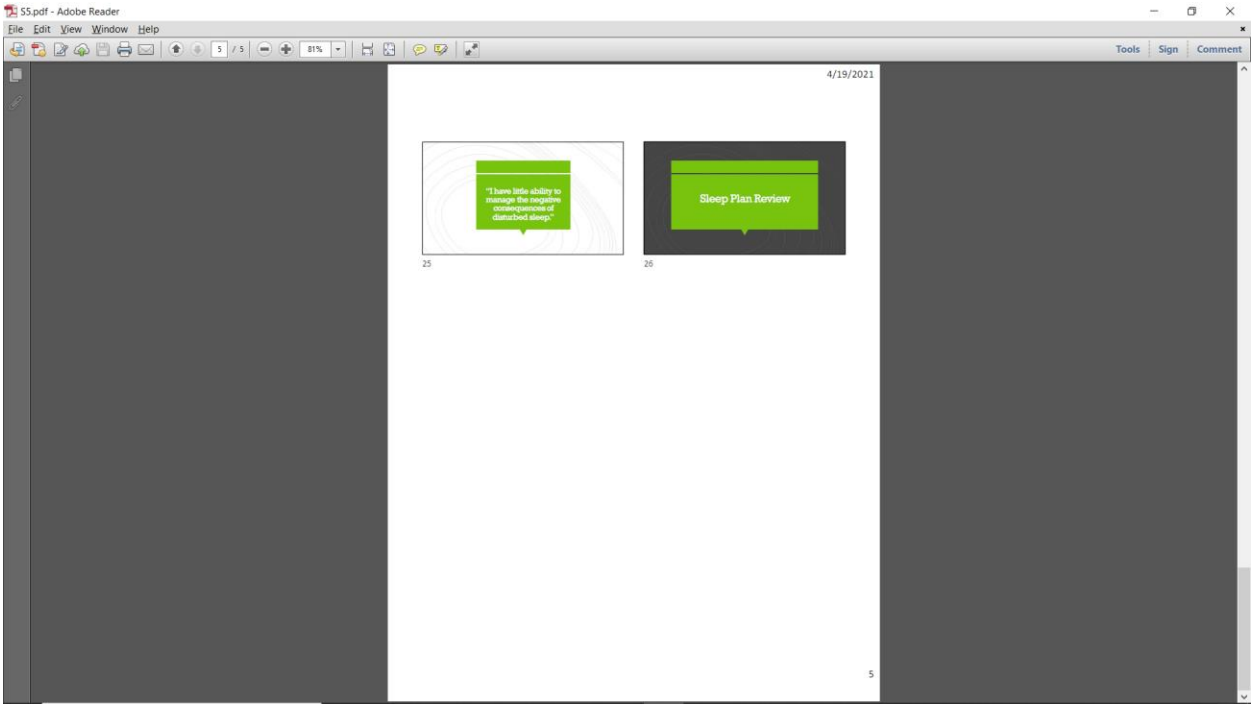
Session 5 Slides





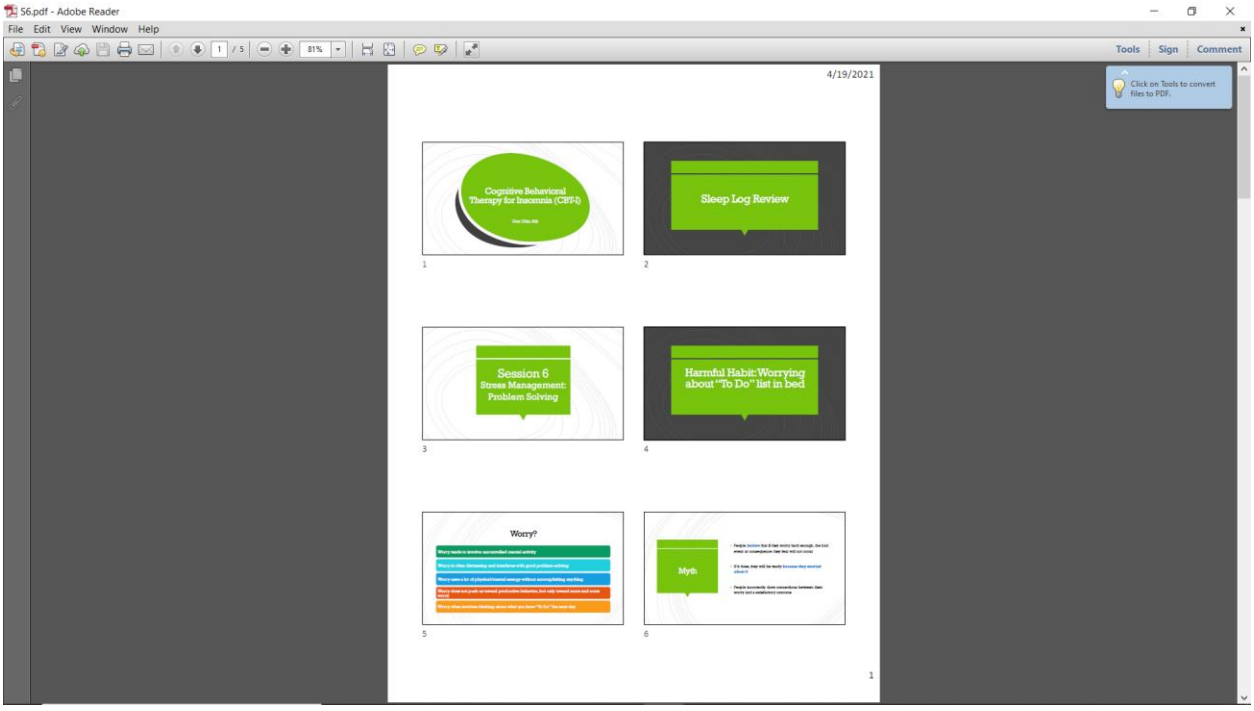

S5.pdf - Adobe Reader
File Edit View Window Help
Tools Sign Comment
Generating alternative thoughts
13
Evidence
Remember, we all have different sleep needs that may be less during times of stress.
Refer your sleep log.
14
Possible alternative thoughts
Not everyone needs to get 8 hours of sleep. I seem to get by fine with less.
I wish I could get 8 hours of sleep per night, but I seem to get by OK with less.
15
"When I don't get a proper amount of sleep on a given night, I need to catch up the next day by napping or the next night by sleeping longer."
16
Generating alternative thoughts
17
Evidence
18
3
4/19/2021

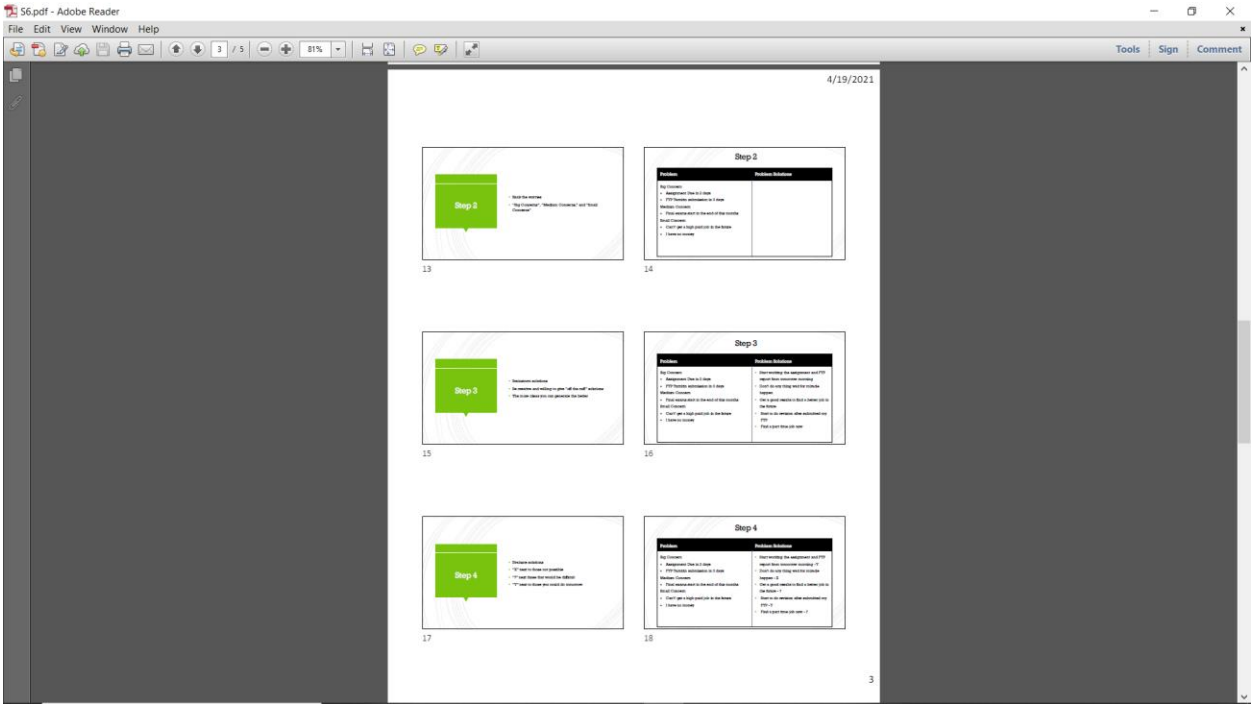

S5.pdf - Adobe Reader
File Edit View Window Help
Tools Sign Comment
4/19/2021
Possible alternative thoughts
19
"A poor night's sleep will interfere with my daily activities on the next day."
20
Generating alternative thoughts
21
Evidence
22
Possible alternative thoughts
23
"When I feel tired, have no energy, or just seem not to function well during the day, it is generally because I did not sleep well the night before."
24
4

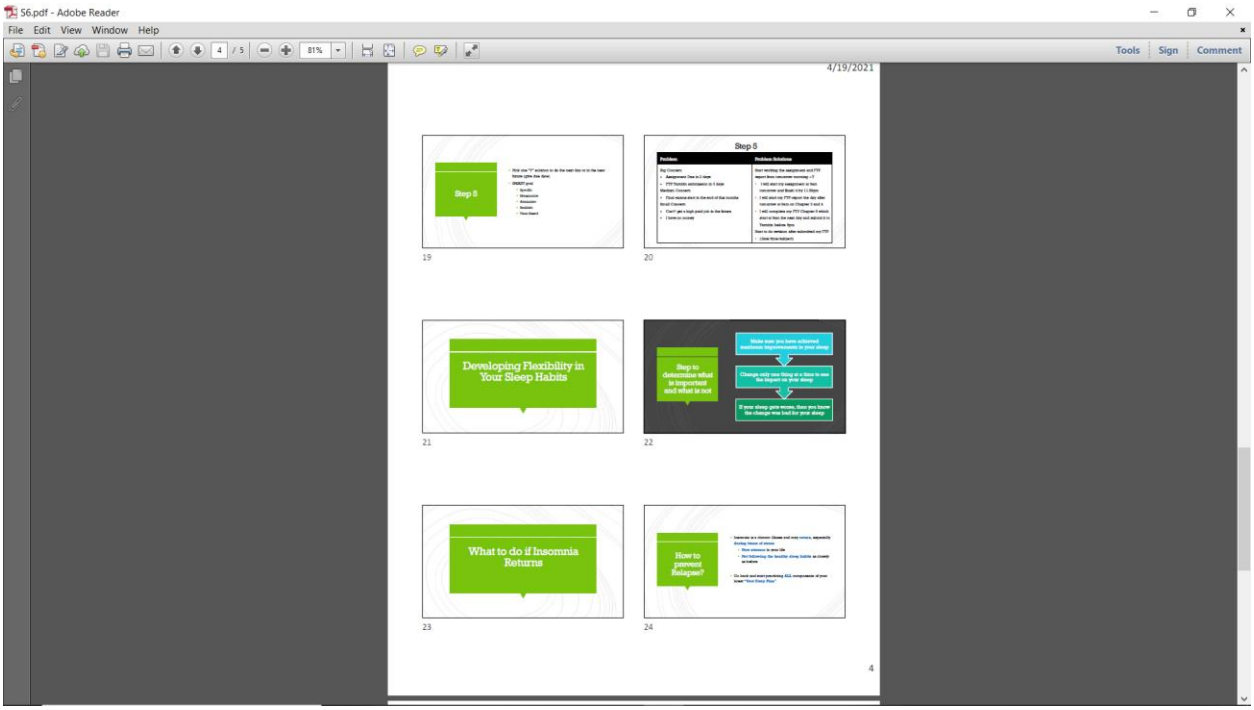

S5.pdf - Adobe Reader
File Edit View Window Help
Tools Sign Comment
4/19/2021
"I have little ability to manage the negative consequences of disturbed sleep."
25
Sleep Plan Review
26
5

Appendix N

Session 6 Slides




S6.pdf - Adobe Reader
File Edit View Window Help
Tools Sign Comment
4/19/2021
Step 3
13
Step 2
14
Step 3
15
Step 3
16
Step 4
17
Step 4
18
3


S6.pdf - Adobe Reader
File Edit View Window Help
Tools Sign Comment
4/19/2021
Step 5
19
Step 5
20
Developing Flexibility in Your Sleep Habits
21
Step to determine what is important and what is not
22
What to do if Insomnia Returns
23
How to prevent Relapse?
24
4